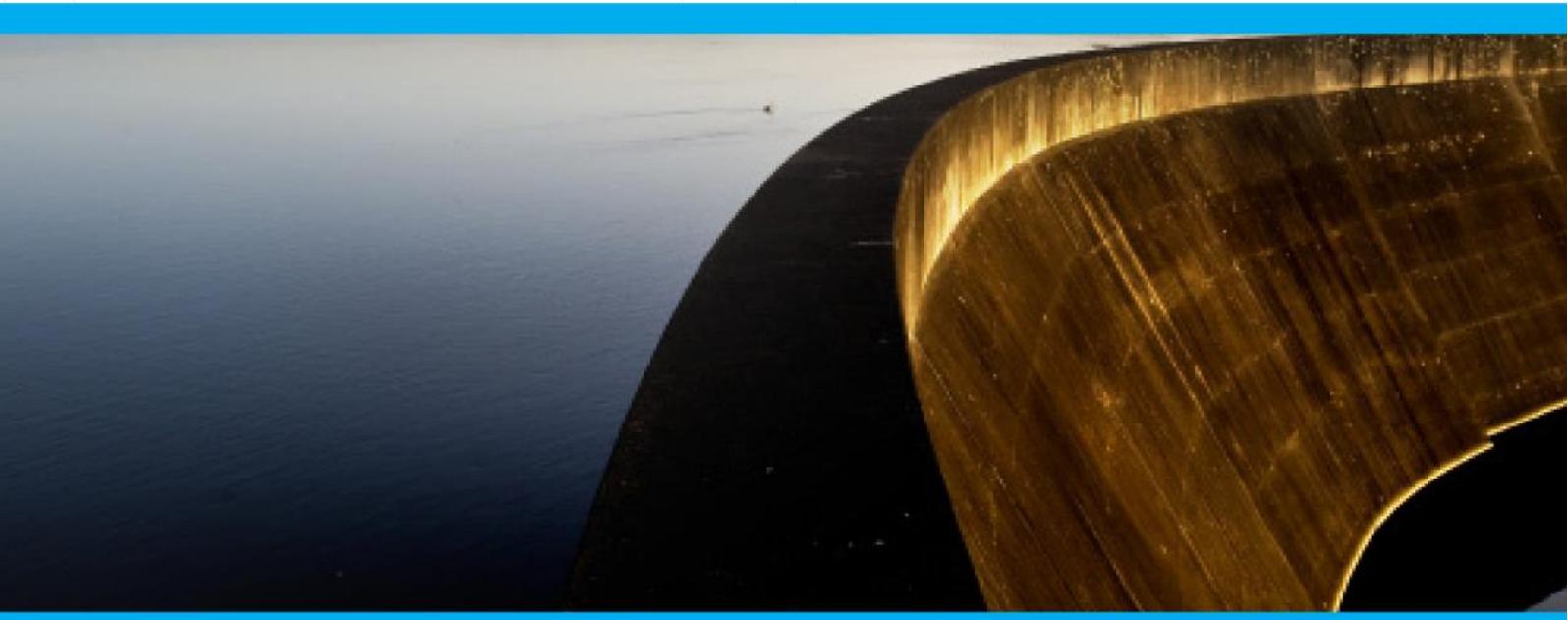


Drinking Water Quality Management Plan Report 2016-17

Seqwater (SP507) Drinking Water Quality Management Plan



Distribution list

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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 a number of small reticulation systems supplying recreation parks.

Seqwater’s annual *Drinking Water Quality Management Plan Report* (DWQMP report) outlines the activities for the management of water quality risk and issues. This report covers the period 1 July 2016 – 30 June 2017 (“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-certified laboratory. Verification monitoring included 25,081 treated water analyses, and 41,561 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 six individual health-related exceedances and 13 individual aesthetic exceedances against the water quality criteria identified in the DWQMP, for 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 its drinking water quality management system.

Seqwater reported all incidents concerning health related guideline values to the regulator within the required timeframes. Four of the health-related exceedances (*E.coli*) were most likely related to sampling contamination and are unlikely to be an indication of process failure against the DWQMP. Additional improvements to Seqwater’s sampling processes are expected to prevent recurrence and therefore reduce the number of health exceedances which has generally related to *E.coli* in previous years. Another exceedance related to elevated total chlorine due to the dosing of disinfectant into an isolated main, which when released blended with other drinking water to be within specification before any off-takes or supply points to customers.

