

Queensland Bulk Water Supply Authority *trading as* Seqwater

Water Service Provider Number SP507



Drinking Water Quality Management Plan

This document is subject to OWSR approval.
Once approved, a statement reflecting the approved status and the Seqwater CEO signature will
appear herein.

Drinking Water Quality Management Plan

Table of Contents

Introduction	6
1 Element 1 – Commitment to Drinking Water Quality Management	12
1.1 Drinking Water Quality Policy	12
1.2 Regulatory and Formal Requirements	12
1.2.1 Regulatory Scope	12
1.2.2 Employee Responsibilities	13
1.2.3 Identifying and Communicating Regulatory Changes	13
1.3 Engaging Stakeholders.....	14
2 Element 2 – Assessment of the Drinking Water System	16
2.1 Water Supply System Analysis.....	16
2.1.1 Assembly of a team	16
2.1.2 Flow Diagram.....	16
2.1.3 System Overview	16
2.1.4 Periodically review the water supply system analysis	17
2.2 Assessment of Water Quality Data	17
2.2.1 Assembly of water quality data	17
2.2.2 List and examine exceedances.....	17
2.2.3 Identification of trends and potential problems.....	17
2.3 Hazard Identification and Risk Assessment.....	18
2.3.1 Hazard identification and risk assessment methodology.....	18
2.3.2 Identify and document hazard and hazardous events of each component on the water supply system	19
2.3.3 Estimate the level of risk for each hazard or hazardous event	21
2.3.4 Evaluate major sources of uncertainty associated with the risks assigned to hazardous events and consider actions to reduce uncertainty	22
2.3.5 Determine significant risk and document priorities for risk management	23
2.3.6 Periodically review and update the hazards identification and risk assessment to incorporate any changes	23
3 Element 3 – Preventive Measures for Drinking Water Quality management.....	25
3.1 Preventive Measures and Multiple Barriers	25
3.2 Critical Control Points	25
3.2.1 Assess preventive measures to identify Critical Control Points	25
3.2.2 Establish mechanisms for operational control.....	27
3.2.3 Document the Critical Control Points and Critical Limits	27
4 Element 4 – Operational Procedures and Process Control.....	28

Drinking Water Quality Management Plan

4.1	Operational Procedures	28
4.2	Operational Monitoring.....	28
4.2.1	Develop monitoring protocols for operational performance of the water supply system .	28
4.2.2	Document monitoring protocols into an operational monitoring plan	29
4.3	Corrective Action	29
4.4	Equipment Capability and Maintenance	30
4.4.1	Maintenance Planning	30
4.4.2	Integrated Maintenance Management System.....	31
4.4.3	Renewals	32
4.4.4	SAMP	32
4.5	Materials and Chemicals	32
5	Element 5 – Verification of Drinking Water Quality	34
5.1	Drinking Water Quality Monitoring	34
5.2	Consumer Satisfaction	35
5.3	Short-term Evaluation of Results	35
5.4	Corrective Action.....	37
6	Element 6 – Management of Incidents and Emergencies	38
6.1	Communication	38
6.1.1	Communication protocols and contact lists for relevant agencies and key personnel	38
6.1.2	Public and media communications strategy	38
6.2	Incident and Emergency Response Protocols	39
6.2.1	Procedures and response plan for potential incidents and emergencies	39
6.2.2	Emergency response plan training and regular testing.....	40
6.2.3	Incident and Emergency Response Plan and the revision of protocols as necessary	41
7	Element 7 – Employee Awareness and Training.....	42
7.1	Employee Awareness and Involvement.....	42
7.1.1	Staff Inductions	42
7.1.2	Mechanisms to Increase Employee Awareness.....	42
7.1.3	Employee Participation	44
7.2	Employee Training.....	44
7.2.1	Employees Experience and Qualifications	44
7.2.2	Training Needs and Resources	46
7.2.3	Age of Workforce Structure and Skills Retention.....	47
7.2.4	Training records	48
8	Element 8 – Community Involvement and Awareness	49
8.1	Community Consultation	49
8.2	Communication.....	49

Drinking Water Quality Management Plan

9	Element 9 – Research and Development	51
9.1	Investigative Studies and Research Monitoring	51
9.1.1	Establish programs to increase understanding of the water supply system.....	51
9.1.2	Use information to improve management of the water supply system	52
9.2	Validation of Processes	53
9.2.1	Validation of processes and procedures to effectively control hazards.....	53
9.2.2	Revalidation of processes	54
9.3	Design of Equipment	55
10	Element 10 – Documentation and Reporting.....	56
10.1	Management of Documentation and Records	56
10.1.1	Document Control System	56
10.1.2	Records management training	56
10.1.3	Review and revision of documentation	57
10.2	Reporting.....	57
10.2.1	Internal Reporting.....	57
10.2.2	External Reporting	58
11	Element 11 – Evaluation and Audit.....	60
11.1	Long-term Evaluation of Results	60
11.1.1	Collection and evaluation of long-term data	60
11.1.2	Documentation and reporting of long-term results	60
11.2	Audit of Drinking Water Quality Management	61
12	Element 12 – Review and Continual Improvement	63
12.1	Review by Senior Executive	63
12.2	Drinking Water Quality Management Improvement Plan	63

Drinking Water Quality Management Plan

Document History and Status

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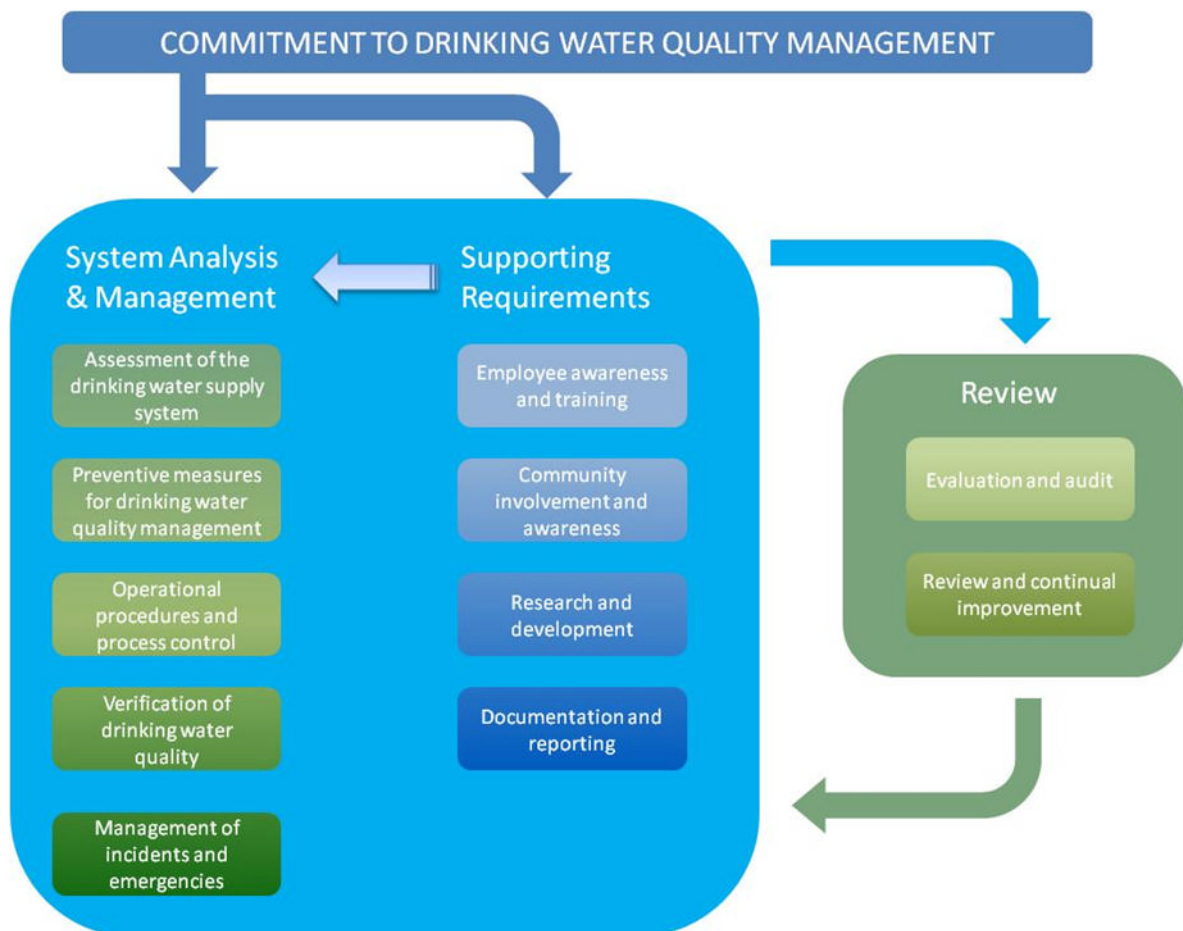
Drinking Water Quality Management Plan

1.2

Introduction

Seqwater is currently in the process of developing a drinking water quality management system to cover all of its assets and activities consistent with the “Framework for the Management of Drinking Water Quality” within the Australian Drinking Water Guidelines (ADWG, 2004).

The Framework was developed to guide the design of a structured and systematic approach to the management of drinking water quality and includes 12 Elements that are considered good practice for management of drinking water supplies. The Framework is a quality management system that has been specifically designed for the water industry, incorporating a preventive risk management approach from catchment to consumer utilising elements of HACCP, ISO 9001 and AS/NZS 4360.



Diagrammatic representation of the Framework for Management of Drinking Water Quality (adapted from ADWG, 2004)

Drinking Water Quality Management Plan

ADWG Guiding Principles

Pivotal to the ADWG, 2004 are six fundamental concepts known as the Guiding principles; their purpose is to set direction on the standard of duty of the service provider.

Principle 1: The greatest risks to consumers of drinking water are pathogenic microorganisms. Protection of water sources and treatment are of paramount importance and must never be compromised.

Principle 2: The drinking water system must have, and continuously maintain, robust multiple barriers appropriate to the level of potential contamination facing the raw water supply.

Principle 3: Any sudden or extreme change in water quality, flow or environmental conditions should arouse suspicion that drinking water might be contaminated (trouble is preceded by change!)

Principle 4: System operators must be able to respond quickly and effectively to adverse monitoring signals.

Principle 5: System operators must maintain a personal sense of responsibility and dedication to providing consumers with safe water, and should never ignore a complaint about water quality.

Principle 6: Ensuring drinking water safety and quality requires the application of a considered risk management approach.

Scope of the Drinking Water Quality Management Plan

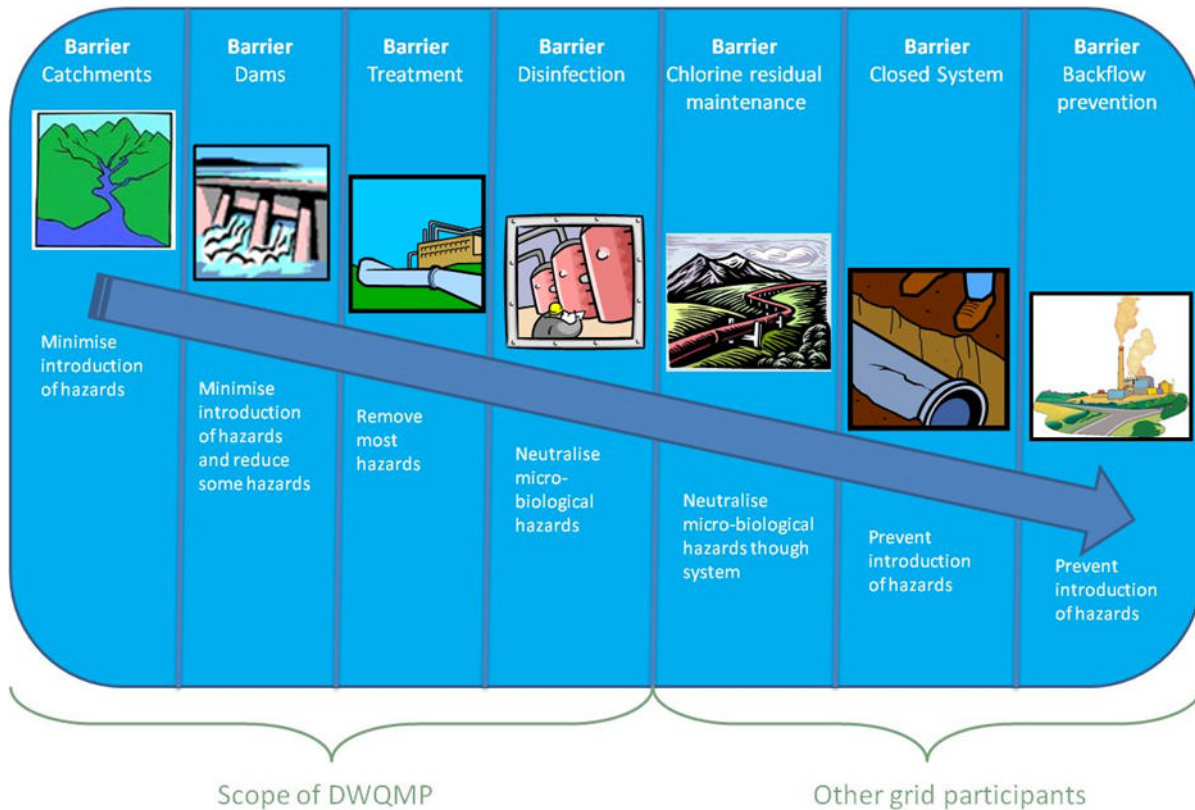
This Drinking Water Quality Management Plan (DWQMP) applies to the total water quality management activities of Seqwater. The diagram below depicts the holistic catchment to tap management philosophy of drinking water, representing the likely barriers that exist in SE Queensland systems. Under the recent water reforms in SE Queensland, Seqwater is responsible for the first 4 of these barriers, which include:

- Catchments
- Storages and Dams
- Water treatment
- Disinfection

With the vertical disaggregation of the water industry, other grid participants, such as LinkWater and the three distribution entities (Allconnex Water, Queensland Urban Utilities, and Unity Water) are responsible for the bulk transport and reticulation of the treated water and therefore their responsibilities include:

- Maintaining chlorine residuals
- Maintaining storage reservoirs and reticulation systems, and
- Direct customer interaction and education

Drinking Water Quality Management Plan



Illustrating multiple barriers and the scope of Seqwater DWQMP

The Extent of Seqwater Operations

Seqwater provides bulk water storage and treatment services to the South East Queensland (SEQ) Water Grid. Seqwater works collaboratively with a number of other water entities as part of the SEQ Water Grid - designed to interconnect new and existing water sources across the region and secure our water supply now and for the future.

Seqwater (Queensland Bulk Water Supply Authority) formed on 1 July 2008 as part of the Governments reform of water supply arrangements in South East Queensland. Seqwater acquired bulk water storage and treatment assets from various Local Governments and Government Owned Corporations (SEQWater and SunWater) from Noosa to Gold Coast regions and across to the Somerset region. The formation of Seqwater created an opportunity to take an integrated approach to catchment-sourced water management across the region. This approach will help ensure the long-term security and sustainability of our region's catchment-based water supply.

The Asset Services map on the Seqwater intranet (Enclosure 1 / [AOP AssetInfrastructureDistribution.pdf](#)) shows the dispositions of Seqwater's various operations that are widely spread across South East Queensland including all storage and treatment infrastructure.

Seqwater has responsibility for managing 25 dams and 47 weirs, including Wivenhoe, Somerset and North Pine Dams, Hinze Dam on the Gold Coast and Baroon Pocket Dam on the Sunshine Coast. Seqwater also owns and manages Atkinson Dam, Bill Gunn Dam, Borumba Dam, Cedar Pocket Dam, Clarendon Dam, Cooloolabin Dam, Enoggera Dam, Ewen Maddock Dam, Gold Creek Dam, Lake Manchester Dam, Little Nerang Dam, Sideling Creek Dam (Lake Kurwongbah),

Drinking Water Quality Management Plan

Six Mile Creek Dam (Lake MacDonald), Leslie Harrison Dam, Maroon Dam, Moogerah Dam, Poona Dam and Wappa Dam.

In addition to this Seqwater currently manages 46 Water Treatment Plant (WTP) facilities across the South East Queensland region and these are listed below. Of these facilities, 21 are physically connected to the water grid, 14 consist bore fields (as indicated *) and 7 have Seqwater-owned reticulation systems.

