



Redland

CITY COUNCIL

SPID No. 541

Drinking Water Service Annual Report 2022/2023

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This report has been prepared in accordance with the *"Guideline for the preparation, review, and audit of DWQMPs (DRDMW 2022)"*.

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Notation and Abbreviations

<	Less than
>	Greater than
ACSC	Australian Cyber Security Centre
ADWG	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
ALS	Australian Laboratory Services Laboratory Group
ASMP	Asset and Service Management Plan
DRDMW	Department of Regional Development, Manufacturing and Water
DWQMP	Drinking Water Quality Management Plan
<i>E. coli</i>	<i>Escherichia coli</i> , a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
FY	Financial Year
ICPMS	Inductively coupled plasma mass spectrometry
IPAM	Infrastructure Products and Materials
mg/L	Milligrams per litre
NSI	North Stradbroke Island
NTU	Nephelometric Turbidity Units
OFI	Opportunity for Improvement
PASS	Product and Standards Steering Group
UU SAS	Urban Utilities Scientific Analytical Services
RCC	Redland City Council
REC	Recommendation
RMIP	Risk Management Improvement Program
SEQ D&C Code	South-east Queensland Water Supply and Sewerage Design and Construction Code
SMBI	Southern Moreton Bay Islands
SWIM	Statewide Water Information Management
The Plan	Drinking Water Quality Management Plan
WIMS	Water Information Management Solution – Water Quality Database
WTP	Water Treatment Plant

1 Introduction

This report documents the performance of Redland City Council's (RCC or Council) (Service Provider Identification 541) drinking water service with respect to water quality and performance in implementing the actions detailed in the Drinking Water Quality Management Plan (DWQMP or the Plan) as required under the *Water Supply (Safety and Reliability) Act 2008* (the Act) for the 2022-23 financial year.

The report assists the Department of Regional Development, Manufacturing and Water (the Regulator) to determine whether the approved DWQMP and any approval conditions have been complied with.

This report has been prepared in accordance with the "*Guideline for the preparation, review and audit of DWQMPs (2022)*" published by the Department of Regional Development, Manufacturing and Water, Queensland, accessible at www.rdmw.qld.gov.au.

This DWQMP report includes:

- Activities undertaken over the financial year in operating the drinking water service.
- Performance of RCC's drinking water supply.
- Actions taken to implement the Drinking Water Quality Management Plan.
- Details of incidents and complaints relating to drinking water quality.

This report is available to our customers through the Council [website](#), or upon request at the Council's Customer Service Centres.

2 Summary of schemes operated

Council receives treated bulk water from Seqwater and is responsible for delivering it to residents through its distribution network. The provision of a safe water supply is managed through an approved DWQMP to ensure adherence to the Australian Drinking Water Guidelines (ADWG). Key responsibilities of RCC and Seqwater are summarised in [Table 2.1](#).

Table 2.1 - Seqwater and Redland City Council Responsibilities

Seqwater's Responsibilities	Redland City Council's Responsibilities
<ul style="list-style-type: none"> • Catchment management. • Raw water treatment (including fluoridation). • Operation of bores, dams and reservoirs. • Bulk water transport to defined transfer points. • Monitoring of raw and treated water supply. 	<ul style="list-style-type: none"> • Receipt of bulk treated water from Seqwater at defined transfer points. • Delivery to customers through Council's water distribution network. • Operation and maintenance of the distribution network, service reservoirs and pumping stations. • Monitoring of drinking water quality performance throughout the distribution network.

RCC covers an area of approximately 537 square kilometres and has a population of approximately 159,690 people (as at 30/06/2022). Council provides drinking water to Redland

City residents through four water supply schemes as shown in [Table 2.2](#). There are five bulk water zones within these schemes and the adopted boundaries are shown in [Figure 2.1](#). The suburbs that are supplied in each zone are shown in [Table 2.3](#).

