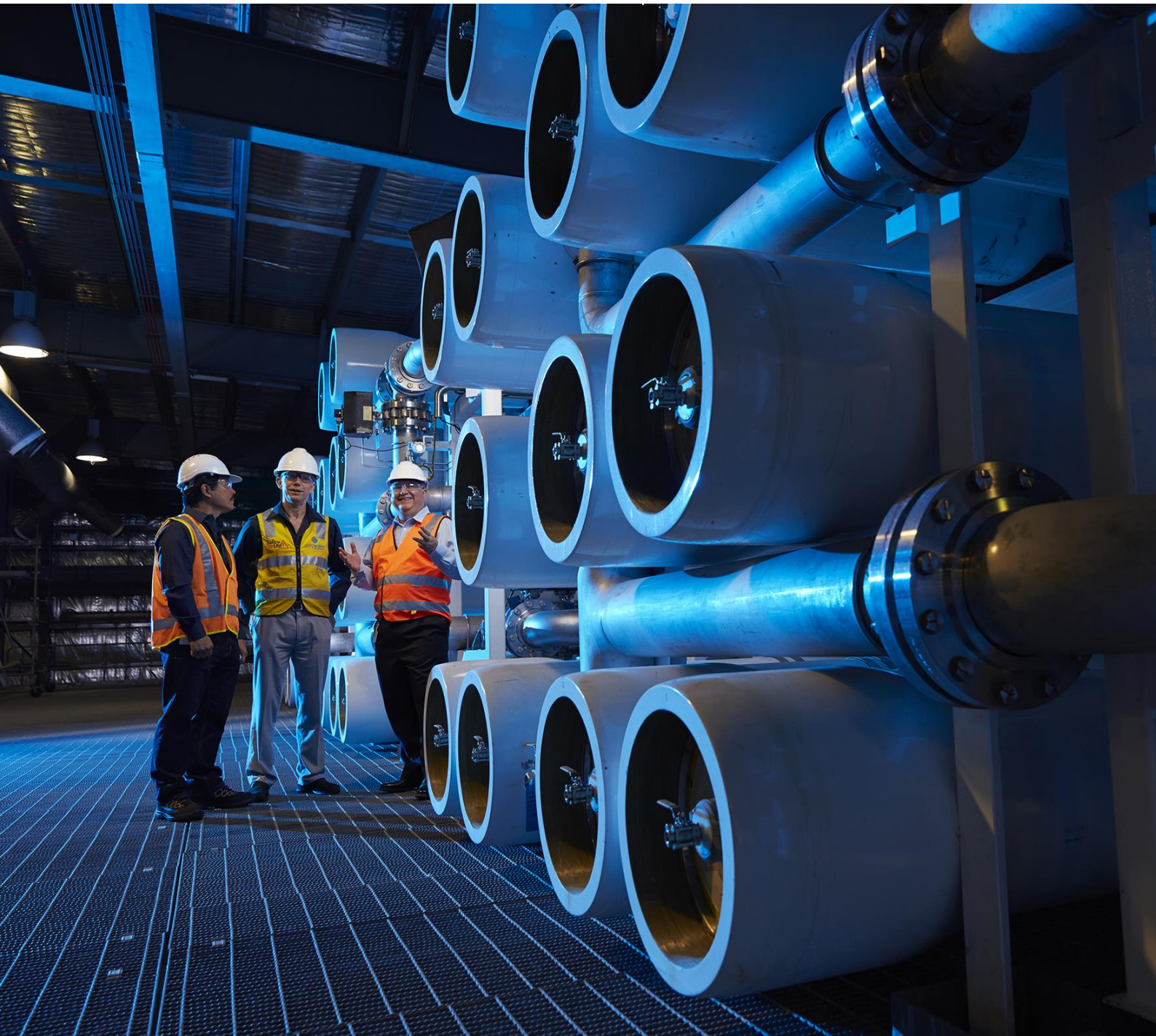


Seqwater (SP507) – Drinking Water Quality Management Plan Drinking Water Quality Annual Report 2018-19



Revision 1 | December 2019



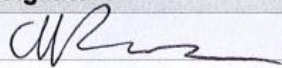
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1. Executive summary

The Queensland Bulk Water Supply Authority trading as Seqwater (**Seqwater**) is responsible for Southeast Queensland's bulk water supply arrangements. This includes catchments, storages and water treatment plants and several small reticulation systems supplying recreation parks.

Seqwater's annual Drinking Water Quality Management Plan report outlines the activities for the management of water quality risk and issues. This report covers the period 1 July 2018 to 30 June 2019 ("**reporting period**"), during which Seqwater complied with 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 process instrumentation and operator testing 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-accredited laboratory. Verification monitoring included 27,696 treated water analyses, and 44,163 Supply System drinking water analyses.

Additionally, catchment and source water monitoring including catchment surveys and the use of passive samplers to detect micro-pollutants (for example, pesticides and pharmaceuticals) are undertaken to support operations and to identify changes for the risk assessment process. Water treatment and supply system operations recorded one individual health related exceedances and eight individual aesthetic exceedances (3 pH, 3 turbidity, 1 hardness & 1 iron) against the water quality criteria identified in the DWQMP detected within the routine monitoring program within the reporting period.

This represents the maintenance of relatively low exceedance numbers compared with earlier years (e.g. 25-30 exceedances per year during 2012-14). The result reflects the achievements made through the continuous improvement of Seqwater's drinking water assets and drinking water quality management system. Seqwater reported all incidents concerning health related guideline values to the Regulator within the required timeframes.

There were eight minor aesthetic exceedances:

- Three of these occurred in the Supply System at a single location and were found to be related to the sample point arrangement and were not representative of the actual water quality supplied;
- Three were from distribution systems at Seqwater recreation areas and were due to low turnover and ageing distribution system materials;
- One was a low pH from a WTP that was likely a short-term event or analytical error;
- One was for hardness and is directly related to source water conditions for the WTP.

Seqwater continues to improve its systems and processes to prevent further exceedances.

Other drinking water quality management system improvement activities completed during the reporting period included six risk assessment reviews, 41 HACCP team meetings, 26 internal audits of treatment plants and supply system sites, and an external (SAI Global™) surveillance audit that covered 12 WTPs and a supply system water quality management facility for AS NZS/ISO 22000:2005 certification.

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These reviews and audits are part of a schedule that covers all Seqwater’s treatment plants and supply system sites. Seqwater has used the findings of these improvement activities to improve its Drinking Water Quality (**DWQ**) management system and update its DWQMP through an amendment application to the Regulator. The long-term improvement initiatives identified through these assessments and reviews have been captured in a consolidated Drinking Water Quality Improvement Plan (**DWQIMP**).

2. Introduction

2.1 Purpose

This annual report has been prepared in accordance with section 142 of the Water Supply (Safety and Reliability) Act 2008 (the Act) (refer to Table 1). The purpose of this annual report is to provide the Water Supply Regulator (WSR or the Regulator) with information on the overall performance of the DWQMP for the period 1 July 2018 to 30 June 2019.

