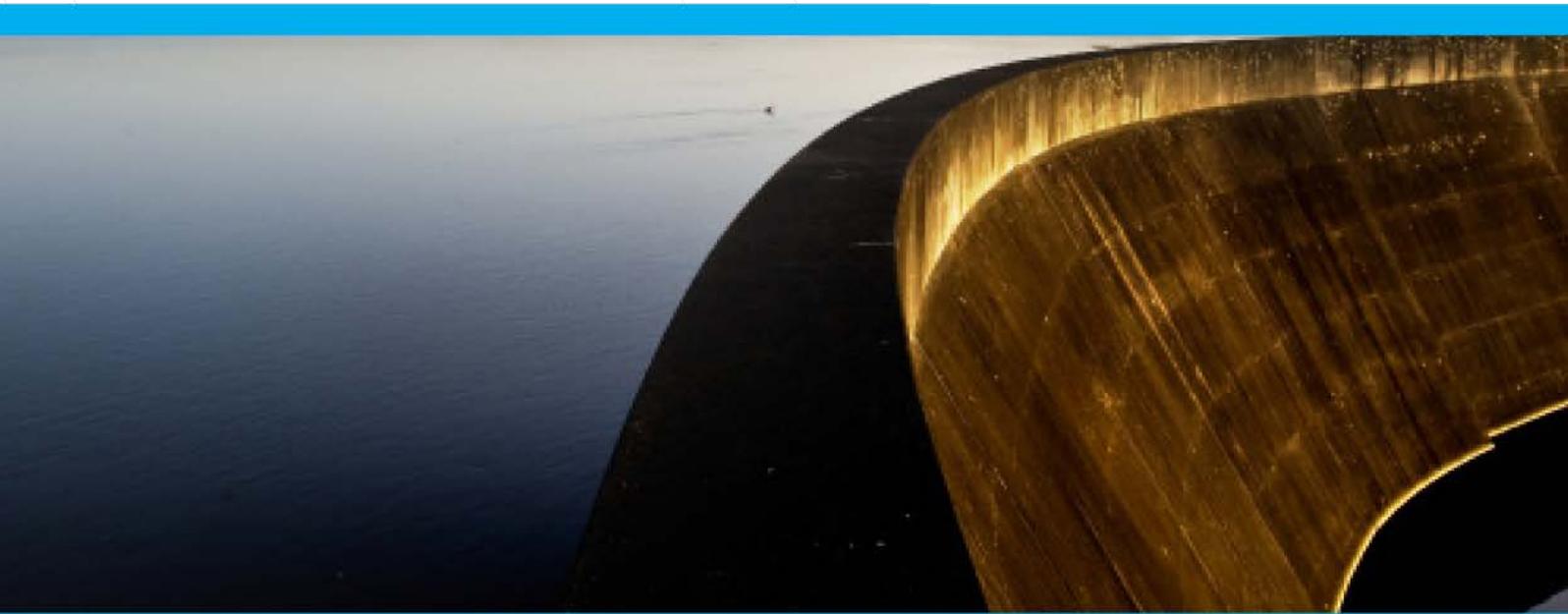


Annual Report 2013-14

Seqwater (SP507) Drinking Water Quality Management Plan



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1. Executive summary

The Queensland Bulk Water Supply Authority trading as Seqwater (Seqwater) was restructured on 1 January 2013 as part of the Government's reform of water supply arrangements in South East Queensland. This involved the merger of LinkWater, Seqwater, the SEQ Water Grid Manager and parts of the Queensland Water Commission and their respective functions and activities, into a single integrated business.

Following the merger, Seqwater has consolidated its drinking water quality management systems under a single Drinking Water Quality Management Plan (DWQMP). The amendment application for this plan was approved by the Queensland Water Supply Regulator under section 99 (1)(b) of the *Water Supply (Safety and Reliability) Act* on 18 March 2014.

This is the first annual report under the consolidated Seqwater DWQMP. It outlines the water quality management activities for the management of risk and issues encountered during the period July 2013 – June 2014.

In 2013-14, Seqwater met the approval conditions for its DWQMP.

Seqwater's operational and verification monitoring programs have occurred in accordance with the programs documented in the approved DWQMP. Operational monitoring includes real-time monitoring through process instrumentation, operator grab sample tests and observations, and analytical laboratory testing undertaken by Seqwater's process laboratories.

Operational monitoring programs are designed to assess the performance of preventive measures identified for particular hazardous events and to prompt requirements for corrective actions. The verification monitoring involves a sampling and analytical testing program which is predominantly undertaken by an external NATA-certified laboratory and has included over 40,000 source water (raw water) analyses, 43,332 treated water analyses, and 52,257 Supply System drinking water analyses.

Water treatment operations recorded 27 aesthetic exceedances and three health-related exceedances against the water quality criteria defined in the DWQMP, for the reporting period. One of the health-related exceedances (*E.coli*, Canungra WTP) was most likely related to sampling contamination and is unlikely to be an indication of process failure against the DWQMP. The other health exceedances (Total chlorine, at Kirkleagh WTP and Linville Town Reservoir (supplied by Kilcoy via tankered water)) were both short term events which resulted in chlorine levels marginally above the long term health guideline value in the Australian Drinking Water Guideline of 5 mg/L. The aesthetic exceedances were in general a result of the individual plants' capabilities to treat raw water under some scenarios rather than a failure of any specific or combined set of barriers. For example, source water hardness which cannot be removed through the treatment plants contributed to 18 aesthetic exceedances.

In the Supply System, there were seven individual health-related exceedances. Four of these exceedances (elevated monochloramine, in the Southern Regional Pipeline

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(SRP)) were related to a single event involving a chlorine dosing failure. The remaining three exceedances involved *E. coli* detections (Eastern Pipeline Inter-connector, Gold Coast and Logan). For all these events, there were adequate chlorine disinfection residuals present in the water supply at the time and no operational disruptions were identified. The aesthetic exceedances reduced markedly from the previous reporting year, partly due to a more efficient supply system monitoring program, but also as a result of improved processes and systems within the supply system control room and its operations. The aesthetic exceedances continued to relate to hardness issues in the Logan zone due to the abovementioned source water issues at upstream treatment operations and an isolated event where ammonia levels were elevated in the SRP due to dosing facility issues.

Seqwater reported all incidents concerning health related guideline values to the Regulator. Additionally, three operational events were reported. Two of these were source water events that were declared non-reportable by the Regulator as there was no identified impact on the safety of the drinking water supplied. The third event related to operational fluoride monitoring at Mt Crosby WTP, where despite the shutdown of the dosing facility due to a batching fault, the fluoride concentration was observed in operational monitoring to be marginally above the ADWG value (of 1.5 mg/L) for a short duration at one of the two supplying reservoirs. All incidents were reported within the required timeframes and have since been closed with the corrective actions finalised.

Drinking water quality management systems improvement activities completed during the reporting year included 10 risk assessment reviews, 16 internal audits of treatment plants and supply system sites, and 18 HACCP team meetings. These reviews and audits are part of a schedule that covers all of Seqwater's treatment plants and supply system sites. In addition, Aquality™ assessments and four external (SAI Global™) audits for ISO 22000:2005 management systems have also been completed. The long-term improvement initiatives identified through these assessments and reviews have been captured in a consolidated Drinking Water Quality Improvement Plan.

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2. Introduction

2.1 Purpose

This annual report has been prepared in accordance with section 141 (1a) and 142(2) of the *Water Supply (Safety and Reliability) Act 2008* (refer to the Table below). The purpose of this annual report is to provide the Queensland Water Supply Regulator (the Regulator) with information on the overall performance of the DWQMPs for the period 1 July 2013 to 30 June 2014.

Annual Report Condition	Seqwater Compliance
141 (1) A service provider must prepare an annual report that complies with section 142— (a) for each financial year after a financial year in which a strategic asset management plan, system leakage management plan or drinking water quality management plan has been approved;	The current report meets these requirements. It is required to be submitted 120 business days following the end of the 2013–14 financial year; QWSR (The Regulator) has confirmed that submission for the current report is by 18 December 2014.
142(2) For an annual report mentioned in section 141(1)(a) that relates to a drinking water quality management plan, the report must— (a) be prepared in accordance with the guidelines, if any, made by the regulator about the preparation of annual reports; and	The current report has been prepared following the Regulator’s <i>Guidelines for Service Provider Annual Reports (July 2013)</i> , including the criteria in the table on pp. 7-8. Consideration has also been given to section 5 of the <i>Drinking Water Quality Management Plan Guideline (September 2010)</i> . Seqwater has endeavoured to provide an update on the implementation of the DWQMP following the guiding principles in these guidelines.
(b) document the actions taken by the drinking water service provider to implement the plan; and	Refer to Section 3 of this report.
(c) state the outcome of any review of the plan in the financial year to which the annual report relates, and how the service provider has addressed matters raised in the review; and	Refer to Section 6 of this report. A Review of the DWQMP was completed during the 2013-2014 year.
(d) include details of the findings of, and any recommendations stated in, an audit report about a regular audit given to the regulator in the financial year; and	Refer to Section 5 of this report. A Regular audit was not required to be undertaken during the 2013-2014 year.
(e) include details of the information given to the regulator under sections 102 and 102A in the financial year; and	Refer to Section 4 of this report for details of incident/event reporting during the 2013-2014 year.
(f) include details of the provider’s compliance with water quality criteria for drinking water; and	Refer to Sections 3 and 4 of this report.