Grid connected WTPs:

→ Algester* WTP	→ Image Flat WTP	→ North Stradbroke Island* WTP
→ Banksia Beach* WTP	→ Landers Shute WTP	→ Petrie WTP
→ Caboolture WTP	→ Mt Crosby Eastbank and Westbank WTPs	→ Runcorn* WTP
→ Capalaba WTP	→ Molendinar WTP	→ South Maclean WTP
→ Chandler* WTP	→ Mudgeeraba WTP	→ Sunnybank* WTP
→ Enoggera WTP	→ Noosa WTP	
→ Ewen Maddock WTP	→ North Pine WTP	
→ Forest Lake* WTP		

WTPs connected to stand-alone systems:

→ Amity Point* WTP	→ Jimna WTP	→ Point Lookout* WTP
→ Beaudesert WTP	→ Kenilworth* WTP	→ Rathdowney WTP
→ Boonah-Kalbar WTP	→ Kilcoy WTP	→ Somerset Dam Township WTP
→ Canungra WTP	→ Kooralbyn WTP	→ Woodford WTP
→ Dayboro* WTP	→ Linville* WTP	
→ Dunwich* WTP	→ Lowood WTP	
→ Esk WTP	→ Maleny WTP	

WTPs connected to Seqwater-owned distribution systems:

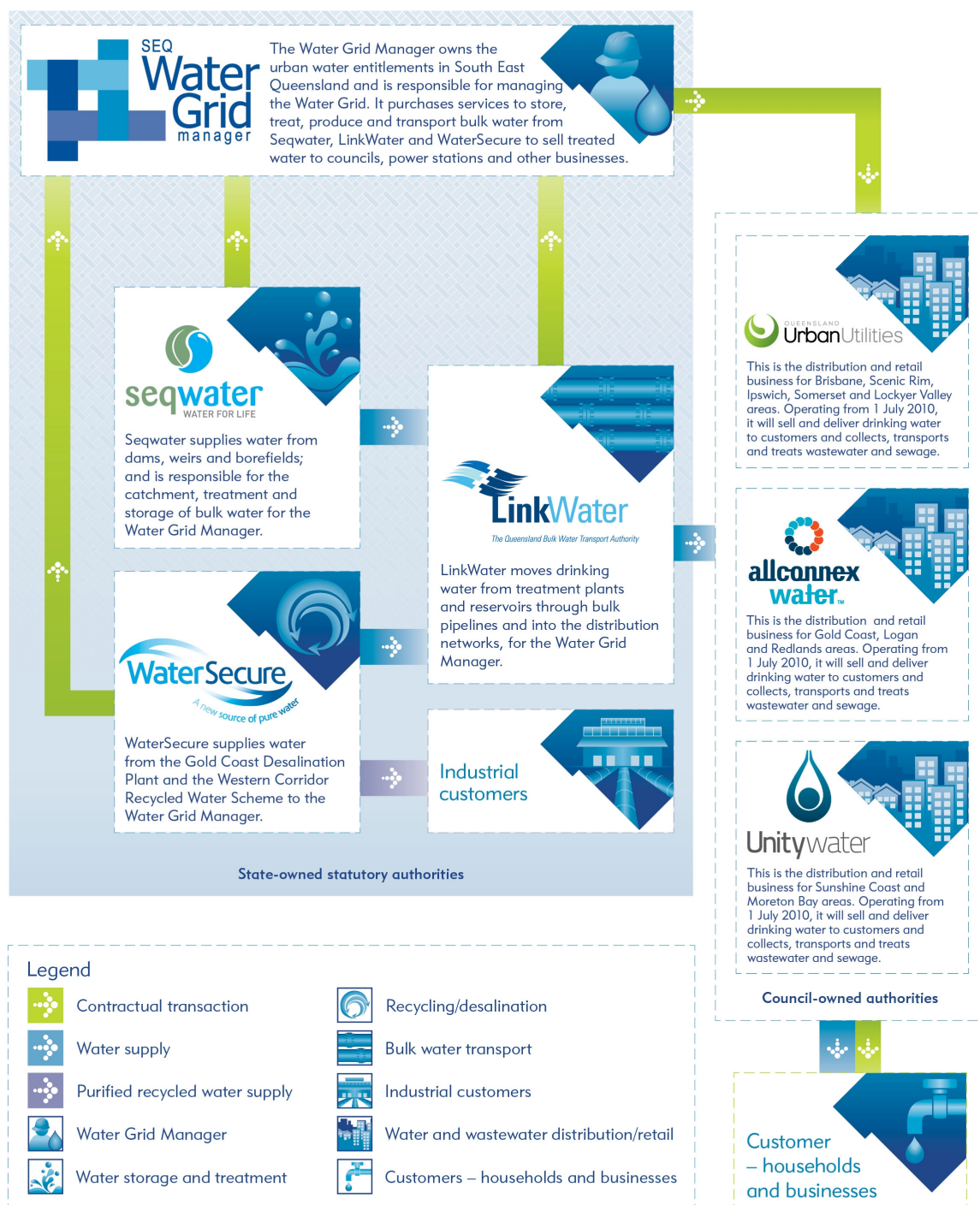
→ Atkinson Dam* WTP	→ Kirkleagh WTP	→ Wivenhoe Dam WTP
→ Borumba Downs WTP	→ Maroon Dam WTP	
→ Hinze Dam WTP	→ Moogerah Dam WTP	

In addition to these WTPs, Seqwater will construct and operate the Wyaralong Dam WTP when the Wyaralong Dam is completed. The Kilcoy-Lake Somerset WTP is also being recommissioned and will provide Kilcoy with another treatment facility. Maleny WTP and the five Brisbane aquifer WTPs are expected to be taken-offline later in 2010.

The following figure shows the extent of the SEQ Water Grid and role of each Water Service Provider (WSP) involved, including Seqwater as the bulk treated water supplier.

A flowsheet for SEQ Water Grid is shown in Enclosure 2 and shows the significantly large size and flexibility of the grid's operations. Further detail on the schemes that the above WTPs supply is provided in the site-specific HACCP plans for each facility (sub-plans to this DWQMP). Enclosure 3 details the Water Grid Risk Assessment, including Seqwater's participation and the risks that Seqwater has passed onto downstream entities.

Drinking Water Quality Management Plan



Illustrating extent of the SEQ Water Grid and Seqwater's role

Drinking Water Quality Management Plan

Seqwater also provides essential flood monitoring services, catchment management services for landholders, water quality research and investigation, recreation services, and irrigation services to around 1,000 rural customers in five water supply schemes. In addition, the organisation is responsible for a range of new water infrastructure projects and initiatives, including a WTP on Ewen Maddock Dam on the Sunshine Coast, raising the dam wall to increase the capacity of the Hinze Dam on the Gold Coast, and the fluoridation of the region's drinking water supply. In delivering these services, Seqwater seeks to maintain productive relationships with government agencies, research organisations, landholders and the community.

The Current Context and Limitations

This DWQMP sits within the context of other management plans ranging from SEQ Water Grid Manager's management plans, such as Water Grid entity DWQMPs, to Seqwater's incident and emergency response plan. This plan does not seek to replace or otherwise override those plans, but to complement them and provide a key link in total drinking water quality management.

This DWQMP has been prepared based on the historical information available to Seqwater, having regard to the conditions of the infrastructure inherited by Seqwater. Given the extent and nature of the institutional, structural, regulatory and contractual changes implemented around 1 July 2008, as well as the diverse nature of the assets, systems, processes and cultures, the DWQMP was developed to consolidate the past knowledge.

Seqwater will in the coming months work with its regulators, stakeholders, other Grid Participants and community to enhance, harmonise and standardise Seqwater's approach to ADWG and DWQMP, across the other regulatory requirements such as asset management plans and emergency response plans. A separate DWQMP has been prepared for the water management for Lake Wivenhoe with regard to the augmentation of supplies in that Lake with Purified Recycled Water (PRW). It considers the complex relationship of inflows, understanding of the catchment, and complexities of environmental values in an 'open' system. This DWQMP provides linkages with the Lake Wivenhoe plan, including relationships with the water treatment train. Both plans will be submitted for approval by the Office of the Water Supply Regulator within the legislated timeframes.

Drinking Water Quality Management Plan

1 Element 1 – Commitment to Drinking Water Quality Management

The ongoing support and commitment of the senior executive is essential for successful implementation of effective drinking water quality management. This includes supportive policies as well as appropriate staffing, employee training, financial resources, and active participation and reporting to the Board of Directors and CEO.

1.1 Drinking Water Quality Policy

Seqwater has a strong commitment to Drinking Water Quality Management (DWQM). This has been demonstrated in the form of a water quality policy endorsed by the CEO through sign-off of this document (Appendix 1.1 / [POL-00012](#)).

This policy has been communicated to all staff and is available to all staff as a registered document in Q-Pulse and from the Seqwater internet site (<http://www.seqwater.com.au/public/news-publications/water-quality-policy>). The policy is included in the staff induction presentation (Appendix 7.1 / [TRA-00009](#)) to ensure that new staff are aware of the policy upon joining the organisation.

The policy is available to the community through the Seqwater internet site.

1.2 Regulatory and Formal Requirements

1.2.1 Regulatory Scope

Under section 92 of the *Water Supply (Safety and Reliability) Act*, it is an offence to carry out a drinking water service (which includes the treatment of water for supply as drinking water and water collection and storage that includes recycled water) without an approved Drinking Water Quality Management Plan (DWQMP).

The SEQ Water Market transitional arrangements (see sections 628 & 630 of the Act) set out a two-stage drinking water quality process for existing large drinking water suppliers, including Seqwater:

1. by 1 January 2009 – commence an initial monitoring program, based on criteria prescribed by Queensland Health, at all water treatment plants; and
2. by 1 July 2011 – develop and implement a DWQMP.

The Act also requires that a DWQMP be approved and implemented before water treatment operations can include the introduction of purified recycled water into their raw water sources to augment the drinking water supply.

Accordingly, Seqwater requires a DWQMP which covers organisational as well as site specific elements for the water treatment operations in the Lake Wivenhoe system before the Western Corridor Purified Recycled Water (PRW) project can be finalised and begin to augment supplies with PRW. The water treatment operations affected by the PRW scheme and covered by this DWQMP include the Mt Crosby (East and West Bank), Esk, Lowood and Wivenhoe Dam water treatment plants. A separate DWQMP is being prepared and submitted for Lake Wivenhoe storage.

The current DWQMP will be expanded to include Seqwater's remaining water treatment operations when resubmitted for approval before 1 July 2011.

Drinking Water Quality Management Plan

A summary of the relevant regulatory and other formal requirements relevant to Seqwater is provided in the Regulatory and Formal Requirements Register at Appendix 1.2 ([LEG-00072](#)).

The relevant legislation deals with the requisite content of a DWQMP. The general expectation is compliance with the Australian Drinking Water Guidelines (ADWG). This outcome is also supported by the Grid Contract which prescribes that all treated water must comply with the ADWG.

1.2.2 Employee Responsibilities

The *Water Quality Manager* is responsible for implementing and maintaining this DWQMP and is recorded as the document's *Approver* for document control purposes.

Those employees with responsibilities directly related to water quality management have the requirements given in Appendix 1.2 ([LEG-00072](#)) relevant to their position reflected in their Position Description (PD). Accordingly, their understanding and awareness of these responsibilities is reinforced through the performance review process. Through this process, the employee's responsibilities are discussed initially to determine agreed goals and performance targets and their performance is assessed through mid-term and annual performance reviews.

An organisational chart shown in Appendix 1.3 provides Seqwater's structure from the CEO to team management level. The CEO and those managers whose responsibilities directly relate to this plan are included in the Stakeholder Register at Appendix 1.4 ([REG-00002](#)). The details of managers who are part of the on-call arrangements for incident and emergency management are provided at Appendix 6.1 ([REG-00001](#)).

The details of the *Operations Coordinator* responsible for the operation of a particular water treatment plant are provided in the above mentioned Stakeholder Register and the HACCP team table in the site's HACCP plan.

1.2.3 Identifying and Communicating Regulatory Changes

Seqwater governance structure caters for the maintenance of regulatory framework relevant to the organisation, including drinking water quality. This includes the communication of such changes to the relevant managers. Team managers throughout the business are also required to keep internal stakeholders informed of any developments affecting the regulatory framework.

Seqwater receives regular Lawlex and news feed alerts on water, environment, health and safety, and construction topics through a subscription with SAI Global. Any new regulatory or formal requirements affecting Seqwater are identified and communicated throughout the business.

The *Water Quality Manager* and the *Principal Coordinator Drinking Water Quality* are then responsible for investigating the implications for this DWQMP and ensuring that the findings are reflected in the DWQMP where appropriate. The *Water Quality Manager* is responsible for communicating the implications that any legislative changes have on this DWQMP to the Executive Management Team.

All employees are responsible for ensuring their actions are compliant with the regulatory and formal requirements in Appendix 1.2 ([LEG-00072](#)) and do not

Drinking Water Quality Management Plan

compromise the safety of the drinking water supplied by Seqwater. Therefore, any changes to this DWQMP due to regulatory and formal requirements are to be communicated to all employees after endorsement by the Executive Management Team. Any such notices are to be promulgated through Seqwater's staff bulletin "Inform" which is distributed through the email system and staff notice boards by Corporate Communications. The *Drinking Water Quality Coordinators (Northern, Central-west, and Southern)* are to work directly with the staff whose duties routinely affect water quality and ensure that such changes are implemented on site.

1.3 Engaging Stakeholders

The Queensland Government's 2008 water reforms have changed the water supply arrangements in SE Queensland from what was predominantly a catchment to tap processes managed "vertically" within local government organisations to one which is now vertically disaggregated and managed by 7 water entities. Seqwater has an important role in this new system as the bulk water supplier and its position with respect to other stakeholders is shown in Figure 1.2.

It is now therefore essential that Seqwater supports an 'integrated management approach with collaboration from all relevant agencies' (ADWG 2004) in order to maintain effective drinking water quality management.

Throughout the transition process for establishment of SE Queensland's new water supply arrangements, Seqwater has actively engaged stakeholders in order to establish integrated management protocols and collaboration with respect to drinking water quality. To date, this has been achieved through:

- Establishment of a stakeholder register (Appendix 1.4 / [REG-00002](#)) which identifies all stakeholders who could affect, or be affected by, decisions or activities of Seqwater. The register lists each stakeholder's contact details and their commitment and involvement with water quality. This register is maintained on an ongoing basis and is confirmed annually during the internal audit of the DWQMP;
- Seqwater is required to interact with the Water Grid Manager under the *Market Rules* including consultation on this DWQMP, Seqwater's Strategic Asset Management Plan (SAMP), and the Water Grid Quality Management Plan.
- Ongoing liaison with the Office of the Water Supply Regulator for the submission of DWQMPs within agreed deadlines;
- Active participation and representation at the Water Grid Manager's forums, risk assessments and water quality technical committee;
- Review and provision of feedback to the Office of the Water Supply Regulator on their draft guidelines;
- Review and provision of feedback to the Water Grid Manager on the SEQ Water Grid Quality Management Plan and Emergency Response Plan;
- Informal liaison with the water quality representatives from LinkWater and the local government distribution entities to maintain lines of communication and collaboration in the management of water quality issues;

Drinking Water Quality Management Plan

- The Executive General Manager and staff from Seqwater's Asset Delivery group may also be called to provide technical and expert advice and information that assists community awareness on projects concerning Queensland Water Commission and State Government, such as the infrastructure and processes implemented for fluoridation of the water supply; and
- The provision of Capacity Forecast Notices for Seqwater infrastructure to the SEQ Water Grid Manager on a monthly basis – this process includes constraints due to water quality.

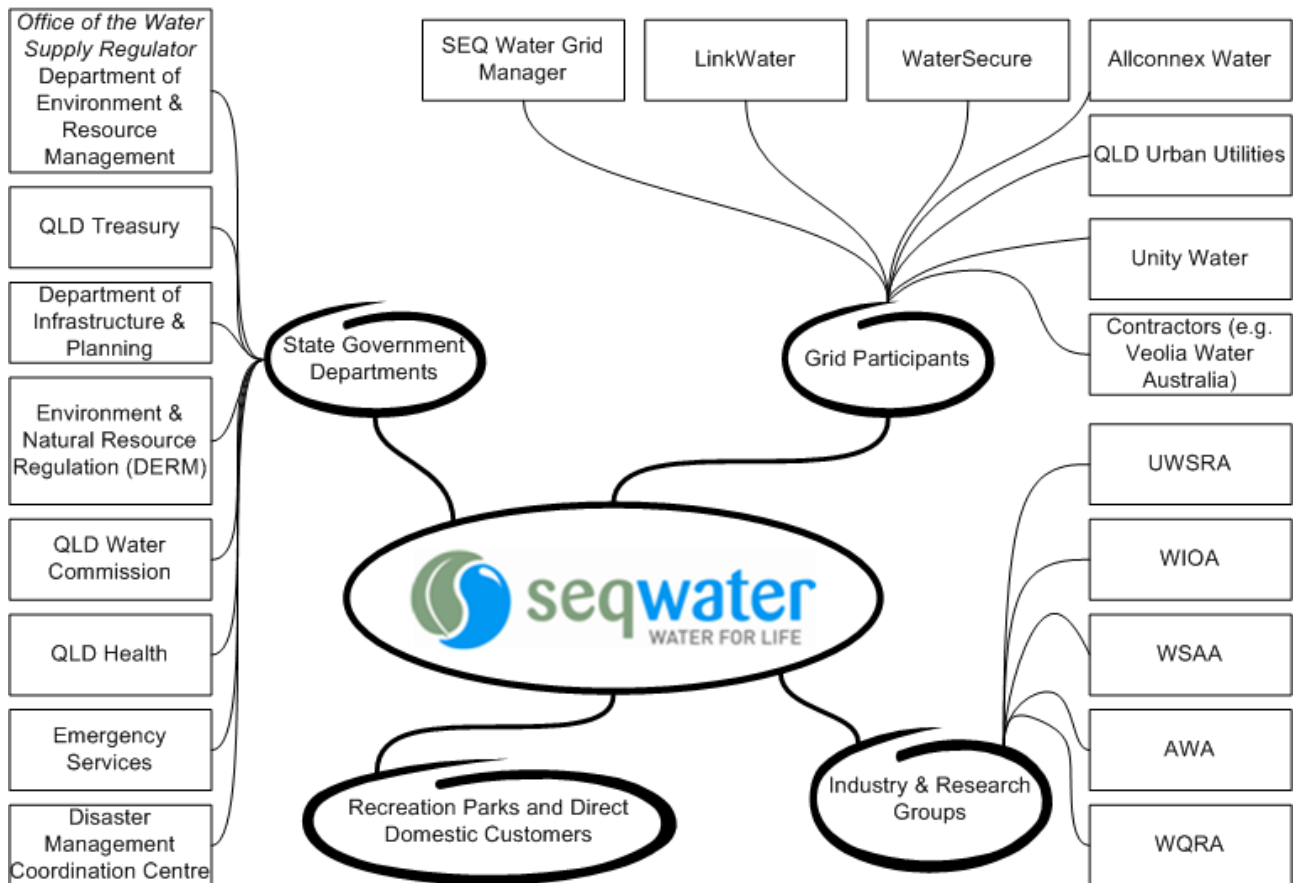


Figure 1.2 Relevant stakeholders

The details of those Seqwater employees responsible for engaging the stakeholders shown in Figure 1.2 are provided in the Stakeholder Register at Appendix 1.4 ([REG-00002](#)).