The remaining health incidents related to parameters that were detected which do not currently have a guideline value in the Australian Drinking Water Guidelines. This included levels of chlorate above Seqwater’s criteria specification which had formed due to higher than normal levels of degradation of the disinfectant (sodium hypochlorite) during manufacture, transport and on-site storage; and the detection of nitroso-pyrrolidine, which upon further investigation by the contracted laboratory

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found an instrument fault had caused an unreliable result. This result has been removed from the data set.

There were 13 minor aesthetic exceedances identified and these relate to source water conditions in certain catchments that contribute to; elevated hardness, pH or manganese levels which are not able to be sufficiently treated in Seqwater's treatment plants in regional locations. The two aesthetic exceedances for iron and turbidity in the supply system related to a single sampling site affected by issues with the sample line which have since been rectified. Seqwater continues to improve its systems and processes to prevent further exceedances.

Other drinking water quality management system improvement activities completed during the reporting year included four risk assessment reviews, 62 HACCP team meetings, 27 internal audits of treatment plants and supply system sites, and 20 external (SAI Global™) audits for AS NZS/ISO 22000:2005 certification.

These reviews and audits are part of a schedule that covers all of Seqwater's treatment plants and supply system sites. Seqwater has used the findings of these improvement activities to improve its 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.

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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 the Table below). 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 2016 to 30 June 2017.

DWQMP Report Condition	Seqwater Compliance
<p>Section 142 Drinking water quality management plan reports</p> <p>(1) 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>(2) The provider must, unless the provider has a reasonable excuse—</p> <p>(a) 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>(b) give the regulator a copy of the report within 120 business days after the financial year ends.</p>	<p>The current report meets these requirements. It is required to be submitted to the Regulator within 120 business days following the end of the 2016–17 financial year. Accordingly, submission for the current report is due by 19 December 2017.</p> <p>The current report has been prepared in accordance with the approval conditions of the DWQMP and the Regulator's guidance at https://www.dews.qld.gov.au/water/regulation/drinking/dwqmp-report</p> <p>Section 142C(2) is not applicable.</p>
<p>Section 142(3) The report must state or include all of the following—</p> <p>(a) 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. Seqwater has not received any additional report requirements during the current reporting period.</p> <p>Refer to Section 3 of this report.</p> <p>A review of the DWQMP was not required to have been completed during the 2016-2017 reporting year.</p> <p>A four-yearly Regular audit was not required to have been completed during the 2016-2017 reporting year.</p> <p>Refer to Section 5 of this report for details of incident/event reporting during the 2016-2017 reporting year.</p>
<p>(b) the actions the provider took to implement the plan;</p>	
<p>(c) the outcome of any review of the plan in the financial year and how the provider has addressed matters raised in the review;</p>	
<p>(d) if a drinking water quality management plan audit report has been prepared for the financial year— a summary of its findings and any recommendations;</p>	
<p>(e) details of any information the provider gave the regulator under sections 102 and 102A in the financial year;</p>	

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DWQMP Report Condition	Seqwater Compliance
(f) 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 2016-17 Water Quality Data report. This report also includes aesthetic criteria.
(g) 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 Chapter 2, Part 4, Division 1 of the Act. The DWQMP forms 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 DWQMP

Seqwater’s amended DWQMP received final approval from the Regulator under Information Notice dated 18 March 2014 (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.

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 2016-17 reporting year 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 2016-17 reporting year.

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 2016-17 reporting year 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 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 (DWQIMP)) during the 2016-17 reporting year as described in section 4 of this report. The DWQIMP changes during 2016-17 are provided in Enclosure 3 to this report.

3.1 Approval conditions

Seqwater received final conditional approval of its amended DWQMP on the 18 March 2014 under sections 99(1)(b) and 100(3) of the Act. A summary of the approval conditions, and Seqwater’s compliance with them, is provided in the following table.

Condition	Compliance
No. 1. Water Quality Criteria	
Water quality criteria for drinking water including: <ul style="list-style-type: none"> i. The standards for drinking water quality prescribed in a regulation under the Public 	Compliant. Seqwater has reported all non-compliance with relevant criteria including health guideline values in the

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Condition	Compliance
<p>Health Act.</p> <p>ii. The criteria in any guideline, if any, made by the regulator about the quality of drinking water.</p> <p>iii. 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. 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>ADWG and standards in the <i>Public Health Act</i> 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>
<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> <p>(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.</p> <p>(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> <p>These reporting requirements must be reported to the regulator immediately and followed up in writing using 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>

Condition	Compliance
No. 3. Research projects and additional reporting requirements	
<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>The detection must be reported to the regulator immediately and followed up in writing using the prescribed form within 24 hours.</p>	<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>
No. 4. Financial outlays	
<p>The State accepts no liability for any financial outlay incurred by Seqwater in complying with the drinking water quality management plan and the conditions in this approval</p>	<p>—</p>

3.2 Risk assessment

Seqwater completed a project to consolidate its DWQ risk assessments into a single file known as *Risk Assessment Dashboard*. The dashboard was implemented in May and Seqwater completed 4 risk assessment reviews for its drinking water quality management plans, with the remainder of plants and the supply system scheduled for completion in the remainder of the following reporting period (2017-18). The WTP reviews completed include: Beaudesert, Hinze, Rathdowney and Ewen Maddock (ahead of its restart in July 2017).