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Annual Report Condition	Seqwater Compliance
(g) if the provider supplies drinking water to customers—include details of any complaints made to the provider about the provider’s drinking water service.	Consumer complaints are managed by the downstream distribution and retail entities, with the exception of the small recreation park systems operated by Seqwater where there have been no recorded complaints. Accordingly, complaints are not detailed in this report.

2.2 Plan overview

Seqwater must comply with the Seqwater (SP507) Drinking Water Quality Management Plan (DWQMP) approved by the Regulator. The Seqwater DWQMP was developed under Chapter 2, Part 4, Division 3 of the Act. The plans form part of the corporate drinking water quality management system that Seqwater has implemented to cover all of its drinking water assets and activities that are captured by the Act. The Seqwater water quality management system has been developed to be consistent with the *Drinking Water Quality Management Plan Guideline (2010)* issued under the Act as well as the Framework for the Management of Drinking Water Quality within the *Australian Drinking Water Guidelines (ADWG, 2011)*. Accordingly, Seqwater adopts the multi-barrier approach for drinking water quality management.

Seqwater currently has responsibilities across all of these barriers, which include:

- Catchments
- Storages and dams
- Water treatment
- Disinfection
- Supply systems
- Distribution systems in recreation areas.

The Seqwater (SP507) DWQMP covers the drinking water quality management activities of Seqwater for all drinking water treatment plants and the bulk water supply systems managed by Seqwater. Accordingly, the plan applies to barriers including selective abstraction of the raw water to the management of bulk water supply assets and small distribution networks in Seqwater’s recreation areas.

The final barriers in the distribution system are predominantly managed by downstream Water Service Providers who provide distribution and connections with consumers in all systems except for Seqwater’s recreation area systems.

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3. Implementation of the Plans

Seqwater’s amended DWQMP received final approval from the Regulator on 18 March 2014. Amendments were made as part of the Review of the DWQMP, site-based HACCP plans (sub-plans) and Risk Assessments and these are detailed in section 6 of this report. Seqwater’s compliance with the conditions in the ‘Information Notice’ for its approved DWQMP are detailed in section 3.1. The risk assessment reviews completed during the 2013-2014 year are detailed in section 3.2.

Seqwater maintains an operational monitoring program which supports the multiple barrier approach to effectively manage drinking water quality as described in section 3.3. This includes the operational monitoring performed by the operators of the Water Treatment Plants. This monitoring is used to verify the operation of the plant and the accuracy of any online instrumentation available, the various Supervisory Control and Data Acquisition (SCADA) tools available at the Water Treatment Plants, and the Internal Process Laboratory results of key operational parameters. There have been no significant revisions to the operational monitoring program during the 2013-2014 year.

Seqwater’s verification monitoring plan covers a wide range of parameters that have been determined using a risk based approach and has been detailed in the DWQMP. The results of Seqwater’s verification monitoring during the 2013-2014 year are described in section 3.4 and a detailed data report in the format prescribed by the Regulator is provided in the spreadsheets at Enclosure 1. Verification monitoring, including sampling and analysis, is undertaken by an external NATA accredited laboratory and the results are recorded in the Seqwater’s Laboratory Information Management System (LIMS). There have been no variations to the verification monitoring program detailed in the approved DWQMP.

Seqwater has continuously sought improvement opportunities for drinking water quality management and the implementation of the actions in the risk management improvement program (known as the *Drinking Water Quality Improvement Plan*) during 2013-2014 as described in section 3.5.

3.1 Approval conditions

Seqwater was given final conditional approval of its amended DWQMP on the 18 March 2014 under section 99 (1)(b) of Act. The approval conditions, and Seqwater’s compliance with them, are detailed in the following table.

Condition	Compliance
No. 1. Water Quality Criteria	
Water quality criteria for drinking water including:	Compliant.
i. The standards for drinking water quality prescribed in a regulation under the Public Health Act.	Seqwater has reported all non-compliance with relevant criteria including health guideline values in the ADWG and standards in the <i>Public Health Act</i> as identified through its verification monitoring program. A review of the verification monitoring data report (Enclosure 1) found that all
ii. The criteria in any guideline, if any, made by the regulator about the quality of drinking water.	
iii. The criteria for drinking water	

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Condition	Compliance
<p>made in a condition applicable to the DWQMP.</p> <p>For the purpose of (iii), the following applies:</p> <p>All parameters that have health guideline values in the ADWG are deemed to be water quality criteria. Aesthetic guideline values are not considered to be water quality criteria and are not required to be reported.</p> <p>Seqwater is required to implement the verification monitoring program in the approved DWQMP and report any non-compliance with the water quality criteria for the parameters monitored. Additionally, Seqwater must report any non-compliance with a health guideline value through monitoring or other activity that is not part of this program.</p>	<p>such non-compliances were covered by formal reports to the Regulator using the prescribed form.</p> <p>Seqwater has fully implemented its verification monitoring program.</p> <p>Seqwater is not aware of any non-compliance with the health guideline values in the ADWG that could have been identified through other monitoring including research activities.</p>
<p>No. 2. Additional Reporting requirements; (a) events and (b) where a parameter has no water quality criteria</p>	
<p>Additional reporting requirements include:</p> <ul style="list-style-type: none"> (a) An event including anything that has happened to Seqwater's service which has escalated beyond its ability to control, and Seqwater believes, or is concerned, that public health may be impacted as a result. (b) Where a parameter has no water quality criteria which Seqwater believes cannot be managed under its DWQMP and Seqwater believes, or is concerned, that public health may be impacted. <p>These reporting requirements must be made to the regulator immediately and on the prescribed form within 24 hours.</p>	<p>Compliant.</p> <p>Seqwater has actively reported all events relating to its treatment operations which could have had the potential to impact on public health. Incident reports have included events where there was an increased risk profile.</p> <p>Seqwater routinely reports parameters which have no water quality criteria such as bromide, a potential contaminant resulting from the desalination treatment process.</p> <p>Reporting requirements are compliant.</p>
<p>No. 3. Research projects and additional reporting requirements</p>	
<p>If Seqwater becomes involved in any research activities and becomes aware of a detection that must be reported as:</p> <ul style="list-style-type: none"> • Non-compliance with water quality criteria • An event • A parameter with no water quality criteria 	<p>Seqwater is not aware of any non-compliance with the health guideline values in the ADWG, events that could impact on public health, or detections of parameters without water quality criteria that is identifiable from research activities.</p>

Condition	Compliance
These reporting requirements must be made to the regulator immediately and on the prescribed form within 24 hours.	
No. 4. Financial outlays	
The State accepts no liability for any financial outlay incurred by you in complying with the drinking water quality management plan and the conditions in this approval	No applicable claims/actions.

3.2 Risk assessment

Seqwater completed 10 risk assessment reviews for its drinking water quality management plans during the reporting year and these included Banksia Beach, Borumba, Canungra, Ewen Maddock, Gold Coast Desalination Plant, Hinze, Jimna, Kalbar, North Stradbroke Island and Petrie treatment operations.

There were seven water treatment operations listed (in a total of 43) in section 6.1 of the *Information Notice* for the approved DWQMP which are no longer in service and have not been risk reviewed. These are Atkinson Dam, Caboolture, Kilcoy (Lake Somerset), Kilcoy (Wade Street), Linville, South Maclean, Woodford.

Seqwater's remaining water treatment operations and the supply system have been reviewed and reported during the 2012-2013 year.

The findings from the recent risk assessment reviews are consistent with those reported in the 2012-2013 Annual Report; i.e., the main risks identified did not significantly change, and in most cases pathogens are the predominant limiting hazard. The following presents a summary of the significant risk management improvements that have been identified from these recent reviews:

- In some cases the residual (mitigated) risks have been further reduced by capital upgrades as a part of the regular asset management process.
- Process instrumentation and a SCADA upgrade have been completed at nearly all of Seqwater's WTPs improving monitoring and alarming, and therefore reducing the risk of non-compliant water leaving the WTP. The new instruments have typically included:
 - Raw water turbidity (if not already installed)
 - Settled water turbidity
 - Pre and Post Clear water reservoir instruments for pH, free chlorine and turbidity.
- Improvements that have been identified through incident management processes including protection from lightning strikes and power interruptions on control systems.

An Aquality assessment of the Seqwater DWQMP was conducted in May-June 2014 (refer to section 6 of this report for further details). This assessment focuses on the

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12 elements of the Framework and benchmarks the DWQMP and systems against other water supply authorities nationally.

3.3 Operational monitoring

Water Treatment Plant operational monitoring

Operational monitoring in water treatment operations includes real-time monitoring through process instrumentation, operator grab sample tests and observations, and analytical laboratory testing undertaken by Seqwater’s process laboratories. Operational monitoring programs for each Water Treatment Plant (WTP) are designed to assess the performance of preventive measures identified for particular hazardous events and to prompt requirements for corrective actions.