Table 2.2 - Summary of Schemes

Scheme	Water Source*
Redland City Mainland and Southern Moreton Bay Islands including: <ul style="list-style-type: none"> - Alexandra Hills water supply zone - Heinemann Rd Reservoir water supply zone 	<ul style="list-style-type: none"> • Mt Crosby WTP via Eastern Pipeline Interconnector • North Stradbroke Island WTP • Capalaba WTP
Dunwich	<ul style="list-style-type: none"> • Dunwich WTP
Amity Point	<ul style="list-style-type: none"> • Amity Point WTP
Point Lookout	<ul style="list-style-type: none"> • Point Lookout WTP

*Water Treatment Plants (WTPs) owned and operated by Seqwater. Refer to Seqwater annual report for details of WTP processes and capacities.

Table 2.3 - Suburbs in Bulk Water Supply Zones

Bulk Water Supply Zone	Suburb
Alexandra Hills Reservoir Zone	All of Birkdale, Thorneside, Wellington Point and Ormiston. Majority of Capalaba, Alexandra Hills, and Cleveland. Small part of Sheldon and Thornlands.
Heinemann Road Reservoir Zone	All of SMBIs (Russell, Macleay, Lamb and Karragarra Islands). Redland Bay, Victoria Point, Coochiemudlo Island and Mount Cotton. Majority of Sheldon and Thornlands. Small part of Capalaba, Alexandra Hills and Cleveland.
Dunwich Zone	Dunwich Township
Amity Point Zone	Amity Point Township
Point Lookout Zone	Point Lookout Township

