Drinking Water Service Annual Report 2022-2023

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seqwater
WATER FOR LIFE

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1. Executive summary

The Queensland Bulk Water Supply Authority trading as Seqwater (SPID 507) is responsible for South East Queensland's bulk water supply system. This includes catchments, storages, water treatment plants and bulk transport infrastructure along with several small reticulation systems supplying recreation parks.

Seqwater's Drinking Water Service Annual Report (**report**) outlines the activities for the management of water quality risk and issues. The report covers the period from 1 July 2022 to 30 June 2023 (**reporting period**), during which Seqwater complied with the approval conditions of its Drinking Water Quality Management Plan (**DWQMP**).

Seqwater's operational and verification monitoring programs have occurred in accordance with the criteria documented in the approved DWQMP. Operational monitoring includes online monitoring with process instrumentation and operator testing designed to assess the performance of preventive measures and requirements for corrective actions. Verification monitoring involves a sampling and analytical testing program. Sampling and some on-site analyses are undertaken by Seqwater, with the majority of analytical testing undertaken by an external National Association of Testing Authorities (**NATA**) accredited laboratory. Verification monitoring during the reporting period included 33,898 tests of treated water at individual water treatment plants, and 62,702 drinking water tests throughout the SEQ Water Grid.

Seqwater also completed catchment and source water risk characterisation and monitoring activities, including catchment surveys and deployment of passive samplers to detect micro-pollutants. These activities help identify changes to the source water risk profile and support Seqwater operations by enabling informed decisions about daily operations, water security and supply planning.

Seqwater was compliant with the microbiological and health requirements in the *Public Health Regulation 2018* during the 2022-2023 reporting period for all of its water treatment operations and SEQ Water Grid zones. Water treatment and Water Grid verification testing against the water quality criteria in the DWQMP did not detect any individual health-related exceedances at water treatment plants (**WTPs**), nor in the SEQ Water Grid.

There were seven aesthetic exceedances detected within the routine verification monitoring program during the reporting period. These predominantly related to elevated hardness at Linville WTP. Six exceedances were recorded in 2022 due to source water conditions and limitations in the treatment capability for reducing hardness at this site. A water softening installation was successfully commissioned towards the end of 2022 and no further hardness exceedances have been detected at Linville WTP since. The remaining aesthetic exceedance concerned elevated free ammonia at Petrie Offtake on the Northern Pipeline Interconnector (**NPI**) in the SEQ Water Grid, which was caused by a short-term anomaly in ammonia dosing at the Caloundra Street Water Quality Management Facility (**WQMF**).

There was one reportable event during the reporting period. This related to Hepatitis A virus detection in treated drinking water produced at the Gold Coast Desalination Plant. An investigation was conducted to determine the cause of the Hepatitis A detection, which concluded that the result was a false-positive detection. The investigation concluded that as all critical limits were met, and all other water quality results were within normal limits, the Gold Coast Desalination Plant was working within its operating specifications to produce safe drinking water. The incident was reported to Water Supply Regulation (**WSR** or **Regulator**) within the required timeframe. Seqwater's management of this event was compliant with its DWQMP.

Consistently low numbers of exceedances and reportable events across a large and complex system over a number of years, including 2022-2023, reflects the achievements made through the continuous improvement of Seqwater's drinking water assets and drinking water quality management system.

Other drinking water quality management system improvement activities completed during the reporting period include the regular review of the DWQMP and subsequent amendment application to the Regulator, 12 risk assessment reviews, 22 Hazard Analysis Critical Control Point (**HACCP**) team meetings, 25 internal audits of WTPs and Water Grid sites, 18 water treatment performance assessments against the Australian Drinking Water Guidelines (**ADWG**) microbial Health-Based Target criteria and an external third-party audit to maintain AS NZS/ISO 22000:2018 Food Safety Management Systems (**ISO 22000**) certification. A regular audit of the DWQMP was not required to be undertaken during the reporting period.

These meetings, reviews and audits are part of a schedule that encompasses all of Seqwater's WTPs and Water Grid sites. Findings were used to improve the drinking water quality management system. Long-term improvement initiatives identified through these assessments and reviews have been captured in a consolidated Drinking Water Quality Improvement Plan (**DWQIP**).

2. Introduction

This is the 2022-2023 Drinking Water Service Annual Report for Seqwater, a registered service provider with identification (**SPID**) number SP507. Seqwater operates raw water storage, bulk treatment and transport assets from Noosa to the Gold Coast region and across to the base of the Great Dividing Range. Seqwater has responsibility for managing 32 operational WTPs, a desalination plant, 26 dams and 48 weirs. Not all of this infrastructure is related to the supply of drinking water, as some of the dams and weirs are used for irrigation schemes. Seqwater has nine WTPs and a desalination plant connected to the SEQ Water Grid, 19 WTPs (including the offline Banksia Beach WTP) directly connected to SEQ Water Service Providers (**WSPs)** and five recreational WTPs operated solely for Seqwater's recreational sites and supporting assets. One plant (Wivenhoe Dam WTP) was taken offline during the reporting period. Only those WTPs and SEQ Water Grid components operated for the supply of drinking water are included in the Seqwater DWQMP and this report.

Seqwater is operating under an approved DWQMP to ensure consistent supply of safe, high quality drinking water to protect public health. This is achieved through proactive identification and minimisation of public health-related risks associated with drinking water.

This Drinking Water Service Annual Report includes:

- the activities undertaken to operate our drinking water service during the financial year
- drinking water quality summary
- summary of our performance implementing our approved DWQMP

This report is submitted to the WSR to fulfil our regulatory requirement under the *Water Supply (Safety and Reliability) Act 2008* (Qld) (**Act**). This report is made publicly available to our customers and the South East Queensland community through our website, or for inspection upon request at Seqwater's Head Office during office hours on business days.

2.1. Purpose

This Drinking Water Service Annual Report has been prepared in accordance with section 142 of the Act (refer to Table 1). The purpose of this Drinking Water Service Annual Report is to provide the Regulator with information on the overall performance of the DWQMP for the reporting period 1 July 2022 to 30 June 2023. This report also provides an accountability mechanism to our customers and communities.