Drinking Water Quality Management Plan

Each site that is covered in the DWQMP will have a site specific HACCP plan, i.e., a plan that predominantly covers Elements 2-5. The following sections 2-5 will outline the methodology used to address these elements; however the evidence and the details will be documented in each site specific HACCP plan. These plans appear as enclosures to this document. In cases where previous HACCP plans were in place prior to 1 July 2008, the methodology used may have been different. These have since been reviewed and are consistent with this DWQMP. The risk assessment methodology was further developed and standardised for the assessment of Seqwater's systems at a workshop held in February 2009 (Appendix 2.1).

2 Element 2 – Assessment of the Drinking Water System





2.1 Water Supply System Analysis

2.1.1 Assembly of a team

For each water supply system analysis a team is assembled with different expertise. The team generally comprises of water quality experts, risk experts, water treatment plant operators and supervisors, catchment management experts and process specialists.

2.1.2 Flow Diagram

For each water treatment plant or catchment system a HACCP style flow diagram is produced. The flow diagram for each site is verified by the HACCP team on site and with publication in the site specific HACCP plan is evidence of the verification. The flow diagram uses standard symbols to denote;

- Storage 
- Process Step 
- Monitoring 
- Transport 

2.1.3 System Overview

In the site based HACCP plan for each system there is a detailed description of the supply system from catchment to tap, incorporating:

- All water sources
- Treatment processes,
- Treatment capability,
- Supply areas and drinking water service providers supplied
- Typical raw and treated water characteristics
- Event driven fluctuations, and

Drinking Water Quality Management Plan

- Operational challenges

2.1.4 Periodically review the water supply system analysis

There is a defined process for updating diagrams and system information to reflect changes. Prior to the publication of all HACCP plans the HACCP flow diagram undergoes on-site verification by members of the HACCP team. Seqwater is developing an endorsed quality procedure “PRO-#### Process changes updates” to ensure that any changes to infrastructure or process alternations are communicated to the *Water Quality Manager* to ensure relevant updates to the water supply system analysis and associated HACCP plans and procedures are completed. This requirement is reflected in the Drinking Water Quality Management Improvement Plan at Appendix 12.1. Any updated procedure or HACCP plan will be recorded in the document control section of the relevant document.

Each water supply system is also reviewed annually at a revalidation workshop detailed in section 9.2.2. The HACCP team is assembled for this workshop and any changes in the system that may affect the risk assessment or HACCP Plan are reviewed. Additionally, water quality trends are analysed and the Critical Limits are verified (revalidated).

2.2 Assessment of Water Quality Data

2.2.1 Assembly of water quality data

Where possible, for each system analysis there is a comprehensive set of water quality data from routine and event conditions for at least 5 years, when available. For those sites where 5 years of historical water quality data is not available because limited monitoring was undertaken by the Local Government authority previously responsible for the site, then a requirement for further monitoring to address these shortfalls has been added to the Drinking Water Quality Improvement Plan (Appendix 12.1). These water quality data sets have been prepared in spreadsheet format for the purpose for the risk assessments. These datasets are summarised in the HACCP plans for each site, with statistical information such as minimum, maximum, average and standard deviations.

2.2.2 List and examine exceedances

The datasets described above have been analysed for deviations from normal operating conditions as a way of determining the likelihood of events that is used as an input into the risk assessment process for calculating the extent of a hazard or hazardous event.

2.2.3 Identification of trends and potential problems

Appended with each HACCP plan is a graphical representation of the raw data for both raw and treated water quality, which was utilised in the risk assessment process. Basic trends analysis was undertaken on the data sets to assist in the interpretation of long term trends and to assess the correlation of data spikes with historical events, such as rainfall or dam turnovers.

Drinking Water Quality Management Plan

2.3 Hazard Identification and Risk Assessment

2.3.1 Hazard identification and risk assessment methodology

The hazard identification and risk assessment approach is consistent with the Australian Standard AS/NZS 4360:2004, the risk management guidelines HB 4360:2004, and section 3.2 of ADWG (2004). For the purpose of the assessment hazards include, microbial, physical, chemical and radiological agents.

Risk is to be assessed as follows:

- Assess unmitigated risk (risk without preventive measures) using likelihood and consequence descriptors below;
- Assess mitigated risk (risk with preventive measures) using likelihood and consequence descriptors below; and
- Those hazards and hazardous events with a mitigated risk of high or very high should have further risk treatments identified (where appropriate) and residual risk assessed (mitigated risk after the application of a risk treatment).

Table 2.1 Likelihood Criteria

Likelihood	Descriptor	Definition
1	Rare	Occurs less than or equal to once every 5 years
2	Unlikely	Occurs more often than once every 5 years and up to once per year
3	Possible	Occurs more often than once per year and up to once a month (12/yr)
4	Likely	Occurs more often than once per month (12/yr) and up to once per week (52/yr)
5	Almost Certain	Occurs more often than once per week (52/yr)

Table 2.2 Consequence Criteria

Consequence	Descriptor	Definition
1	Insignificant	Little or no disruption to normal operation
2	Minor	Operational disruption Localised aesthetic impact for non-SEQ Water Grid plants Isolated sample reports above guideline value/specification for chronic health parameters
3	Moderate	Widespread aesthetic impact for SEQ Water Grid plants Repeated breach of guideline value/specification in quarterly Water Quality reports for chronic health parameters
4	Major	Potential acute health impact, no declared outbreak expected
5	Catastrophic	Potential acute health impact, declared outbreak expected

Drinking Water Quality Management Plan

Table 2.3 Risk Calculator

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Moderate (4)	High (16)	Very High (32)	Very High (64)	Extreme (128)
Likely	Moderate (2)	High (8)	High (16)	Very High (32)	Very High (64)
Possible	Low (1)	Moderate (4)	High (8)	High (16)	Very High (32)
Unlikely	Low (0.5)	Low (1)	Moderate (4)	High (8)	High (16)
Rare	Low (0)	Low (0.5)	Moderate (2)	Moderate (4)	High (8)

2.3.2 Identify and document hazard and hazardous events of each component on the water supply system

The microbiological, chemical and radiological hazards have been identified for each system and documented in the site specific HACCP plans. The need for a standard set of hazards was identified and is to be considered at each risk assessment. This list (shown below) should evolve and be updated as required, hazards identified at a risk assessment not on the list should be added, as well as those not present at any WTP should be removed (N.B. the 4 categories of hazard are to remain).

The following hazards are to be assessed in the unmitigated risk assessment:

- Microbial
 - Bacteria
 - Viruses
 - Protozoa
 - Problem algae
- Chemical
 - Cyanotoxins
 - Taste and odour compounds
 - Iron
 - Pesticides (all types e.g. herbicides & insecticides)
 - Pharmaceuticals and endocrine disruptor chemicals (EDC)
 - Hydrocarbons
 - Heavy metals (note treatment chemicals may add some more)
 - Toxins
 - Nitrate
 - Arsenic
 - Sulphide

Drinking Water Quality Management Plan

- Physical
 - Total organic matter
 - Colour
 - Turbidity
 - pH
 - Temperature
 - Dissolved oxygen (DO)
 - Hardness
 - Total dissolved solids (TDS)
- Radiological

The above hazards that have been identified in the unmitigated risk assessment, with a risk score higher than a low are to be assessed in the mitigated risk assessment stage. Also, the following hazards, which can be introduced during the water treatment process (for e.g., through the use of water treatment chemicals) should also be considered in the mitigated risk assessment:

- Fluoride
- Aluminium
- Chlorine
- Disinfection by-products (DBP)
- Bromate
- Formaldehyde
- Chlorate
- Chlorite
- pH (e.g. from lime)
- Turbidity (e.g. from lime)
- Polymers
- Permanganate
- Ammonia
- Asbestos
- Corrosivity
- *Naegleria fowleri* (regrowth pathogens)

In addition hazardous events specifically related to that system have also been documented. These may include events such as “failure of chlorination system” or “filter breakthrough.” Figures 2.1 and 2.2 show an example of the hazardous events listed and assessed in the risk assessment process.

Drinking Water Quality Management Plan

Hazard Identification and Unmitigated Risk										
Image Flat WTP			Unmitigated Risk				Barriers			
Hazard	Health / Aesthetic	Source	Likelihood	Consequence	Risk	Uncertainty	Raw Water Source Selection	PAC Dosing	Coagulation, Flocculation & Sedimentation	Filtration
Biological										
Algal Toxins	H	High numbers of blue-green algae in Poona and Wappa dams as well as possible blooms at the diversion weir on the South Maroochy River. No Algae blooms reported in Cooloolabin Dam.	Possible	Catastrophic	Very High	Annual algae blooms in Poona Dam, possibly as a result of a high nutrient load. Cell counts up to 200,000 to 300,000 cells/ml including B-G Algae (Wappa 2,000-60,000)				
Protozoa	H	Humans and Animals, HSTPs, septic systems, dairy and beef cattle and horses	Almost Certain	Catastrophic	Very High	Cryptosporidium has not been identified in the catchment. However, it has been assumed that it is present due to the sources identified. GHD developed a Cryptosporidium model in the Maroochy Water Supply System - Water Quality Risk Assessment and it showed a load of 7.2E+07 Oocysts/day at the Image Flat WTP.				
Viruses	H	Dairy located on the South Maroochy River next to Poona Dam Land care and catchment groups active.	Almost Certain	Catastrophic	Very High	There is no data regarding viruses. The HACCP Team did not feel there was a requirement to monitor viruses, at this stage. It was assumed that they were present due to the sources in the catchment. The likelihood has been based on the bacteriological monitoring.				
Bacteria	H		Almost Certain	Catastrophic	Very High	There are always background levels of bacteria, which are elevated during storms.				

Figure 2.1 Example of unmitigated risk assessment with treatment barriers

Mitigated Risk													
Eastbank WTP													
Step	Hazardous Event	Potential Hazard	Limiting Hazard	Preventive Measures	Monitoring	Likelihood	Consequence	Mitigated Risk	Mitigated Risk Comments	Uncertainty	ALARP	Risk Treatment	Residual Risk
Filteration	Filterback through	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2
	Contaminant filter	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2
	Flow control	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2 	<ul style="list-style-type: none"> Microbes - B2 Microbes - B2 Microbes - B2

Figure 2.2 Example of a site based risk register of mitigated risks with risk comments

2.3.3 Estimate the level of risk for each hazard or hazardous event

In the site specific risk register (Figure 2.2) the level of risk has been identified by the HACCP team and subsequently scored using the risk matrix and documented. In this process, risk is scored for hazardous events, rather than individual hazards. For each hazardous event, reasons have been captured which include lists any actual hazardous events.

When scoring the consequence of a hazardous event the 'limiting hazard', i.e. the hazard/s that determine the controls and present the greatest risk, is considered. The limiting hazards for a number of hazardous events are provided in Table 2.4.

Drinking Water Quality Management Plan

Table 2.4 Hazardous Events

Hazardous Events		Limiting hazards - the one or a few hazards that ultimately define the controls and present most of the risk
Raw water		
Storm event in catchment		Turbidity <i>Cryptosporidium</i>
Turnover of reservoir		Manganese
Algal bloom in reservoir		Taste & Odour Cyanotoxin
Spill in catchment		Hydrocarbons
Acute changes in raw water quality		Hardness pH Manganese
Post-bushfire runoff		Turbidity and ash
Intake of contaminated raw water, other events		Assess on case by case, depending on what's in the raw water
Treatment		
Over-dosing - cause 1 - cause 2 - cause 3		Assess the risk for the primary objective(s) of the process, e.g. one or more of: - Parasite - Bacteriological - Virus - Turbidity - Manganese - Colour - Taste and Odour
Under-dosing - cause 1 - cause 2 - cause 3		
Contaminated treatment chemical - cause 1 - cause 2 - cause 3		
Process failure - cause 1 - cause 2 - cause 3		

2.3.4 Evaluate major sources of uncertainty associated with the risks assigned to hazardous events and consider actions to reduce uncertainty

In accordance with the ADWG the level of uncertainty associated with a risk assessment is to be identified. This is undertaken by noting the available information used in determination of the risk score and assigning a level of uncertainty in the form of a 1 to 5 ranking based on the descriptions shown in Table 2.5.

A ranking will allow the comparison of uncertainty and will be useful in identify areas for research (i.e. high risks with a high level of uncertainty should be prioritised). Generally this involves implementation of a sampling program to gain better understanding of the likelihood of particular hazards. Once enough data has been gathered, the hazard will

Drinking Water Quality Management Plan

be reassessed. The outcome of this may be a reduction in the unmitigated level of risk as with high uncertainty in many cases the worst case scenario would be applied.

Table 2.5 Uncertainty Criteria

Level of Uncertainty	Descriptor	Definition
1	Certain	There is 5 years of continuous monitoring data, which has been trended and assessed, with at least daily monitoring. The processes involved are thoroughly understood.
2	Confident	There is 5 years of continuous monitoring data, which has been collated and assessed, with at least weekly monitoring or for the duration of seasonal events. There is a good understanding of the processes involved.
3	Reliable	There is at least a year of continuous monitoring data available, which has been assessed and there is a good understanding of the processes involved.
4	Estimate	There is limited monitoring data available and there is a reasonable understanding of the processes involved.
5	Uncertain	There is limited or no monitoring data available and the processes are not well understood.

2.3.5 Determine significant risk and document priorities for risk management

Documented in the site specific risk registers is a listing for risk management activities with acute health related risk prioritised over chronic and aesthetic water quality risks. Where risks remained high, risk treatment has been recommended and accordingly incorporated into the Drinking Water Quality Management Improvement Plan.

It is understood that some high risks may be deemed to be acceptable because they are 'As Low As Reasonably Practicable' (ALARP). This scenario is to be identified in the risk assessment with an additional column in the risk register (Figure 2.2).

2.3.6 Periodically review and update the hazards identification and risk assessment to incorporate any changes

The review of the risk assessment is done using a number of initiatives

- With the emergence of any new water quality risks the Drinking Water Quality Team or the Catchment Water Quality Team is responsible for revisiting the risk assessment process to capture new potential hazards. An example of this would be the introduction of purified recycled water into a new water supply source, or after a

Drinking Water Quality Management Plan

sanitary survey within a catchment the risk assessment would be readdressed for raw water quality supplied to a water treatment plant.

- Documented in each site based HACCP plan is an action to inform the Drinking Water Quality Team of any process changes to a water treatment system. This must be undertaken in order to readdress the risk assessment, update CCP if required and make alterations to operational procedures and Critical Limits.

3 Element 3 – Preventive Measures for Drinking Water Quality management

3.1 Preventive Measures and Multiple Barriers

The risk register for each HACCP plan documents the current preventive measures that are in place to manage the potential hazards throughout the treatment process that may occur during specific hazardous events. An estimation of the residual risk has also been documented in the risk register. This is calculated using the risk matrix detailed in section 2.3.1. Where the residual risk is unacceptable additional preventive measures and risk treatment has been listed in the risk register. For each system, catchment or treatment plant, these improvements will be documented in the Drinking Water Quality Improvement Plan, as referred to in Element 12. The Drinking Water Quality Improvement Plan will feed into the relevant program (e.g., capital works, training, mechanical and electrical improvements). The improvement plan will be reviewed once the additional preventive measure or improvement has been made.

One of the major initiatives for Seqwater is to ensure that the system is designed on a multiple barrier approach to ensure water quality. In the risk register for each site the current barriers have been documented for each hazard in the water treatment process. As the catchment to tap DWQMP's become more advance these barrier tables will be updated to include more catchment barriers as the catchment risk assessments are undertaken.

3.2 Critical Control Points

3.2.1 Assess preventive measures to identify Critical Control Points

For each individual HACCP plan, Critical Control Points (CCP) have been identified for each process step or activity for the production of drinking water. The determination of each Critical Control Point was made using a modified CCP decision tree (Figure 3.1) adapted from the Australian Drinking Water Guidelines (2004). The modification allows for the creation of Quality Control Points (QCP) as well as Critical Control Points. CCP are directly related to health parameters while QCP's are related to aesthetic parameters. In some cases the HACCP team may override the outcomes of the decision tree based on their experience and expertise.