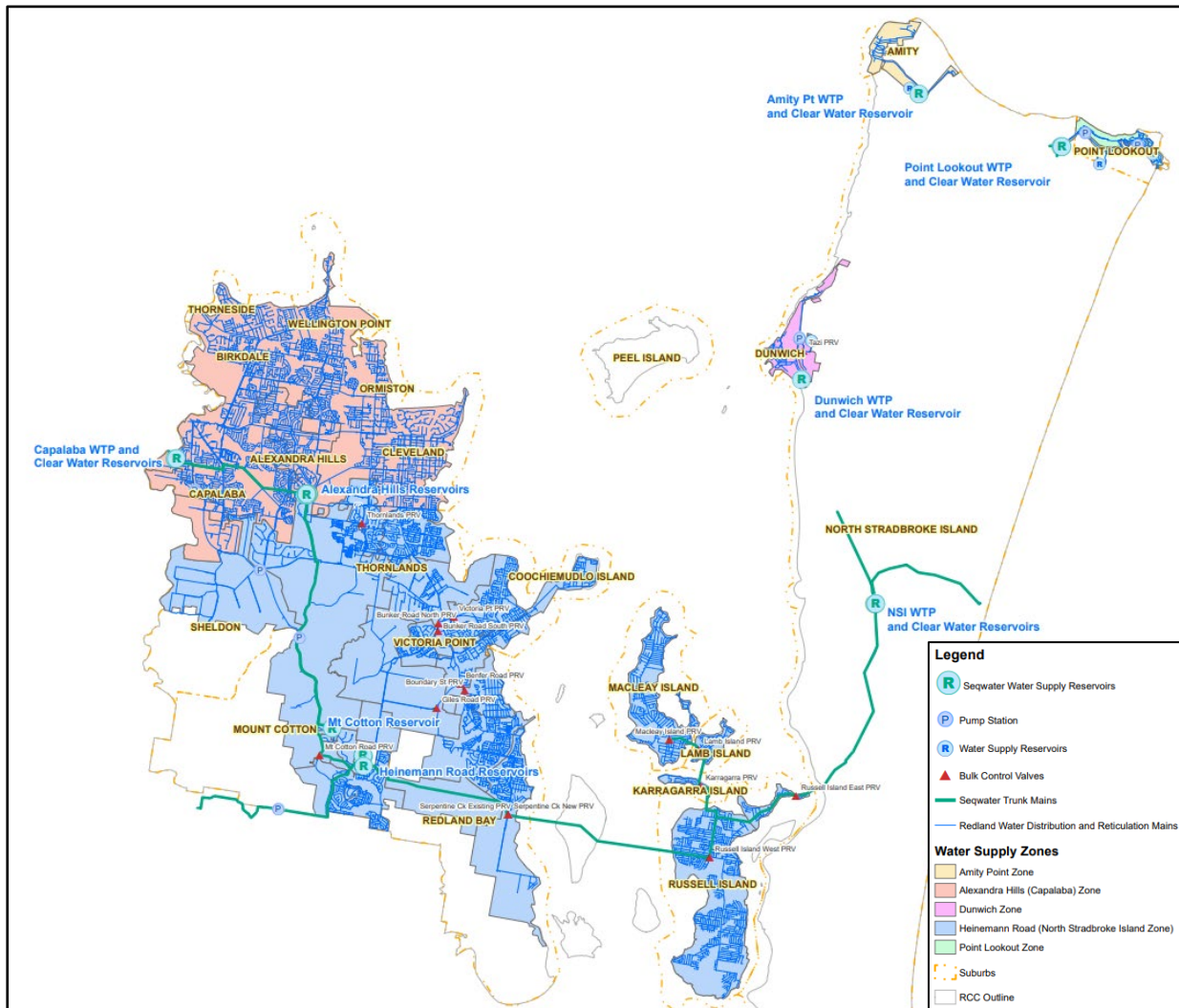


Figure 2.1 - Redland City Council Water Supply Zones

3 DWQMP Implementation

Council's City Water Group is responsible for providing customers with a safe, reliable and compliant water supply. The Compliance and Reporting Unit oversee the implementation of the DWQMP and manage the drinking water verification monitoring program, investigate customer drinking water complaints and report any drinking water non-compliances to the Regulator.

City Water's Network Operations Unit and City Assets Group – Water and Wastewater Infrastructure Asset Management Unit also play an integral role to ensure that construction, operation and maintenance activities do not impact on water quality throughout the water supply system.

Council's Water Quality Officer is responsible for ensuring the DWQMP is implemented and actively promotes the importance of operating under the Plan to management and operators through discussions at monthly water (and sewer) toolbox meetings, development and implementation of procedures, and Council's ongoing training and induction processes.

3.1 Progress in implementing the Risk Management Improvement Program

Council's Risk Management Improvement Program (RMIP) is aimed at reducing contamination risks associated with the supply of drinking water. Actions captured in the RMIP may originate from the following sources:

- Risk Assessments
- DWQMP reviews and audits
- Drinking water incidents
- Regulator feedback
- General improvements

Council conducts regular reviews of its progress against the RMIP to ensure actions from the RMIP are implemented effectively and in a timely manner. The RMIP is an evolving component of the DWQMP as actions are added and removed as necessary, or as identified.

All RMIP actions are entered into RCC's risk management system 'Protecht' and assigned to the responsible officer as identified in the Risk Register. Target dates are allocated to each actionable item and are monitored regularly to ensure they are being progressed and completed.

The Water Quality Officer collates information from the individual risk owners on progress and completion of actions which is then reported in RCC's Drinking Water Service Annual Report.

The RMIP implementation status is included in [Appendix A](#) with some key achievements summarised below:

- Reservoir assessments and inspections undertaken.
- Testing for Heterotrophic Plate Counts (HPC) added to the verification monitoring program.
- Tools and equipment disinfection procedure developed and operator training completed.
- Commenced construction of a new storage area for pipes and fixtures.

Many of the RMIP actions have been completed and the outstanding actions will continue to be progressed during 2023/24.

3.2 Revisions made to the verification monitoring program

The following changes were made to the verification monitoring program during 2022/2023:

- Free Chlorine, pH, Turbidity and Temperature are now being tested at all sites on a weekly basis.
- HPC testing commenced in March 2023 and is to be undertaken quarterly at all sites.
- Water quality data collected from the verification monitoring program was transitioned into a new database – SWIMLocal. This is now the primary database for all current and historical data and transfers are occurring directly from the laboratory to the SWIMLocal server.

Further revisions, as recommended by the Regulator in the DWQMP Approval - Information Notice for the Decision dated 25 January 2023, have been included in the 2023/2024 verification monitoring program. Details of these will be provided in the 2023/2024 Annual Report.

3.3 Revisions made to the operational monitoring program

Seqwater is responsible for operational monitoring of the system as it owns, operates, and monitors all chlorine dosing systems at the treatment plants and reservoirs. Verification monitoring is the only available option to monitor drinking water quality in the Council controlled part of the water supply network.