Table 1 – Regulated conditions and implemented compliance

Drinking Water Service Annual Report Condition	Seqwater Compliance
Section 142 Drinking water service annual reports 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. The provider must, unless the provider has a reasonable excuse— • prepare a report (a drinking water service annual report) for the financial year complying with this section and, if section 142C(2) applies to the provider, that subsection; and • give the regulator a copy of the report within 120 business days after the financial year ends.	The current report is required to be submitted to the Regulator within 120 business days after the 2022-2023 financial year ends. This report has been prepared in accordance with the *Guideline for the preparation, review and audit of drinking water quality management plans* (Version 3, 1 October 2022), and to report on the approval conditions of the DWQMP. Section 142C(2) is not applicable.
Section 142(3) The report must state or include all of the following—	This report provides an update on the implementation of the DWQMP in accordance with the approval conditions and the above regulatory guidance.
a) the information required under the latest report requirement given to the provider;	
b) the actions the provider took to implement the plan;	Refer to Section 3 of this report.
c) 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 regular review of the DWQMP was undertaken in the reporting period and further detailed in section 7.
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;	Refer to Section 6 of this report. A regular audit of the DWQMP was not required to be completed during the reporting period.
e) 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.
f) details of the provider's compliance with water quality criteria for drinking water;	Refer to Sections 3 and 5 of this report. Enclosure 1a provides the 2022-2023 Water Quality Data report. This report also includes aesthetic criteria.

Drinking Water Service Annual Report Condition	Seqwater Compliance
g) if the provider supplies drinking water to customers—details of any complaints to the provider about the provider's drinking water service.	Not applicable. Seqwater is a bulk water provider. As per the *Guideline for the preparation, review and audit of drinking water quality management plans* (Version 3, 1 October 2022) bulk water providers who do not provide water directly to customers do not have to include this section in their Drinking Water Service Annual Report.
h) if the provider has reviewed a customer service standard during the financial year—the outcome of the review and how the provider has addressed matters raised in the review.	Not applicable. Under s 114(1) of the Act, Seqwater is not required to have a customer service standard because it has a service contract in place with each of its customers (WSPs, as above) in the form of a bulk water supply agreement made under s 360G of the *Water Act 2000* (Qld).

2.2. Plan overview

Seqwater must comply with the DWQMP approved by the Regulator and developed under the Act. The DWQMP forms part of the corporate drinking water quality management system Seqwater has implemented to cover the drinking water assets and activities captured by the Act. The Seqwater water quality management system has been developed to be consistent with the *Guideline for the preparation, review and audit of drinking water quality management plans* (2022) 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
- Disinfection
- Supply systems (SEQ Water Grid)
- Distribution systems in recreation areas

The DWQMP encompasses 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 from 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 reticulated distribution system are predominantly managed by downstream WSPs who provide distribution and connections with consumers in all systems except for Seqwater's recreation areas.

3. Implementation of the DWQMP

The version of Seqwater's DWQMP that was active during the 2022-23 reporting period was reviewed and submitted to the Regulator on 11 August 2020. Seqwater received approval from the Regulator under Information Notice dated 15 March 2021 (**Information Notice**) for the revised and updated DWQMP. 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. The DWQMP amendments included various minor changes to the DWQMP; associated site-based HACCP plans; and procedures identified in the DWQMP review. Additionally, the currency of the DWQMP and site-based HACCP plans (sub-plans) have been reviewed through ongoing continuous improvement activities detailed in Section 7 of this report. The risk assessment reviews completed during the reporting period are detailed in Section 3.2 of this report. The outcomes of these review activities were shared with relevant Seqwater staff via HACCP team meetings. Changes to the DWQMP and site-based HACCP plans are detailed in Enclosure 4.

It should be noted that a revised and updated version (12) of Seqwater's DWQMP was submitted to the Regulator on 11 August 2023, with the regular review being completed on 30 June 2023.

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 monitoring of key operational parameters by online instrumentation that feed into Supervisory Control and Data Acquisition (**SCADA**) systems as well as the operational monitoring performed by water treatment plant operators and internal process laboratories. Operator and process laboratory monitoring is used to verify the operation of the plant and the accuracy of online instrumentation. There have been no significant revisions to the operational monitoring program during the reporting period.

Seqwater's verification monitoring program covers a wide range of parameters determined using a risk-based approach. These are detailed in the DWQMP. The results of Seqwater's verification monitoring during the 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 Enclosure 1a. Analysis of verification samples was undertaken primarily by an external NATA-accredited laboratory. Seqwater undertakes sampling and specific analysis to support operations, and also inform verification monitoring, underpinned by a laboratory quality management system based on ISO 17025. This analysis includes on-site field tests and parameters analysed at Seqwater Process Laboratories, such as Taste and Odour compounds. In addition, the Seqwater verification monitoring program includes aspects at the cutting edge of modern monitoring. This analysis is undertaken by specialist laboratories that have implemented rigorous quality systems, based on ISO 17025. All verification monitoring results are recorded in Seqwater's Laboratory Information Management System (**LIMS**). Seqwater reviews the verification monitoring program on a quarterly basis.

Seqwater continued to improve its drinking water quality management system. Actions in the risk management improvement program, known as the Drinking Water Quality Improvement Plan (**DWQIP**) were implemented during the 2022-2023 reporting period as described in Section 4 of this report. The DWQIP changes during 2022-2023 are provided in Enclosure 3 to this report.

3.1. Approval conditions

As outlined above, the Regulator provided approval of Seqwater's amended DWQMP on 15 March 2021, prior to the commencement of the 2022-2023 reporting period. Under an Information Notice given pursuant to section 99(1)(b) of the Act, Seqwater's amended DWQMP was formally approved by the Regulator. The approval conditions and Seqwater's compliance with these conditions, are detailed in Table 2 below.

Table 2 – Conditional approval and compliance

Condition	Compliance
No. 1. Water Quality Criteria	
Water quality criteria for drinking water including: i. The standards for drinking water quality prescribed in a regulation under the *Public Health Act 2005* (Qld) (**Public Health Act**). ii. The criteria in any guideline, if any, made by the Regulator about the quality of drinking water. iii. The criteria for drinking water made in a condition applicable to the DWQMP. For the purpose of (iii), the following applies: 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 required to be reported. 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.	Compliant. There were no non-compliances with relevant criteria including health guideline values in the ADWG and standards in the Public Health Act as identified through the verification monitoring program. Reporting requirements were compliant. Seqwater has fully implemented its verification monitoring program. In accordance with the DWQMP, samples were not taken when WTPs were offline and no water was available for sampling, including: • Three samples due to North Pine WTP being offline for maintenance • One sample due to Dayboro WTP being offline for maintenance Seqwater is not aware of any other non-compliance with the health guideline values in the ADWG that could have been identified through other monitoring, including research activities.