Table 1 - Regulated Conditions and Implemented Compliance

DWQMP Report Condition	Seqwater Compliance
<p>Section 142 Drinking water quality management plan reports</p> <p>This section applies for each financial year after a financial year in which a relevant service provider’s drinking water quality management plan has been approved.</p> <p>The provider must, unless the provider has a reasonable excuse—</p> <p>prepare a report (a drinking water quality management plan report) for the financial year complying with this section and, if section 142C(2) applies to the provider, that subsection; and</p> <p>give the regulator a copy of the report within 120 business days after the financial year ends.</p>	<p>The current report is required to be submitted to the Regulator within 120 business days following the end of the 2018-19 financial year. Accordingly, submission for the current report is due by 18 December 2019.</p> <p>The current report has been prepared in accordance with the approval conditions of the DWQMP and the Regulator’s DWQMP report guidance at</p> <p>https://www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/industry-regulation/drinking-water/annual-report</p> <p>Section 142C(2) is not applicable.</p>
<p>142(3) The report must state or include all of the following—</p> <p>the information required under the latest report requirement given to the provider;</p>	<p>This report provides an update on the implementation of the DWQMP in accordance with the approval conditions of its DWQMP and the above regulatory guidance.</p>
<p>the actions the provider took to implement the plan;</p>	

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DWQMP Report Condition	Seqwater Compliance
the outcome of any review of the plan in the financial year and how the provider has addressed matters raised in the review;	Refer to Section 7 of this report. A review of the DWQMP is not required until 1 July 2020. reporting period.
if a drinking water quality management plan audit report has been prepared for the financial year—a summary of its findings and any recommendations;	A four-yearly regular audit was not required to have been completed during the 2018-19 reporting period. The next regular audit is required to occur prior to 1 March 2020.
details of any information the provider gave the regulator under sections 102 and 102A in the financial year;	Refer to Section 5 of this report for details of incident/event reporting during the reporting period.
details of the provider's compliance with water quality criteria for drinking water;	Refer to Sections 3 and 5 of this report. Enclosure 1 provides the 2018-19 Water Quality Data report. This report also includes aesthetic criteria.
if the provider supplies drinking water to customers— details of any complaints to the provider about the provider's drinking water service.	Seqwater does not supply drinking water directly to customers (as defined under the Act). 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 the Act. The plan forms part of the corporate drinking water quality management system that Seqwater has implemented to cover all 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* (2018) 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 these barriers, which include:

- Catchments
- Storages and dams
- Water treatment

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- 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 DWQMP

Seqwater’s amended DWQMP received final approval from the Regulator under Information Notice dated 29 April 2019 (Information Notice). Seqwater’s compliance with the conditions in the Information Notice for its approved DWQMP is detailed in section 3.1 of this report. The DWQMP amendment included:

- the site based HACCP plan for the new Canungra WTP
- a new site based HACCP plan for Lake Wivenhoe, that was included in preparation for potential augmentation of drinking water supply with water from Western Corridor Recycled Water Scheme in the future
- various other minor changes to the DWQMP and associated site based HACCP plans and procedures

Additionally, the currency of the DWQMP has been reviewed as detailed in section 7 of this report.

Amendments to the DWQMP were made in accordance with section 99A of the Act as part of the ongoing continuous improvement of the DWQMP and site-based HACCP plans (sub-plans). The risk assessment reviews completed during the 2018- 19 reporting period are detailed in section 3.2 of this report. Changes to the DWQMP and site-based HACCP plans are detailed in Enclosure 4 to this report.

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 2018-19 reporting period.

Seqwater’s verification monitoring plan covers a wide range of parameters that have been determined using a risk-based approach and have been detailed in the DWQMP. The results of Seqwater’s verification monitoring during the 2018-19 reporting period are described in section 3.4 of this report 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, was undertaken by an external NATA accredited laboratory and the results are recorded in the Seqwater’s Laboratory Information Management System (LIMS). Seqwater reviews the verification monitoring program on a quarterly basis.

Seqwater has continued to improve its drinking water quality management system and implement the actions in the risk management improvement program (known as the Drinking Water Quality Improvement Plan (DWQIMP)) during the 2018-19 reporting period as described in section 4 of this report. The DWQIMP changes during 2018-19 are provided in Enclosure 4 to this report.

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3.1 Approval conditions

AS outlined above, Seqwater was given final conditional approval of its amended DWQMP on the 29 April 2019 under Information Notice given pursuant to section 99(1)(b) of Act. The approval conditions, and Seqwater's compliance with them, are detailed in Table 2 below.

Table 2 - Conditional Approval and Compliance

Condition	Compliance
No. 1. Water Quality Criteria	
<p>Water quality criteria for drinking water including:</p> <p>The standards for drinking water quality prescribed in a regulation under the Public Health Act 2005 (Qld) (Public Health Act). The criteria in any guideline, if any, made by the Regulator about the quality of drinking water.</p> <p>The criteria for drinking water 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 that apply, to this DWQMP. Parameters with only aesthetic guideline values are not considered to be water quality criteria and are not considered water quality criteria and are not required to be reported.</p> <p>Seqwater is required to implement the verification monitoring program as detailed 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>Compliant.</p> <p>Seqwater has reported all non-compliance with relevant criteria including health guideline values in the ADWG and standards in the Public Health Act as identified through its verification monitoring program.</p> <p>A review of the verification monitoring data report (Enclosure 1) found that all 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>
No. 2. Additional Reporting requirements; (a) events and (b) where a parameter has no water quality criteria	
<p>Additional reporting requirements include:</p> <p>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.</p> <p>Where a parameter has no water quality criteria which Seqwater believes cannot be managed under its DWQMP and Seqwater</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>

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Condition	Compliance
believes, or is concerned, that public health may be impacted. These reporting requirements must be made to the regulator immediately and on the prescribed form within 24 hours.	Reporting requirements are compliant.
No. 3. Research projects and additional reporting requirements	
If Seqwater becomes involved in any research activities and becomes aware of a detection that must be reported as: Non-compliance with water quality criteria An event A parameter with no water quality criteria These reporting requirements must be made to the regulator immediately and on the prescribed form within 24 hours.	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.
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 six risk assessment reviews for its DWQMP during the reporting period.

There are 32 water treatment schemes listed in section 5.1 of the Information Notice for the approved DWQMP including the Gold Coast Desalination Plant and the Supply System. The Canungra scheme was significantly upgraded during the reporting period. Linville was non-operational for the entire reporting period and the scheme has been supplied by tankering water in from another scheme for the duration of the reporting period. An upgrade to the Linville scheme which will enable its operation again is scheduled to occur in the 2019-2020 reporting period.

Seqwater's remaining water treatment operations and the supply system have been reviewed and reported during the 2018-2019 year.