4 Verification monitoring - water quality information and summary

To ensure the provision of safe and reliable drinking water to RCC customers, sample sites are selected within each zone to monitor the reticulated distribution system water quality. Some reticulation sample locations were chosen to give a 'worse-case' picture of water quality, including end-of-line areas, areas affected by high water age, and others to identify any emerging issues in the system. The parameters monitored are selected based on risks identified in the risk assessment and as required by the Regulator via the DWQMP. The monitoring program also assesses and confirms the performance of control measures identified in the risk assessment. The verification monitoring locations are included in [Appendix C](#).

The sample collection, field analysis and laboratory testing for the 2022/2023 verification monitoring program was contracted to Urban Utilities Scientific Analytical Services (UUSAS) Laboratory, who are NATA accredited. All samples were collected, stored and transported to the laboratory for analysis by appropriately qualified staff in accordance with approved procedures.

The results from the verification monitoring program for *E. coli* have been compared against the water quality criteria specified in the DRDMW "*Guideline for the preparation, review and audit of DWQMPs (2022)*". The results from the verification monitoring program for all other parameters have been compared against the National Water Quality Management Strategy, *Australian Drinking Water Guidelines 6 2011*, Version 3.8 (updated September 2022).

The reported statistics do not include results from repeat samples, or from emergency or investigative samples undertaken in response to an elevated result or an incident such as a main break.

The verification monitoring summaries are included in [Appendix A](#).

5 Incidents reported to the Regulator

During the 2022/2023 financial year, there was one non-compliance against the ADWG from verification monitoring that was reported to the Water Supply Regulator under section 102 of the Act. There were no prescribed incidents reportable under section 102A of the Act.

Table 5.1 - Incidents Reported to Regulator

Incident Date	Location	Parameter	Corrective and Preventive Actions
27/06/2023	Heinemann Road Reservoir Zone – Thornlands Sample Tap M60	<i>E.coli</i>	<p>Immediate:</p> <ul style="list-style-type: none"> • The mains network was flushed. • Follow-up samples taken with no further detections of <i>E.coli</i>. <p>Preventive:</p> <ul style="list-style-type: none"> • Contractor's sampling procedure audited. • All sample taps audited to ascertain condition, proximity to hazards and whether they are in an appropriate location. • Investigated alternative sample tap designs that may provide better protection from external contamination sources.

The incident investigation concluded there was likely contamination of the sample due to the presence of animal faeces in close proximity to the sample tap. Recent mowing and splash back from the sample tap during pre-sample flushing likely flicked up contaminated grass clippings onto the tap. No complaints or reports of illness were reported from the receiving community.

6 Customer complaints related to water quality

RCC is committed to ensuring our water service meets the needs and expectations of the community. Feedback is encouraged to help identify any potential issues, trends and possible areas for improvement in the operation, maintenance and management of the water supply network. Customers can lodge complaints through the following mechanisms:

- Over the telephone,
- Via the Online enquiry form,
- In writing, and
- In person at Council Customer Contact Centres.

Council keeps a record of all customer enquiries and complaints in an electronic database (Property and Rating). Water quality related complaints are dispatched immediately for investigation to the City Water Group and are followed up initially within 4 business hours.

Water quality complaints are categorised as:

- Discoloured water
- Taste/odour
- Suspected illness

Throughout the year the following complaints in relation to water quality were received:

Table 6.1 - Water Quality Complaints

Water Supply Scheme	Connections*	Health Concern	Discoloured Water	Taste and Odour	Total Per 1000 Connections
Redland City Mainland & SMBI	70,014	0	58	25	1.19
Dunwich	475	0	0	0	0
Point Lookout	1,218	0	0	1	0.82
Amity Point	403	0	0	1	2.48
Total*	72,110	0	58	27	1.18

* Total connected properties including vacant land.