Following the recommendations in the ADWG with regards to the reliance on operational monitoring, the site specific Hazard Analysis and Critical Control Point (HACCP) plans generally specify online monitoring as the Critical Limit monitoring. All potential exceedances are first verified, to rule out instrumentation measurement errors, and upon verification, are reported to the Drinking Water Quality team within a specified timeframe.

The main Preventive measures are well established across all WTPs, with critical control points monitored by online instrumentation clearly identified in the process flow diagrams in each site-based HACCP Plan. Where possible, multiple levels of alarms for each online instrument through the SCADA system provide early warning of process control issues and early intervention by Operations staff. Additionally, some alarm set points are interlocked to shut the WTP down before Critical Limits are exceeded. The Critical Control Point (CCP) procedures have documented Action Limits, Critical Limits and key corrective actions including clear instructions for Operations staff and their supervisors on when the process is to be rated down or shut down as well as reporting requirements. Across Seqwater’s treatment operations, the operational monitoring system has worked successfully throughout the year with many improvements implemented.

Internal auditing (section 5) reviews the effectiveness of operational monitoring, alarm set points and the compliance with the CCP procedures. The main preventive measures typical of most WTPs are listed below with an update of the status of the preventive measures and operational monitoring.

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Coagulation	<ul style="list-style-type: none"> Raw water exceeds treatment capability Coagulant dosing failures Low alkalinity Poor pH control Poor or excessive mixing Incorrect dose rates Inadequate coagulation aids 	<ul style="list-style-type: none"> Dose water pH Chemical dosing alarms Observation checks of flocculation and sedimentation 	<p>Instrumentation for dosed water pH including alarming is established at all sites using alum as the coagulant and where pH regulation of the dosed water is in place. Additionally, the instrumentation and SCADA upgrade is providing settled water turbidity analysers and alarming across all of Seqwater's sites that have a clarification or Dissolved Air Flotation (DAF) process. Operator grab sample monitoring has been compliant with the WTP's HACCP plan which documents operational monitoring.</p>
Filtration	<ul style="list-style-type: none"> Raw water exceeds treatment capability Coagulation failure Solids carryover Poor backwashing Filtration break-through 	<ul style="list-style-type: none"> Online turbidity for each cell/filter outlet SCADA tools such as headloss, runtime / production 	<p>The instrumentation and SCADA upgrade is providing filtered water turbidity alarming across Seqwater's sites which consist of an interlock to plant operation or activate back washing, and dial-out to the on-call operator's mobile. Operator grab sample monitoring has been compliant with the WTP's HACCP plan which documents operational monitoring.</p>
Disinfection (by chlorination)	<ul style="list-style-type: none"> Chlorine dosing failures Incorrect dose rates Poor pH control High flows – low contact time 	<ul style="list-style-type: none"> Online free chlorine after dosing and after contact time Online pH and turbidity after contact time 	<p>The instrumentation and SCADA upgrade is providing filtered water turbidity alarming across Seqwater's sites which consist of an interlock to plant operation or</p>

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
	<ul style="list-style-type: none"> • Low reservoir levels • Contamination to reservoir • Filter break-through causing shielding 	<ul style="list-style-type: none"> • Reservoir levels and flows • Chemical dosing alarms 	activate back washing, and dial-out to the on-call operator's mobile. Operator grab sample monitoring has been compliant with the WTP's HACCP plan which documents operational monitoring.
Fluoridation	<ul style="list-style-type: none"> • Overdosing fluoridation chemical 	<ul style="list-style-type: none"> • Online fluoride monitoring pre and post on-site reservoir • Operator fluoride monitoring – concentration by lab testing • Operator monitoring – daily calculated fluoride dose using product weights and flow meter data. • Chemical dosing alarms 	The fluoride dosing monitoring arrangements are fully established and documented. Operator testing and checks of the online monitoring system are performed at least daily. Queensland Health periodically audit fluoridation of the water supply at all Seqwater sites with fluoridation systems.
Reticulation (recreation sites)	<ul style="list-style-type: none"> • Ingress or infiltration • Corrosion and deterioration of assets 	<ul style="list-style-type: none"> • Observation • Chlorine residual monitoring • Demand monitoring (plant operation hours and reservoir levels) • Vermin proofing inspections on reservoirs 	Reticulation systems have been monitored by on-site staff to ensure that there is no ingress from vermin or through loss of positive pressure. This is scheduled through Preventive Maintenance work orders. If leaks occur, they would be detected by these inspections and the draw on the plant's capacity. Chlorine testing on recreation park taps is undertaken and backed up by verification monitoring at the same sample sites.

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Supply System operational monitoring

Operational monitoring in the DWQMP includes the planned sequence of measurements and observations to assess and confirm the performance of preventive measures identified for particular hazardous events. Measurements are of operational parameters that will indicate whether processes are functioning effectively. As part of the ADWG Framework, ISO22000 and HACCP standards, these operational measures have been identified and summarised within the Supply System DWQMP as Critical Control Points and Operational Pre-requisite Programs.

The preventive measures are well established within the business, with CCPs monitored by online instrumentation throughout the Supply System. Operation Centre staff are able to react to the Supply System exceedances when notified through the SCADA system. Alarming is programmed into the SCADA system at three different incident levels, each defining the severity of the exceedance. Each incident level has documented contingency and escalation procedures for staff to follow. The top five critical limit alarms have been reviewed and discussed every two months at scheduled meetings. The overall operational monitoring system has worked successfully throughout the year.

Internal auditing and compliance spot-checks monitor the Operational Pre-requisite Programs. The main preventive measures are listed below with an update of the status of the preventive measures, with the main limiting hazard in most instances being Pathogens. Unacceptable risks requiring further treatment are listed in the improvement plan of this report.

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Monthly Operating Supply Schedule (MOSS)	<ul style="list-style-type: none"> Non-compliant water supplied to the Supply System by Bulk Water Suppliers Deterioration of water quality in service reservoirs due to variable water ages 	This is issued monthly to the Drinking Water Quality team for review and to provide feedback on any foreseen issues arising from different source waters.	This formalised process continues as the Monthly Operating Supply Schedule (MOSS) at Seqwater. Water Quality issues are raised if there are concerns of any localised issues and the MOSS amended accordingly. E.g. Mt Crosby MIB & Geosmin issues.
Maintain Disinfection residual	<ul style="list-style-type: none"> Non-potable water or organic matter entering service reservoir or pipeline 	Chlorine, pH and temperature parameters are measured online at all Key Interface Points which is representative to each water zone. In some locations SUVA instruments are in place	Established SCADA systems and critical limit alarming levels notify the operations centre of low chlorine residual. Escalation procedures covering different severities of alarms are well

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
	<ul style="list-style-type: none"> Contamination to reservoirs by access by third party Contamination to reservoir by vermin entry 	to provide further data. These signals are transferred and alarmed at the 24/7hrs attended operations centre. Operations center escalation and corrective action procedures are audited routinely. Training is delivered for new operations center staff.	established and are followed by operations centre staff. Corrective actions are documented in a procedure and are followed by operations centre staff and Supply System operations management. A documented procedure is allocated to maintaining chlorine residual and is used as a guideline for operational staff.
Service Reservoir Inspection Program	<ul style="list-style-type: none"> Ingress of non-potable water to reservoirs Vermin entry to reservoir Corrosion and deterioration of assets 	Service reservoir inspections are carried out monthly by the Service Contractor using a checklist and photo evidence process. These records are audited routinely to identify any deficiencies.	This process and water quality focused culture is now well established within the business. Any issues identified are raised and corrected through the work order system. Checklists and photos are checked monthly by Drinking Water Quality staff.
Mains Hygiene Procedure	<ul style="list-style-type: none"> Stagnation of reservoirs and pipelines Commissioning new assets and pipelines Maintenance and operational changes to the Supply System 	This formalised procedure provides the process to prevent contamination of pipelines and reservoirs during maintenance activities. It also covers disinfection of assets prior to returning to service. Onsite compliance checks are routinely carried out to identify any deficiencies.	This process and water quality focused culture is now well established within the business. Training is delivered during the induction of new field staff. This process is now 'business as usual'
Locked and Alarmed Hatches on reservoirs	<ul style="list-style-type: none"> Contamination to reservoirs by access by third party 	All reservoirs are locked and alarm systems notify the 24/7hr operations centre of any unauthorised access to grid reservoirs. Closed Circuit TV cameras are also in place at some reservoir sites. Security guards routinely patrol the reservoir sites.	The alarming of reservoirs is tested routinely with operations centre staff well versed in the procedures if a security breach occurs. Access to these reservoirs is managed by Works Access and permit to work procedures.