The findings from the recent risk assessment reviews are consistent with those reported in the 2017-2018 DWQMP 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 to assets as a part of the regular asset management process.

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Improvements that have been identified through incident management processes including protection from lightning strikes and power interruptions on control systems.

Improvements that have been identified through the risk assessment review process include SCADA upgrades, process instrumentation, and interlocks between these instruments and plant operation. These improvements have reduced the risk of non-compliant water leaving the WTP.

The remaining operational WTPs that are yet to have SCADA upgrades have been included in the program schedule. Seqwater is continuing to monitor its progress in these areas through its capital works and renewals programs and the implementation of its Monitoring and Control System project.

Seqwater also reviewed and improved upon the established Pre-requisite Programs (PRPs), that were implemented across the organisation in the previous reporting period. This approach is consistent with the requirements of AS NZS/ISO22000:2005 Food Safety Management Systems standard. Seqwater PRPs are documented in a quality-controlled register (REG-00775) which is summarised in Table 3 below.

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Table 3 - Prerequisite Programs (REG-00775)

Reference	Process step	Component/ Asset	Hazardous Event	Potential Hazard	Limiting Hazard	Preventive Measure	Monitoring procedures/ corrective actions	Responsibilities and Authorities	Documented Information	Verification	Validation
PRP- 1 Source water Management	Raw water	Source water	Change in raw water may trigger a deviation of water treatment practices including inability to treat water to standard	Chemical Physical Microbiological	Microbiological Cyanotoxins	De- stratification activities Early warning system announces changes in raw water quality Dam depth profiling Stakeholder engagement Routine and condition based maintenance	Passive sampler monitoring program Catchment Monitoring Program	DWQ, Environment and Process Improvement	Sanitary Surveys	Catchment Monitoring Program- water quality data trending	Risk assessment review
PRP- 2 Pest Management	Whole of system	All assets	Attraction of pests Vermin infestation including rodents, birds, insects	Chemical Physical Microbiological	Microbiological	Contractual agreement Routine and condition based maintenance program Training	PRO-02196 Pest Management at Seqwater Facilities Monitoring of disinfection residue and <i>E. coli</i>	Asset maintenance	Q-Pulse REX CIS	Internal audit program ISO 22000 audit program	Risk assessment review
PRP- 3 Management of sanitary integrity	Filtration Disinfection Transport	Filter Filtered water transfer pipes/ channels Intermediate tanks Drinking water reservoirs Pipelines	Ingress of contaminants into the water treatment process leading to out of specification product. Asset maintenance Project work Commissioning assets/ Returning assets to service Natural events	Chemical Physical Microbiological	Microbiological	Contractual agreement Routine and condition based maintenance program Training (DWQ awareness and disinfection requirements)	Asset Class Plan(s) Tactical maintenance plans PRO-01551 Sanitary Integrity Inspection for Treated Water Reservoirs Disinfection Procedures PRO-01560 – Disinfection of Tools and Equipment PRO-01869 – Disinfection of Pumps and Hoses	Asset Management Asset maintenance Tactical maintenance Project management Operations	Q-Pulse REX CIS	Internal audit program ISO 22000 audit program	Risk assessment review

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Reference	Process step	Component/ Asset	Hazardous Event	Potential Hazard	Limiting Hazard	Preventive Measure	Monitoring procedures/ corrective actions	Responsibilities and Authorities	Documented Information	Verification	Validation
							PRO-01554 – Disinfection of Water Mains PRO-01559 – Disinfection of Bulk Water Supply Reservoirs PRO-02019 – Disinfection of Small Reservoirs in Free Chlorine Systems PRO-01870 – Underwater Inspection and Work in Reservoirs PRO-02102- Disinfection of Filters and Media				
PRP- 4 Bulk chemicals supply control including product selection delivery and storage	Whole of system	All assets	Contamination of process/ drinking water due to unspecified chemicals Material emits chemicals into process and treated water over a long period of time causing public health issues Cross contamination Chemical deterioration	Chemical Physical Microbiological	Chemical	Contractual agreement including product specifications Chemical delivery procedures Training FIFO process Routine and condition based maintenance Business case review process AS/NZS 4020:2005	REG-00250 Commercial Services- Chemical Panel List Register Chemical Delivery Procedures PRO-01540 Work Instruction Chemical Deliveries PRO-01825 Procedure Receiving Liquid Aluminium Sulphate PRO-01882 Procedure Receiving Calcium Hydroxide PRO-01917 Procedure Receiving Aqueous Ammonia PRO-01919 Receiving Liquid	APDD Procurement Operations	Q-Pulse REX CIS	Internal audit program ISO 22000 audit program	Risk assessment review

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Reference	Process step	Component/ Asset	Hazardous Event	Potential Hazard	Limiting Hazard	Preventive Measure	Monitoring procedures/ corrective actions	Responsibilities and Authorities	Documented Information	Verification	Validation
							Sodium Hypochlorite PRO-01991 Receiving Chlorine Gas PRO-02052 Receiving Compressed/Liquid Oxygen Project management				
PRP-5 Management of WQ Online Instruments	Whole of system	All process steps	Inadequate chemical dosing leading to out of spec product Under and overdosing treatment chemicals	Chemical Physical Microbiological	Microbiological	Routine and condition based maintenance program Training	Asset Class Plan Tactical maintenance plan PRO-02120 Management of Online Instrument Integrity Operations site inspection checklist	DWQ, Environment and Process Improvement	CIS REX QPulse Plant data sheets Operational check lists hardcopies on site	Internal audit program ISO 22000 audit program	Risk assessment review
PRP-6 Management of chemical dosing equipment	Whole of System	All assets	Inadequate chemical dosing leading to out of spec product Under and overdosing treatment chemicals	Chemical Physical Microbiological	Microbiological	Housekeeping oPRP definition (including Drop test, where applicable and SCADA flow control) Routine and condition based maintenance program Training	Asset Class Plan(s) oPRP table in HACCP plans Tactical maintenance plans Operations site inspection checklist	Asset manager Maintenance Operations	CIS REX Q-Pulse Operational check lists hardcopies on site	Internal audit program ISO 22000 audit program	Risk assessment review

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Reference	Process step	Component/ Asset	Hazardous Event	Potential Hazard	Limiting Hazard	Preventive Measure	Monitoring procedures/ corrective actions	Responsibilities and Authorities	Documented Information	Verification	Validation
PRP-7 Management of Maintaining the Disinfection Residual	Supply System	Reservoirs Pipelines	Deterioration of water quality in service reservoirs and balance tanks as a result of variable residence times Water age in extremities	Pathogens	Bacteria Viruses	Operating philosophy Pressurized pipes Secondary disinfection Re-chlorination Blending of Water	SCADA Zoned pressure Disinfection residual monitoring	Operations	SCADA Control room diary	Internal audit program ISO 22000 audit program	Risk assessment review

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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 (CCP) 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 HACCP Plan Wall Chart procedures document the 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 6) 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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Table 4 - Preventive Barriers in Water Treatment