The findings from the recent risk assessment reviews are consistent with those reported in the 2015-16 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 as part of the regular asset management process.
- The risk assessment at Ewen Maddock WTP was undertaken before re-commissioning the WTP after it had been in ‘cold stand-by’ (i.e. whilst off-line and non-operational) and the following improvements were instigated:
 - Replacement of perishable process components, for e.g. dosing lines.
 - Replacement or refurbishment of online instrumentation.
 - General maintenance to improve assets that required cleaning, repair or refurbishment.
- 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.

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 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>

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Disinfection (by Ultraviolet irradiation)	<ul style="list-style-type: none"> • UV dosing failure • Raw water exceeds treatment capability • Coagulation failure • Filter break-through causing shielding 	<ul style="list-style-type: none"> • Online monitoring for UV intensity and flow • UV transmittance (online or grab sample) monitoring • Observation checks of the UV system status 	This is only applicable to sites that have insufficient pathogen treatment barriers for their catchments. This includes: Kilcoy, Kenilworth, Dayboro, Capalaba, Beaudesert and Kalbar WTPs where UV disinfection has worked effectively without significant issues/excursions.
Disinfection (by chlorination)	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<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.

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Reticulation (recreation sites)	<ul style="list-style-type: none"> Ingress or infiltration Corrosion and deterioration of assets High water age within the network 	<ul style="list-style-type: none"> Observation Chlorine residual monitoring Demand monitoring (plant operation hours and reservoir levels) Vermin proofing inspections on reservoirs 	<p>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.</p> <p>Chlorine testing on recreation park taps is undertaken and backed up by verification monitoring at the same sample sites.</p>

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 programed 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 overall operational monitoring system has worked successfully throughout the reporting year.

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Seqwater monitors the Operational Pre-requisite Programs through internal auditing and compliance spot-checks. The main preventive measures are listed below, including an update of the status of each measure, with the main limiting hazard in most instances being pathogens. Risks requiring further treatment are listed in the improvement plan – refer to section 4 of this report.

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Monthly Operating Supply Schedule (MOSS) & routine meeting with Supply Partners (Regional Operational Managers Meeting)	<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 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 are representative for 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 center. Operations center escalation and corrective action procedures are audited routinely. Training is delivered for new operations center staff.	Established SCADA systems and critical limit alarming levels notify the operations center of low chlorine residual. Escalation procedures covering different severities of alarms are well established and are followed by operations center staff. Corrective actions are documented in a procedure and are followed by operations center staff and Supply System operations management. A documented procedure is allocated to maintaining chlorine residual and is used as a guideline for operational staff.

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
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 using a checklist and photo evidence process. These records are audited routinely to identify any deficiencies. A project trialing the use of Unmanned Aerial Vehicles (UAV), submersible Remote Operated Vehicles (ROV) and specialist software to inspect and track deterioration commenced in March 2017.	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 	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 center 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 center 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	<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 center of any low pressure situations.	The operations center 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.

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Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
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 center.	Control systems are well established and now have proven historical track records. The operations center has comprehensive documentation to assist in the control of these systems and is 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 center.

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3.4 Verification monitoring

The results of Seqwater’s verification monitoring during the 2016-17 reporting year are summarised 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 (mean) concentration or count.

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 catchment 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 2016-17 reporting year are provided at Enclosure 2.

There were no exceedances of the ADWG values for these chemicals observed during the 2016-17 reporting year 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 2005* (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 do not exceed the water quality criteria, namely *E.coli* (as per Public Health Regulation).
- **Health related compliance** - For parameters sampled eight or more 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

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any value greater than the water quality criteria, then the whole zone is deemed non-compliant.

Seqwater was assessed as compliant during the 2016-17 reporting year for all of its water treatment operations and supply system zones for microbiological, health and aesthetic compliance. This was assessed on 25,081 treated water analyses and 41,561 supply system water analyses (a total of 66,642 bulk water supply test results).

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 up to 89 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 2016 to 30 June 2017 is provided below. The statistics from verification monitoring results for all parameters for both source (raw) and treated water at each operational site are provided at Enclosure 1.