Condition	Compliance
No. 2. Additional Reporting requirements; (a) events and (b) where a parameter has no water quality criteria	
Additional reporting requirements include: • 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. • 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. These reporting requirements must be made immediately to the Regulator and in the prescribed form within 24 hours.	Compliant. Seqwater has actively reported all events relating to its treatment operations which had the potential to impact on public health. Incident reporting included one event where there was an increased risk profile: a Hepatitis A virus detection in treated drinking water produced at the Gold Coast Desalination Plant that investigation concluded was a false positive result. An investigation concluded that as all critical limits were met, and all other water quality results were within normal limits, the Gold Coast Desalination Plant was working within its operating specifications to produce safe drinking water. Reporting requirements were compliant.
No. 3. Research projects and additional reporting requirements	
If Seqwater becomes involved in any water quality 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 immediately to the Regulator and in the prescribed form within 24 hours, unless Seqwater has obtained formal acknowledgement of the research activity by the Regulator.	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 water quality 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

Assessment of Seqwater's water treatment operations and the SEQ Water Grid, along with 12 risk assessment reviews, were completed during the reporting period. There are 34 water supply schemes listed in Section 5.1 of

the Information Notice for the approved DWQMP, including 32 water treatment plants, the Gold Coast Desalination Plant and the SEQ Water Grid (Supply System).

The findings from the recent risk assessment reviews are consistent with those reported in the 2021-2022 DWQMP Report (i.e. the main risks identified did not significantly change, and in most cases pathogens are the predominant limiting hazard). From these recent reviews, significant risks and improvements to reduce those risks to acceptable levels were identified. Multiple sites have identified opportunities for:

- increased source water and raw water quality information collation to aid in decision-making to optimise source selection of raw water to the WTP
- process assessment and optimisation of coagulant dosing and mixing to optimise flocculation and settling performance
- improved system monitoring and control around filter performance and supernatant management to optimise filter performance and reduce filter breakthrough probability
- improved asset integrity protective measures against animal and stormwater ingress
- improved disinfection, secondary disinfection and network monitoring of disinfectant residuals.

In some cases, the residual (mitigated) risks have been further reduced by capital upgrades to assets as part of the regular asset management process. Improvements identified through incident management processes include protection from lightning strikes and power interruptions on control systems. Improvements 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 WTPs.

The remaining operational WTPs yet to have SCADA upgrades have been included in the forward program schedule. Seqwater is continuing to monitor progress in these areas through its capital works and renewals programs and the implementation of its Monitoring and Control Systems Asset Class Plan.

Seqwater reviews and improves the established Pre-requisite Programs (**PRPs**) and operational Pre-requisite Programs (**oPRPs**) every 3 years or more frequently if required. This approach is consistent with the requirements of ISO 22000 to which Seqwater has maintained its certification (See Section 6.2 for more details). The latest improvements to these Programs were made outside the 2022-2023 reporting period.

3.3. Operational monitoring

3.3.1. Water treatment plant operational monitoring

Operational monitoring of water treatment includes real-time monitoring through process instrumentation, operator grab sample tests and observations, and analytical laboratory testing by Seqwater's process laboratories. Operational monitoring programs for each 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 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 down the WTP 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, online water quality instruments, 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 measure and operational monitoring.

Table 3 – 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 alarms, is established at all sites using aluminium sulfate (**alum**) as the coagulant and where pH regulation of the dosed water is in place. Additionally, the instrumentation and SCADA upgrade provides settled water turbidity analysers and alarms across all of Seqwater's sites that have a clarification or Dissolved Air Flotation process. Operator grab sample monitoring has been compliant with the WTPs' 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 head loss, runtime / production For membrane filtration sites - Pressure Decay Test.	Instrumentation is in place for monitoring individual filters for filtered water turbidity at all relevant sites. All sites have alarms that automatically dial-out to the on-call operator's mobile phone. Most sites have interlocks in place to stop operation or activate filter backwash. There is a program of control system upgrades to implement this functionality across all sites where it is achievable. Online instrumentation and operator grab sample monitoring has been compliant with the WTPs' HACCP plan, which documents operational monitoring.
Disinfection (by Ultraviolet irradiation (**UV**))	High flows – low contact time Low flows – not enough turbulence to distribute the dose	Online UV intensity and flows UV Dose Ultraviolet Transmittance (**UVT**)	UV disinfection is typically implemented at sites that require pathogen treatment beyond what is achievable by 'conventional treatment'. These sites include Kilcoy, Capalaba, Beaudesert, and Boonah-Kalbar WTPs. It is also implemented at smaller sites, such as Dayboro, Kenilworth and Linville WTPs where it forms an

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
	Low UVT – unable to adequately penetrate microorganisms		efficient primary pathogen treatment process. UV disinfection has worked effectively at these sites without significant issues/excursions.
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	All sites have online instrumentation monitoring free chlorine, pH and flow in the dosed filtered water and treated water. Alarms dial-out to the on-call operator's mobile phone. At most sites, interlocks are also implemented that stop the WTP process. There is a program of control system upgrades to implement this functionality across all sites where it is achievable. Online instrumentation and operator grab sample monitoring has been compliant with the WTPs 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)	Reticulation systems are monitored by operational staff to ensure there is no ingress from vermin or through loss of positive pressure. System leaks are identified by these inspections and the draw on the plant's capacity. Scheduled maintenance inspections and condition assessments are also conducted.

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
		Vermin proofing inspections on reservoirs.	Chlorine testing on recreation park taps is undertaken and supported by verification monitoring at the same sample sites.

3.3.2. Supply System (SEQ Water Grid) operational monitoring

In the DWQMP, operational monitoring includes the planned sequence of measurements and observations to assess and confirm the performance of preventive measures identified for particular hazardous events. Measurements of operational parameters indicate the effectiveness of processes. As part of the ADWG Framework, ISO 22000 and HACCP standards, these operational measures have been identified and summarised within the Supply System HACCP plan as CCPs and operational Pre-requisite Programs.