Drinking Water Quality Management Plan

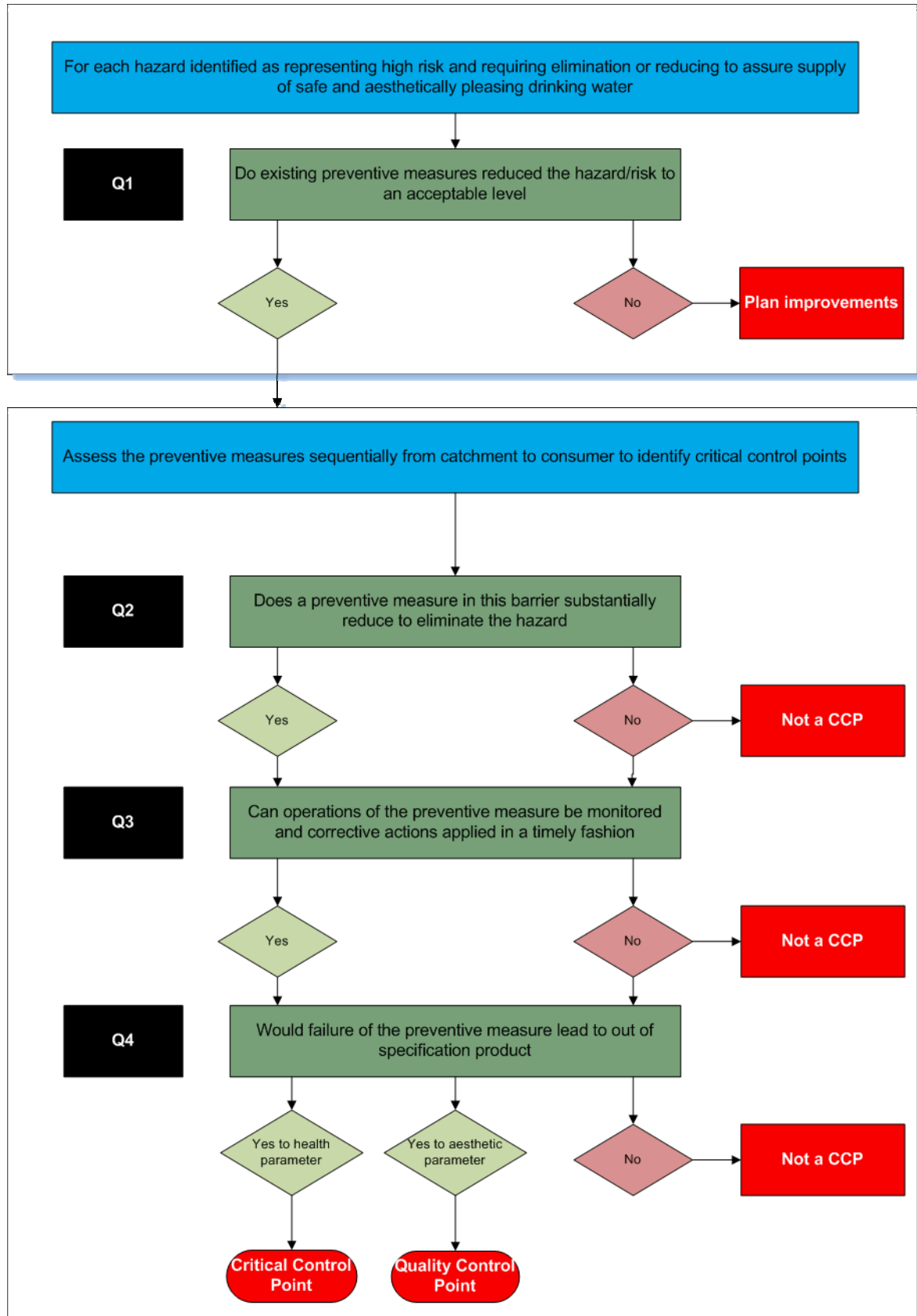


Figure 3.1. Critical and Quality Control Point decision tree

Drinking Water Quality Management Plan

3.2.2 Establish mechanisms for operational control

For each Critical Control Point a CCP operational procedure has been developed. (See Element 4).

3.2.3 Document the Critical Control Points and Critical Limits

As a part of each HACCP plan, all Critical Control Points and Quality Control Points are listed in the HACCP table along with the associated operational ranges, Action Limits and Critical Limits.

Operational ranges are the optimal range in controlling a Critical Control Point.

Action Limits are defined as the initial lead indicator whereby initial corrective actions can be applied along with associated reporting.

Critical Limits are the point of a process which separates acceptability from unacceptability in terms of hazard control and water safety. Deviation from a Critical Limit indicates a loss of control of the process or activity and represents a potential unacceptable health risk and may result in a warranted corrective action, such as plant shutdown and an incident declaration. An associated procedure for each site specific HACCP plan will be the "HACCP Plan Wall Chart". This document will be placed in the water treatment plant control room for quick reference to be used as a guide to the HACCP plan. An example is in Figure 3.2.

The validation for above ranges and limits, and the corrective actions, are documented in section 7 of every CCP/QCP procedure.

Process Step	CCP/QCP	Hazards	Preventative Measures	Monitoring	Target	Action Limit	Critical Limit	Corrective Actions
Disinfection (CW1, CW2)	CCP	<ul style="list-style-type: none"> Bacteria Viruses Chlorine Taste & odour pH Turbidity 	<ul style="list-style-type: none"> Duty/ standby chlorine pumps SCADA monitoring and control 	Disinfected water free chlorine – on-line prior to clear water storage (mg/L)	1.3 mg/L	<0.7 or >1.9 mg/L for >1 hour	<0.6 or >2.3 mg/L for >30 minutes	Action Limit <ul style="list-style-type: none"> Take a grab sample and verify result. Check the integrity of the chlorine and pi Check the dosing equipment and ensun Check calibration of chlorine probe. Report using HACCP Action Limit Regis Critical Limit <ul style="list-style-type: none"> Take a grab sample and verify result. Report to Operations Coordinator. If Chlorine critical limit is reached, Suspe authorised to resume water treatment. Report using HACCP Excursion Form (f For more information refer to: Lander's Shut
				CW2 Disinfected water pH – on-line prior to clear water storage	7.1	<6.8 or >7.8 for >2 hours	<6.6 or >8.0 for >2 hours	
				CW1 Disinfected water pH – on-line prior to clear water storage	7.1	<6.8 or >7.8 for >1 hour	<6.6 or >8.0 for >1 hour	

Figure 3.2 Critical Control Point Summary (Wall chart)

Drinking Water Quality Management Plan

4 Element 4 – Operational Procedures and Process Control

4.1 Operational Procedures

For all HACCP plans each Critical Control Point will have a distinct HACCP procedure that will list operational targets, Action Limits (target criteria) and Critical Limits. In systems where there are already detailed Operations manuals, these will be referred to in the HACCP plan as instructions to maintain normal operation of the plant, including processes and activities they may not be directly CCP or HACCP related. Copies of these procedures will be available to all staff through Q-Pulse and hard copies available onsite for reference if there is a power failure or failure of the computer system.

The development of the HACCP operational procedures are facilitated by the Drinking Water Quality Team. The Operations group provide input and process expertise into the process and may write these procedures where required.

Each HACCP Operational Procedure is reviewed by the Operations Coordinator and signed off by the *Northern or Southern Operations Manager* for their area of responsibility. It is the responsibility of these managers to ensure that these procedures are implemented and adhered to by the operational staff. During the internal review stage, auditors from the Drinking Water Quality team will audit these operational procedures against operational activities to measure the level of compliance. The *Water Quality Manager* is the *Approver* of these procedures.

4.2 Operational Monitoring

Operational monitoring includes the planned sequence of measurements and observations to assess and confirm the performance of preventive measures. Measurements are of operational parameters that will indicate whether processes are functioning effectively.

4.2.1 Develop monitoring protocols for operational performance of the water supply system

In each HACCP plan the following principles for monitoring are applied.

- At each Critical Control Point there will be defined operational ranges, Action Limits (target criteria) and Critical Limits. For example:

CCP	Operational Range	Action Limit	Critical Limit
Filtration	<0.1 NTU	0.2 NTU for 2 hours	0.3 NTU for 15 mins.

- The validation for the Operational Range, Action Limits, Critical Limits and Corrective Actions will be defined in each CCP Procedure (section 7) and will be subject to review annually when the HACCP team is assembled for the revalidation workshop.

Drinking Water Quality Management Plan

- Where possible online instrumentation will be used to monitor each CCP where appropriate. It is the highest priority of Seqwater to have the acute health related CCPs, filtration (turbidity) and disinfection (chlorine) online monitoring at all plants in the first instance.
- Where online instrumentation is not practicable or is awaiting installation and commissioning, grab sampling will be used. The frequency of the grab samples will be frequent enough to effectively monitor the Critical Control Point. Where instrumentation is lacking, refer to the Risk Register and Improvement Plan for the WTP concerned.
- Operational monitoring results are recorded in Plant Data Sheets on a daily or shift basis, or each time the plant is operated. Examples of Plant Data Sheets templates for large and small-sized water treatment plants are shown at Appendix 4.1. Separate spreadsheets are maintained for fluoridation and an example is also provided at Appendix 4.1. Conditional formatting is used to highlight results outside operational or Critical Limits.
- The reporting requirements for all Action Limits and Critical Limits are defined in the procedure at Appendix 4.2 ([PRO-00656](#)). The Action Limits and Critical Limits are summarised in each HACCP plan and also as a procedure called 'HACCP Plan Wall Chart'. Breaches of Critical Limits and ADWG guideline values are reported to relevant internal stakeholders within 24 hours via a *HACCP Excursion Notification* form (Appendix 4.3 / [FRM-00027](#)). Breaches of Action Limits are recorded on the *HACCP Action Limit Register* (Appendix 4.4 / [FRM-00106](#)).
- All online instrumentation is connected or will be connected to a plant control system. Where data and trends are able to be recorded, for e.g. SCADA, these trends are then available for operational monitoring, root cause analyses after an incident and for audit purposes. The telemetry systems are set up with alarms to notify the operator when an internal alarm has been triggered.

4.2.2 Document monitoring protocols into an operational monitoring plan

Each site based HACCP plan will document the operational monitoring program for all monitoring that is directly related to Critical Control Points. Any other operational monitoring is kept at each specific site generally in the form of a spreadsheet, which will be available for periodic audit.

4.3 Corrective Action

Procedures are essential for immediate corrective action to re-establish process control following failure to meet actions or Critical Limits. For each HACCP plan there is an operational procedure for each Critical Control Point which defines:

- Aim of the procedure
- Roles & Responsibility – defines ownership of procedure and operations responsibilities
- Background - an explanation of the process step

Drinking Water Quality Management Plan

- Monitoring – a clear definition (and photo(s) if required) on how, what, where and when to monitor the process step
- Limits - clearly defined **Operational Targets**, **Action Limits** and **Critical Limits**.
- Corrective actions for the process step. Prompts for the operator to stay within operational targets / regain control in a timely manner, or shutdown of supply,
- Validation – addresses validity of CCPs, preventive measures, limits and corrective actions,
- Review – details of the audit / review process,
- References – including the HACCP Plan, risk register and other operational procedures including the plant's detailed O&M Manual

The *HACCP Excursion Notification* form (Appendix 4.3 / [FRM-00027](#)) clearly identifies the cause of any loss of control, the immediate corrective actions taken and any potential impacts and consequences. Seqwater has a quality management system which allows improvements that may be generated from one or more HACCP excursions, to be logged, actioned and signed off, with the aim of preventing any reoccurrences. All improvements are recorded and tracked in the Issue Module on Q-Pulse where they can be directly entered by the responsible *Drinking Water Quality Coordinator*. In the absence of Q-Pulse access, the details can be submitted through an *Notification of Issue* Form (Appendix 6.5 / [FRM-00001](#)) to the Senior Management Systems Coordinators (who will then register on Q-Pulse).

These formal notifications must be made within a 24 hour period; however when a breach of a Critical Control Point has occurred, an immediate telephone call is made to the relevant *Operations Coordinator*.

4.4 Equipment Capability and Maintenance

The capability of equipment is an important consideration in maintaining process control. Equipment and infrastructure in a drinking water supply system need to be adequately designed and if sufficient capacity (size, volume, detention time) to handle all flow rates (peak and otherwise) without limiting performance. Processes should not be overloaded or subject to rapid changes in hydraulic loading, as these conditions may compromise performance. The Conditions of Operation is detailed in each WTP's HACCP plan and include the maximum flow rate and total daily production.

4.4.1 Maintenance Planning

The maintenance planning for all sites is undertaken by the *Strategic Maintenance* team.

When assets transitioned from the water authorities, maintenance planning consisted adopting the existing activities, schedules, etc for a period of time prior to undertaking a review. Service Level Agreements (SLA) with the previous water authorities were in place for many sites for several months to allow for the transfer of asset and maintenance data to the Integrated Maintenance Management module on Seqwater's Corporate Information System (CIS) and to continue to provide existing levels of service.

In 2010, the SLAs have expired and maintenance services are now provided through Seqwater's *Infrastructure Maintenance* team. The Noosa WTP continues to be maintained and operated under contract with Veolia Water Australia.

Drinking Water Quality Management Plan

Maintenance schedules have been prepared based on a review of the existing schedules and recent performance of existing infrastructure and equipment. Adjustments have been made to meet legislative requirements, codes of practice, equipment manual schedules, and the knowledge, experience and feedback from maintenance staff.

The *Strategic Maintenance* team is responsible for continuously improving the maintenance plan and updating CIS accordingly. This is undertaken through investigations of breakdowns/failures, asset performance reviews and best management practice. Any controls identified during water quality risk assessments and development of site-specific HACCP plans that can be entered in to maintenance plan are updated on CIS through the *Strategic Maintenance* team. Additionally, controls identified through the management of HACCP excursions or water quality incidents can also lead to revised maintenance schedules.

4.4.2 Integrated Maintenance Management System

The maintenance plan is held on Integrated Maintenance Management module on Seqwater's Corporate Information System (CIS). This plan provides all maintenance strategies, schedules and job plans, costings and renewal data.

Before the commencement of the month, the regional *Maintenance Planning Officer* is responsible for running the schedules that generate the work orders. *Key Operations* and *Infrastructure Maintenance* staff at each site receive the work orders which include:

- Maintenance work orders and job plans, i.e. the detailed work instructions of the job to be performed.
- Operational work orders and check lists, i.e. a plant checklist which includes infrastructure, equipment and instrumentation checks.
- WH&S work orders, which include house keeping checks relevant to the water quality and environment management systems.

After the work is completed the work orders are signed and returned to regional *Maintenance Planning Officer* and entered into CIS. Additional work orders are then raised to complete any further work identified during the month. Emergency or urgent maintenance identified during the month is however immediately notified to the relevant *Maintenance Supervisor* who raises corrective work orders through the regional *Maintenance Planning Officer*.

Drinking Water Quality Management Plan

4.4.3 Renewals

Renewals planning and implementation has targeted areas identified through the 'due diligence' process (Cardno Audits) and the available renewals documentation from the previous authorities.

Since 2010, Seqwater has commenced more detailed site assessments through the development of a Facility Asset Management Plan (FAMP) for each site. The FAMP workshop participants include a Maintenance Planner, Operations Coordinator, Maintenance Coordinator, Process Engineer, and Drinking Water Quality Coordinator. Other inputs will include planning and drinking water quality data.

The FAMP determines asset condition and criticality assessment, and identifies improvement opportunities, which will be an input to the future renewals process. Once completed, FAMPs are linked to the capital program. In the final steps of this process, stakeholders sign-off on the FAMP and budget (which includes a 10 yr forecast).

4.4.4 SAMP

Seqwater has developed a SAMP ([PLN-00059](#)) which was approved by Department of Environment and Resource Management (DERM) on 13 July 2009. The SAMP outlines a detailed Operational, Maintenance and Renewals Plan for the next 5 years. A 10 year view was included in the SAMP. The *Manager Strategic Maintenance* is responsible for the SAMP.

4.5 Materials and Chemicals

Seqwater's water treatment plants currently use the supply arrangements for the provision of drinking water treatment chemicals that existed prior to the water reform's transition on 1 July 2008. Accordingly a list of suppliers and whether they are ISO 9001 certified companies has been documented in the site specific HACCP plans. Where a discrepancy exists and a supply company without a certified quality system is being contracted, then the HACCP plan identifies the appropriate course of action (e.g. whether the company is progressing towards certification and any additional quality assurance that Seqwater may need to carry out).

Seqwater is currently selecting suppliers through a tender evaluation process. Seqwater has specified chemical quality in the tender specification which includes meeting the requirements of the relevant AWWA/ANSI standard and the maximum concentrations of any particular contaminants (consistent with Sections 8.5–8.8 of the ADWG (2004)). The requirement for suppliers to provide Certificates of Analyses is also included.

The Water Delivery EGM has assigned *Southern Operations Manager* the procurement portfolio which covers procurement across the Water Delivery Group. This includes responsibility for leading the management of treatment chemical supplies and the above tender evaluation process.

Under the new supply arrangements the delivery of chemicals will be managed so that shelf life (for e.g. degradation of sodium hypochlorite) is not extended and stock is either regularly resupplied or rotated. These requirements are being addressed through the

Drinking Water Quality Management Plan

tender evaluation and contract negotiation processes, and this action has been recorded in the Drinking Water Quality Management Improvement Plan at Appendix 12.1.

Chemicals received by Seqwater for fluoridation of the water supply have specific requirements detailed in the Code of Practice. To meet these obligations and ensure the quality of the fluoride product used by Seqwater is maintained, the procedures at Appendices 4.5 and 4.7 ([PRO-00910](#) and [PRO-984](#)) and wall charts at Appendices 4.6 and 4.8 ([REG-00080](#) and [REG-00144](#)) are in place for the receipt and acceptance of sodium fluorosilicate and sodium fluoride deliveries.