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Coagulation	Raw water exceeds treatment capability Coagulant dosing failures Low alkalinity Poor pH control Poor or excessive mixing Incorrect dose rates Inadequate coagulation aids	Dose water pH Chemical dosing alarms Observation checks of flocculation and sedimentation	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.
Filtration	Raw water exceeds treatment capability Coagulation failure Solids carryover Poor backwashing Filtration break-through	Online turbidity for each cell/filter outlet SCADA tools such as headloss, runtime / production	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.
Disinfection (by Ultraviolet irradiation)	High flows – low contact time Low flows – not enough turbulence to distribute the dose Low UVT – unable to adequately penetrate microorganisms	Online UV intensity and flows Reduction Equivalent Dose (R.E.D.) Ultraviolet Transmissivity (UVT)	This is only applicable to sites that have insufficient pathogen treatment barriers for their catchments. This includes Kilcoy, Kenilworth, Dayboro, Capalaba, Beaudesert, Canungra and Kalbar WTPs where UV disinfection has worked effectively without significant issues/excursions.

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Disinfection (by chlorination)	Chlorine dosing failures Incorrect dose rates Poor pH control High flows – low contact time Low reservoir levels Contamination to reservoir Filter break-through causing shielding	Online free chlorine after dosing and after contact time Online pH and turbidity after contact time Reservoir levels and flows Chemical dosing alarms	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.
Fluoridation	Overdosing fluoridation chemical	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)	Ingress or infiltration Corrosion and deterioration of assets	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, AS NZS/ISO22000:2005 Food Safety Management Systems standard and HACCP standards, these operational measures have been identified and summarised within the supply system DWQMP as CCPs 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 can 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 a documented contingency and escalation procedure for staff to follow. The top five critical limit alarms have been reviewed and are 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 principal preventive measures are listed in Table 5. The most common limiting hazard that has been identified is Pathogens. Unacceptable risks requiring further treatment are listed in the improvement plan (section 4) of this report.

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Table 5 - Preventive Measures in the Supply System

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Water Quality considerations as part of the Monthly Operating Supply Schedule (MOSS) & routine meetings with Supply Partners (Regional Operational Managers Meeting)	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	Non-potable water or organic matter entering service reservoir or pipeline Contamination to reservoirs by access by third party Contamination to reservoir by vermin entry	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 to provide further data. These signals are transferred and alarmed at the 24/7hrs attended operations centre. Operations centre escalation and corrective action procedures are audited routinely. Training is delivered for new operations centre staff.	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 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	Ingress of non-potable water to reservoirs	Service reservoir inspections are carried out monthly using a checklist and photo evidence process. These records are audited routinely to identify any deficiencies. A project trailing the use of	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

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
	Vermin entry to reservoir Corrosion and deterioration of assets	Unmanned Aerial Vehicles (UAV), submersible Remote Operated Vehicles (ROV) and specialist software to inspect and track deterioration commenced in March 2017.	system. Checklists and photos are checked monthly by Drinking Water Quality staff.
Mains Hygiene Procedure	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	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.
Maintaining Positive Pressure	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 Disinfection of Water Mains Procedure
Optimisation of re-chlorination through Automated control systems	Formation of disinfection by-products	All chemical dosing facilities are comprehensively equipped with system redundancies including dual online	Control systems are well established and now have proven historical track records. The operations centre has comprehensive

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Maintain or treat to lower DOC/Bromide Levels		instruments, UPS, multiple chemical dosing pumps, backup telemetries with multi-barrier alarming to the 24/7 operations centre.	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	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 results of Seqwater's verification monitoring during the 2018-19 reporting period are summarized below. The detailed data report at Enclosure 1 is in the format prescribed by the Regulator. This program 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
- average (arithmetic 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).

Analysis of Micro-pollutants using Passive Samplers

The sampling and analysis of micro-pollutants using a '*passive sampler*' methodology began in July 2014 for sites in the catchments where the sampling devices could be deployed. The micro-pollutants analysed included pesticides, pharmaceuticals and personal care products.

The 'passive sampler' reports for sampling conducted during the 2018-19 reporting period are provided at Enclosure 2. There were no exceedances of the ADWG values for these chemicals observed during the 2018-19 reporting period using either grab sampling or passive sampling methodologies. Some parameters have been detected at trace levels, but this has generally been two orders of magnitude below the guideline values.

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 2018 (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 (KPI) 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 do not exceed the water quality criteria, namely *E. coli* (as per Public Health Regulation).

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Health related compliance - For parameters sampled eight or more times during the year, the 95th percentile result of each health-related parameter is used for assessment against the water quality criteria. For parameters sampled less than eight times per year, the maximum result is used for assessment against the water quality criteria. If the 95th percentile (or maximum if sampled less than eight time) value is greater than the water quality criteria, then the whole zone is deemed non-compliant.

Aesthetic compliance - the average of each parameter is 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 2018-2019 reporting period for all of its water treatment operations and supply system zones for microbiological, health and aesthetic compliance.

Water Treatment Plant verification monitoring

Verification monitoring occurred in accordance with the Seqwater Water Quality Verification Monitoring Plan. This was undertaken by the NATA accredited (ISO17025) contracted 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 2018 to 30 June 2019 is provided in Table 6. The statistics from the verification monitoring results for all parameters for both source (raw water) and treated water at each operational site is provided within Enclosure 1.

Table 6 - WTP Verification Monitoring Summary

Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Amity Point WTP	654	0	0
Beaudesert WTP	801	0	1 (treated water hardness)
Banksia Beach WTP	0 ⁽²⁾	0	0
Boonah-Kalbar WTP	805	0	0
Canungra WTP	811 ⁽³⁾	0	0
Capalaba WTP	773	0	0
Dayboro WTP	669	0	0
Dunwich WTP	654	0	0
Esk WTP	782	0	0

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Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Ewen Maddock WTP	812	0	0
Hinze Dam WTP	1192	0	0
Image Flat WTP	1733	0	0
Jimna WTP	740	0	0
Kenilworth WTP	601	0	0
Kilcoy WTP	760	0	0
Kirkleagh WTP	1082	0	0
Kooralbyn WTP	795	0	0
Landers Shute WTP	775	0	1 (treated water pH – low)
Linville WTP	392 ⁽¹⁾	0	0
Lowood WTP	786	0	0
Maroon Dam WTP	1000	0	2 (2 x reticulated water pH- high)
Molendinar WTP	626	0	0
Moogerah Dam WTP	1003	0	1 (reticulated water turbidity)
Mt Crosby WTP	1583	0	0
Mudgeeraba WTP	768	0	0
Noosa WTP	934	0	0
North Pine WTP	827	0	0
North Stradbroke Island WTP	507	0	0
Point Lookout WTP	654	0	0
Rathdowney WTP	759	0	0
Somerset Dam WTP	792	0	0
Tugun Desalination Plant	1216	0	0
Wivenhoe Dam WTP	1410	0	0
Total	27,696	0	5

Notes:

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- (1) Linville WTP is a stand-alone non grid connected scheme. It was off-line for the entire reporting period and supply demand was achieved by tankering water supplies from a nearby scheme; this site continued to be monitored as treated water.
- (2) Banksia Beach WTP is a grid connected scheme. It was in cold standby and no water was produced for the reporting period with supply demand being met by the water grid.
- (3) The Canungra WTP was completely rebuilt, and so different sample points are given to for treated water from the old plant and new plant in Enclosure 1.