Name of scheme component	Number of Analyses Performed	Number of Individual ADWG/DWQMP Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Amity Point WTP	583	0	0
Atkinson Dam WTP / Recreation Park	327	0	1
Beaudesert WTP	619	0	3
Boonah-Kalbar WTP	695	0	0
Borumba Dam WTP / Recreation Park	333	0	0
Canungra WTP	578	0	0
Capalaba WTP	614	0	0
Dayboro WTP	659	0	0
Dunwich WTP	577	0	0
Esk WTP	627	0	0
Gold Coast Desalination Plant	1133	0	0
Hinze Dam WTP / Recreation Park	1051	0	0

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Name of scheme component	Number of Analyses Performed	Number of Individual ADWG/DWQMP Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Image Flat WTP	1157	0	1
Jimna WTP	600	0	0
Kenilworth WTP	624	0	0
Kilcoy WTP	660	0	0
Kirkleagh WTP / Recreation Park	1139	0	0
Kooralbyn WTP	746	0	2
Landers Shute WTP	643	0	0
Linville WTP	332	0	0
Lowood WTP	615	0	0
Maroon Dam WTP / Recreation Park	858	1	2
Molendinar WTP	612	0	0
Moogerah Dam WTP / Recreation Park	943	0	1
Mt Crosby WTP	1296	0	0
Mudgeeraba WTP	605	0	0
Noosa WTP	814	1	0
North Pine WTP	730	0	0
North Stradbroke Island WTP	593	0	0
Petrie WTP	1219	0	0
Point Lookout WTP	580	0	0
Rathdowney WTP	648	0	0
Somerset Dam Township WTP	954	1	0
Wivenhoe Dam WTP / Recreation Park	1250	1	1
Total	25414	4	11

Notes:

- (1) Banksia Beach WTP remained offline in ‘cold standby’ during the 2016-17 reporting year and was not subject to verification monitoring whilst off-line.
- (2) Atkinson Dam WTP and Borumba Dam WTP which supply recreation areas, and Linville WTP which supplies a stand-alone community, remained off-line and supply was achieved by tankering water supplies from a nearby scheme. Treated water continued to be monitored at these sites.

Analysis of the Water Treatment Plant and Recreation Site verification monitoring data

Through an assessment of the water quality data from the verification program (25,414 treated water and recreation distribution system drinking water analyses), it was found that the WTPs complied with the ADWG health guideline values for drinking water. However, there were single detections of *E.coli* at Somerset Dam WTP (incident report number: DWI-507-00096), Maroon Dam WTP (DWI-507-00097), and Wivenhoe Dam WTP (DWI-507-00098). Additionally, there was a chlorate concentration (0.89 mg/L) exceeding Seqwater’s specification (0.8 mg/L), and whilst no ADWG guideline exists, this was reported to WSR as required in Seqwater’s DWQMP (DWI-50700102).

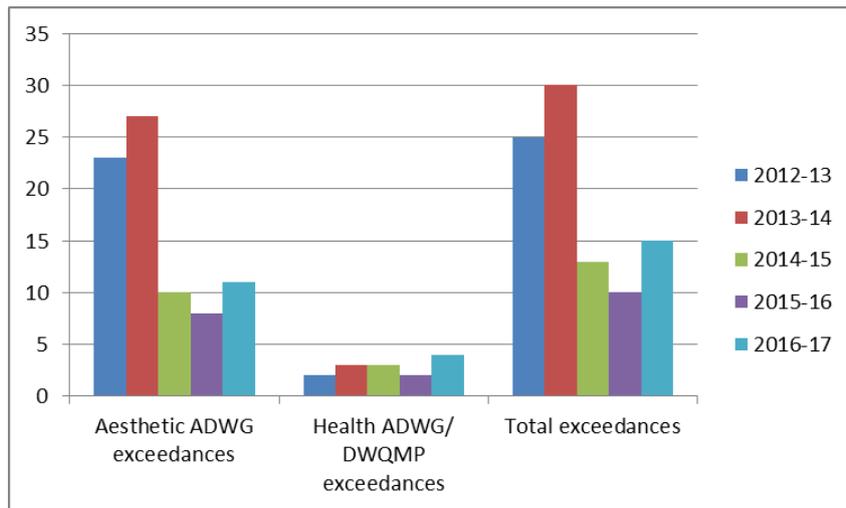
All of the health related exceedances were notified to the Regulator in accordance with section 102 of the Act. There was a nickel exceedance (Image Flat WTP, 1 August 2016) that was due to a low level of confidence in the sampling and analysis. Following confirmatory tests, it was determined that the results for nickel and all other metals in the same analytical suite for the sample were unreliable and it was appropriate to exclude them from the monitoring database (and the data shown at Enclosure 1).