Seqwater also requires that materials that come in to contact with drinking water are appropriately selected to ensure that there are no adverse effects on the drinking water supply. As a minimum, only materials that comply with AS/NZS 4020 should be allowed to come into contact with drinking water. This process is covered in the SAMP (section 4.4.3).

Drinking Water Quality Management Plan

5 Element 5 – Verification of Drinking Water Quality

Verification of drinking water quality provides an assessment of the overall performance of the system and the ultimate quality of the drinking water being supplied to 'customers'. Verification incorporates monitoring drinking water quality as well as assessment of consumer satisfaction.

5.1 Drinking Water Quality Monitoring

For each site there is a customised verification monitoring program that has been developed during the risk assessment process. This monitoring program is detailed in the site specific HACCP Plan. For some water treatment plants there was a lack of historical verification / compliance sampling in either the raw or treated water and therefore there was a high level of uncertainty of risk during the assessment. In these cases a comprehensive sampling program has been established to gather data to reduce the uncertainty of the risks for those systems. Sample site location and sampling frequency for each parameter is documented.

In addition there is a statutory requirement under the *Water Supply (Safety and Reliability) Act 2008*, to undertake mandatory monitoring. Mandatory monitoring began on 1 January 2009 whereby any existing monitoring program in place at that time must continue for all systems until there is an approved Drinking Water Quality Management Plan in place. The verification monitoring detailed in the site specific HACCP Plan will replace the existing mandatory monitoring when this Plan is approved.

The *Public Health Act 2005* and *Public Health Regulation 2008* also have mandatory monitoring requirements. Monitoring must be undertaken on a daily basis for fluoridated water supplies and reported on the correct forms provided in the Code of Practice. Monitoring must also be undertaken for *Escherichia coli* in the reticulation system, at the frequency specified by Queensland Health in the *Public Health Regulation 2005*. Schedule 3A of the *Public Health Regulation* outlines the testing requirements. Seqwater owns several small reticulation systems which serve recreation parks, Seqwater offices and small communities along side some of its storages.

The results of the monitoring program are required to be reported to OWSR every quarter until this Drinking Water Quality Management Plan is approved and an annual reporting program commences. Under the *Market Rules*, the Water Grid Manager is to be provided a copy of these reports. Non-compliances with water quality criteria, including summaries of any drinking water quality incidents, are provided with this report. The immediate reporting of drinking water quality incidents to the OWSR is covered in section 6.2.

For the water treatment plants covered under this plan, verification monitoring samples are collected either by the Operators or external laboratory staff. In the case of Operator collected samples the external laboratory pickup the samples on the day of collection from a designated site for analysis. The site specific HACCP plans detail for which parameters the analysis is NATA accredited.

Operators have been provided training in sample collection for microbiological, physical and chemical analysis. The training was conducted by Seqwater internal analytical laboratory staff. It is recognised that improvement is required in this area (for both

Drinking Water Quality Management Plan

operational and verification monitoring), and an Seqwater 'Key Initiative' project (funded in the 2010/11 financial year) has been instigated for improved training of Operators in sample collection (refer to Improvement Plan, Appendix 12.1).

Seqwater is currently reviewing its sampling and analytical arrangements and it is expected that both sampling and analyses will be undertaken by selected third party NATA accredited laboratories and specialist research laboratories (for specialised testing). These arrangements are subject to a tender evaluation process and implementation of the successful tender is expected to be completed by 2011. The tender specification documents the analytical method used and the minimum detection limits of that method, thus ensuring the testing methods for the verification monitoring have the required sensitivity.

5.2 Consumer Satisfaction

Seqwater is currently developing a process for recording all consumer / customer complaints and this has been recorded in the Drinking Water Quality Management Improvement Plan (Appendix 12.1). Under the *Market Rules*, Seqwater has only one customer, namely the SEQ Water Grid Manager. However, the *Operating Protocols* are an instrument that exists to regulate the operational interactions between the Grid Service Providers. Via these instruments, Seqwater is working with other grid participants, including LinkWater and the Distribution entities, to develop clear two-way reporting requirements for data and information transfer, including consumer complaints that may be related to Bulk water quality issues.

5.3 Short-term Evaluation of Results

Figure 4.1 shows the responsibilities for the evaluation and communication of verification monitoring results on a short term basis.

Drinking Water Quality Management Plan

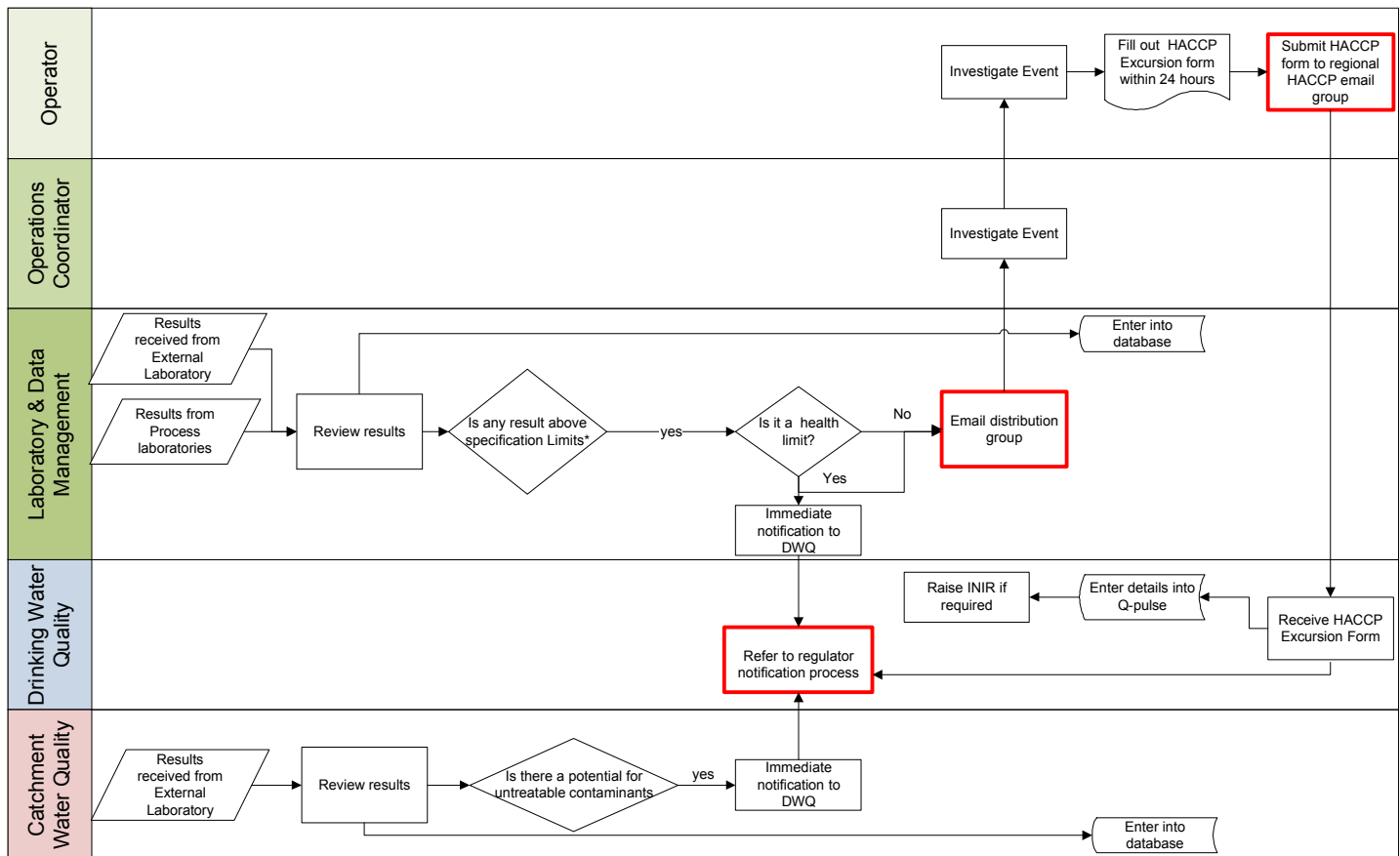


Figure 5.1 Communication and evaluation of verification monitoring results

All verification monitoring is out sourced through external laboratories, and the results are sent to Seqwater's Laboratory and Data Management team (via the email address operations@seqwater.com.au). This team is responsible for the review of any verification monitoring results received to confirm that the water produced at any WTP complies with the appropriate standards. It is the *Principal Coordinator Laboratory and Data Management's* responsibility to ensure that the verification results are electronically stored on a suitable database and that the treatment plant Operators and Coordinators are notified of the results in a timely manner. If a parameter exceeds a health based guideline value in ADWG (2004), then the *Water Quality Manager* is to be notified immediately so that regulatory reporting can be initiated.

The Catchment Water Quality Team also undertakes a similar monitoring process, albeit with a sampling program based on catchments and storages. If there is potential for untreatable contaminants, then the *Water Quality Manager* is to be notified immediately so that regulatory reporting can be initiated and preventive or corrective actions can be undertaken through the incident management process (Element 6).

Seqwater has appointed regional *Operations Coordinators* to oversee the operation of every water treatment plant. It is the Coordinators' responsibility to check water quality results weekly and investigate any results that either exceed the guideline values in ADWG (2004), or the Critical Limits that have been established for each water treatment plant.

Drinking Water Quality Management Plan

Any non-conformances to these water quality targets identified from verification monitoring are reported internally using the HACCP Excursion Notification form (Appendix 4.3 / [FRM-00027](#)) as shown in Figure 1. There is a section on the form for notification of a breach of an ADWG guideline value. Depending on the parameter this may initiate the incident management process (Element 6) and trigger reporting to OWSR. The *Drinking Water Quality Coordinator* responsible for the site is responsible for registering excursions on Q-Pulse and recording any necessary corrective action requests.

The *Principal Coordinator Laboratory and Data Management* is also responsible for producing monthly reports and during this process all data will be analysed for compliance against the appropriate standards and assessed against previous data for any variations. These monthly reports include reporting to Seqwater's Board of Directors and the SEQ Water Grid Manager (i.e. Customer confidence reporting; the website can be found at <http://www.seqwgm.qld.gov.au/Customer-confidence-report.aspx>).

5.4 Corrective Action

Seqwater has a process for corrective actions which utilises the Q-Pulse application and an Issue Notification and Response procedure (Appendix 5.1 / [PRO-00003](#)). All improvements, including corrective actions, are recorded and tracked in the Issue Module on Q-Pulse where they can be directly entered by the responsible *Drinking Water Quality Coordinator*. In the absence of Q-Pulse access, the details can be submitted through a *Notification of Issue* Form (Appendix 6.9 / [FRM-00001](#)) to the *Senior Management Systems Coordinators* (who will then register it on Q-Pulse). Once all the corrective actions for a particular issue are complete, the responsible Manager or Coordinator "assigned" as the responsible person for the issue can close the issue out and record it as resolved on Q-Pulse.

Section 6.2 covers reportable drinking water quality incidents in more detail. Also, a procedure which contains some responses to non-conformance with water quality criteria can be found at Appendix 6.8 ([PRO-00707](#)).

Seqwater, specifically the *Water Quality Manager*, is responsible for reporting drinking water quality incidents and their proposed or completed corrective actions to the Office of the Water Supply Regulator (OWSR) in accordance with the *Water Supply (Safety and Reliability) Act 2008*. A copy of the incident report is provided to the SEQ Water Grid Manager in accordance with the *Market Rules*.

6 Element 6 – Management of Incidents and Emergencies

6.1 Communication

6.1.1 Communication protocols and contact lists for relevant agencies and key personnel

Internal contact numbers are documented in the Seqwater procedure 'On-call Arrangements' (Appendix 6.1 / [REG-00001](#)). This document outlines the duty roster and internal contact lists, which include:

- WTP Supervisors and Coordinators ([REDACTED])
- Dam Supervisors and Coordinators ([REDACTED])
- Drinking Water Quality Coordinator ([REDACTED])
- Duty Manager (Tel 1800Seqwater [REDACTED])
- Executive General Manager ([REDACTED])
- Key internal stakeholders.

The 'On-call Arrangements' also clearly states the on call roster for dam and water treatment plant coordinators, Drinking Water Quality Coordinators, Duty manager and Executive General Managers. It is the responsibility of the *Principal Coordinator, Incident & Emergency Management* to ensure that this list is kept up to date by reviewing the procedure every 6 months and making adjustments on an on-going basis to cover absences due to leave or business travel.

The Water Grid Manager is responsible for the *SEQ Water Grid Emergency Response Plan* shown at Appendix 6.2 ([ERP-00014](#)). The contacts of all external stakeholders relevant to incident management across the grid are listed Attachment A to this document.

Seqwater is required to have its own plan for the management of incidents and emergencies which is consistent with the SEQ Water Grid Emergency Response Plan. Additionally, Seqwater's Incident and Emergency Response Plan (Appendix 6.4 / [ERP-00001](#)), and the associated Seqwater's Incident Manager's Handbook (Appendix 6.3 / [ERP-00050](#)), also lists the key internal and external emergency contacts.

These lists cover all water grid participants and the lines of communication are clearly identified in the plan. The contact details for other relevant stakeholders identified during incident management can be found in the Seqwater Stakeholder Register (Appendix 1.4 / [REG-00002](#)) and the PRW Communication procedure (Appendix 6.5 / [PRO-00708](#)).

6.1.2 Public and media communications strategy

Seqwater's Strategic Relations and Communication team is responsible for dealing with all external public and media communication via the SEQ Water Grid Manager Communication team. Through the Strategic Relations and Communication team there is only one avenue for external communications and all staff have been notified through

Drinking Water Quality Management Plan

incident management training (Appendix 6.6 / [TRA-00008](#)) to maintain communications at an internal level until directed otherwise by an EGM or CEO.

The *Water Quality Manager* has been authorised by the Executive Management Team to report water quality incidents identified under this DWQMP to the Office of the Water Supply Regulator (OWSR) and a procedure for this process is shown at Appendix 6.7 ([PRO-00707](#)). The OWSR's incident reporting template is shown at Appendix 6.8 ([RFM-00139](#)). Email Carbon Copies (CC) of such reports are to be provided to this EGM (or the appropriate EGM in the new structure) and the Water Grid Manager (notifications@seqwgm.qld.gov.au) when dispatched to OWSR. Advice is also to be provided to the *Principal Coordinator Incident and Emergency Management*.

The SEQ Water Grid Emergency Response Plan (Appendix 6.2 / [ERP-00014](#)) provides the communications protocols, including a water grid participant and government stakeholders and stakeholder outside the water grid such as the media, Tables 12–13 (pp 44–48). The need for a Seqwater external public and media communication plan or procedure has been recorded in the Drinking Water Quality management Improvement Plan at Appendix 12.1. In the absence of such a plan or procedure, the SEQ Water Grid Emergency Response Plan is to be followed.

6.2 Incident and Emergency Response Protocols

6.2.1 Procedures and response plan for potential incidents and emergencies

There are a number of processes that define how Seqwater is notified and manages incidents and emergencies:

- HACCP Excursion Notification procedure (Appendix 4.2 / [PRO-00656](#)), including:
 - HACCP Excursion Notification form (Appendix 4.3 / [FRM-00027](#)), or
 - Notification of Issue form (Appendix 6.9 / [FRM-00001](#));
- Procedure: Linkages between the DWQMP and Incident and Emergency Response Plan (Appendix 6.10 / [PRO-00933](#));
- Seqwater Incident Management Responsibilities (poster) (Appendix 6.11 / [LEG-00053](#));
- Seqwater Incident Manager's Handbook (Appendix 6.3 / [ERP-00050](#));
- Seqwater Incident and Emergency Response Plan (Appendix 6.4 / [ERP-00001](#));
- SEQ Water Grid Emergency Response Plan (Appendix 6.2 / [ERP-00014](#)); and
- Seqwater Drinking Water Quality Incident Reporting to the OWSR procedure (Appendix 6.7 / [PRO-00656](#)), including:
 - OWSR's *Drinking water quality: incident reporting* form (Appendix 6.8 / [RFM-00139](#)).

For incidents occurring in the water catchment and dams there are Emergency Action Plans for Water Quality which are a group of detailed processes and procedures for dealing with specific water quality incidents such as:

Drinking Water Quality Management Plan

- high inflow event,
- cyanobacteria,
- hydrocarbon spill,
- waste dumping,
- terrorism,
- sewage release, and
- fauna kills.

These plans have been developed for all water sources. The Wivenhoe Dam and Catchment EAP is directly relevant to the augmentation of supplies with PRW and can be found in the Lake Wivenhoe Water Quality Management Plan. These plans contain their own communications strategy a function as a sub-set of the overall Seqwater Incident Management process.

OWSR has provided a list of non-reportable parameters and these are available at http://www.derm.qld.gov.au/water/regulation/drinking/non_reportable.html

All incidents are recorded and tracked on the *Issues* module on Q-Pulse as shown in the User's Guide to Q-Pulse (Appendix 10.2 / [PRO-00031](#)). The *Business Improvement Manager* is responsible for the management of this system and resolved incidents must be closed out once they are complete.

The *Principal Coordinator, Incidents & Emergency Management* is responsible assisting the nominated *Incident Manager* in order to ensure that incident is managed and documented in accordance with these processes.