The preventive measures are well established within Seqwater, with CCPs monitored by online instrumentation throughout the SEQ Water Grid. Network control room staff can react to the 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.

Internal auditing and compliance spot checks monitor the operational Pre-requisite Programs. The principal preventive measures are listed in Table 4. The most common limiting hazard identified is pathogens. Unacceptable risks requiring further treatment are listed in the improvement plan (Section 4) of this report.

Table 4 – Preventive measures in the SEQ Water Grid

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Water quality considerations as part of the Monthly Operating Supply Schedule (**MOSS**) & routine meetings with WSPs (Regional Operational Managers Meeting). Includes drought operating modes.	Non-compliant water supplied to the SEQ Water Grid 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 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 geosmin and 2-methylisoborneol (**MIB**) issues.)

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
Maintain disinfection residual	Non-drinking 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. These signals are transferred and alarmed at the network control room. Control room escalation and corrective action procedures are audited routinely. Training is delivered for new control room staff.	Established SCADA systems and Critical Limit alarm levels notify the network control room of low chlorine residual. Escalation procedures covering different severities of alarms are well established and are followed by control room staff. Corrective actions are documented in a procedure and are followed by control room staff and SEQ Water Grid operations management. A documented procedure on maintaining chlorine residual is used by operational staff.
Service Reservoir Inspection Program	Ingress of non-drinking 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. These inspections are supplemented by annual external inspections using Unmanned Aerial Vehicles (**UAV**), and three-yearly internal inspections using submersible Remote Operated Vehicles (**ROV**) combined with specialist software to inspect and track deterioration.	This process and water quality focused culture is well established within the business. Any issues identified are raised and corrected through the Seqwater maintenance system and for larger improvements via the renewals process within the capital improvement program.
Mains Hygiene Procedure	Stagnation of reservoirs and pipelines Commissioning new assets and pipelines	This procedure provides the formal process to prevent contamination of pipelines and reservoirs during maintenance activities. It also covers disinfection of assets before returning to service. On-site compliance	This process and water quality focused culture is now well established within Seqwater. Training is delivered during the induction of new field staff.

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
	Maintenance and operational changes to the SEQ Water Grid	checks are routinely carried out to identify any deficiencies.	
Locked and alarmed hatches on reservoirs	Contamination to reservoirs by access of third party	All reservoirs' hatches are locked, and alarm systems notify the network control room of any unauthorised access to 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 network control room staff well versed in the procedures to follow if a security breach occurs. Access to these reservoirs is managed by Seqwater's works access and permit to work procedures.
Maintaining Positive Pressure	Ingress of non-potable water or organic matter to pipelines	Pressure and flow are monitored online at locations throughout the SEQ Water Grid. These locations are alarmed and notify the network control room of any low-pressure situations.	The network control room staff are well versed in the procedures to follow in the case that low pressure occurs within the SEQ Water Grid. Planned and unplanned pipeline isolations are managed by the Disinfection of Water Mains Procedure.
Optimisation of re-chlorination through automated control systems Maintain or treat to lower DOC/Bromide Levels	Formation of disinfection by-products	Most chemical dosing facilities are comprehensively equipped with system redundancies including dual online instruments, Uninterruptable Power Supply, multiple chemical dosing pumps, back-up telemetries with multi-barrier alarming to the network control room.	Control systems are well established and have a proven historical track record in providing accurate and timely information. The network control room has comprehensive documentation to assist in the control of these systems and are well versed in the procedures to operate these stations efficiently and effectively.
Pigging or super-chlorination of pipelines	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, there is no routine scheduled pigging program for the existing pipelines. Biofilm testing has proven biofilms are in low volume and

Preventive Measure	Related Hazardous Events	Operational Monitoring	Status
			pathogens have not been detected in the samples measured. High flows and direction changes are managed through the control systems and operating manuals.

3.4. Verification monitoring

The results of Seqwater's verification monitoring during the 2022-2023 reporting period are summarised below. The detailed data report at Enclosure 1a is in the format prescribed by the Regulator. This program includes:

- 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.

The analysis results from SEQ Water Grid sampling points that were offline at the time of sampling were excluded from the data report as these may not be representative of the quality of the water provided to the WSPs. For completeness, these omitted analysis results are presented separately in Enclosure 1b.

For all parameters tested more than once a year, the frequency of sampling has been distributed evenly throughout the year (weekly, monthly, quarterly or six-monthly).

3.4.1. Analysis of Micro-pollutants using Passive Samplers

The sampling and analysis of micro-pollutants using a passive sampler methodology began in July 2014 for catchment sites where the sampling devices could be deployed. The micro-pollutants analysed included pesticides, pharmaceuticals and personal care products. This analysis is undertaken by a specialist laboratory under a rigorous internal quality system.

The passive sampler reports for sampling conducted during the 2022-2023 reporting period are provided at Enclosure 2a and 2b. There were no exceedances of the ADWG values observed during the 2022-2023 reporting period for these chemicals using passive sampling methodologies. Some parameters have been detected at trace levels, but this has generally been two orders of magnitude below the guideline values.

3.4.2. Compliance with DWQMP and Key Performance Indicators

Drinking water quality compliance is measured using the methods recommended by the ADWG and the *Public Health Regulation 2018* (**PHR**). 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. A supply zone is defined as a WTP and if relevant, the connected downstream components of the SEQ Water Grid. The methods are briefly described below:

3.4.2.1. 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 section 52 of the PHR).

3.4.2.2. 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, being the health guideline values in the ADWG as per section 52 of the PHR. 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 times) value is greater than the water quality criteria, then the whole zone is deemed non-compliant.

3.4.2.3. Aesthetic compliance

The average of each parameter is assessed against the water quality criteria (aesthetic guideline values from the ADWG) only if there are impacts to downstream users. If any value is greater than the water quality criteria, then the whole zone is deemed non-compliant.

Seqwater was measured to be compliant during the 2022-2023 reporting period for all of its water treatment operations and SEQ Water Grid zones for microbiological, health and aesthetic compliance.

3.4.3. Water treatment plant verification monitoring

Verification monitoring occurred in accordance with Seqwater's Water Quality Verification Monitoring Plan. This was primarily undertaken by the NATA-accredited (ISO 17025) contracted Laboratory Service Provider at Seqwater's raw water, treated water and recreation sites distribution system sample points, covering more than 70 different parameters at various frequencies. On-site field testing and monitoring, for example on free and total chlorine and pH, supports operations. This testing also forms part of the verification monitoring program and is undertaken by Seqwater in accordance with its laboratory quality management system, based on ISO 17025. The verification program provides the necessary information to validate the preventive approach to water quality management is effective.