The following chart shows an ongoing significant reduction in the number of exceedances since the 2012-13 reporting year. Overall, ADWG health related exceedances over the past four years have remained consistently low, between 2 – 4 exceedances per year, which a considerable achievement given the number of diverse schemes and systems.

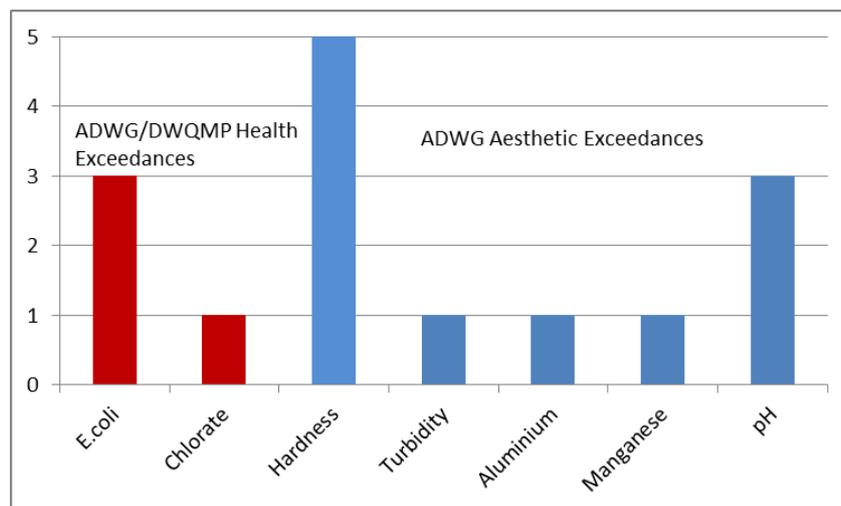
Most health related exceedances observed in the past concerned the detection of *E.coli* in the presence of significant chlorine residuals in the supplied water. In June 2016, Seqwater established a Field Services Team and quality control during sampling and on-site testing became the responsibility of Seqwater. This has supported the reduction of the number of health based exceedances further compared with previous reporting years given that these *E.coli* detections were likely to be related to sampling issues or the transportation of samples.

The number of aesthetic exceedances has been consistent with recent years, such as 13 exceedances in 2016-17, eight exceedances in the 2015-16 and 10 exceedances in the 2014-15. In the current report, all except one exceedance (acid soluble aluminum at Wivenhoe WTP) had been due to raw water conditions where the aesthetic parameter (pH, hardness, iron or manganese) had exceeded the treatment capability of the plant. These results are in improvement earlier reporting periods, such as 27 exceedances in 2013-14 and 23 exceedances in 2012-13. Accordingly, good operational practice has been demonstrated in recent years where exceedances due to operational issues at the WTPs have been reduced to zero or near zero events.

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



The isolated instances of ADWG health exceedances are not believed to be the result of HACCP failures. The three *E.coli* detections, as mentioned earlier in the report, were in the presence of significant residual chlorine concentrations and no operational disturbances were observed.

The aesthetic exceedances predominantly relate to hardness or pH in treated water produced from Beaudesert, Kooralbyn and Maroon WTPs all of which have been affected by conditions in the same source water, the Logan River. The treatment process does not have the ability to treat parameters such as hardness. The iron exceedance observed at Image Flat WTP is also due to source water conditions which have made it difficult to sufficiently remove manganese below the aesthetic guideline value. The aluminum exceedance at Wivenhoe WTP appears to be related to control of coagulant dosing and dosed water pH. 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 mitigation of a risk has been determined to be inadequate (even for aesthetic parameters), an improvement action is recorded and its progress is regularly reviewed through Seqwater’s Drinking Water Quality Improvement Plan.

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 four 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 40,363 tests during 2015-16 and 41,561 tests during 2016-17.