6.2.2 Emergency response plan training and regular testing

All operational staff will be trained and assessed in the Seqwater incident and emergency process. The current training presentation is shown in Appendix 6.6 ([TRA-00008](#)) and the On Call Arrangements are shown at Appendix 6.1 ([REG-00001](#)).

Seqwater has a process of testing its incident and emergency response plans by conducting Emergency Response Scenarios. Additionally, it will participate in the SEQ WGM's scenarios and exercises. The *Principal Coordinator, Incident & Emergency Management* is responsible for the planning and conduct of staff training, rehearsals and testing. These mock scenarios will be undertaken on at least a six-monthly basis, with the first scenario conducted by the SEQ WGM during March 2010.

Drinking Water Quality Management Plan

6.2.3 Incident and Emergency Response Plan and the revision of protocols as necessary

The Incident Management Responsibilities flyer/poster (Appendix 6.11 / [LEG-00053](#)) describes the responsibilities of Seqwater staff from the first person aware to the Executive General Manager and CEO. The nominated *Incident Manager's* responsibilities are also covered in the Incident Manager's Handbook (Appendix 6.3 / [ERP-00050](#)). Additionally, the *Principal Coordinator, Incident & Emergency Management* is responsible for assisting the nominated *Incident Manager* assemble the Incident Management Team and ensure that lessons are documented and actions are identified as a result of any incident.

Outcomes of this process may include an investigation and any follow up actions documented as corrective/preventive actions on the Q-Pulse system's Issue module. Findings from these processes would lead to system improvements and may lead to a process change, procedure improvement or recommendations for operational or capital works improvements.

7 Element 7 – Employee Awareness and Training

Seqwater's ability to successfully operate water supply systems relies not solely on engineered components, but also the knowledge, skills, motivation and commitment of staff and contractors. This requirement is reflected in the *Water Supply (Safety and Reliability) Act 2008* and *Market Rules* whereby Seqwater, as a water service provider, must have sufficient, adequately experienced and trained operating personnel available to conduct its water supply operations properly.

7.1 Employee Awareness and Involvement

7.1.1 Staff Inductions

Seqwater's staff induction process includes an introduction to the Drinking Water Quality Policy (Appendix 1.1 / [POL-00012](#)) and this DWQMP in order to ensure all employees and contractors who join Seqwater understand the importance of water quality and their role in achieving a safe, quality product. This brief presentation is shown at Appendix 7.1 ([TRA-00009](#)). The Drinking Water Quality Policy is available to all employees through the Water Quality page on Seqwater's intranet site. It can be accessed by external stakeholders and the community through Seqwater's website at <http://www.seqwater.com.au/public/news-publications/water-quality-policy>.

7.1.2 Mechanisms to Increase Employee Awareness

Drinking water quality awareness road show. The Drinking Water Quality Team has conducted awareness training sessions through a road show that was conducted across SE Queensland for all staff from the water treatment plant sites. The road show presentation is at Appendix 7.2 ([TRA-00010](#)). These sessions included the following training objectives:

- Importance of drinking water quality and significant historical incidents.
- Impact of staff actions on drinking water quality and public health.
- Regulatory and formal requirements that require a DWQMP.
- Explanation and understanding of the principles of HACCP.
- Where HACCP fits into to the formulation of a site specific elements of the DWQMP.
- Ongoing requirements to maintain effectiveness of the system (record keeping, reporting, audits and continuous improvement).

Incident and emergency response training and rehearsals are conducted separately by Water Delivery staff and facilitated by the *Principle Coordinator, Incident & Emergency Management*.

HACCP risk assessment workshops. *Operations Coordinators* and *WTP Operators* actively participate at the HACCP risk assessment workshops and team meetings

Drinking Water Quality Management Plan

related to their regional area. Their inclusion in the HACCP assessment process and ongoing meetings has been invaluable in gaining their operational knowledge and experience but also, in providing exposure to the principles of HACCP and the ADWG's *Framework for Management of Drinking Water Quality*. Accordingly, operations staff are to continue to be included in all risk assessments, the development of HACCP plans and ongoing HACCP team meetings.

Staff bulletins and review meetings. Seqwater's management and communication structure is shown in Figure 7.1. Regular updates on the drinking water management system and the improvement program are to be promulgated through the weekly staff news letter, *Inform*. Emergent issues that need to be communicated more urgently, at the discretion of the CEO, can be promulgated through the staff bulletin, *Message from the CEO*. Furthermore, updates to the material presented at the awareness road show or the DWQMP can also be presented at the Business Review Meetings which are held for all staff at regional centres across SE Queensland every quarter. The *Water Quality Manager* is responsible for ensuring that drinking water quality awareness, including any changes to the DWQMP, is communicated through these mediums.

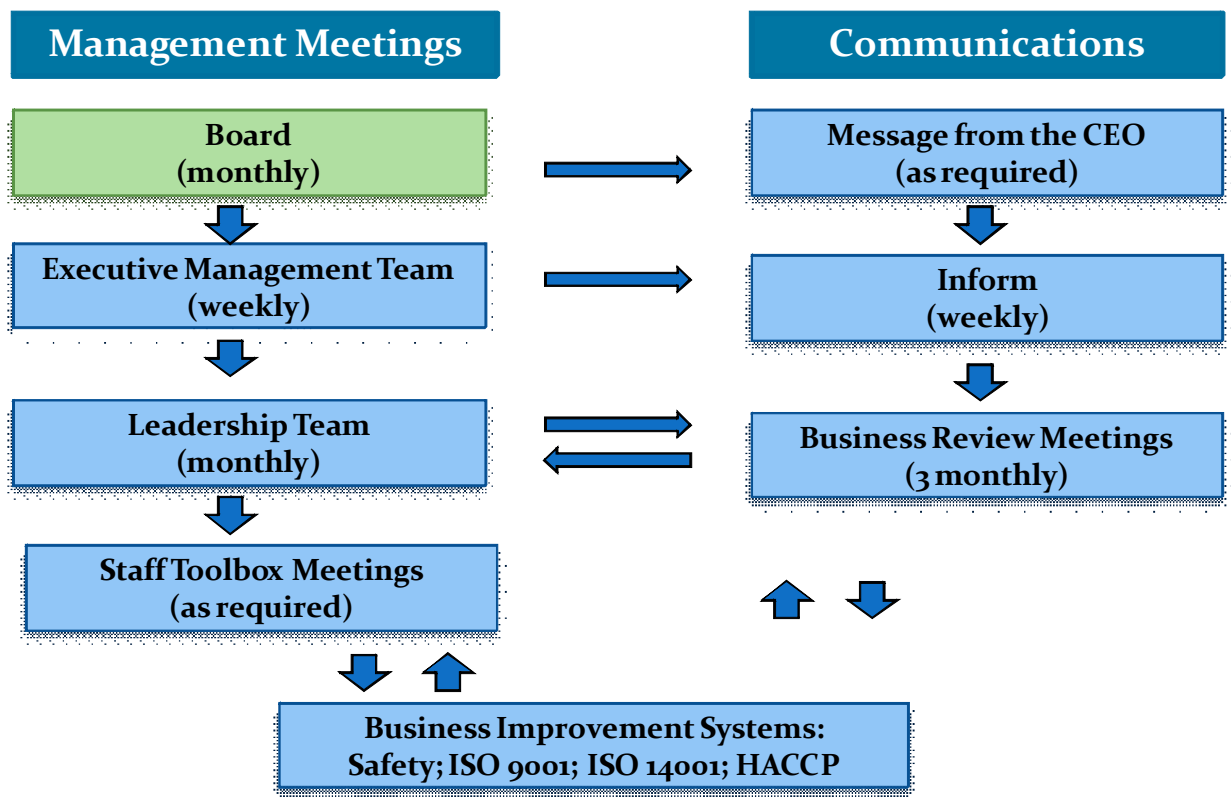


Figure 7.1 Management and staff communication structure

Dissemination of water quality reports. A brief presentation on HACCP excursions and any patterns that have emerged over the past 12 months will be provided to each water treatment plant's HACCP team by the region's *Drinking Water Quality Coordinator* on at least an annual basis. At this meeting, the outcomes of the annual re-validation (verification) of the Critical Limits and the internal audit findings for the plant will also be discussed. Where a need exists to hold this meeting more frequently due to an emerging issue, then interim HACCP team meetings will be held.

Drinking Water Quality Management Plan

Additionally, HACCP excursions and any patterns that have emerged are reported to the CEO and Executive Management Team by the *Water Quality Manager* on a quarterly basis.

7.1.3 Employee Participation

Seqwater is to communicate responsibilities for aspects of water quality management so that all employees can identify how they contribute to water quality management. These responsibilities are clearly defined in employee Position Descriptions (PD), and significant responsibilities against some positions are also to be provided in this DWQMP and the site specific HACCP plans. The responsibilities held by staff who routinely affect water quality has also been reinforced at the road show presentations (Appendix 7.2 / [TRA-00010](#)).

Seqwater has established a notification system for workplace improvements which allows employees to put forward ideas to help achieve the objectives of the drinking water quality management system, along with other parts of Seqwater's integrated management system. The form to be used for Issue Notifications and Improvement Requests (INIR) is provided at Appendix 6.4 ([TRA-00008](#)) and staff have the option to electronically submit an INIR directly through the Q-Pulse Issues Module. The details and progress of any INIR forms/Q-Pulse entries submitted by employees are to be tracked and closed out on the Q-Pulse application (section 10.1 / ([PRO-00001](#))).

Feedback from regional or site operations team (tool box) meetings, including suggested improvements to the drinking water quality management system, are also required to be submitted by the *Operations Coordinator* by direct entry into Q-Pulse or by sending an INIR form to the *Senior Management Systems Coordinator* for entry into Q-Pulse.

7.2 Employee Training

7.2.1 Employees Experience and Qualifications

All managers and coordinators at Seqwater are responsible for ensuring that all members of their team have the knowledge, experience and competence to safely complete their tasks and ensure the safety and quality of the final treated water product. Table 7.1 identifies employee experience and qualifications pertinent to drinking water quality management at Seqwater.

Where a manager or coordinator identifies knowledge, experience or qualification requirements that are essential for a staff member to correctly complete their tasks and ensure the safety and quality of the final treated water product, then this requirement is discussed with the *Manager Learning and Development* so that it can be included in the training program (including the relevant staff members' *My Achievement Plan*) and reflected in the Position Description for their role.

Training records are to be maintained as described in section 7.2.3.

The *Learning and Development* team provides guidance and support for the management of education and training including the identification of skills gaps and training needs.

Drinking Water Quality Management Plan

Currently a task analysis and audit is being undertaken by the *Learning and Development Team*. This will identify training that is required for today as well as for the future. This will also allow training to be planned in a structured way. This will enable the implementation of an Annual Training Calendar that will be aligned to the gaps, skills and training requirements that are needed to develop and maintain a competent workforce. Learning and development activities will be provided by external or internal training providers dependant on the expertise and requirements needs. A skills matrix will be in place by the end of 2011 that will enable employees to view what training is needed for career planning or working 'across' the organisation. This will enable the establishment of a co-ordinated educational program that will enhance employee competency levels, skills sets and knowledge that is need across the organisation

A mentoring training package has been designed and will be delivered early in 2011. This program will work in conjunction with training programs encouraging cross-skilling and shared experiences. It will build and improve the training offered as well as sharing ideas, methods and tasks required to transfer knowledge and skills required to work in operational areas.

Table 7.1 Experience and Qualifications relevant to Water Quality Management

Employee Role	Qualification	Experience/Other Requirement
All staff and contractors	Seqwater Induction	An induction kit which included a self-paced learning CD was provided to all employees who transitioned to Seqwater on or before 1 July 2008. A Seqwater Induction Form was required to be completed, signed and returned to HR for these employees. All new employees are required to attend an Induction training session conducted monthly by the Human Resources team at 240 Margaret Street, Brisbane.
All employees, contractors, visitors	Site Specific Inductions	Necessary supervision of contractors and visitors to ensure their safety and the safety and quality of the drinking water supply is not compromised. All contractors and visitors are required to sign-in on arrival to the site. A Site Induction Checklist Form is to be completed and signed before the work or tour can commence.
Water Treatment Plant Operators / Lead Operators	Certificate II or III in Water Industry Operations or equivalent	Desirable qualification only. Unqualified employees to be provided with peer support or supervision, as appropriate, from a senior operations team member who is qualified. All Treatment Plant Operators are to be provided with the opportunity to attain Certificate IV qualifications. Certificate level qualifications are not currently legislated, but may be prescribed in future years in accordance with the <i>Water Supply (Safety and Reliability) Act 2008</i> .
Operations Coordinators (Water Treatment Plant Supervisors)	Certificate II or III in Water Industry Operations or an appropriate equivalent / higher qualification	Mandatory qualification as part of the selection criteria for this role. An appropriate equivalent or higher qualification could be an Associate Diploma or Degree in a relevant field combined with water treatment experience. Additionally, Coordinators are to have at least 5 years

Drinking Water Quality Management Plan

Employee Role	Qualification	Experience/Other Requirement
		experience in water treatment operations.
Water Treatment Plant Supervisors and Operators	-	Ongoing training sessions for the implementation of new plant and equipment (e.g. fluoridation) and maintaining the state of the art of water treatment operations (e.g. coagulation, clarification and filter optimisation). Includes internally organised training as well as seminars held by industry groups such as WIOA.
All internal lead auditors and auditors	RABQSA Lead Auditor / Auditor Course or equivalent qualification	Additionally, staff without previous auditing experience are to complete at least one audit with an experienced Lead Auditor before completing internal audits alone.
Drinking Water Quality Coordinators (HACCP Team Leaders / Drinking Water QMS Auditors)	RABQSA Drinking Water Quality Management System Auditor Certification Scheme Formal ISO22000 or Codex HACCP Training Course or equivalent qualification	Complete the necessary competencies and actively participate in the internal audit program before leading internal audits or participating in external audits for client Water Service Providers. Complete the course requirements for the RABQSA Food Safety Management Systems competency or an equivalent (ISO22000 / Codex HACCP) qualification. Previous experience in water or industrial environment working with quality management systems (ISO 9001, ISO 22000, or Codex HACCP).

7.2.2 Training Needs and Resources

Seqwater generally budgets funds to the value 5% of each employee's remuneration towards training. The need for a training requirements register to be developed has been recognised, and is currently being developed as described in section 7.2.1. The need for this training requirements/skills register has been included as an action in the improvement plan at Appendix 12.1. The register will provide an openly accessible list of training courses and opportunities. The Q-Pulse Training module and a *Water Delivery Training Gap Analysis* spreadsheet (Appendix 7.3) will be used as an interim arrangement for managing training records and identifying shortfalls. In order to achieve the experience and qualification requirements identified in section 7.2.1, the following training needs, resources and support have been identified.

It is Seqwater's aim that all water treatment plant operators and their immediate supervisors are qualified in Certificate II or III in Water Industry Operations or equivalent. Where this is not currently the case, the opportunity to complete up to Certificate IV training is to be made available to the employee through a suitable Registered Training Organisation (Note: Presently Certificate III is available, however, a Certificate IV course is expected to be developed in the near future). The costs associated with this training are covered in the site's operational budget. This training has commenced for unqualified operators at Seqwater.

Some unqualified operators may not take up the opportunity to complete the above mentioned courses, for e.g., those staff that are nearing retirement. The Operations Coordinator responsible for an unqualified employee's site is to ensure that peer support or supervision is provided, as appropriate, from a senior operations team member who is qualified so that there is no significant risk of the safety and quality of the product being

Drinking Water Quality Management Plan

compromised. It should be noted that some of these unqualified operators often have significant operational experience (i.e. between 10–40 years) during which time they have actively participated in industry workshops, conferences and internally conducted water quality management activities (for e.g., audits, presentations and review meetings). Therefore, they have a good working knowledge of the treatment process and the management of drinking water quality.

All operators are required to attend training on new treatment processes that are about to be implemented (e.g. fluoridation), the state of the art of water treatment processes (e.g. filter optimisation), and refresher training. Filter optimisation training workshops were completed in July 2009. More recently, a seminar on Chemical Dosing, Coagulation and Clarification was conducted by Water Industry Operators Association (WIOA) at Seqwater during June 2010. The *Northern Operations Manager* is overall responsible for identifying and organising training opportunities such as these on an ongoing basis. The *Operations Coordinators* and *Operators* also actively participate in other WIOA activities including workshops held around Australia. This participation will include presentations to be made by Operational staff in order to share Seqwater's experiences and network with other industry professionals. The costs associated with this training and participation at professional development activities are to be covered in the project's delivery budget or the site's operational budget, as appropriate.

All staff that are required to undertake internal audits will be provided with the opportunity to complete the RABQSA Auditor/Lead Auditor courses, or an equivalent qualification, through a local Registered Training Organisation that specialises in running IMS and Food Safety training. The RABQSA Auditor/Lead Auditor courses have the advantage in that they contribute towards becoming certified under the RABQSA Drinking Water Quality Management System (DW QMS) Auditor/Lead Auditor certification scheme. The costs associated with this training are to be covered in the budget for the relevant team from which the staff member belongs (for e.g. IMS, Water Quality).

The Water Quality team staff will be provided the opportunity to complete the necessary training and examinations to become certified under DW QMS Auditor/Lead Auditor Certification Scheme.