A summary table of verification monitoring of the treated or SEQ Water Grid (bulk) water for the reporting period is provided in Table 5. The statistics from the verification monitoring results for all parameters for raw water and treated water at each operational site is provided within Enclosure 1a. The recreational plants show a larger number of analyses performed as these sites include reticulation system monitoring in WTP test count.

Table 5 – 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	800	0	0
Beaudesert WTP	904	0	0
Banksia Beach WTP	0	0	0
Boonah-Kalbar WTP	904	0	0
Canungra WTP	948	0	0

Name of Scheme Component	Number of Analyses Performed	Number of Individual ADWG Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Capalaba WTP	904	0	0
Dayboro WTP	806	0	0
Dunwich WTP	812	0	0
Esk WTP	864	0	0
Ewen Maddock WTP	934	0	0
Gold Coast Desalination Plant	1439	0	0
Hinze Dam WTP	1266	0	0
Image Flat WTP	1782	0	0
Jimna WTP	908	0	0
Kenilworth WTP	760	0	0
Kilcoy WTP	904	0	0
Kirkleagh WTP	1280	0	0
Kooralbyn WTP	860	0	0
Landers Shute WTP	908	0	0
Linville WTP	1287	0	6
Lowood WTP	892	0	0
Maroon Dam WTP	1244	0	0
Molendinar WTP	911	0	0
Moogerah Dam WTP	1244	0	0
Mt Crosby East Bank and West Bank WTPs	1879	0	0
Mudgeeraba WTP	904	0	0
Noosa WTP	1537	0	0
North Pine WTP	932	0	0
North Stradbroke Island WTP	852	0	0
Point Lookout WTP	800	0	0
Rathdowney WTP	852	0	0
Somerset Dam WTP	880	0	0
Wivenhoe Dam WTP	1701	0	0
Total	**33898**	**0**	**6**

During the reporting period, a total of four samples were not taken, which was in accordance with the DWQMP for situations when WTPs are offline and no water is available for sampling:

- Three occurred at the North Pine WTP, when it was offline for planned maintenance, with the reservoir drained. It was not possible to take samples of treated water
- One occurred at Dayboro WTP, when it was offline for planned maintenance and treated water could not be sampled.

3.4.4. Analysis of the water treatment plant verification monitoring data

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

Overall, the count of ADWG health-related exceedances over the past few years has remained at a relatively constant low level with no exceedances occurring in 2018-19 and 2020-21, which is a considerable achievement given the number of diverse schemes and systems. The increase in the number of aesthetic exceedances since 2021-22 has been mainly due to increased treated water hardness levels at Linville WTP. Otherwise, exceedances have, on average, been generally decreasing (Figure 1). The continued improvement in reducing exceedances across all WTPs is evident in the simple linear trend of total exceedances.

The six aesthetic guideline exceedances in the routine verification monitoring were attributed to elevated hardness results in the treated water from Linville WTP (270-320 mg/L, 6/7/2022 – 16/11/2022). These are due to an increase in source water hardness levels, following periods of significant wet weather. The WTP was upgraded towards the end of 2022 with a water softener that has successfully prevented any further hardness exceedances at Linville WTP.

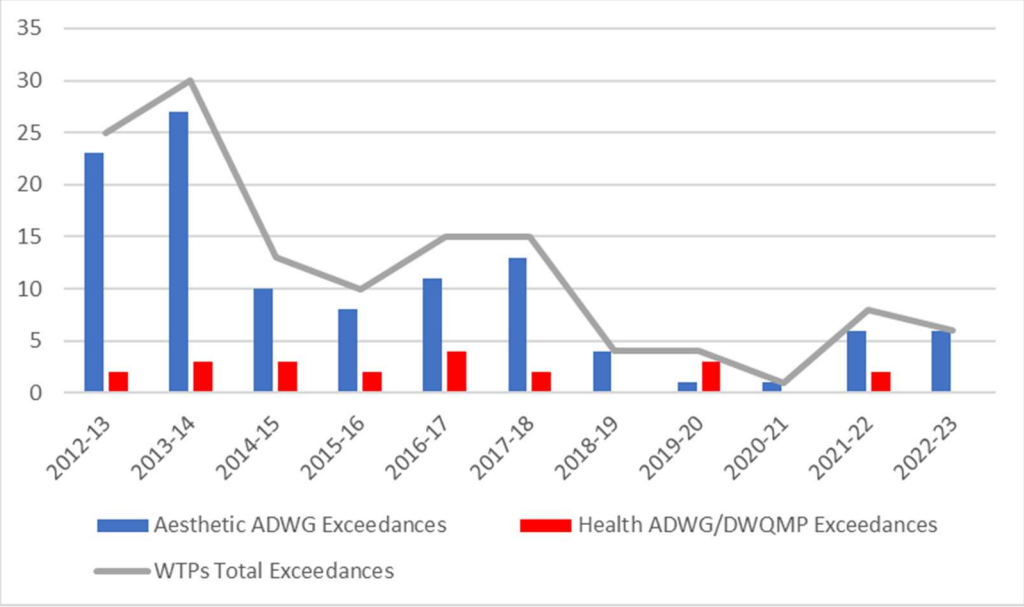

Figure 1 – WTP exceedances over different reporting periods

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 the mitigation of a risk has been determined to be inadequate, even for aesthetic parameters, an improvement action is recorded in the Drinking Water Quality Improvement Plan. A version of the DWQIP that focuses on unacceptable health risks only can be found in Enclosure 3. Subsequent processes ensure those improvement actions are addressed appropriately. This currently includes treatment plant upgrades, improved instrumentation, early intervention by Operations and Engineering staff through changes in process control and improvements in sampling practices and the third-party NATA-laboratory performance.

3.4.5. SEQ Water Grid verification monitoring

Verification monitoring occurred in accordance with the Supply System Water Quality Monitoring Plan. 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 more than 30 different parameters with weekly and monthly sampling frequency scheduled in eight different zones. The verification program provides the necessary information to validate the preventative approach to water quality management is working effectively.