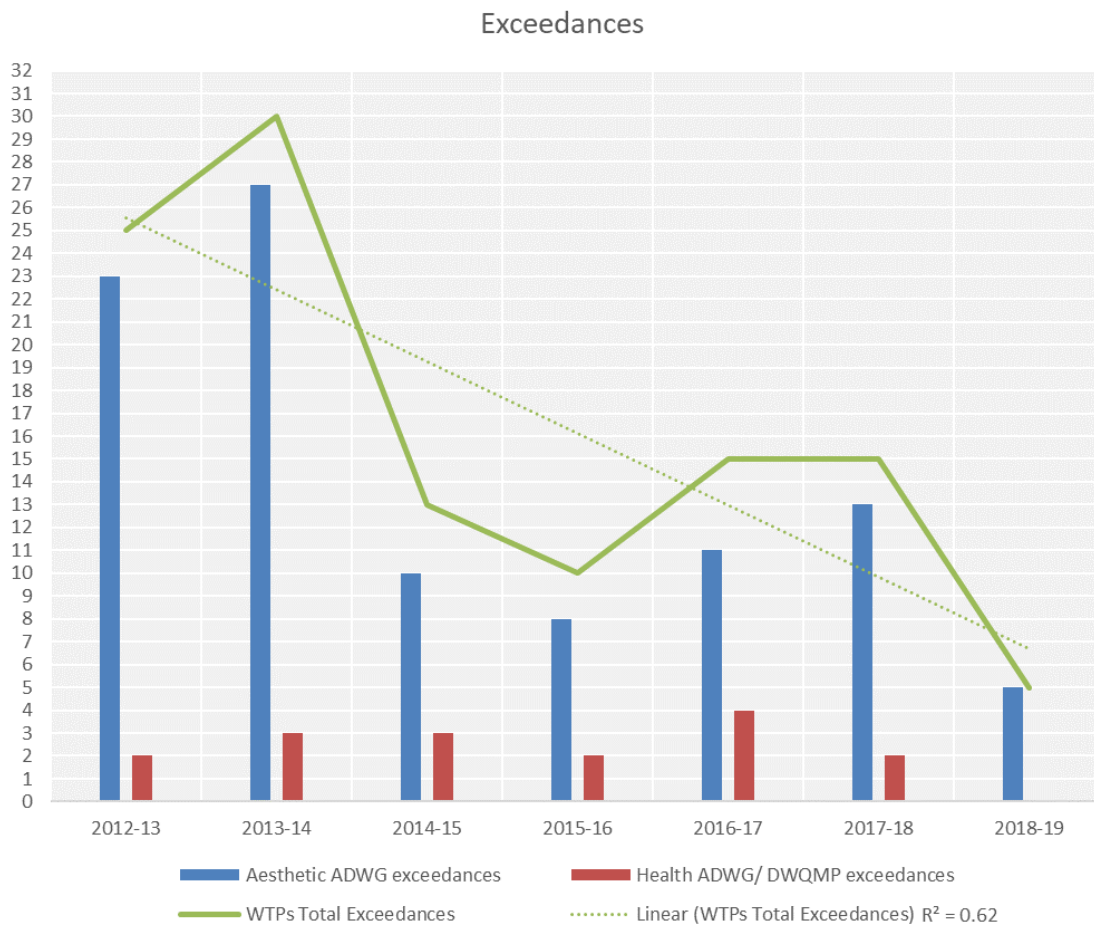
Analysis of the Water Treatment Plant verification monitoring data

Through an assessment of the water quality data from the verification program it was found that the WTPs were compliant against the ADWG health guideline values for drinking water, with no health exceedances recorded for individual WTPs during the reporting period. This exemplifies the continued improvement Seqwater has shown in driving excellence in our produced drinking water quality.

Overall, the count of ADWG health related exceedances over the past years has remained at a relatively constant low (this reporting period being the lowest on record (0)), which is a considerable achievement given the number of diverse schemes and systems. The count of aesthetic exceedances has on average been decreasing with this reporting period also being the lowest on record (5). This reporting period has achieved a new all-time low number of total exceedances, half as many as the previous all-time low of 10 which occurred in the 2015-16 financial year. The continued improvement is evident in the simple linear trend of total exceedances.

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Figure 1 – WTP exceedances over different reporting periods.

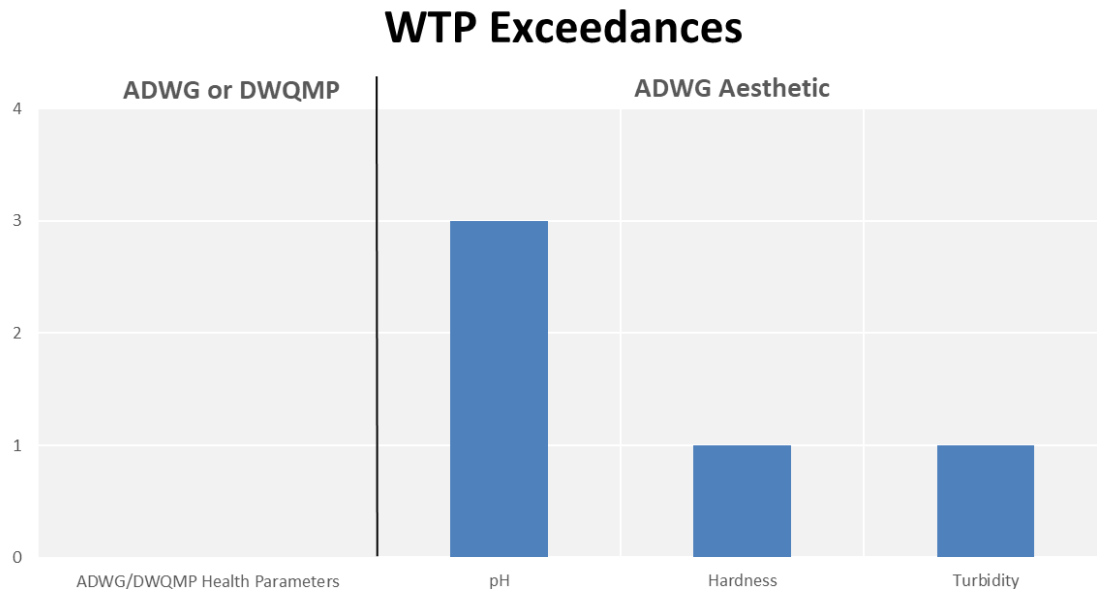


The high pH exceedances at Maroon in the reticulated water are explained by long water age within the reticulation circuit that occurs when demand is low and as such do not represent a failed treatment process. Similarly, the elevated reticulation turbidity at Moogerah was due to ageing galvanized infrastructure and does not represent a failure in the treatment process. New treated water reticulation rising mains and gravity mains made of High Density Polyethylene (HDPE) pipe replaced the old systems in January 2019 and May 2019 respectively to address these issues.