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Maintaining Positive Pressure	<ul style="list-style-type: none"> Ingress of non-potable water or organic matter to pipelines 	Pressure and flow is monitored online at locations throughout the grid. These are alarmed and notify the 24/7 operations centre of any low pressure situations.	The operations centre staff are well versed in the procedures to follow in the case that low pressure occurs within the Supply System. Planned and unplanned pipeline isolations are managed by the Mains Hygiene procedure.
Optimisation of re-chlorination through Automated control systems	<ul style="list-style-type: none"> Formation of disinfection by-products 	All chemical dosing facilities are comprehensively equipped with system redundancies including dual online instruments, UPS, multiple chemical dosing pumps, backup telemetries with multi-barrier alarming to the 24/7 operations centre.	Control systems are well established and now have proven historical track records. The operations centre has comprehensive documentation to assist in the control of these systems and are well versed in the procedures to operate these stations efficiently and effectively.
Pigging or super-chlorination of pipelines	<ul style="list-style-type: none"> High flow or changes in flow rate or direction in pipelines 	Turbidity and conductivity parameters are measured online at all Key Interface Points.	Routine cleaning programs for reservoirs are in place. However, the existing pipelines do not have a pigging program at this point in time. Biofilm testing has proven that biofilms are in low volume and pathogens have not been detected in the samples measured. High flows and direction changes are managed by the control systems and operating manuals by the operations centre.

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3.4 Verification monitoring

The verification monitoring program has been revised and approved by the Regulator during the 2013-2014 reporting year. The amended monitoring program uses a risk based approach to determine the more efficient sampling and testing schedule detailed in the DWQMP. There have been no variations to the approved monitoring programs such as missed sample runs. The results of Seqwater’s verification monitoring during the 2013-2014 year are summarised below.

The detailed data report at Enclosure 1 is in the format prescribed by the Regulator; Accordingly, it includes: the Scheme component (e.g. reticulation, source water), parameter, unit of measure, total number of samples collected (number of analyses), number of samples that did not meet the water quality criteria, minimum concentration or count, maximum concentration or count and average (mean) concentration or count. For all parameters tested more than once annually, the frequency of sampling has been distributed evenly throughout the year (weekly, monthly, quarterly, or 6-monthly).

Compliance with DWQMP and Key Performance Indicators

Drinking Water Quality compliance is measured across supply zones using the methods recommended by the ADWG and the Public Health Regulation. A supply zone is defined as a WTP and if relevant, the connected downstream components of the Supply System. For Corporate Key Performance Indicator reporting, the water quality results from routine monitoring in each supply zone are assessed over a 12 month period against the water quality criteria, with the final report being issued in June each year. The methods are briefly described below:

- **Microbiological compliance** - A supply zone is compliant if at least 98% of routinely monitored samples contain no water quality criteria, namely *E.coli* (as per Public Health Regulation).
- **Health related compliance** - For parameters sampled eight or greater times during the year, the 95th percentile result of each health related parameter shall be used for assessment against the water quality criteria. For parameters sampled less than eight times per year, the maximum reading should be used for assessment against the water quality criteria. If any value is greater than the water quality criteria, then the whole zone is deemed non-compliant.
- **Aesthetic compliance** - the average of each parameter shall be assessed against the water quality criteria only if there are impacts to downstream users. If any value greater than the water quality criteria, then the whole zone is deemed non-compliant.

Seqwater was measured to be compliant during the 2013-2014 reporting year for all of its water treatment operations and supply system zones for Microbiological, Health and Aesthetic compliance. This was assessed on 43,332 treated water analyses and 52,257 supply system water analyses (a total of 95,589 bulk water supply test results).

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Water Treatment Plant verification monitoring

Verification monitoring occurred in accordance with the Seqwater Water Quality Verification Monitoring Plan. This was undertaken by the contracted NATA certified Laboratory Service Provider at Seqwater's raw water, treated water and recreation park distribution system sample points, covering 56 different parameters at various frequencies. The verification program provides the necessary information to validate that the preventive approach to water quality management is effective.

A summary table of verification monitoring of the treated or supply system (bulk) water from 1 July 2013 to 31 June 2014 is provided below. The statistics from verification monitoring results for all parameters for both source (raw) and treated water at each operational site is provided at Enclosure 1.

Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Aesthetic Exceedances	Number of Individual ADWG Health Exceedances
Amity Point WTP	990	0	0
Atkinson Dam WTP / Recreation Park	1506 ⁽²⁾	3	0
Banksia Beach WTP	992	0	0
Beaudesert WTP	991	8	0
Boonah-Kalbar WTP	1082	0	0
Borumba Dam WTP / Recreation Park	1427	0	0
Canungra WTP	989	0	1
Capalaba WTP	1058	0	0
Dayboro WTP	1055	0	0
Dunwich WTP	989	0	0
Esk WTP	1009	1	0
Ewen Maddock WTP	52 ⁽¹⁾	0	0
Gold Coast Desalination Plant	2290	0	0
Hinze Dam WTP / Recreation Park	2100	0	0
Image Flat WTP	1996	0	0
Jimna WTP	966	0	0
Kenilworth WTP	915	0	0
Kilcoy WTP	978	0	0
Kilcoy Seib St	160 ⁽¹⁾	0	0
Kirkleagh WTP / Recreation Park	1396	0	1
Kooralbyn WTP	1051	4	0

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Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Aesthetic Exceedances	Number of Individual ADWG Health Exceedances
Landers Shute WTP	1092	0	0
Linville WTP	1078 ⁽²⁾	0	1
Lowood WTP	1016	0	0
Maroon Dam WTP / Recreation Park	1309	3	0
Molendinar WTP	987	0	0
Moogerah Dam WTP / Recreation Park	1320	1	0
Mt Crosby WTP	2002	4	0
Mudgeeraba WTP	1055	0	0
Noosa WTP	1156	0	0
North Pine WTP	974	0	0
North Stradbroke Island WTP	1078	0	0
Petrie WTP	1118	0	0
Point Lookout WTP	983	0	0
Rathdowney WTP	987	2	0
Somerset Dam Township WTP	1415	1	0
Wivenhoe Dam WTP / Recreation Park	1770	0	0
Total	43332	27	3

Notes:

- (1) Ewen Maddock and Kilcoy Seib Street operated intermittently during the reporting year and were not subject to verification monitoring whilst off-line.
- (2) Atkinson Dam and Linville WTPs which supply in stand-alone communities were taken off-line and supply demand was achieved by tankering water supplies from a nearby scheme; these sites continued to be monitored as treated water.

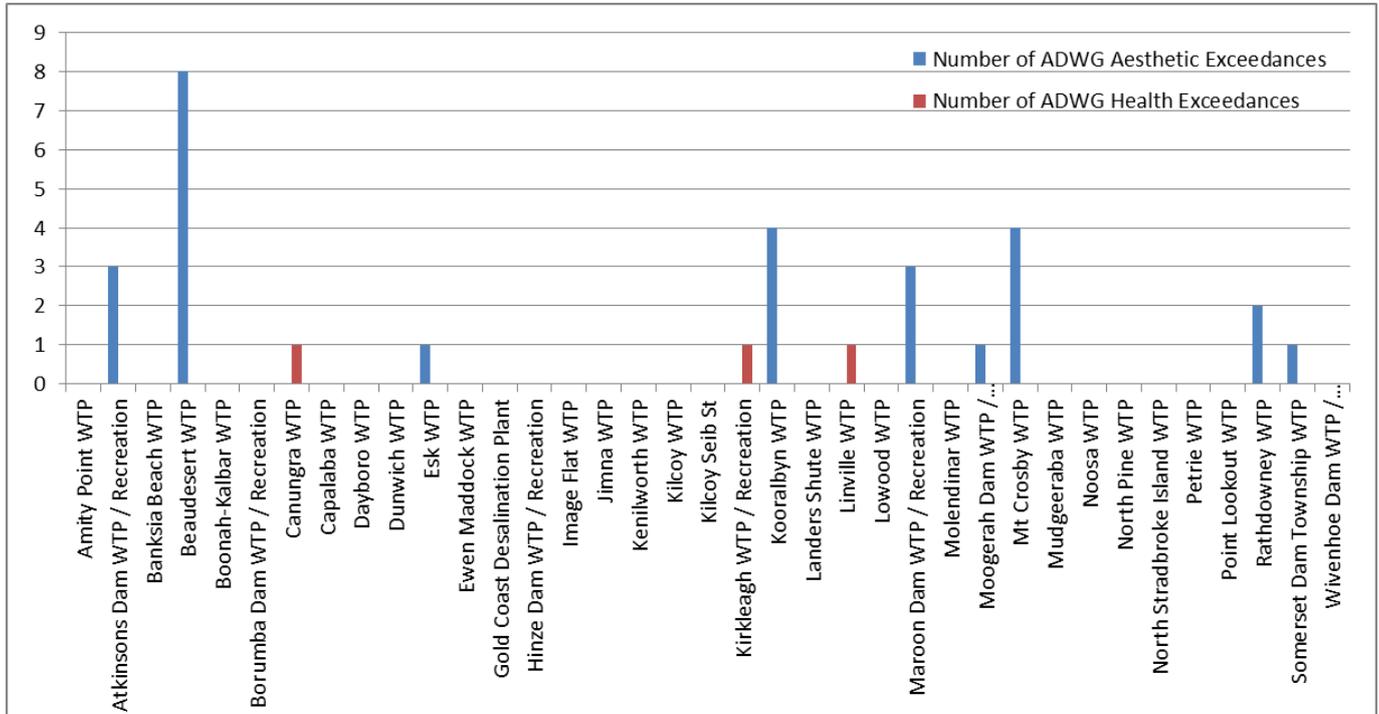
Analysis of the Water Treatment Plant verification monitoring data