The SEQ Water Grid has been assessed as compliant for all eight zones for microbiological, health and aesthetic compliance during the reporting period, as shown in Table 6.

Table 6 – SEQ Water Grid verification monitoring summary

Name of scheme component	Number of Analyses Performed	Number of Individual ADWG Health Exceedances	Number of Individual ADWG Aesthetic Exceedances
Brisbane	24566	0	0
Eastern Pipeline Interconnector (**EPI**)	1244	0	0
Gold Coast and Network Integration Pipeline (**NIP**)	3512	0	0
Logan	4717	0	0
Northern Pipeline Interconnector (**NPI**)	11034	0	1
Redland	5722	0	0
Southern Regional Pipeline (**SRP**)	11907	0	0
Total	**62702**	**0**	**1**

3.4.6. Analysis of the SEQ Water Grid verification monitoring data

There were no ADWG health exceedances and one aesthetic guideline exceedance for the SEQ Water Grid during the reporting period, consistent with the low numbers of exceedances for each category since 2014-15 reporting period (Figure 2). Although the initial drop in 2013-14 may be attributed to the reduction in monitoring when a risk-based approach was adopted, the overall trend supports the continued successful operation of the SEQ Water Grid to provide safe and high-quality drinking water.

The ADWG aesthetic exceedance was attributed to an elevated free ammonia result (free ammonia 0.62 mg/L, 6/9/2022) at Petrie Offtake on the NPI. This result was caused by a short-term ammonia dosing anomaly at the Caloundra Street WQMF.

Three free ammonia results from Aspley WQMF in the Brisbane network exceeded the ADWG aesthetic limit. However, these were considered 'non-representative samples' as the WQMF was offline at the time of sampling. It is known that small amounts of ammonia can bleed into the main while the WQMF is offline and can lead to elevated free ammonia detections that are not representative of the water provided to customers.

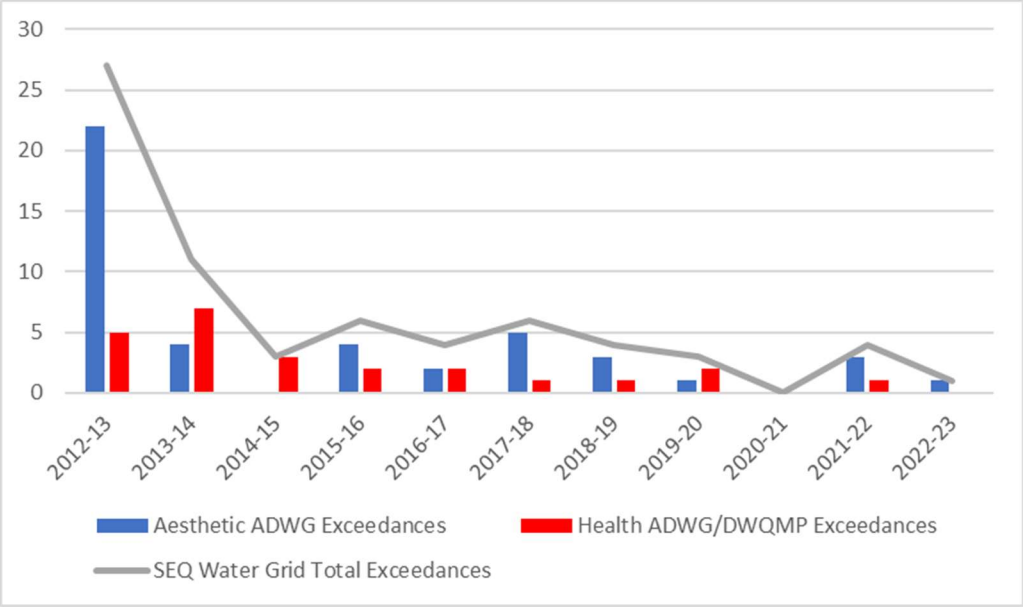

Figure 2 – SEQ Water Grid exceedances over different reporting periods

The minimal number of exceedances across the SEQ Water Grid since 2014-15 is supported by good operating practice. Improved source water conditions also contributed to a strong performance in some of the previous reporting periods, although significant challenges for water treatment and distribution are occasionally experienced due to increased heavy rain events.

4. Improvement plan

Improvements continue in accordance with the DWQIP. The progress made during the reporting period to reduce health-related risks and improve the reliable provision of safe drinking water is tabled in Enclosure 3 of this report. Any improvements which are yet to be implemented are reassessed and prioritised through the internal audit and risk assessment review schedule. Asset-related improvements are assessed via the capital program prioritisation process. The changes to the DWQMP identified in risk assessment reviews, HACCP team meetings and the investigation of incidents, reflect the significant amount of progress 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. A summary of significant water quality improvements delivered in the reporting period and taken from the DWQIP or from other sources like the Renewals Program, is listed below.

Whole of Business:

- Implementation of process engineering assessments and audits
- Improvement opportunities for online analyser maintenance
- Continuation of consistent reservoir inspection program
- Ongoing renewal program for Laboratory, Hydrometric and Catchment Water Quality equipment
- Ongoing water quality improvement planning sessions with each retailer customer to improve service delivery in line with the individual Future Desired Water Quality Service Standard Memorandums of Understanding

Northern Region:

- Water softener installation at Linville WTP to treat increasing hardness of raw water
- Implementation of upgrades to the PAC dosing system at Image Flat WTP
- Implementation of PLC upgrades at Ewen Maddock WTP and Noosa WTP
- Replaced filter media at Landers Shute WTP
- Service water fluoride upgrade at Landers Shute WTP
- pH adjustment upgrade at North Pine WTP
- Control System upgrade at North Pine WTP
- Bank stabilisation on Stanley River
- Bank stabilisation on Neurum Creek
- Treated water upgrade at Kilcoy WTP

Central Region:

- Construction of South West Pipeline almost complete, connecting Beaudesert to the SEQ Water Grid in 2024
- Mixers were installed on the outlet pipework of Cameron's Hill Reservoirs 1 and 2 in July 2022 to improve secondary disinfection
- A monochloramine and free ammonia online analyser was installed, calibrated, commissioned, and made fully operational in August 2022 at Holts Hill (Mt Crosby WTPs) to improve monitoring of the chloramination process
- Improvements to the Control System at Mt Crosby East Bank WTP including chemical dosing control improvements for lime and sodium hypochlorite dosing
- Control System for the fluoride dosing facility at Holts Hill (Mt Crosby WTPs) was upgraded in February 2023 including relocation of the control system and switch board outside the fluoride chemical dosing rooms to comply with Code of Practice requirements

- Replacement of 8 large valves at Green Hill Reservoirs
- Progression of the clarifier renewal and UV disinfection projects at Lowood WTP
- Ongoing progress on the Regional Secondary Disinfection Optimisation Project – targeted at improving disinfection residuals in Seqwater chloraminated water supply zones, as a key project from Water Quality service standards.