The low pH (6.4) at Landers Shute WTP was most likely due to a sampling issue (confirmed by Seqwater process laboratory results which analysed the same water returning a pH of 7.2).

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Figure 2 - WTP Exceedances by Parameter for this reporting 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 DWQIMP. 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. The monitoring plan has been improved over the past five years to adopt a risk-based approach and improve efficiency. Accordingly, the number of analyses for the supply system was reduced from 52,257 tests during 2013-14 to 39,577 tests during 2014-15 but has since been maintained at this level with 43,030 tests during 2017-18 and 44,163 tests during 2018-19.

Sampling and on-site field tests were undertaken by Seqwater’s field services team and laboratory testing was undertaken by a contracted NATA accredited laboratory service provider. This covered 31 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.

The Supply System has been assessed as 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

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did occur within the supply system during the 2018-19 reporting period and these are shown in Table 7.

Table 7 - Supply system verification monitoring summary.

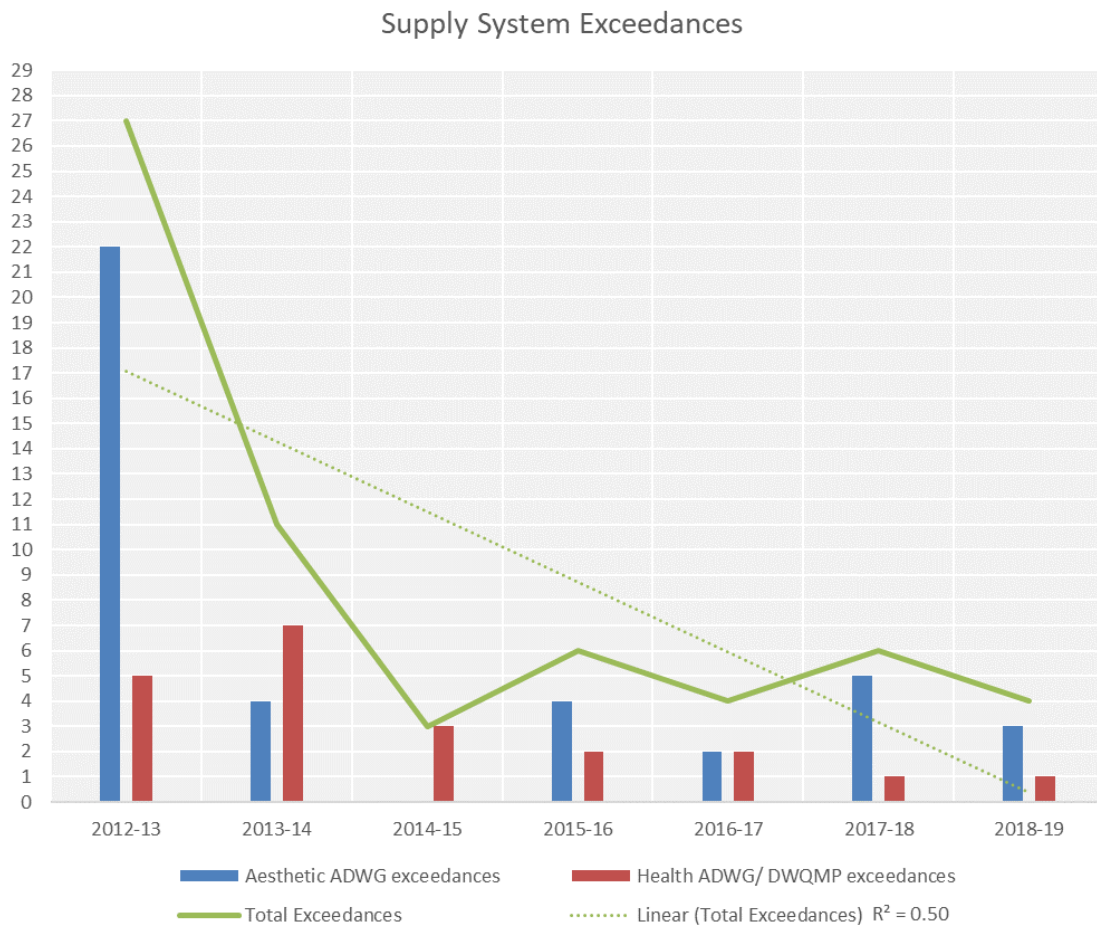
Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Brisbane	14,898	0	0
Eastern Pipeline Interconnector (EPI)	2069	0	0
Gold Coast	1394	0	0
Logan	3344	0	0
Network Integration Pipeline (NIP)	2136	0	0
Northern Pipeline Interconnector (NPI)	8191	0	3 (1 Iron, 2 Turbidity)
Redland	5627	1 (<i>E. coli</i>)	0
Southern Regional Pipeline (SRP)	6504	0	0
Total	44,163	1	3

Analysis of the Supply System verification monitoring data

There was one ADWG health exceedance and three aesthetic guideline exceedances for the Supply System during 2018-19 reporting period consistent with the low numbers of exceedances for each category in previous two years. The chart below shows an initial reduction and maintenance of low numbers of exceedances since the 2013-14 reporting period. Although this trend is partly supported by a reduction in monitoring to adopt a risk-based approach and improve efficiency, this improvement trend also demonstrates a successful year of operation.

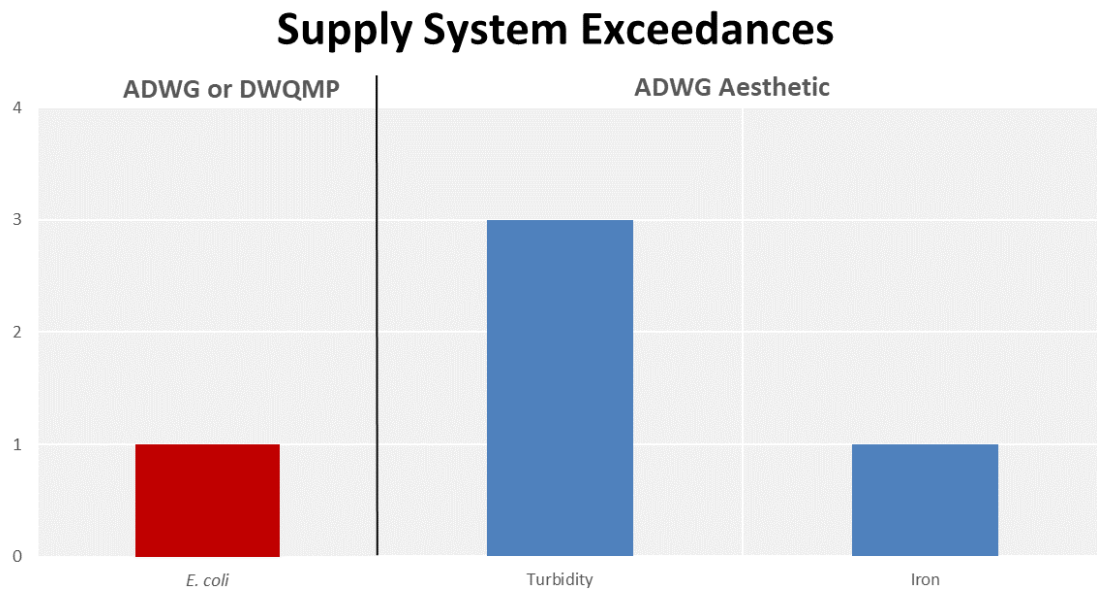
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Figure 3 - Supply System exceedances over different reporting periods.