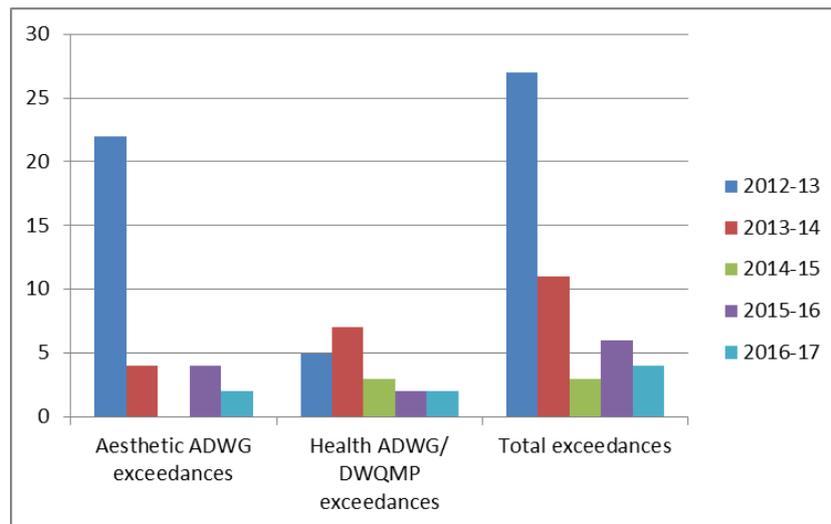
Sampling and on-site field tests were undertaken by Seqwater’s field services team and laboratory testing was undertaken by a contracted NATA-certified Laboratory Service Provider. This covered 31 different parameters with weekly and monthly routines scheduled in eight different zones. The verification 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 did occur within the Supply System during the 2016-17 reporting year and these are shown in the following table.

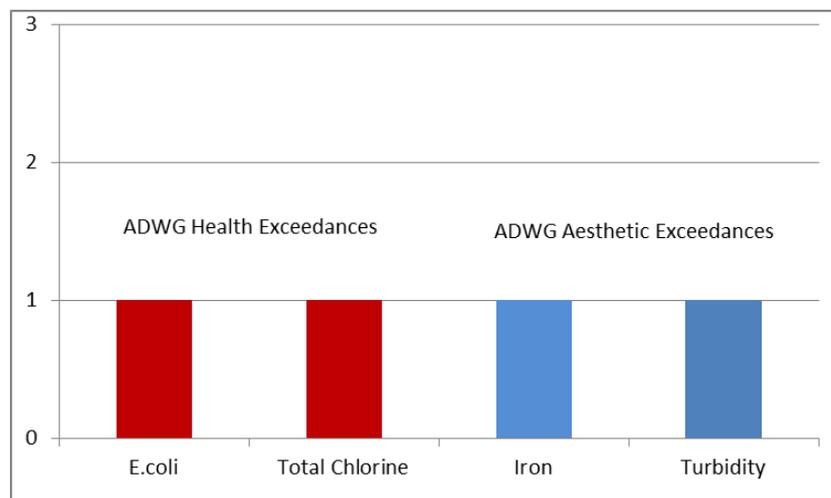
Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Brisbane	14176	0	0
Eastern Pipeline Interconnector (EPI)	1865	0	0
Gold Coast	1220	0	0
Logan	3268	0	0
Network Integration Pipeline (NIP)	1896	0	0
Northern Pipeline Interconnector (NPI)	7687	0	2
Redlands	5579	1	0
Southern Regional Pipeline (SRP)	5870	1	0
Total	41561	2	2

Analysis of the Supply System verification monitoring data

There were two ADWG health exceedances and two aesthetic guideline exceedances for the supply system during 2016-17 reporting year consistent with the low numbers (0-4) 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 2012-13 reporting year. 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.



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



The health guideline exceedances included one *E.coli* detection and this represents the maintenance of an ongoing a reduction from the previous reporting years with five *E.coli* detections during 2012-13, three during 2013-14, one during 2014-15 and one during 2015-16. The cause for the *E.coli* detections were 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. Seqwater has since established its own Field Services team in June 2016

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and as discussed above, assumed responsibility for the sampling program including quality control during sample collection and transportation.

The total chlorine exceedance was found to be non-representative of water distributed to consumers and the unrepresentative sample was due to its collection at a time when the (Chamber's Flat) southern panel was not in operation. Accordingly, the sample had been collected from a small amount of water in a temporarily isolated main which when brought back into service was blended and diluted to within specification before any bulk supply point or distribution to consumers. Management of this sampling issue has prevented recurrence throughout the remainder of the reporting period.

All of these health related exceedances were notified to the Regulator in accordance with section 102 of the Act.

The iron and turbidity in the Northern Pipeline Interconnector (at Morayfield) was most likely due to a non-representative sample as turbidity analyser trends at the time had remained within specification. An investigation found issues with the plumbing of the sample tap which has since been rectified to minimise the possibility of recurrence. The minimal number of aesthetic exceedances across the supply system is supported by good operating practice and improved source water conditions, where previous years have been affected by parameters such as hardness in the mid-Brisbane River system which is not amenable to treatment at Seqwater's largest conventional water treatment plant at Mt Crosby.

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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 (risk treatments) have been assessed to be necessary during the risk assessment to reduce risks that have been deemed unacceptable, as specified in the risk methodology in the DWQMP.