Southern Region:

- Improved understanding of ground water quality risks on Minjerribah (North Stradbroke Island - NSI) – Ground water infiltration zone report to inform water quality risk, potential ground water protection zones and development assessment
- Relocation of raw water analyser at Moogerah Dam WTP to better capture potential rain event contamination
- Progression of the planning for installation of UV systems at the NSI township, Kooralbyn and Rathdowney WTPs
- Automation of alum flow control at Moogerah Dam and Maroon Dam WTPs
- Installation of a pressure loading valve on the discharge of alum dosing pumps at North Stradbroke Island WTP to prevent ineffective coagulation due to overdosing of alum
- Automation of supernatant return flow control at Rathdowney WTP

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
- Prescribed incidents reported during the year including corrective and preventive actions
- Comments on the effectiveness of any preventive/control measures.

A summary of incidents at Seqwater's treatment operations and SEQ Water Grid reportable to the Regulator are shown in Table 7. Seqwater had one incident considered a 'reportable event'. Reporting to the Water Supply Regulator was completed within the required timeframes.

Table 7 – Summary of incidents at Seqwater's treatment operations and SEQ Water Grid

Incident Number	Name of scheme component	Date Reported	Description of the Event/Incident	Improvements
DWI-507-22-09898	Gold Coast Desalination Plant	10/10/2022	A detection of Hepatitis A virus that an investigation concluded was a false positive. Event: An annual sample collected on 4 October 2022 reported the presence of genetic material from Hepatitis A virus in the treated water produced at the Gold Coast Desalination Plant. At and around the time of sampling, all critical limits were met, and all other water quality results were within normal limits indicating the Gold Coast Desalination Plant was working within its	The investigation concluded that this result was almost certainly due to sample contamination or analytical error. It was not possible to identify a clear cause of contamination based on the available information. The most plausible explanation for the Hepatitis A result is that it represents a false-positive detection. The laboratory relayed information that is indicative of a very low load of genetic material, though the precise level could not be quantified. Such a result can be considered as consistent with a low level of contamination, such

Incident Number	Name of scheme component	Date Reported	Description of the Event/Incident	Improvements
			operating specifications to produce safe drinking water. Sampling had occurred as per the relevant procedures. There was no hepatitis or hepatitis-like symptoms, or illness reported or observed on site around the time of the result. No other indicators were present at the time of sampling in source and finished water.	as through aerosols. Contamination may have occurred at any stage of the sampling or laboratory analysis processes. The following improvements were determined based on the factors identified as contributing to the incident: • The monitoring of specific pathogens (further to surrogates or indicators) in treated drinking water was reviewed and, in accordance with the ADWG stating that the inclusion of specific pathogens (including Hepatitis viruses) in routine monitoring programs is not recommended, monitoring for specific pathogens was ceased. The focus of treating for virus risk continues to be on monitoring of control measures at Critical Control Points. • Sampling procedures were reviewed and compared to best practices to further minimise the risk of sample contamination. • Further improvements to laboratory performance management and communication processes were identified.

6. Audit of the Plans

6.1. Regular audits

Seqwater must audit its DWQMP at the intervals stated in an Information Notice provided under section 99 of the Act. The Information Notice for the approval of Seqwater's amended DWQMP dated 15 March 2021 specifies the next regular audit of the DWQMP is to be completed by 1 March 2025. Further regular audits are required to be completed every five years from that date. Accordingly, there was no regular audit of the DWQMP during the 2022-2023 reporting period.

6.2. Audits – water treatment and SEQ Water Grid operations

6.2.1. Internal audits – HACCP and Integrated Management System audits

Internal audits were 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 25 WTP and SEQ Water Grid sites in the reporting period. COVID restrictions had been lifted before the start of the reporting period, which allowed for an increase in the number of audits conducted (up from 17 internal audits in the previous year). Seqwater's remaining operational sites are scheduled as part of an ongoing audit cycle.

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. There were 22 HACCP team meetings conducted across Seqwater's operational regions during the reporting period.

6.2.2. External audits – ISO 22000 Re-certification audits

Seqwater has integrated the AS NZS/ISO22000:2018 Food Safety Management Systems standard into the DWQMP. 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**).

During the reporting period, Seqwater prepared for and successfully completed a certification surveillance audit against ISO 22000 conducted by its contracted third-party independent auditor. The scope of certification 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, Boonah-Kalbar and Lowood WTPs, and the SEQ Water Grid (i.e. network control room and all operational sites).

6.2.3. External audits – Regulated Fluoridation Systems audits

Seqwater participates in regulatory fluoride audits every two years. Every plant with fluoride dosing is checked for compliance with the current *Queensland Water Fluoridation Code of Practice* by the Health Regulator (the respective Public Health Unit (**PHU**)) for the relevant WTP. No regulatory fluoride audits have been conducted in the 2022-2023 reporting period. All Seqwater WTPs are expected to be audited by the various Public Health Units during the 2023-2024 reporting period.

7. Regular review of the DWQMP

Pursuant to section 10.1 of the Information Notice for the approval of Seqwater's DWQMP, Seqwater is required to complete the next review of its DWQMP before 1 July 2023. The DWQMP review was conducted by stakeholders relevant to each element of the DWQMP. 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 ADWG. Seqwater's HACCP plans and appendices to the DWQMP were also subject to review through continuous improvement programs. This included:

- Risk assessments for all WTPs and the SEQ Water Grid
- Critical Limits and risk improvements through HACCP team meetings regularly held across all operational sub-regions
- Incident investigations
- Internal site audits to assess the accuracy and implementation of HACCP plans.

7.1 Review of and improvements to the drinking water quality management system

The review of the DWQMP was completed by Senior Water Quality staff in the Drinking Water Quality Unit and consisted of a review of the currency of the material.