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Figure 4 - Supply System exceedances by parameter for this reporting period.



The health guideline exceedances due to routine verification monitoring included one *E. coli* detection. The cause for the *E. coli* detections investigated and, consistent with the detections in the past, there were significant chlorine levels present which indicate potential issues with the sample collection and analysis method. An investigation into the iron and turbidity detection at Ferntree WQMF on the NPI found issues with the plumbing of the sample tap which is likely to result in the implementation of an improved sample tap design. The minimal number of aesthetic exceedances across the Supply System is supported by good operating practice and improved source water conditions.

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4. Improvement plan

Improvements continue in accordance with the Drinking Water Quality Improvement Plan.

The progress that has been made during the 2018-19 reporting period to reduce health related risks and improve reliability in providing safe drinking water supplies is tabled in the spreadsheets at Enclosure 3 of this report.

Any improvements which are yet to be implemented are reassessed and prioritized through the internal audit and Risk Assessment review schedule.

The changes to the DWQMP identified in risk assessment reviews, HACCP team meetings and the investigation of incidents, reflect the significant amount of progress that Seqwater has made in improving its drinking water quality management system.

The details of these changes are provided in the register of changes to DWQMP, HACCP plans and procedures at Enclosure 4.

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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 Table 8. All incidents were reported within the required timeframes.

Table 8 - A summary of incidents at Seqwater's treatment operations and Supply System

Incident Number	Name of scheme component	Date	Description of the Event/Incident	Improvements
DWI-7-507-00112	Karragarra Island	21/10/2018	<p>Non-routine Due to a burst water main on Karragarra Island, water pressure and supply was lost to Macleay, Lamb and Karragarra Islands. The leak was estimated to be between 200 - 700 L/s. The burst water main was discovered at approximately 6 pm on 21 October 2018.</p> <p>Seqwater worked with Redlands Council to develop and release a boiled water notice to residents.</p>	<p>The affected water main was repaired on the 23 October 2018. The pipework was charged and scoured before water testing was undertaken. All <i>E. coli</i> results came back as <1 MPN/100 mL and total chlorine water was detected in the supply system above >0.5 mg/L at all sites.</p> <p>Based on these results, the boil water notice was lifted at approximately 8:30 pm on 24 October 2018 following consultation with the Public Health Unit.</p> <p>The burst section of pipe was analysed and found to be affected by years of localised exposure to groundwater in the soil,</p>

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Incident Number	Name of scheme component	Date	Description of the Event/Incident	Improvements
				<p>exacerbated by a number of other localised environmental and manufacturing aspects.</p> <p>Long term corrective actions include enhanced stakeholder engagement and asset reliability understanding on the bay islands.</p>
DWI-7-507-00110	Mt Crosby WTP	17/7/2018	Non-routine Investigative monitoring returned an ADWG health exceedance for acrylamide of drinking water leaving Cameron's Hill 1 Reservoir.	<p>Acrylamide monomer is an impurity found in polyacrylamide polymers which is used at Mt Crosby WTPs (and widely across the water industry) and is used as a flocculant aid, a filter aid and in the centrifuges to assist in the sludge dewatering process (which is returned of the head of the treatment works).</p> <p>Under the operating conditions around the time of sampling the acrylamide monomer concentration in the drinking water was modelled at about 0.0001 mg/L (the ADWG limit is 0.0002 mg/L).</p> <p>The external laboratory analysed the sample in duplicate obtained results within measurement uncertainty at a concentration of approximately 0.0005 mg/L (0.00048, 0.00052) upon which Seqwater were verbally notified as per our notification protocols.</p> <p>However, prior to issuing the Certificate of Analysis (CoA) a second duplicate was taken from the same sample by the lab which returned a result of 0.00012 mg/L. This is what the lab reported on the CoA. A subsequent low-level quantification method returned a result of 0.000056 mg/L (i.e. an order of</p>

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Incident Number	Name of scheme component	Date	Description of the Event/Incident	Improvements
				<p>magnitude lower than those initial results that were verbally reported).</p> <p>Optimisation of the centrifuge operating conditions enabled the polymer dose to be reduced, decreasing the load and concentration of acrylamide monomer in the drinking water and an intensive acrylamide monomer monitoring program for a period of two weeks was undertaken.</p> <p>A predictive 'Live acrylamide concentration monitoring system' has been implemented using the SCADA system at Mt Crosby Eastbank WTP. This is a predictive modelling tool that identifies to the operator the predicted acrylamide monomer concentration in the drinking water under the current operating conditions. Enabling early operational intervention to avoid concentration above the ADWG.</p>
DWI-507-19-07606	Molendinar WTP	20/6/2019	<p>Non-routine Sampling and testing undertaken on 20 June at Molendinar WTP Treated water old Fluoridation sampling line returned a positive <i>E. coli</i> result of 1 MPN/100mL.</p> <p>The maintenance activity was being undertaken by contractor on a Supply System asset within the Molendinar WTP compound. The disinfection solution used for the maintenance job was made up and tested and strength verified by the</p>	<p>Immediate actions undertaken included appropriate timely notification actions and immediate resampling and further exploratory analysis.</p> <p>The original <i>E. coli</i> detection was sent to Griffith university to isolate the microorganism and undertake Microbial Source Tracking (MST) (<i>E. coli</i> profiling) which identified the isolate as a non-pathogenic type originating from a non-human source (animal – not further specified).</p>

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Incident Number	Name of scheme component	Date	Description of the Event/Incident	Improvements
			Seqwater Process Laboratory staff at Molendinar WTP.	
No incident number advised from WSR	Supply System – Redland (Heinemann Road Reservoirs – Common 2 & 3 Outlet)	15/5/2019	Routine supply system verification monitoring at Heinemann Road Reservoirs returned an <i>E. coli</i> result of 1 MPN/100 mL	<p>Additional microbiological sampling was undertaken with all results returning non detections</p> <p>The original <i>E. coli</i> detection was sent to Griffith University to isolate the microorganism and undertake MST testing (<i>E. coli</i> profiling) which identified the isolate as a non-pathogenic type originating from a non-human source (animal – not further specified).</p> <p>An inspection of the reservoir identified small gaps around the walls and under the roof area which are in the program of work to be repaired.</p>

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6. Audit of the Plans

6.1 Regular audits

Seqwater must audit its DWQMP at the intervals stated in an Information Notice given to it under section 99 of the Act. The Information Notice for the approval of Seqwater's amended DWQMP dated 29 April 2019 specifies that the next regular audit of the DWQMP is to be completed prior to 1 March 2020. Further regular audits are required to be completed every four years from that date. Accordingly, the regular audit was not conducted during the 2018-2019 reporting period.