Through an assessment of the water quality data from the verification program (41,042 treated water and recreation distribution system drinking water analyses), it was found that the WTPs were compliant against the ADWG health guideline values for drinking water. However, there has been an individual detection of *E.coli* at Canungra WTP (incident report number: DWI-50700082) and Total Chlorine results above the health guideline value in the Kirkleagh Recreation Park system (incident report number: DWI-50700078) and at the Linville town reservoir (incident report number: DWI-50700077). All of these health related exceedances have been

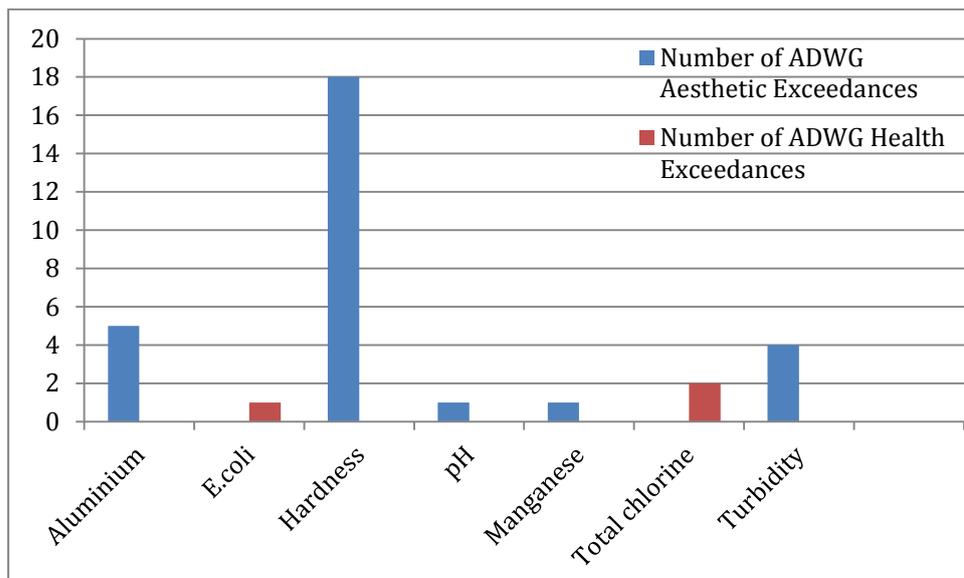
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reported to the Regulator in accordance with section 102 of the Act and the above mentioned conditions of approval (as detailed in section 4).

The chart below is a summary of all of the ADWG exceedances in the 2013-14 reporting year. The majority of the sites display only aesthetic exceedances.



The following chart details the exceedances according to the parameter and whether they were health or aesthetic based.



Overall, ADWG health related exceedances over the past three years have remained consistently low, between 2 – 4 exceedances per year, which is a considerable achievement given the number of diverse schemes and systems. The number of

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aesthetic exceedances has remained relatively stable with 23 aesthetic exceedances observed in the 2012-213 year compared with 27 exceedances in the 2013-2014 reporting year.

The isolated instances of ADWG health exceedances are not believed to be the result of HACCP failures. The *E.coli* detection is likely to be a false positive result as significant chlorine levels were present at the time of sample collection and no operational disturbances were observed. Additionally, the test cell was checked by a third party laboratory to confirm the Colilert test method was not at fault. Subsequent reviews into the external laboratory's sampling methodology have been completed and the laboratory's performance continues to be reviewed. The Total Chlorine exceedances were due to the operational issues that occurred when boosting the chlorine disinfection levels at remote sites. This includes a dosing calculation error when boosting the free chlorine residual in a batch of tankered water (Linville town reservoir) and control signal issues with a sodium hypochlorite boosting pump on an intermittently flowing recirculation line (Kirkleagh WTP).

The aesthetic exceedances predominantly relate to hardness with a small number of aluminium, turbidity, pH and manganese issues in treated water produced from sites in the Brisbane, Somerset and Scenic Rim areas. The underlying cause for the hardness exceedances is associated with the raw water sources from which the WTPs draw and that the treatment process does not have the ability to treat these parameters. Additionally, some aluminium and pH exceedances identified at the smaller WTP systems have been due to difficulties in the coagulation process step. The turbidity and manganese exceedances observed have been due to stir up of sediment in the on-site reservoir or scouring of biofilm from pipe walls in the reticulation system. Consequently, there have been short periods of time during the year when these individual instances have exceeded the maximum ADWG aesthetic values, while still meeting the compliance targets over the annual period.

Seqwater continues to seek and implement improvements for its treatment processes and preventive measures. With regards to continually improving water quality (for example, in accordance with Element 12 of the Framework for Management of Drinking Water Quality), these exceedances are considered in risk assessments and subsequent risk assessment reviews. Where a mitigated risk has been determined to be inadequate (even for aesthetic parameters), an improvement action is recorded in the Drinking Water Quality Improvement Plan. Subsequent development ensures that those improvement actions are addressed appropriately. This currently includes treatment plant upgrades, improved instrumentation, and early intervention by operations staff through changes in process control and improvements in the third party NATA laboratory performance.

Supply System verification monitoring

Verification monitoring occurred in accordance with the Supply System Water Quality Monitoring Plan. This was successfully undertaken by the contracted NATA certified Laboratory Service Provider covering 56 different parameters with weekly and monthly routines scheduled in eight different zones. The verification program provides the necessary information to validate that the preventive approach to water quality management is working effectively.

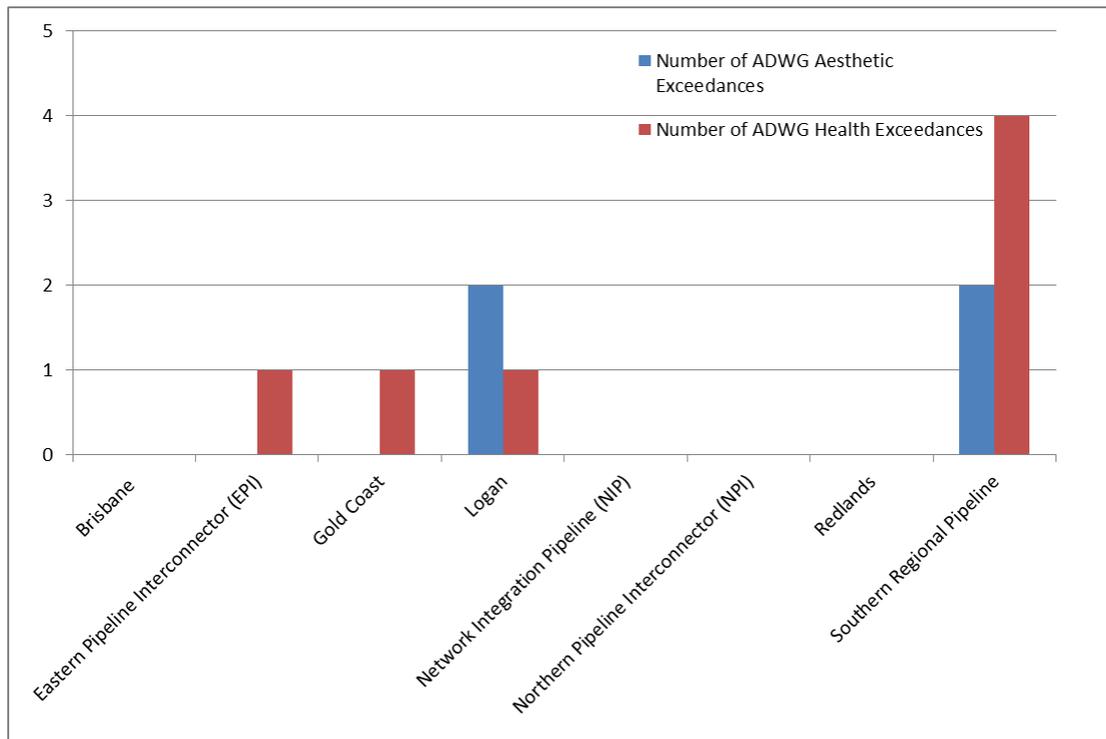
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The Supply System has been measured to be compliant for all eight zones for Microbiological, Health and Aesthetic compliance. Whilst water quality compliance has been achieved based on the assessment of long term trends over a 12 month period, some individual exceedances did occur within the Supply System during the 2013–2014 year and these are shown in the table below.