7.2.3 Age of Workforce Structure and Skills Retention

Seqwater has representatives on two Skills Formation Strategies (SFS). There is a state funded Water Industry SFS as well as Water Grid Manager level project, both of which will address the workforce issues that are facing the water industry. The SFS is planned and informed of its future directions by industry that utilises a stakeholder cluster approach. It informs and provide effective workforce planning as well as identifying future training requirements. This may relate to:

- Existing skills of workers
- Career paths
- Succession Planning
- Job design

Drinking Water Quality Management Plan

- Attraction and retention

The *Learning and Development* team are working in conjunction the Water Delivery Group in providing training for existing workers in Cert III Water Operations. A Water Treatment Operator training program will be implemented in January 2011 that will provide skills knowledge and experience to new operators in the water industry providing rigorous succession planning for the future.

7.2.4 Training records

Seqwater is to maintain records of employee training requirements and the currency of training in relation to the management of drinking water quality on its Human Resources module of the Corporate Information System (CIS) due to be finalised in September 2010. The Q-Pulse Training module is being used as an interim arrangement for maintaining employee records for training related to drinking water quality management until the CIS module is in place.

Employees will have computer access to their records through CIS and have the ability to check that their records accurately reflect their competence and formal qualifications. The *Training Coordinator* (Water Delivery) is responsible for updating the system for all Water Delivery staff to ensure that all employee records are maintained and employee entries are verified. The successful implementation of this system has been recorded on the improvement plan at Appendix 12.1.

All participants attending a training course provided by Seqwater are to sign a *Training Attendance Form* (FRM-00043). Once the training has been satisfactorily completed, CIS is to be updated to reflect the competencies achieved. Competencies/qualifications from external training providers, including any copies of certificates, are also to be entered into CIS.

Any Learning and Development intervention is being referenced by signed attendance sheets as well as certificates of attainment or attendance. A hard copy of each of these are being stored in a confidential file as a legislative requirement. This Learning and Development File is keep in a securely locked area. It contains hard copies of all employees attendance records, training certificates and qualifications. This file is available for audit purposes as well as a reference point for all employees to have access to their own records in view of training needs.

8 Element 8 – Community Involvement and Awareness

Community involvement and awareness on water supply issues, including water quality, is important in maintaining public confidence and the organisation's credibility. A communication program including consultation, education and promotional activities needs to establish an active two-way exchange of information and ideas. Through the 2008 State Government water reforms, Seqwater was established within a water industry framework. Seqwater will seek to work actively with the Water Grid Manager, other grid participants and distribution entities to promote a positive image of the water delivery system for South East Queensland. It is important to note the final framework of public communications and community engagement within the Grid is yet to be finalised.

8.1 Community Consultation

Seqwater, conducting operations as part of the water grid, is limited in how it consults the SE Queensland community on decisions or issues directly or solely affected by its operations.

Other entities in the State Government's reformed water industry have the lead on promoting government water policy and initiatives directly to the SE Queensland community. For example these include the following:

- Queensland Water Commission (QWC), or the relevant State Government minister(s), will lead any communication regarding decisions by the government on water sustainability (e.g. water restrictions), water supply options and legislated process changes (e.g. fluoridation). <http://www.qwc.qld.gov.au/>
- SEQ Water Grid Manager will lead most communication and consultation with the community relating to the water grid and its operations. Grid participants including Seqwater may be requested to be involved in joint communications from time to time. <http://www.seqwgm.qld.gov.au/>

Seqwater will work with the QWC and SEQ Water Grid Manager to provide information as required to assist with communication and consultation with the community. Under the SEQ Water Grid Communications Protocols, Seqwater will have the lead in delivering the new Water Grid community education program.

8.2 Communication

Seqwater is committed to the continued engagement of the SE Queensland community through the new Water Grid communications protocols including:

- An updated website presence to actively promote Seqwater initiatives and activities including current key dam levels and rainfall impact and recreation conditions (<http://www.seqwater.com.au/>).
- Direct media through daily/weekly dam updates in print and electronic media via the SEQ Water Grid Manager Communication team.

Drinking Water Quality Management Plan

- Working with the SEQ Water Grid Manager to develop and implement future interactive education centres similar to the facility at Wivenhoe Dam.
- Continuing to implement the community and schools education/tour program of SEQ Water Grid assets including dams, catchments and treatment plants, desalination plant, recycled water treatment plant (Bundamba).
- The publication of Development Guidelines for Water Quality Management in Drinking Water Catchments (Appendix 8.1 / [GDE-00001](#)).
- The publication of Water Quality Confidence reports through the WGM, shown on the WGM website on a monthly basis (<http://www.seqwgm.qld.gov.au/Water-Quality.aspx>).

The Strategic Relations and Communication team has primacy over all external communications and *Manager Strategic Relations and Communication* approval is required for external communications that are commercially or publicly sensitive in consultation with the SEQ Water Grid Manager Communication team.

Informal, or less formal, communications between Seqwater and the Water Grid Manager and Distribution entities on water quality issues occurs through the *Water Quality Manager* at the Water Grid Technical Committee.

The implementation of the Seqwater Recreation Management Framework is underway and involves consultation with key recreation users and community groups across the region.

Seqwater actively communicates and consults with irrigators and lessees within the catchments on a range of land management issues. Seqwater has developed and published *Development Guidelines for Water Quality Management in Drinking Water Catchments* (Appendix 8.1 / [GDE-00001](#)). The purpose of these guidelines is to assist land users, developers and Government authorities in achieving sustainable water quality outcomes for land uses, development and activities within Seqwater's water supply catchments. The guidelines assist those involved in planning and development by providing information on how development can be undertaken in the catchments to recognise and manage impacts on water quality.

9 Element 9 – Research and Development

Seqwater's commitment to conduct applied research and development activities on drinking water issues will ensure continual improvement and the ongoing ability to meet its drinking water quality requirements. This has become increasingly important as a significant number of Seqwater's treatment operations become part of the SE Queensland water grid. Research at a local level also remains important as it identifies and addresses issues that are characteristic of specific sites and their treatment processes.

9.1 Investigative Studies and Research Monitoring

9.1.1 Establish programs to increase understanding of the water supply system

Seqwater is committed to conducting research and investigation programs to fill gaps in knowledge identified during the hazard identification and risk assessment process. An example of such a program was an extensive 15-day survey that was conducted during August 2008 across 15 sites for which there was little or no treated water quality data after the handover over these water treatment plants from the Local Government authorities to Seqwater in the month prior. The results from this study were essential to fill an information gap in an overall business risk assessment that was conducted to identify any unacceptable risk to the community through the treated water supply and to identify the need for any urgent process improvements.

Additionally, Cardno Ltd was commissioned by the State Government to undertake a technical due diligence study at each of the water treatment plant sites. These condition assessment reports have been collated by Seqwater as useful information to fill knowledge gaps on the condition of water treatment infrastructure and its performance including water quality.

Knowledge gaps have also been identified during the risk assessment process for a particular treatment site (for e.g., HACCP assessment workshops). The HACCP team leader is responsible for recording these gaps and the requirement for further research and investigation in the site's improvement plan.

A quarterly review of the Drinking Water Quality Management Improvement Plan (Appendix 12.1) by the Drinking Water Quality team will ensure that those knowledge gaps identified continue to be filled. Additionally, the *Water Quality Manager* is required to report on progress of the improvement plan at quarterly presentations to the CEO and Executive Management Team.

Each Operations team (Northern and Southern) has a Process Improvement unit with the capability and resources to conduct process audits and site-specific research and development work. Each comprises a *Process Improvement Specialist* (leader) and two *Process Engineers* who are capable of undertaking programs such as analytical surveys and pilot trials. Additionally, Seqwater will engage consulting services from external agencies where additional support is required or time constraints apply.

Additionally, Seqwater has established a Research and Development team within the Asset Delivery Group which will support Seqwater's operations through the

Drinking Water Quality Management Plan

management of research partnerships and governance across both natural and built assets.

9.1.2 Use information to improve management of the water supply system

Seqwater uses outputs from its research, investigations and awareness activities to improve drinking water quality management. An awareness of emerging technologies and issues is currently gained through:

- Active participation in steering groups and networks (e.g. WSAA water quality network, SEQ WGM Water Quality Technical Committee, WSAA W&H Committee, QLD Urban Water Security Research Alliance);
- Representation at Water Grid Manager forums and industry presentations (e.g. CRC WQ & Treatment road show and AWA presentations);
- Membership of Water Research Foundation (through WSAA subscription) which provides reports and periodicals, as well as the opportunity to submit proposals and participate in collaborative research projects; and
- Subscriptions to industry news and journals (AWA journal, SAI Global news feeds).

Seqwater is continuing to assess (as recorded in Appendix 12.1) the value of participation in other networks and subscriptions (for e.g., the newly formed WQRA, Health Stream) to improving drinking water quality management and keeping up to date with the state of the art of water treatment technology.

Seqwater also brings a range of operational, scientific and planning staff together when undertaking site specific HACCP assessments and reviews of its DWQMP. The development of the overarching DWQMP involved input and review from teams across the organisation including Asset Delivery, Business Services, and Organisation Development. The HACCP team for each site comprises a wide range of personnel with backgrounds and experience as shown in Table 9.1.

Table 9.1 HACCP Team Composition

Organisational Position	Background/Experience
HACCP Team Leader / Workshop chairperson	Coordination of the workshops and the development of the HACCP plan. Conversant with the ADWG framework and the principles of HACCP. Scientific and risk management backgrounds with a good understanding of water treatment processes.
Operations Coordinator	Experience supervising the operation of the current treatment process. Knowledge of any historical events including upgrades or water quality issues.
Lead Operators / Operators	Experience operating with the current treatment process. Knowledge of any historical events including upgrades or water quality issues.

Drinking Water Quality Management Plan

Organisational Position	Background/Experience
Catchment Manager / Officer	Catchment management including hazards and issues specific to the catchment and raw water storage from which the site draws. Knowledge of any historical events in the catchment.
Process Engineer / Chemist	Process engineering experience, specific to water treatment processes and instrumentation.
Water Quality Manager / Coordinator	Support to the HACCP Team Leader. Conversant with the ADWG framework and the principles of HACCP. Scientific and risk management backgrounds with a good understanding of water treatment processes.

Additionally, Seqwater uses external industry specialists who are qualified under the RABQSA Drinking Water QMS Auditor scheme, to peer review its overarching DWQMP and site specific plans.

9.2 Validation of Processes

9.2.1 Validation of processes and procedures to effectively control hazards

The *Water Supply (Safety and Reliability) Act 2008* requires that the validation of control measure combinations is covered in a Water Service Provider's DWQMP in accordance with the Framework for Management of Drinking Water Quality.

Seqwater explains in detail why the particular control measures, such as Critical Limits and target criteria, have been selected in its CCP/QCP procedures (e.g. filtration) for each specific site. In the risk Register to these plans, Seqwater demonstrates that the collective effect of the target criteria and Critical Limits at all identified control points can consistently and effectively control the hazards.

An example of the validation of the controls for filtration from a site specific procedure is shown in Table 9.2. These controls are defined earlier in the procedure and the target criteria and limits are also defined in the site's Critical Control Point (CCP) Summary.

Table 9.2 Example – Validation of the Controls for Filtration

Controls	Validation
Critical Control Point decision	The process step of Filtration is the final barrier against pathogens resistant to chlorine disinfection, in particular, <i>Cryptosporidium</i> . Critical process for effective disinfection.
Preventive Measures	Filtration is heavily dependent on the effectiveness of upstream processes (coagulation, flocculation and sedimentation) and optimisation of the physical filtration process (i.e. media selection, media condition, backwash). Preventive measures focus on the optimisation and reliability of upstream processes and the physical filtration process. They are consistent with industry good practice and records indicate are effective in

Drinking Water Quality Management Plan

	maintaining process in control.
Operational Target	The target of 0.1 NTU is achievable during normal operation and is recommended by the Water Treatment Alliance as an achievable filtered water turbidity target that will minimise the risk to treated water safety. 0.10 NTU is the 95 th percentile target in Drinking Water Standard for New Zealand 2005 (revised 2008) for individual filtered water turbidity for 4 log removal of <i>Cryptosporidium</i> .
Action Limit	Early indication that the filtration process is failing due to significant change in the raw water, problems have arisen in the clarification process or filter performance has drifted due to excessive head loss, backwash due etc. The treatment process is likely to fail if corrective actions are not applied. Triggers a HACCP report.
Critical Limit	Corrective actions from the Action Limit have not worked or the raw water has continued to change at an undesirable rate or significant filter breakthrough is occurring or upstream chemical dosing is not optimised. The Critical Limit of 0.3 NTU individual filters is based on Drinking Water Standard for New Zealand 2005 (revised 2008) 99% individual filter turbidity target to achieve 4 log reduction of <i>Cryptosporidium</i> . Exceeding 0.3 NTU presents an unacceptable level of risk to treated water safety. Triggers a HACCP report.
Corrective Actions	Filtration is a physical removal process but is only effective if upstream coagulation and flocculation processes are optimised. For this reason corrective actions are focused on the coagulation, flocculation and clarification as well as backwashing of the filter. The detailed corrective actions have been demonstrated as effective in returning the process to control (Action Limit) and preventing the release of unsafe water – i.e. shutdown (Critical Limit)

9.2.2 Revalidation of processes

The *Water Quality Manager* is responsible for the conduct of the revalidation of control processes at each Critical Control Point and changes are to be considered and reviewed by the remainder of the HACCP team for the specific site. Revalidation is to occur in the following instances:

- Annual revalidation of all Operational, Action and Critical Limits and Control Measures for each CCP;
- In response to a system or condition changes (for e.g., a processes change or a significant change in raw water quality);
- In response to a significant incident, HACCP excursion or Issue Notification and Improvement Request; and
- To take into account emerging knowledge from the information gained from the research activities described in section 9.1.

Drinking Water Quality Management Plan

When a process change occurs, the re-optimisation of the affected parts of the treatment train is to occur and this process must be documented, including any necessary changes to HACCP plan and its Critical Limits.

9.3 Design of Equipment

Seqwater is to validate the selection and design of new equipment and infrastructure to ensure continuing reliability. The project officer responsible for the delivery of the new equipment or infrastructure is responsible for ensuring that this occurs. This requires the Asset Planning and Delivery team to work closely with the Operations and Laboratory and Data Management teams responsible for the specific site.

The Operations, Laboratory and Data Management and Drinking Water Quality Team members also have a responsibility to actively participate in the Capital Expenditure workshops held by the Asset Planning and Delivery team.

Seqwater is yet to document its process for the design or purchase of new equipment that includes design specifications to ensure that new equipment will be able to meet the intended requirements. The procurement processes need to ensure that fitness for purpose and optimal performance are written into the design specifications for each project. The requirement for this process or procedure has been recorded in the Drinking Water Quality Management Improvement Plan at Appendix 12.1.

The processes for evaluating the design of new equipment and infrastructure to ensure that required water quality outcomes are not compromised include:

- Trials with new instruments parallel to existing instruments;
- Equipment or instrumentation that is proven in an identical process elsewhere;
- Bench-top or Pilot scale studies;
- Full scale proving trials prior to the use of new equipment or infrastructure; and
- Commissioning period prior to the connection of the plant to the distribution system.

Design issues will also be covered under Seqwater's Strategic Asset Management Plan (SAMP).

The Water Grid Manager is responsible for identifying any impact that the design of equipment may have on the management of water quality within the water grid. Accordingly, as part of the *Market Rules*, the Water Grid Manager will be able to have input into Seqwater's SAMP and the opportunity to review and comment on this DWQMP prior to submission for approval by the Regulator.

10 Element 10 – Documentation and Reporting

The management of documents and records is essential to ensure that all information relevant to water quality management can be effectively retained and retrieved. A system of regular reporting is also important so that the relevant people receive the information necessary to make timely informed decisions about the management or regulation of drinking water quality.

10.1 Management of Documentation and Records

10.1.1 Document Control System

The Document and Records Management Procedure (Appendix 10.1 / [PRO-00001](#)) and Preparing and Managing New Document Procedure ([PRO-00875](#)) provides the process for the development and management of documentation within Seqwater's Integrated Management System (IMS).

Seqwater manages documents and records in its IMS using the **Q-Pulse** application. A user guide to the Q-Pulse application is provided at Appendix 10.2 ([GDE-00022](#)).

Documents that are registered in Q-Pulse, such as plans, procedures and forms, are made available for access by all staff either directly through Q-Pulse or through the Seqwater intranet. An action to ensure all procedures referred to in this DWQMP and the site specific plans have been registered on Q-Pulse has been recorded in the Drinking Water Quality Management Improvement Plan at Appendix 12.1.

Presently all controlled copies of documents are held as electronic copies accessible through these systems. The document control and version details can be seen in the footer of the document. All printed copies or copies saved to disk are regarded as uncontrolled copies and are not current unless matched against the current version obtained through Q-Pulse. The registration and storage of documents on this system is performed by the *Senior Management Systems Coordinator*. The *Senior Management Systems Coordinator* is responsible for ensuring that documents are registered according to their status in the appropriate folder in Q-Pulse.

Draft, *Active*, *Obsolete* and *Inactive* (suspended) documents can exist in the system, however, all users outside of the Business Capability team only have read-only access to the *Active* documents, although any document can be saved to folders outside of Q-Pulse in order for changes/updates to be made. All document revisions are available in Q-Pulse via the document's registration revision history.

10.1.2 Records management training

Training in Q-Pulse is available to all staff through the Business Capability team. The training program for this system commenced November 2008. To date, Q-Pulse training has since been attended by all Operations Managers and Coordinators, Water Quality staff, and other key staff. These staff are likely to be the Approvers and technical

Drinking Water Quality Management Plan

authors (Document Owners) of registered documents related to drinking water quality management.