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 relevant site's HACCP plan, wall chart procedure (incorporating the CCPs), operational monitoring plan, and operator and maintenance records. It includes verification of the HACCP flow diagram and process flow schematic by the HACCP Team Leader and available operational staff from the HACCP team. Internal audits have been conducted at 26 WTP and Supply System sites. Seqwater's remaining operational sites are scheduled for the next reporting period (2019-20) as part of an ongoing cycle.

During the course of the 2018-2019 reporting period, the audit, risk assessment and document review schedule was altered to improve efficiency. The new schedule begins with an internal audit and is followed by the risk assessment review and consequently the document review. Theoretically, this enables audit findings to be captured directly within risk treatments identified as part of the risk assessment review, and thus enable a document review that captures both changes to risk and risk treatment.

All major and minor non-conformances and opportunities for improvement are delivered through engagement with operations staff and the use of Seqwater's electronic document and record management systems.

External audits – AS NZS/ISO 22000 Re- Certification audits

Seqwater has integrated the AS NZS/ISO22000:2005 Food Safety Management Systems standard into the DWQMP, as many of the requirements of the standard are consistent with 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 DWQMP implementation and ensures the DWQMP becomes part of the Integrated Management System (IMS).

Seqwater has been AS NZS/ISO 22000 re-certified during the 2018-19 reporting period. Seqwater is obligated to undergo re-certification audits conducted by SAI Global every two years. The SAI Global Surveillance Audit in May 2019 and June 2019 resulted in two major non-conformances for Seqwater against all four systems. Subsequent corrective actions resulted in both non-conformances being downgraded to minor.

The scope of accreditation continues to include Seqwater's DWQMP and its major operational sites including Mt Crosby East Bank and West Bank, Capalaba, North Stradbroke Island, Molendinar, Mudgeeraba, Landers Shute, North Pine, Noosa, Image Flat, Kalbar and Lowood WTPs, and the supply system (i.e. control room and all operational sites).

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External audits- Regulated fluoride audit

Seqwater accommodates regulated fluoride audits every two years. The audit period stretches from November to February where every Fluoride plant is checked for compliance with the current *Fluoride Code of Practice* by the regulator. Audits were conducted in the 2017-2018 financial year and consequently there were no fluoride audits required for this reporting period.

Other audits- third party-Internal

As part of the 2018-19 Internal Audit Plan approved by the Seqwater Audit and Risk Committee Deloitte performed an assessment over the conformance with the Act and compliance of the Drinking Water Quality Management Plan (DWQMP) at Mt Crosby East and West bank WTPs, Dayboro WTP and Molendinar WTP. No major non-conformances were identified.

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7. Regular review of the plans

Pursuant to section 10.1 of the Information Notice for the approval of Seqwater's DWQMP Seqwater is required to complete a review of its DWQMP before 1 July 2020.

The DWQMP review will be conducted by stakeholders relevant to each element of the DWQMP through a series of workshops. The elements, or sections of the DWQMP, are based on the 12 Elements of the 'Framework for Management of Drinking Water Quality' outlined in the Australian Drinking Water Guidelines (**ADWG**).

Seqwater's Hazard Analysis and Critical Control Point (**HACCP**) plans and appendices to the DWQMP will also be subject to review through continuous improvement programs. This has included reviews of all risk assessments, the review of Critical Limits and risk improvements through 46 HACCP team meetings regularly held across all of the operational sub-regions, incident investigations and the two-yearly internal site audits of the HACCP plans accuracy and implementation.

Seqwater's review and improvements to the DWQ Management System

The main improvements that have been achieved by Seqwater that were reflected in the application to amend the DQWMP following this review or identified for further improvement of the management system included:

The ongoing conduct of risk reviews through an integrated Risk Dashboard which displays the results of previous risk assessment reviews.

HACCP plans, procedures and flow diagrams that provide an understanding of the system were updated to reflect any operational changes or infrastructure upgrades.

A complete review of incidents over the last two years along with long-term data was conducted as part of every risk assessment review.

Seqwater's research programs were updated to reflect the improved connectivity with business needs and research-related organisations.

The development and implementation of engineering and commissioning standards across the organisation.
The development and implementation of operational manuals and expanding coverage of operational procedures

The review of the DWQMP will aim to highlight any deficiencies and outline the significant amount of progress that Seqwater has made in improving its drinking water quality management system. The details of these changes will be provided in the *Register of changes to DWQMP, HACCP plans and procedures* (for current – see Enclosure 4). In accordance with section 107(2) of the Act, Seqwater may submit an application to the Regulator to amend the approved DWQMP within 30 business days of the completion of this review, where the review indicates the DWQMP needs to be changed to reflect changes to the operation of the water service provided by Seqwater.

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8. Glossary

Term	Definition
ADWG	Australian Drinking Water Guidelines 2011, 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'.
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	ISO 22000:2005 Food Safety Management Systems. International standard for food safety.
LIMS	Laboratory Information Management System
NPI	Northern Pipeline Inter-connector
WSR	Water Supply Regulator
SCADA	Supervisory Communication and Data Acquisition (SCADA) system. Human to Process software interface.
Supply System	Previously named the Bulk Distribution Network and formerly operated by LinkWater.
SUVA	Specific UltraViolet Absorbance
The Act	Water Supply (Safety and Reliability) Act 2008 (Qld)
The Regulator	Queensland Water Supply Regulator
WSAA	Water Services Association of Australia
WTP	Water Treatment Plant
WQMF	Water Quality Management Facility

9. Enclosures

Enclosure	Name
1	Verification monitoring 2018-2019 Water Quality data report (REX ID: D19/170995)
2a	Catchment and Drinking Water Quality Micropollutant Monitoring Program – Entox Passive Sampling Winter 2018 Report (REX ID: D18/184022)
2b	Catchment and Drinking Water Quality Micropollutant Monitoring Program – Entox Passive Sampling Summer 2019 Report (REX ID: D19/94832)
3	Drinking Water Quality Improvement Plan (DWQIMP) (REX ID: D15/200)
4	Register of changes to DWQMP, HACCP plans and procedures - 2018-2019 (REX ID: D14/7606)

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