The progress that has been made during the 2016-17 reporting year 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 will be reassessed and prioritised through the internal audit schedule and the 2017 Risk Assessment reviews.

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 incidents notified to the Regulator in accordance with sections 102 and 102A of the Act, detailing:

- Non-compliances with the water quality criteria for drinking water, and the corrective and preventive actions undertaken in response to each non-compliance
- Prescribed incidents reported during the year, including the corrective and preventive actions that 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.

WSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
DWI-507-00095	Image Flat WTP (Nickel 0.048 mg/L, 1/8/2016)	1/08/2016	There was a low level of confidence in the sampling and analysis for nickel and other metal concentrations detected in this sample. Following confirmatory tests, it was determined that the results for nickel and all other metals in the same analytical suite for the sample were unreliable. Confirmatory tests included the original sample (i.e. starting from the original sample bottle) and another sample collected from the same sample point on 5/8/2016. All re-tests had a result below the limit of detection at <0.001 mg/L.	The contracted laboratory has confirmed that they had that transient contamination occurred in the laboratory during sample preparation. Communication between the laboratory and Seqwater for future reporting of exceedances that are confirmed but yet to be verified has since been improved through an ‘Out of Specification’ (OOS) process. The result has been removed from Seqwater’s Laboratory Information System (LIMS).

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WSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
DWI-507-00096	Somerset Dam WTP (<i>E.coli</i> 1 MPN/100 mL, 28/09/2016)	30/09/2016	Seqwater confirmed that there were no operational issues at Somerset WTP and that disinfection was within specification. There were no operational issues and the treated water was within specification. There was a free chlorine residual of 2.1 mg/L at the time of sampling. Resampling and testing occurred to confirm that there were no issues.	There were no indications that contamination of the water supply had actually occurred. Sampling in the downstream distribution system confirmed that they had no detections and normal chlorine residuals. Seqwater examined its processes to minimize the risk of sample contamination during future sampling work. This included sample collection and preservation methods, and feedback on any sample receipt issues from the analytical laboratory.
DWI-507-00097	Maroon Dam WTP (<i>E.coli</i> 1 MPN/100 mL, 28/09/2016)	30/09/2016	The sampling undertaken that caused this event was in the same sample run as the event above (DWI-507-00096). Seqwater confirmed that there were no operational issues at Maroon Dam WTP and that disinfection was within specification. There were no operational issues and the treated water was within specification. There was a free chlorine residual of 2.1 mg/L at the time of sampling. Resampling and testing occurred to confirm that there were no issues.	There were no indications that contamination of the water supply had actually occurred. As mentioned above for the Somerset WTP incident report, Seqwater continued to work with its Field Services team to prevent recurrence.
DWI-507-00098	Wivenhoe Dam WTP (<i>E.coli</i> 1 MPN/100 mL, 28/09/2016)	30/09/2016	The sampling undertaken that caused this event was in the same sample run as the events above (DWI-507-00096 and 97). Seqwater confirmed that there were no operational issues at Wivenhoe Dam WTP and that disinfection was within specification.	There were no indications that contamination of the water supply had actually occurred. As mentioned above for the Somerset WTP incident report, Seqwater's Field Services team continued to work on

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WSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
			There was a free chlorine residual of 2.0 mg/L at the time of sampling. Resampling and testing occurred to confirm that there were no issues.	sampling processes to prevent recurrence.
DWI-507-00099	Gramzow Road WQMF, Redland (<i>E.coli</i> 1 MPN/100 mL, 6/10/2016)	8/10/2016	Seqwater confirmed that there were no operational issues through reservoir inspections and extensive follow up sampling on the facility's inlet and outlet. Further testing confirmed that there were normal chlorine levels in the system.	There were no indications that contamination of the water supply had actually occurred. As mentioned in the above incident reports, Seqwater's Field Services team continued to work on sampling processes to prevent recurrence.
DWI-507-00100	Landers Shute WTP (Nitroso-pyrrolidine, 6/2/2017)	10/2/2017	Nitroso-pyrrolidine was detected and reported to WSR as there is no ADWG guideline value for this potentially-health related parameter. An investigation identified that an unreliable result was received due to a laboratory instrument fault involving a leak on the instrument's vacuum line.	The sample was retested and the results (less than the limit of reporting) were reissued. This result has been removed from the data set.
DWI-507-00101	Camerons Hill, Mt Crosby (Total chlorine > 5 mg/L, 15/2/2017)	15/2/2017	Operations Total chlorine analyser showed high result. Operations staff conducted grab testing to verify analyser and the results ranged from 5.0 to brief peak at 5.4. The main was isolated to complete investigation which found that the duty Ammonia dosing pump had failed but did not generate an alarm, so the issue was picked up by the online chlorine analyser. The ammonia pump was reinstated and Total Chlorine concentration was returned to normal levels before the main was re-instated.	The incident occurred at Additional grab samples were taken upon reinstatement and the Total chlorine results were between 3.32-3.80 mg/L. Main was successfully reinstated. The Online analyser was verified and was monitoring water leaving the site.