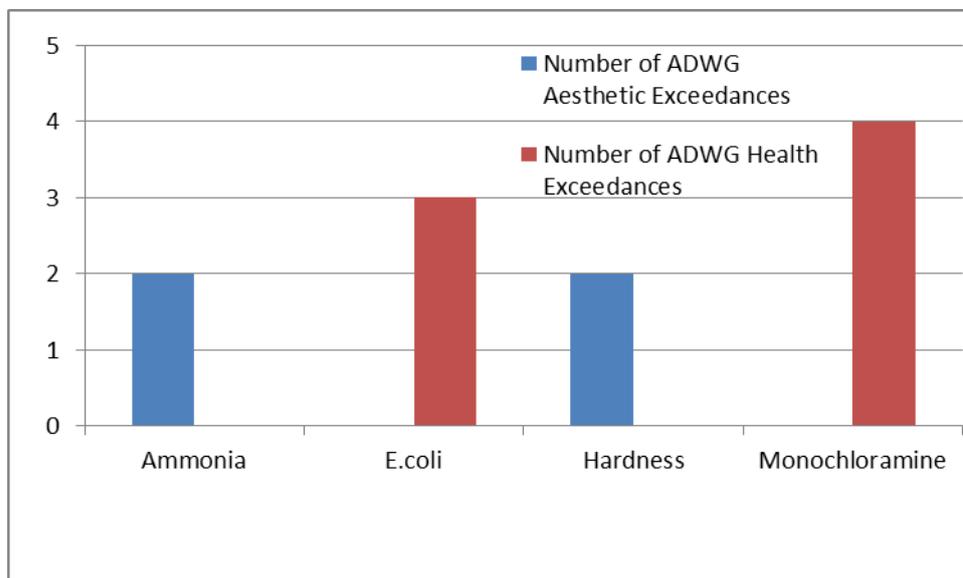
Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Aesthetic Exceedances	Number of Individual ADWG Health Exceedances
Brisbane	14819	0	0
Eastern Pipeline Interconnector (EPI)	2472	0	1
Gold Coast	2860	0	1
Logan	3778	2	1
Network Integration Pipeline (NIP)	3407	0	0
Northern Pipeline Interconnector (NPI)	9147	0	0
Redlands	8877	0	0
Southern Regional Pipeline (SRP)	6897	2	4
Total	52257	4	7

Analysis of the Supply System verification monitoring data

The chart below demonstrates the overall ADWG Health and Aesthetic exceedances which occurred within the Supply System over the past year's routine verification testing. This demonstrates a successful year of operation, with ADWG Health exceedances in the Supply System being maintained at a historical low of seven instances, four of which have been attributed to the same event (monochloramine from a dosing facility incident on the SRP).



The parameters causing the most exceedances are demonstrated in the chart below.



The health guideline exceedances includes three *E.coli* detections and this is consistent with the previous reporting year (2012-2013) where five out of six exceedances also related to *E.coli* detections. The cause for the *E.coli* detections was investigated, and consistent with the detections at WTP on-site reservoirs in the past, these were found to have significant chlorine levels present, which indicates a potential issues with the sample collection and analysis method. The Colilert test cell has been checked by a third party laboratory to confirm the Colilert test method has not been at fault. All of these health related exceedances have been reported to the Regulator in accordance with section 102 of the Act and the above mentioned conditions of approval. There have also been four monochloramine results above the

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health guideline value, however, these have been attributed to a single event concerning a dosing facility on the SRP, which was picked up at four sample sites on the same day (same sampling run).

The aesthetic exceedances continue to relate to hardness issues in the Logan zone and ammonia levels in the SRP. The increased ammonia level events relate to the issues with the chemical dosing facility at Chambers Flat. The cause of the hardness issue is associated with the Mid-Brisbane river catchment from which Mt Crosby WTP draws water. Unfortunately, neither of the Mt Crosby WTPs have the ability to reduce hardness levels. Consequently there have been short periods of time during the year when these have been in excess of the ADWG values within the Supply System.

Overall, there has been a reduction in ADWG health related exceedances over the past three years. There were 13 exceedances in the 2011-2012 year, six in the 2012-2013 year, and this has reduced further to three incidents (represented by seven exceedances) in the 2013-2014 year. In addition, the number of aesthetic exceedances has decreased from 22 exceedances in the 2012-213 year to four exceedances during the 2013-2014 year. Whilst the reduction in the number of exceedances reported is partly related to the 50% reduction in supply system monitoring which has been achieved through efficiencies in sample monitoring points; the large reduction in aesthetic exceedances clearly demonstrates that continual improvements are being made through further implementation of drinking water quality management and the preventive processes within the Supply System.

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4. Improvement plan

Improvements to the Water Treatment Operations and Supply System continue in accordance with the Drinking Water Quality Improvement Plan. These improvements have been assessed to be necessary during the risk assessment to reduce an unacceptable risk.

The progress that has been made during the 2013-2014 reporting year to reduce health related risks and improve reliability in providing safe drinking water supplies is tabled in the spreadsheets at Enclosure 2.

Any improvements which are yet to be implemented will be reassessed and prioritised through the internal audit schedule and the 2015 Risk Assessment reviews.

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5. Drinking water quality incidents

The following section summarises information given to the Regulator detailing:

- Non-compliances with the water quality criteria for drinking water, and the corrective and preventive actions undertaken in response to the non-compliance.
- Prescribed incidents reported during the year include what corrective and preventive actions have been undertaken.
- Comments on the effectiveness of any preventive/control measures.

A summary of incidents at Seqwater's treatment operations and supply system that are reportable to the Regulator are shown in the following table. All incidents were reported within the required timeframes.

QWSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
DWI-507-00075	Mt Crosby WTP Fluoride (Operational monitoring indicating Fluoride 1.5 – 1.7 mg/L for approximately 45 minutes in one of the two Camerons Hill reservoirs)	02/08/2013	High concentration fluoride solution had formed in the batching tank as the mixer had failed, and this was delivered into the dosing line during a plant reinstatement process. The Fluoridation system was shut down and the treated water concentration had lowered to 0.9 mg/L within 2 hours.	ICAM™ investigation was completed which identified a number of recommendations for asset maintenance and project delivery, which have rectified the fault, and been effective in improved asset reliability and control.

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QWSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
DWI-507-00076	Linville – Len Haynes Park Reservoir (Total Chlorine 5.2 mg/L for < 1 hour)	27/08/2013	Water was being tankered to this site at the time of the incident. The high chlorine result was due to an overdose of sodium hypochlorite (disinfectant) to the tank during delivery as a result of a miscalculation by the contractor.	Training on the tankering procedure was performed by all operational staff involved in the incident and has prevented reoccurrence. The new source water and treatment operations at Kilcoy (and hence, a different chlorine decay profile) is expected to provide water that does not require additional chlorine dosing during tankering.
DWI-507-00077	Gold Coast – Brigman Drive (<i>E.coli</i> 1 MPN/100 mL)	19/09/2013	The Free chlorine residual at the sample point was 1.22 mg/L and there were no <i>E.coli</i> detections and satisfactory chlorine levels in the NPI (upstream) or other Gold Coast sample points including those at the Gold Coast City Council. Accordingly, it was highly likely to have been a sampling process issue.	The chlorine residual was acceptable and there were no maintenance or pressure events at the time of the incident. Seqwater is continuing to work with its contracted laboratory to improve sampling for microbial testing. Testing of the Colilert™ trays by QHFSS Laboratories have confirmed the microbiological laboratory test method was not at fault.
DWI-507-00078	Kirkleagh WTP (Total Chlorine 5.5 mg/L)	24/12/2013	The elevated chlorine was due to the intermittent operation of the treated water recirculation pump and the failure of the recirculation sodium hypochlorite boosting dose point. The pump has been set to run continuously. A pressure sustaining valve was installed on the dosing line to prevent siphoning.	The treated sample was only representative of what would have been going into the distribution system for a short period of time. The mode of operation of the recirculation line from intermittent to continual has provided a more stable chlorine residual throughout the system.

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QWSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
DWI-507-00079	Somerset Township WTP Cylindrospermopsin in raw water	13/01/2014	13.6 µg/L of cylindrospermopsin was detected in the raw water supply, however, the free chlorine residual at this site (1.7 mg/L) was assessed as sufficient to sufficiently oxidise this toxin and therefore have no impact on the provision of safe drinking water.	The Regulator confirmed that this event was not reportable as an incident.
DWI-507-00080	Banksia Beach Event - Ozonation offline	16/01/2014	The ozone disinfection system went offline at Banksia Beach WTP, however, chlorine disinfection was increased to ensure that adequate disinfection C.t was achieved and that there was no impact on the provision of safe drinking water.	The Regulator confirmed that this event was not reportable as an incident.
DWI-507-00081	Logan Supply System – Kimberly Park Reservoir (<i>E.coli</i> 2 MPN/100 mL)	21/03/2014	The Total chlorine residual at the sample point was 1.0 mg/L and there were no detections and satisfactory chlorine <i>E.coli</i> levels in the EPI (downstream) or other Logan sample points (upstream) including the Springwood Reservoir operated by Logan City Council. Accordingly, it was highly likely to have been a sampling process issue.	As above for DWI-507-00077.