Document and information currency review:

The update of the plan considered the following elements:

- Update of state and federal government departments, regulators and policy setters, including Water Service Providers and their abbreviations
- Updates to reflect changes in government legislation including changes to Public Health and Fluoride Regulations
- Updates to internal team structure and names after internal restructuring at Seqwater.

Major changes of note:

- Introduction: addition of the *Water Supply (Safety and Reliability) Act 2008* (Qld) to the cross-reference table between the ADWG Framework, the *Guideline for the preparation, review and audit of drinking water quality management plans* (2022) and International Standards
- Introduction: changes to the "WSR DWQMP Guidelines" chapter names following the introduction of the *Guideline for the preparation, review and audit of drinking water quality management plans* (2022)

- Element 1: significant update reflecting recent updates of Seqwater's Risk Appetite and Enterprise Risks
- Element 2: updates to indicate Seqwater started following Chapter 5 of the ADWG for the assessment of Health Based Targets
- Element 2: updates to the documentation that describes Seqwater's catchment characteristics to ensure currency of source water risk characterisations which inform water safety and reliability risk assessment
- Element 2: significant updates to the Risk Assessment methodology for WTPs and the SEQ Water Grid following the recent update of Seqwater's Enterprise Risk Management framework
- Element 3: update to reflect the updated version of the HACCP Wall Chart
- Element 4: changes to Action Limit reporting
- Element 5: addition of description of a new Memorandum of Understanding to improve aesthetic and operational water quality performance between Seqwater and the Water Service Providers
- Element 6: several updates to Incident Management (e.g. regarding the description of incident exercises)
- Element 7: several updates regarding employee awareness and training
- Element 9: significant update reflecting the recent restructure of the R&D department and the creation of a separate group focusing on (technological) innovations
- Element 9: updates to research and innovation project names that are currently in progress
- Element 9: updates to better reflect how the Validation Standard is used and updates to the references to new/updated documents describing Management of Change
- Element 9: updates to referenced procedures and other documents regarding engineering design
- Element 10: several updates throughout Documentation and Reporting (e.g. on the IMS and on Action Limit Reporting)
- Element 11: updates to reflect the introduction of iAuditor and change of the internal audit frequency of the drinking water quality management system
- Element 12: significant update reflecting the introduction of the Emerging Asset Risk (EAR) process for capturing facility-based risk improvements
- General: multiple updates to Seqwater position and group names
- General: several updates reflecting the recent introduction of Labware as Seqwater's data management system
- General: conversion of the DWQMP into the new Seqwater style format.

The review of the DWQMP was completed on 30 June 2023 and outlined the significant amount of progress Seqwater has made in improving its drinking water quality management system. In accordance with section 107(2) of the Act, Seqwater submitted an application to amend the DWQMP to reflect the changes identified through the review on 11 August 2023 – within 30 business days of its completion. The details of the changes made are provided with the amended DWQMP to WSR in the Register of Changes to DWQMP, HACCP plans and procedures (for current – see Enclosure 4).

8. Glossary

Term	Definition
Act	*Water Supply (Safety and Reliability) Act 2008* (Qld)
ADWG	Australian Drinking Water Guidelines 2011, National Health and Medical Research Council, Commonwealth Government of Australia, Canberra
Alum	Aluminium sulfate
CCP	Critical Control Point
DWQIP	Drinking Water Quality Improvement Plan
DWQMP	Drinking Water Quality Management Plan
EPI	Eastern Pipeline Interconnector
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.
IMS	Integrated Management System – the combination of the certified ISO9001, ISO14001, ISO 22000 and ISO4500 systems implemented by Seqwater
ISO 22000	ISO 22000:2018 Food Safety Management Systems. International standard for food safety.
KPI	Key Performance Indicator
LIMS	Laboratory Information Management System
MIB	2-methylisoborneol
MOSS	Monthly Operating Supply Schedule
NATA	National Association of Testing Authorities
NIP	Network Integration Pipeline
NPI	Northern Pipeline Interconnector
oPRP	Operational Pre-requisite program
PHR	*Public Health Regulation 2018* (Qld)
PHU	Public Health Unit
PRP	Pre-requisite program – terminology from ISO22000:2018 (section 8.2) that refers to programs that facilitate the prevention and/or reduction of contaminants (including food safety hazards) in the products, product processing and work environment.
Regular audit	An audit conducted in accordance with section 99(2)(c) of the Act.
Regular review	A review conducted in accordance with section 99(2)(b) of the Act.
Regulator	The chief executive of the department is the regulator under the Act. (i.e. Water Supply Regulation – Department of Regional Development, Manufacturing and Water)
Report	Drinking Water Service Annual Report
REX	Seqwater's document and electronic records management system

SCADA	Supervisory Control and Data Acquisition (SCADA) system. Human to Process software interface.
SEQ Water Grid	Bulk water supply network throughout South East Queensland, previously named the Bulk Distribution Network and formerly operated by LinkWater. Also known as Supply System
Seqwater	Queensland Bulk Water Supply Authority
SPID	Service Provide Identification – issued by Water Supply Regulation
SRP	Southern Regional Pipeline
Supply System	Also known as SEQ Water Grid
UAV	Unmanned Aerial Vehicle
UV	Ultraviolet
UVT	Ultraviolet Transmission
WQMF	Water Quality Management Facility
WSP	Water Service Provider (Urban Utilities, Unitywater, City of Logan, Redland City Council and City of Gold Coast)
WSR	Water Supply Regulation – Department of Regional Development, Manufacturing and Water
WTP	Water Treatment Plant

9. Enclosures

Enclosure	Name
1a	Verification monitoring 2022-2023 Water Quality data report (REX ID: D23/220759)
1b	Verification monitoring 2022-2023 Water Quality data from offline SEQ Water Grid sampling points (REX ID: D23/239106)
2a	Catchment and Drinking Water Quality Micropollutant Monitoring Program - QAEHS Passive Sampling Winter 2022 Report (REX ID: D23/3503)
2b	Catchment and Drinking Water Quality Micropollutant Monitoring Program - QAEHS Passive Sampling Summer 2023 Report (REX ID: D23/101936)
3	Drinking Water Quality Improvement Plan (DWQIP) (REX ID: D23/223967)
4	Register of changes to DWQMP, HACCP plans and procedures - 2022-2023 (REX ID: D23/227625)