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WSR Reference	Incident Location	Report Date	Cause / Corrective and Preventive Actions	Comments
DWI-507-00102	Noosa WTP (Chlorate 0.89 mg/L, 3/4/2017)	3/4/2017	Decreased production rates at the WTP reduced the amount of sodium hypochlorite used. Chlorate is a normal degradation product from the prolonged storage of sodium hypochlorite and a reduction in the turn over of chemical stock onsite during lower production has resulted in elevated chlorate levels in the treated water. Both storage tanks for this chemical were pumped out. One tank was isolated and the other was refilled with fresh sodium hypochlorite supplies. Subsequent monitoring confirmed that the treated water had returned to within specification (chlorate <0.8 mg/L).	The use of only one tank was effective in improving sodium hypochlorite turnover. Accordingly, results that had peaked at 0.92 mg/L during the incident were reduced below the 0.8 mg/L limit specified in the Seqwater DWQMP within two weeks. The ADWG does not have a guideline value specified for chlorate. Seqwater's specification has been established to ensure it operations are consistent with best practice in the management of chlorate levels in the water supply.
DWI-507-00103	Petrie WTP (Distribution system backflow event, 5/6/2017)	5/6/2017	During a Unitywater mains flushing project, a reflux vale between the network and the upstream side of the Petrie WTP pumps failed. This caused dirty water to enter the WTP's contact tank and reservoirs for approximately 30 minutes. The dirty water potentially contained harmful microorganisms harbored in pipe biofilm. The treated water turbidity reached 30-40 NTU and there was a potential for disinfection to be hindered through shielding affects. Immediate isolation and rezoning of supply occurred. A WQ advisory was issued to the communities supplied water from this WTP. Flushing and operation of the WTP occurred to bring the water supply within specification and to 'lift' the WQ advisory.	A joint Seqwater-Unitywater investigation was completed and the findings were agreed by senior management. This included improved consultation and communication for projects that could have implications for water supply assets upstream or downstream of the project work.

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6. Audit of the plans

6.1 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, 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 27 WTPs and supply system sites. Seqwater’s remaining operational sites are scheduled for internal audits during the second half of the next reporting year (2016-17) as part of a two-yearly cycle.

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 – AS NZS/ISO 22000 Certification and Surveillance 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 maintained its AS NZS/ISO 22000 certification during the 2016-17 reporting year. Seqwater is obligated to undergo surveillance audits conducted by SAI Global to maintain its certification. A total of 20 audits were conducted across 12 WTPs and the Supply System in September 2016 and April 2017 and no major non-conformances were identified.

The audits in April brought recertification and surveillance by SAI Global into a once per annum program where all site audits will be audited around April-May. The scope of accreditation continues to include Seqwater’s DWQMP (overarching plan) 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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7. 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.
AS NZS/ISO 22000	<i>AS NZS/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
SCADA	Supervisory Communication and Data Acquisition (SCADA) system. Human to Process software interface.
SRP	Southern Regional Pipeline
Supply System	Previously named the Bulk Distribution Network and formerly operated by

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	LinkWater.
SUVA	Specific UltraViolet Absorbance
The Act	<i>Water Supply (Safety and Reliability) Act 2008</i>
The Regulator	Water Supply Regulator
WSAA	Water Services Association of Australia
WSR	Water Supply Regulator
WTP	Water Treatment Plant
2016-17 reporting year or 2016-17 reporting period	Means the period 1 July 2016 to 30 June 2017.

8. Enclosures

- 1 – Verification monitoring 2016-2017 Water Quality data report (TRIM ID: D17/149151)
- 2a – Catchment and Drinking Water Quality Micropollutant Monitoring Program – Entox Passive Sampling Winter 2016 Report (TRIM ID: D16/149152)
- 2b – Catchment and Drinking Water Quality Micropollutant Monitoring Program – Entox Passive Sampling Summer 2017 Report (TRIM ID: D17/149153)
- 3 – Drinking Water Quality Improvement Plan – Progress with health-related risk improvements (TRIM ID: D17/149792)
- 4 – Register of changes to DWQMP, HACCP plans and procedures - 2016-2017 (TRIM ID: D17/149145)

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