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QWSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
DWI-507-00082	Canungra WTP (<i>E.coli</i> 1 MPN/100 mL)	15/05/2014	The Free chlorine residual at the sample point was 2.12 mg/L and there were no <i>E.coli</i> detections and satisfactory chlorine levels in the downstream QUU distribution system, including the Appel Street Reservoir. WTP Operator were consistently above 2.2 mg/L and there were no WTP alarms or shutdowns. Accordingly, it was highly likely to have been a sampling process issue.	As above for DWI-507-00077
DWI-507-00083	Southern Regional Pipeline (SRP) – Chambers Flat WQMF Station (High Monochloramine – levels at approximately 4.0 mg/L)	20/06/2014	Overdosing occurred as the north panel chlorine analyser was incorrectly calibrated by the operational maintenance staff. Due to the low flow in the pipeline system and buffering capacity in downstream storage tanks the impact to connected customers (Logan City Council and Queensland Urban Utilities) was minimal. The analysers were recalibrated and verified and operators were re-trained in the procedure. The chlorine dosing control system has been set to prevent overdose based on the maximum allowable volume dosed from the dosing pump.	No customers were impacted as a result of the non-compliance, therefore no specific actions were required other than to close the offtake to Logan City Council to prevent any overdosed water from entering the Logan distribution system until Seqwater was confident that water passing through Logan offtake would be compliant. The calibration training and dosing controls aim to prevent reoccurrence.

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6. Audit of the Plans

6.1 Regular audits

Pursuant to Section 99 (4) of the Act, an audit (Regular Audit) of the DWQMP is required every 4 years from the date of approval. The most recent 'Information Notice' for the approval of Seqwater's amended DWQMP specifies that a Regular audit is to be completed prior to 16 March 2016. Accordingly, the Regular audit was not conducted during the 2013-2014 year.

6.2 Audits – water treatment and supply system operations

Internal audits – HACCP and Integrated Management System audits

Internal audits have been conducted throughout the year, in accordance with Seqwater's HACCP and Integrated Management System audit schedules. The scope of the internal audits includes the site's HACCP plan, Summary wall-chart, Critical Control Point procedures, Operational monitoring plan, and operator and maintenance records. It includes verification of the HACCP flow diagram and process flow diagram by the HACCP Team Leader and available operational staff from the HACCP team.

Internal audits have been conducted at 16 WTP and supply system sites and the Supply System Control Room. Seqwater's remaining operational sites whose activities affect drinking water quality are scheduled for internal audits during the first half of the next reporting year (2014-2015).

All non-conformances, areas of concern and opportunities for improvement are delivered through engagement with operations staff and the use of Seqwater's electronic document and record management systems and the Drinking Water Quality Improvement Plan processes.

External audits – ISO 22000 Certification and Surveillance audits

Seqwater has integrated the ISO22000:2005 Food Safety Management Systems standard into the DWQMP, as many of the requirements of the standard are consistent or similar to the elements in the DWQMP which is based on the ADWG Framework. This standard promotes greater commitment from all parts of the business during the DWQMP implementation and ensures the DWQMP became part of the Integrated Management System (IMS).

Seqwater has maintained ISO 22000 certification for the Supply System which was accredited to LinkWater in June 2012. As part of the certification, the business is obligated to conduct surveillance audits. The first of the surveillance audits was conducted in May 2013 by SAI Global.

During May 2014, Seqwater successfully increased the scope of accreditation to include the amended DWQMP (overarching plan), and additional sites including Molendinar, Mudgeeraba and Image Flat WTPs. The audit findings found no Non-Conformance Reports

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(NCR) with the recommendation that the certification shall be awarded. There were no Area of Concern (AOC) findings identified.

Seqwater is committed to the staged implementation of the ISO22000 standard and certification across the remainder of its main operational sites.

6.3 Aquality assessments

Seqwater completes an Aquality assessment of its Drinking Water Quality Management System on an annual basis. Aquality is an assessment tool designed by Water Services Association of Australia (WSAA) to allow water service providers to go through every aspect of the Australian Drinking Water Guidelines Framework and measure how well it is understood, documented and implemented across their organisation. The assessment has been conducted internally at Seqwater through a series of targeted workshops involving staff representing management, operations, maintenance, incident management, training, community engagement, documentation, record keeping, audit and review.

Seqwater has continued to improve from year to year - a significant achievement given the amount of change experienced by the organisation and the water industry in South East Queensland during this period, including the incorporation of the former LinkWater and Seqwater Drinking Water Quality Management systems. This has been reflected in scores typically between 85-100%. The assessment has also identified a number of opportunities for improvement, most of which related to implementation of the Drinking Water Quality Management System or specific supporting programs such as documentation, records and compliance systems. These improvements will be progressively actioned through existing projects, the Drinking Water Quality Improvement Plan (DWQIP) and the Learning Management System (LMS). The next Aquality assessment is planned for mid-2015 to determine progress and identify further opportunities for improvement.

The results for Seqwater's 2014 Aquality assessment are shown compared against the 2009 and 2012 results in the figure below. This includes comparisons across each of the components in all 12 Elements.

Summary of the improvements identified for elements with scores $\leq 90\%$

Element 4 Components: *Operational Procedures, Materials and Chemicals*

- Further develop operations manuals and supporting procedures
- DWQ awareness and competency-based training (procedures)
- Chemical specifications for future tenders and on-site chemical acceptance processes
- Drinking water quality requirements built into projects, contracts and work orders

Element 5 Component: *Consumer Satisfaction*

- Update Seqwater compliments and complaints policy (POL-00049) DWQ awareness for reception staff
- Non-conformance response procedure to be developed

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Element 7 Component: *Employee training*

- DWQ management needs to be included in site inductions
- TNA for drinking water quality to be uploaded in LMS
- DWQ related training records need to be captured on the LMS

Element 9 Component: *Design of equipment*

- Capturing consistent standard across the organisation, including design
- Standards and specifications to incorporate drinking water quality requirements

Element 10 Component: *Management of documents and records*

- Need to finalise roll out and formal processes/procedures for records management
- Corporate document records and control systems need to be determined (systems including Q-Pulse, Risk Wizard, OCA, TRIM)
- Use intranet as a portal to DWQ documents and spreadsheets.

Element 12 Components: *Review by the senior executive and DWQ Improvement Plan*

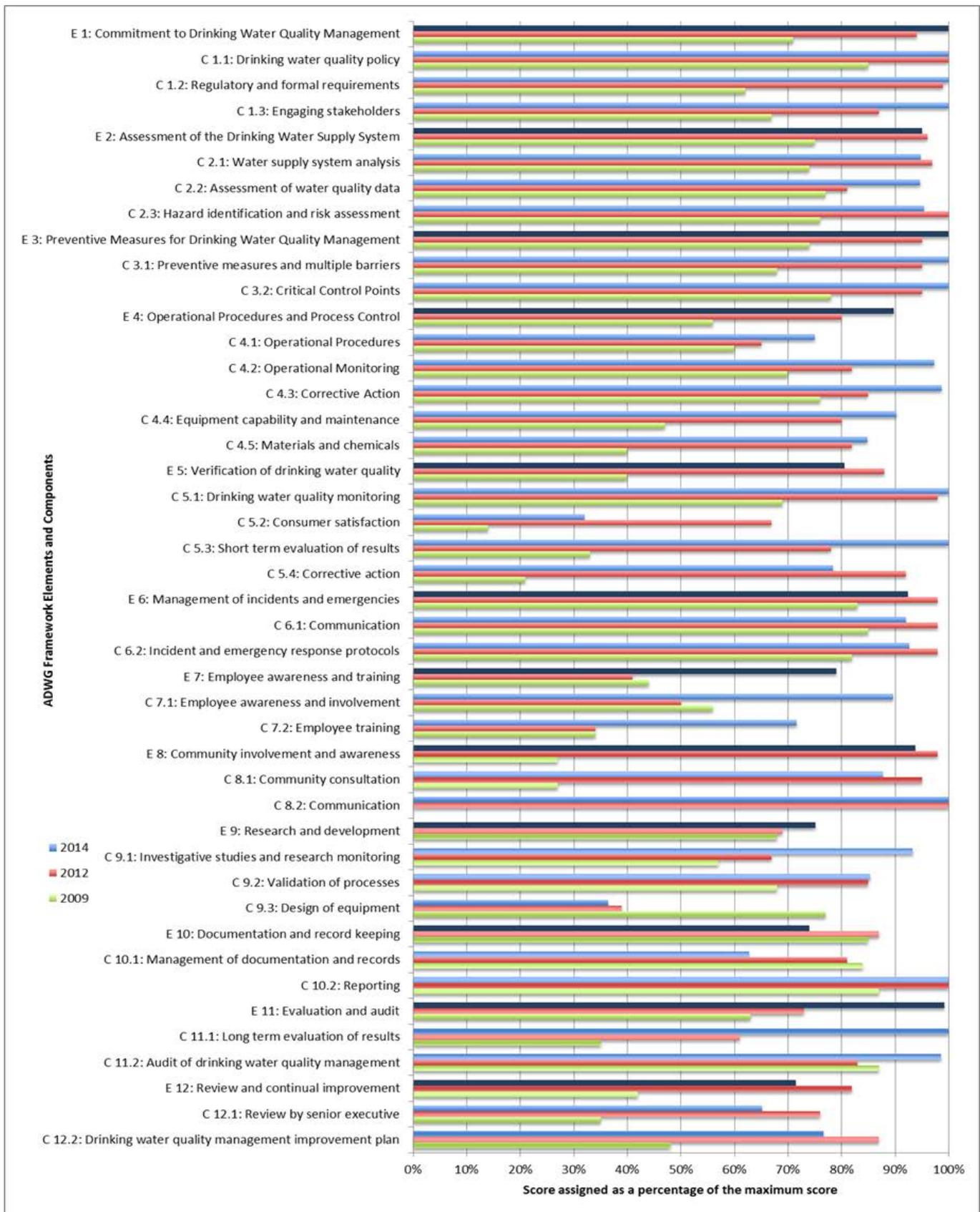
- Outcome of Executive Team/Management review is documented and communicated to employees
- Formalise process for informing capital/asset planning and programs following management review (IRG)

Additionally, ongoing continuous improvement initiatives have been identified include:

- Improved general staff and targeted training programs
- Comprehensive HACCP Internal Auditing program
- Improved monitoring of Critical Control Point reporting and feedback of system performance
- Water quality requirements captured in project delivery, maintenance activities and projects
- Further input into asset delivery programs
- Formal ongoing engagement with the Executive Team through Management reviews and IRG.