Additionally, operator training on the HACCP Excursion Notification form (Appendix 4.3 / [FRM-00027](#)) and the HACCP Action Limit Register (Appendix 4.4 / [FRM-00106](#)) has been undertaken during the Water Quality and HACCP awareness training sessions through a road show that was conducted across all water treatment plant sites (section 7.1.2 and Appendix 7.2 / [TRA-00010](#)).

10.1.3 Review and revision of documentation

All HACCP plans and procedures are to be reviewed annually consistent with the revalidation (section 9.2.2) and audit processes (section 11.2). Procedures are also to be reviewed where a need for change has been identified as a result of an incident investigation, improvement request or the review of a HACCP excursion. Changes to procedures are usually made by the responsible Document Owner, and then endorsed by the recorded Approver who is usually the responsible manager, before adoption as a new version in Q-Pulse.

Other records that relate to water quality management, such as Issue Notification and Improvement Requests (INIR) and HACCP Excursion Notifications, are also reviewed by the relevant managers and the Drinking Water Quality Team. The manager or coordinator responsible for the affected area is required to close out the response to the workplace or system improvements required.

10.2 Reporting

Seqwater is committed to the accurate and timely reporting of necessary information to both internal staff and external groups.

10.2.1 Internal Reporting

Internal drinking water quality reports include HACCP Excursion Notifications (and related trends), HACCP Action Limit exceedances, internal audit reports and drinking water quality management reports to the senior executive.

HACCP Excursion Notifications (Appendix 4.3 / [FRM-00027](#)) are to be completed by operations staff within 24 hours of a Critical Limit being breached. HACCP Action Limit exceedances (Appendix 4.4 / [FRM-00106](#)) are to be completed by operations staff in the weekly report covering when the Action Limit was breached. These requirements are reflected in the HACCP reporting procedure at Appendix 4.2 ([PRO-00656](#)).

The HACCP Excursion Notifications form is distributed by email to the relevant personnel and the form is readable on Blackberry devices carried by managers and coordinators. The distribution list is based on the location where the excursion occurred and there are seven distribution lists, one for each of the seven regions (Figure 10.1) which cover Seqwater's water treatment operations. The distribution list for any one zone includes the EGM Operations, all Operations Managers and Coordinators, Drinking Water Quality team, Business Capability team, Catchment Water Quality Principal Coordinator, and the water treatment plant operators from that zone. Additionally, the Operations Coordinator responsible for that zone is to be notified of the HACCP excursion in person or by telephone.

Drinking Water Quality Management Plan

When completed please e-mail to the relevant HACCP group						
HACCP Sunshine Coast	HACCP Moreton Bay	HACCP Somerset	HACCP Mt Crosby	HACCP Redland	HACCP Gold Coast	HACCP Scenic Rim

Figure 10.1 The seven operations regions as shown at the top of the HACCP Excursion Notification form

The *Northern* and *Southern Operations Managers* and the *Water Quality Manager* are responsible for escalating any HACCP excursions that need to be brought to the attention of the Executive Management Team.

Internal auditing and the reporting of the audit findings is to be conducted in accordance with section 11.2.2 and the internal audit procedure (Appendix 11.1 / [PRO-00002](#)).

The *Drinking Water Quality Coordinator* responsible for the operations region concerned is responsible for ensuring that the HACCP excursion notifications and audit reports are recorded in Q-Pulse (section 10.1.1).

Drinking Water Quality Management Reports to the senior executive involves a formal presentation every two months by the *Water Quality Manager* to the CEO and Executive Management Team. These presentations will commence when all WTP HACCP plans are finalised, i.e. by end of 2010. The report will detail significant HACCP and ADWG specification exceedances, water quality events, water quality trends and progress of the Drinking Water Quality Management Improvement Plan (Appendix 12.1).

10.2.2 External Reporting

External reporting with respect to drinking water quality management can be divided into four groups:

- Reporting between other grid participants, not including the Water Grid Manager;
- Reports to the Water Grid Manager;
- Reports to the Office of the Water Supply Regulator (Department of Natural Resources and Water (DNRW)); and
- Reporting to the community, including all of the above stakeholders, through open forums.

Seqwater communicates and reports with **other Water Service Providers** participating in the water grid as defined in the Water Grid Emergency Response Plan (Appendix 6.2 / [ERP-00014](#)). This reporting is normally based on exception reporting whereby reports are released when contractual or ADWG health limits on water quality parameters are exceeded. The *Northern* and *Southern Operations Managers*, *Water Quality Manager*, *Principal Coordinator Incident and Emergency Management* and the *Principal Coordinator Drinking Water Quality* are responsible for coordinating the reporting to these groups.

Reports to the **Water Grid Manager** are in accordance with contractual obligations, Grid Instructions and the SEQ Water Grid Emergency Response Plan. Accordingly, reports to

Drinking Water Quality Management Plan

the Grid Manager are prepared by the *Northern and Southern Operations Managers* and the *Principal Coordinator Laboratory and Data Management*. Reporting of Water Quality summary data for the SEQ Water Grid Manager's customer confidence report occurs on a monthly basis and is the responsibility of the *Principal Coordinator Laboratory and Data Management*. The Water Grid Manager also receives carbon copies of reports to the Office of the Water Supply Regulator described below.

Reports to the **Office of the Water Supply Regulator (OWSR)** are to occur when an incident occurs (e.g. exceedance of a ADWG health-related specification) and a summary of water quality results is provided on a quarterly basis during the mandatory monitoring program period, or an annual basis (for the sites covered by this Plan) after approval of this DWQMP.

The *Water Quality Manager* is responsible for reporting incidents to OWSR in accordance with section 6.1.2, the procedure at Appendix 6.8 ([PRO-00656](#)), and the form at Appendix 6.9 ([FRM-00139](#)). The procedure and the timeliness of such reports are consistent with OWSR's *Water Quality and Reporting Guideline for a Drinking Water Service (Qld) DRAFT 2009* ([LEG-00164](#)).

Reporting of water quality data (from each site's verification monitoring program) is initially scheduled to occur on a quarterly basis during the mandatory monitoring program period, and then annually as part of the annual report required after approval of this DWQMP. The *Water Quality Manager* is responsible for preparing and presenting the report to the CEO and Executive Management Team before final review and publication by the *Manager Strategic Relations and Communication*.

The reports provided to OWSR will also be made available to the Water Grid Manager in accordance with the *Market Rules*. The quarterly/annual reports will summarise HACCP and ADWG specification exceedances, water quality events, water quality monitoring results, and descriptions of the water supply system. The content for these reports is to be consistent with requirements of the above mentioned *Water Quality and Reporting Guideline for a Drinking Water Service* and any template produced by OWSR.

11 Element 11 – Evaluation and Audit

The long-term evaluation of drinking water quality results and the audit of drinking water quality management are important methods of review that measure the performance of the system and identify opportunities for improvement.

11.1 Long-term Evaluation of Results

11.1.1 Collection and evaluation of long-term data

The long term evaluation of results typically includes a systematic review of monitoring results from the preceding 10 years where the data is available. The systematic review is to be conducted through the collation of data and graphical presentation of historical results as detailed under Element 2 of this DWQMP and following the guidance provided in ADWG 2004 (*Statistics*, Information Sheet 3.1, Part IV).

Seqwater's Laboratory and Data Management team currently collects and evaluates verification monitoring data for each water treatment plant in DatApproach, a dedicated database and quality management system for laboratory information. Process Laboratory (internal) and Operator Laboratory test results are recorded in spreadsheets on a dedicated Water Quality server (G:\Ops-WQ). The former SEQ Water Corporation had a dedicated database, Time Studio, which is still being used to store catchment management monitoring results and these arrangements will remain as interim measures until DatApproach has been fully implemented across the whole organisation. Catchment monitoring from continuous profiling or on-line monitoring instrumentation and weather stations will continue to be recorded on the Time Studio database which is designed specifically to handle telemetered data. The complete implementation of the DatApproach database or Laboratory Information Management System (LIMS) has been recorded in the Drinking Water Quality Management Improvement Plan at Appendix 12.1.

Operator Laboratory testing is conducted on a more regular basis (for e.g., per shift) than monitoring conducted through internal and external analytical staff. The data from these tests is recorded on the Plant Data Sheet (Appendix 4.1) which are kept on the Water Quality server (G:\Ops-WQ). These results and trends, along with SCADA trends, can be compared with the monitoring results from analytical laboratory tests.

11.1.2 Documentation and reporting of long-term results

The *Water Quality Manager*, and the Water Quality Team, is responsible for the long-term evaluation of results and reporting the findings. This review is to be performed annually for each treatment plant and storage and is usually done concurrently with the audit and revalidation processes which are also site-specific and performed annually.

The long-term evaluation of final treated water results is also replicated in the production of the routine reports to Seqwater's CEO and Board of Directors (with recommendations) and the Office of the Water Supply Regulator.

Drinking Water Quality Management Plan

11.2 Audit of Drinking Water Quality Management

The process for the conduct of internal audits is detailed in the procedure at Appendix 11.1 ([PRO-00002](#)). Additionally, the findings of previous internal and external audits are to be considered. The documentation and communication of results will also be in accordance with this procedure.

External audits are required by Office of the Water Supply Regulator every two years and a copy of the final external audit report will also be required to be provided to the Water Grid Manager under the *Market Rules*. The *Water Quality Manager* is responsible for the conduct of the audit schedule and, through *Manager Strategic Relations and Communication*, reporting to these external groups.

Additionally, external audits are undertaken by QLD Health to review the effectiveness of fluoridation processes at Seqwater's treatment plants with fluoridation systems. The audit schedule is at the discretion of QLD Health and is currently scheduled annually.

Corrective actions identified in the audit findings are to be recorded on Q-Pulse through the Audit module and initiated by the staff member assigned as responsible for each corrective action item.

Internal audits of the drinking water quality management system, including this DWQMP and the site specific HACCP plans, are to be conducted annually for each treatment plant. A checklist and audit report template for internal audits is provided at Appendix 11.2 ([TEM-00002](#)). This form is completed during the conduct of the audit and a scanned copy is attached to the record of the audit in Q-Pulse's Audit module, where the audit details, findings and corrective actions are recorded.

The *Drinking Water Quality Coordinators* are responsible for liaison with the Business Capability team for the concurrent conduct of internal audits of DWQMP and the site specific HACCP plans with the internal integrated management system audits (i.e. quality, environment and health and safety). Where it is not practical to conduct the audits on the same day (for e.g., at a small water treatment plant), the drinking water quality management system audits will be conducted on a different occasion so as not to interfere with the operations at that site.

The current DWQMP and HACCP Plan audit schedule has been saved as an openly accessible Outlook calendar. Once audit dates have been confirmed with the on-site Operational staff, the details will be recorded in the Q-Pulse Audit module which indicates the scheduled dates and degree of completion.

The internal audit team is to comprise suitably qualified personnel as detailed in section 7.2.

External audits are conducted as peer reviews by second party auditors (for e.g., staff from other grid participants) or by accredited independent auditors and reviewers (for e.g. Quality Management System auditors or highly regarded water industry specialists).

External audits for CODEX HACCP 2003 accreditation have been conducted by BSI in December 2009 on the Corporate Drinking Water Quality Management System and the Image Flat WTP HACCP Plan and Procedures. This accreditation has been awarded

Drinking Water Quality Management Plan

and the certificate is provided at Appendix 11.3 ([LPA-00098](#)). A surveillance audit was successfully completed during July 2010.

Seqwater has scheduled further third party audits to gradually widen the scope of accreditation to include the remaining WTP sites.

An external (peer) review was also undertaken by the Water Futures Pty Ltd consultancy and the report can be found at Appendix 11.4 ([AUD-160](#)). The auditors at Water Futures are certified under the RABQSA Drinking Water Quality Management System Auditor Certification Scheme. Any recommendations from this report that are yet to be incorporated in the DWQMP or site specific HACCP Plans have been included in the Improvement Plan (Appendix 12.1).

Additionally, regulatory audits will be undertaken to meet the requirements for audit and review stipulated in the *Water Supply (Safety and Reliability) Act 2008*. These audits will be scheduled on a 2-yearly basis and the (independent/external) auditors are required to be qualified under the RABQSA Drinking Water Quality Management System Auditor Certification Scheme (as described in section 7.2, Table 7.1).

12 Element 12 – Review and Continual Improvement

Senior executive support, commitment and ongoing involvement is essential to the continual improvement and success of Seqwater's drinking water quality management system. Senior executives should regularly review its approach to drinking water quality management, develop action plans and commit resources necessary to improve operation and overall drinking water quality performance.

12.1 Review by Senior Executive

There are a number of internal mechanisms for Senior Executive review of water quality and the effectiveness of the water quality management system.

- A standing 2-monthly agenda item on the Executive Leadership Team Meeting, where the *Water Quality Manager* summarises general water quality, water quality excursions, non-conformances and incidents. The purpose of the excursion reporting is to ensure that the Drinking Water Quality Management Systems meets the needs of the business, regulators, Water Grid Manager and the customers. This reporting will commence once all the WTP HACCP plans have been finalised, i.e. by end of 2010.
- Monthly water quality review in the CEO's Board reports.
- Review of quarterly water quality reports submitted to regulator as a requirement under the Water Supply (safety and reliability) Act 2008.

12.2 Drinking Water Quality Management Improvement Plan

A Drinking Water Quality Management Improvement Plan (DWQMIP) has been developed for Seqwater which details the gaps that need to be satisfied for full implementation of the drinking water quality management system, or for continuous improvement of the system.

The DWQMIP is a "working" document and will be kept in conjunction with the overarching plan, thus allowing for reviews and updates to be undertaken regularly. The DWQMIP is provided at Appendix 12.1.

The HACCP team for each site identifies priority actions for ensuring safe water during the risk assessment process, and the development and implementation of the site-specific HACCP plan. Additionally, further improvements and related actions are identified through the revalidation of the Critical Limits (section 9.2) and the audit and review process (section 11.2). These actions are compiled and prioritised in the DWQMIP and responsible managers within Seqwater are assigned to each action (Figure 12.1, column 5) along with the required completion date (Figure 12.1, column 6).

The DWQMIP should be used to document Seqwater's commitment and progress on continual improvements. It is the responsibility of the *Water Quality Manager* to ensure all action items are reviewed and addressed by the appropriate team within Seqwater

Drinking Water Quality Management Plan

and to keep the Executive Leadership Team (ELT) informed of progress on at least a quarterly basis when presenting at ELT meetings.

The DWQIP actions relating to asset renewals, asset improvements and large scale investigative works are currently being incorporated into the Asset Delivery project program and checked for alignment with existing projects and Seqwater's Strategic and Operational Plan. Actions yet to be budgeted will be incorporated in the planning process of the Asset Management Framework with a view to assigning budget for delivery in 2011/2012. Project Managers will be assigned with the overall responsibility to deliver the project in consultation with the project stakeholders and signoff from the client / sponsor.

Drinking Water Quality Management Plan

Table of Appendices

Appendix

1.1 Water Quality Policy

1.2 Regulatory and Formal Requirements Register

1.3 Seqwater Organisational Charts

1.4 Seqwater Stakeholder Register

2.1 Risk Assessment Methodology Review

Mt Crosby East Bank WTP HACCP Plan

Mt Crosby West Bank WTP HACCP Plan

Esk WTP HACCP Plan

Lowood WTP HACCP Plan

Wivenhoe WTP HACCP Plan

4.1 Operational Monitoring – Plant Data Sheets

4.2 HACCP Excursion Notification Procedure

4.3 HACCP Excursion Notification Form

4.4 HACCP Action Limit Register

4.5 Procedure for the Receiving of Sodium Fluorosilicate Deliveries

4.6 Acceptance Criteria for Sodium Fluorosilicate Deliveries

4.7 Procedure for the Receiving of Sodium Fluoride Deliveries

4.8 Acceptance Criteria for Sodium Fluoride Deliveries

5.1 Issue Notification and Response Procedure

6.1 Communications Protocols and On-call Arrangements

6.2 SEQ Water Grid Manager's Emergency Response Plan

6.2 SEQ Water Grid Manager's Emergency Response Plan

6.3 Seqwater Incident Managers Handbook

Drinking Water Quality Management Plan

Appendix

6.4 Seqwater Incident and Emergency Management Plan (IERP)

6.5 Purified Recycled Water (PRW) Communications Procedure

6.6 Seqwater Incident Management Training Presentation

6.7 Drinking Water Quality Incident Reporting to OWSR Procedure

6.8 OWSR's Drinking Water Quality Incident Report Form

6.9 Notification of Issue Form

6.10 DWQMP and IERP Linkages Procedure

6.11 Incident Management Responsibilities (Staff Flyer)

7.1 Water Quality and HACCP Staff Induction Presentation

7.2 Water Quality Management and HACCP Awareness Roadshow Presentation

7.3 Water Quality Management Related Training

8.1 Seqwater Development Guidelines

10.1 Document and Records Management Procedure

10.2 User's Guide to Q-Pulse

11.1 Internal Audit Procedure

11.2 DWQMP and HACCP Plan Audit Check List and Report Template

11.3 CODEX HACCP: 2003 Certificate of Registration

11.4 Audit Report – desktop audit of DWQMP and subordinate documents by Water Futures

12.1 Drinking Water Quality Management Improvement Plan