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7. Regular review of the Plans

Pursuant to s99 and s106 of the *Water Supply (Safety and Reliability) Act 2008* and section 11.1 of the *Information Notice* for the approval of Seqwater's DWQMP (2012), Seqwater has completed an Annual Review of its Drinking Water Quality Management Plan (DWQMP) before 1 July 2014.

The results of the review were presented to the Regulator in December 2013, in the form of an amended DWQMP including site-based HACCP plans and Risk Assessments. The December 2013 submission includes a full organisational review of the former LinkWater and Seqwater DWQMP, subsequent development and submission of a merged DWQMP, and the review of all site-based risk assessments associated with these plans.

The table below details the processes completed in preparing the amended DWQMP and how this has been completed in accordance with the 'Prompts for DWQMP Reviews' as described in Appendix B to QWSR's *Drinking Water Quality Management Plan Review and Audit Guideline (2013)*.

Service description	
During the short period of time since development of the DWQMP and its last submission to the Regulator in May 2012, there have been no changes identified for scheme details, projected water demand or operations downstream of Seqwater's bulk water supply assets.	
Details of infrastructure providing the service	
The details of infrastructure providing the service are confirmed during internal audits where the HACCP flow diagram, Process Flow Diagram, System Description, and Conditions of Application (plant capability) are confirmed by conducting a plant/site walk-through by the HACCP Team Leader and operational staff. When a site has yet to be audited during 2013-2014, then the internal audit from 2011-2012 has been used during the assessment.	
Progress with the Internal Audit schedule is reflected in section 5 of this report.	
These flow diagrams and system descriptions are also confirmed at the beginning of every Risk Assessment Review where the entire HACCP team is assembled and completes a desktop review.	
Asset renewals and refurbishment, including instrument upgrades have been included in findings of these audits and reviews.	
Information gathering water quality and catchment characteristics	
The risk assessment review process includes the compilation of water quality data from operator and verification monitoring. These are collated in a spreadsheet and trends are subsequently reviewed for every parameter. Catchment characteristics are also reassessed through the participation and data prepared by the Catchment Water Quality Coordinator.	
The risk assessment process includes the consideration of the results of recent sanitary surveys and catchment description reports.	
Hazard identification and the assessment of risks	
In addition to water quality monitoring data, a review of Incidents, Critical Limit excursions and Action Limit Exceedances are conducted during the Risk Assessment process.	
The HACCP team undertaking the Risk Assessment process includes representatives and subject matter experts from management, drinking water quality, operations, process engineering, catchment water quality, and maintenance. Changes to the HACCP team to	

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reflect staff changes have been reflected in the amended HACCP plans.
Risk management measures
The Drinking Water Quality Improvement Plan is reviewed as part of the Risk Assessment Process. This includes updating the improvement to reflect those actions that have been fully implemented.
Changes in Regulations and Legislation are identified by ongoing reviews by Seqwater's <i>Governance, Risk and Compliance</i> team, stakeholder engagement including engagement with representatives from the Regulator, and participation in committees including the <i>Fluoridation Code of Practice</i> . Plans and procedures are updated accordingly. Changes of substance are required to be provided to the Regulator for assessment and approval, however, no such submissions have occurred since the submission of the amended Seqwater DWQMP in December 2013.
Following the risk assessment review process and internal audits, Seqwater HACCP plans and procedures have been updated to reflect the improvements identified. The amended plans and procedures were submitted to the Regulator in December 2013 as part of the amended DWQMP package and these were subsequently approved in March 2014.
Operation and maintenance procedures
Seqwater continues to develop its operational and maintenance procedures including work instructions that support the HACCP plans and procedures. There have been no changes of substance that have been required to be provided to the Regulator for assessment and approval since December 2013.
SCADA alarm set points, maintenance work orders, their supporting documentation and the relevance/appropriateness of procedures is reviewed through the internal audit process.
Management of incidents and emergencies
The Seqwater and Water Grid Emergency Response Plan details the processes for managing incidents and emergencies. Stakeholder contact details and involvement is constantly managed by the Incident Management/Advisory staff at all of South East Queensland's Water Service Providers involved in the Water Grid and stand-alone-community supplies.
Training, including inter-agency exercises, has occurred every year, including the 2013-2014 reporting year. The training exercises are managed by incident and security consultants and involve all of South East Queensland's Water Service Providers involved in the Water Grid and stand-alone-community supplies.
The DWQMP links to these corporate processes and includes important linkages between HACCP excursions and incidents as well as notification to the Regulator.
An analysis of the effective management of reportable Drinking Water Quality incidents is reflected in section 4 of this report.
Risk management improvement program
The Risk Management Improvement Program, also know as the Drinking Water Quality Improvement Plan (or 'the Improvement Plan') is reviewed through the risk assessment process and resubmitted to the Regulator as an appendix to the amended DWQMP.
Progress with the Improvement Plan is reflected in section 3.5 of this report.
Service-wide support information management
Supporting programs are an important part of Seqwater's Drinking Water Quality Management system which is based on the 12 elements of the ADWG Framework, including the supporting elements 7 – 11. The review of this part of Seqwater's DWQMP has been completed through a series of workshops with the relevant stakeholders within Seqwater. Accordingly, the DWQMP links to corporate systems and processes which allows the system to continue to become fully integrated with other management systems including quality, workplace health and safety, and environmental management.

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The supporting programs are also reviewed for their effectiveness against criteria developed from the ADWG Framework through WSAA's *Aquality* assessment as described in section 5.3 of this report.

The results of these workshops are reflected in the amended DWQMP submitted to the Regulator in December 2013.

Operational monitoring

The relevance and appropriateness of operational monitoring at each site is reviewed during the risk assessment review. Furthermore, compliance and the relevance of monitoring is also assessed during the internal audits (and external ISO22000 certification audits).

The amended Operational Monitoring plans are included in the amended DWQMP submitted to the Regulator in December 2013. This includes a validation report in Appendix 9.1 to the DWQMP which includes operational monitoring and the validation for the Action/Critical Limits for each process step and the relevant parameters.

Verification monitoring

The verification monitoring has been reviewed using a risk based methodology. Seqwater's initial monitoring plan has been designed for data collection to inform the risk assessment process, however now that more knowledge had been established, a more efficient and relevant program has been developed using this approach.

The water quality sampling sites in the supply system have been rationalised based on the integrated supply chain improvements following the merger between LinkWater and the former Seqwater organisations. This has made the monitoring program more efficient and focused on significant risks.

The results of the review are reflected in the amended DWQMP submitted to the Regulator in December 2013. The results of the Verification Monitoring Plan during 2013-2014 is reflected in section 3.4 of this report.

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8. Glossary

ADWG	<i>Australian Drinking Water Guidelines 2011</i> , National Health and Medical Research Council, Commonwealth Government of Australia, Canberra
Aquality	An assessment tool developed by WSAA used for assessing the effectiveness of implementation of the DWQ Management system, based on the 12 elements of the ADWG 'Framework'.
COP	Code of Practice
CCP	Critical Control Point
DWQ	Drinking Water Quality
DWQMP	Drinking Water Quality Management Plan
EPI	Eastern Pipeline Inter-connector
HACCP	Hazard Analysis Critical Control Point. A food safety management system based on a set of guiding principles, known as HACCP Principles or Codex alimentarius.
ISO 22000	<i>ISO 22000:2005 Food Safety Management Systems</i> . International standard for food safety.
LIMS	Laboratory Information Management System
NIP	Network Integration Pipeline
NPI	Northern Pipeline Inter-connector
QWSR	Queensland Water Supply Regulator
SCADA	Supervisory Communication and Data Acquisition (SCADA) system. Human to Process software interface.
SRP	Southern Regional Pipeline

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Supply System	Previously named the Bulk Distribution Network and formerly operated by LinkWater.
SUVA	Specific UltraViolet Absorbance
The Act	<i>Water Supply (Safety and Reliability) Act 2008</i>
The Regulator	Queensland Water Supply Regulator
WSAA	Water Services Association of Australia
WTP	Water Treatment Plant

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9. Enclosures

Enclosure 1 – Verification Monitoring 2013-2014 Water Quality Data Report (TRIM ID: D14/146093)

Enclosure 2 – Drinking Water Quality Improvement Plan – Progress with Health-related Risk Improvements (TRIM ID: D14/146273)

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