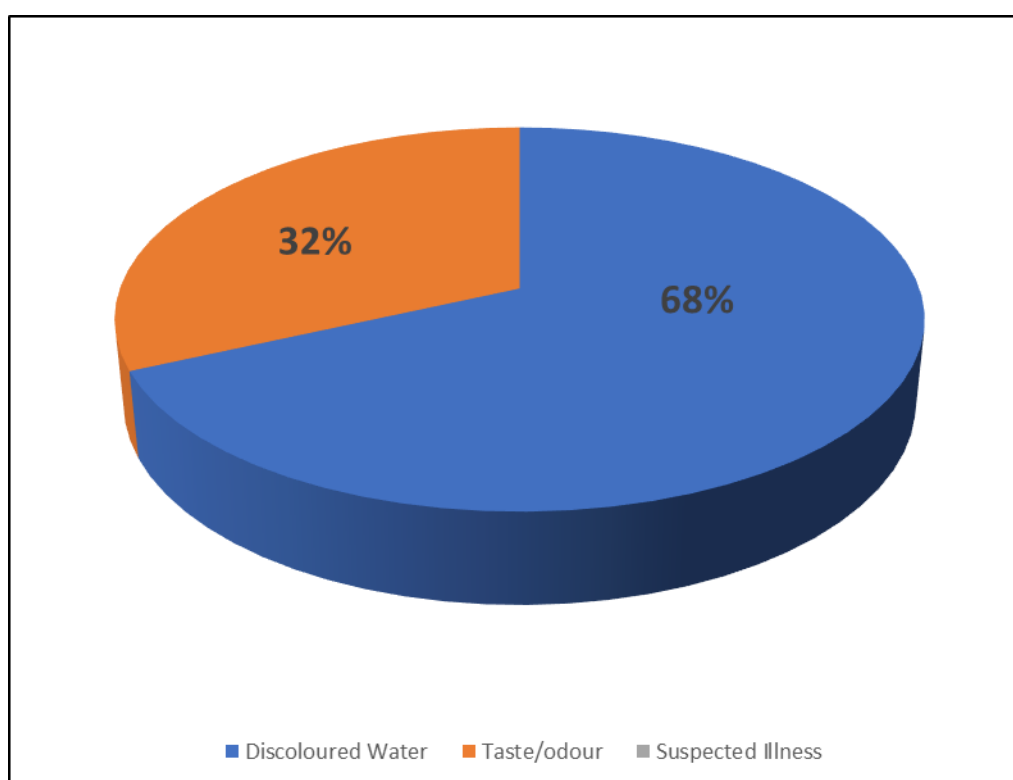


Figure 6.1 - 2022/2023 Water Quality Complaints by Category

6.1 Suspected illness

Complaints are, on occasion, received from customers who suspect their water may be associated with an illness they are experiencing. Council investigates each complaint relating to alleged illness from the water supply, typically by taking samples at the customer's tap, the water meter (council's side) or nearest council hydrant, and the closest verification sampling point. Parameters tested may vary depending on the nature of the health complaint. There were no confirmed cases of illness arising from our water supply system during 2022/23.

6.2 Discoloured water

Discoloured water quality complaints usually occur after maintenance activities on the water distribution network. Customers are advised of the reason for the discoloured water and encouraged to allow water to settle for a brief period and then flush internal pipes for a few minutes. If the issue is not resolved after these actions, the mains will be flushed in the vicinity of the complaint. A regular mains flushing maintenance program is scheduled for known problem areas (usually dead ends and low consumption areas).

6.3 Taste and odour

The taste and odour complaints received are often related to the taste of chlorine in the water supply but can also be reported as metallic/chemical or earthy/dirty tastes and odours. Taste and odour panel samples can be taken to determine if an issue is likely to be originating from the water supply or internally within the customers property and can also assist in determining the veracity of the complaint. More detailed lab analysis can be undertaken if the taste and odour panel test identify discrepancies between samples.

There were a few instances of fuel-like taste/odours reported in 2022/23 that were investigated further by comparing samples from within private properties to samples from the network supply immediately exterior to the complainant's residence. In all cases, fuel related substances were detected in the private property samples and not within the network samples, indicating the source was from internal contamination. Results were communicated with the complainants, and they were advised to not drink the water and to engage a plumbing professional for advice on how to remediate the issue.

7 DWQMP review outcomes

An internal review was required by the regulator to be conducted by 12 October 2022. This was achieved and the amended DWQMP was submitted to the Regulator on 2 November 2022. The amended plan was subsequently approved on 25 January 2023. The review included updated information and figures, and general administrative changes as shown in [Table 7.1](#).

The next internal review is due to be completed before 12 October 2024.

Table 7.1 - Changes made to the DWQMP

DWQMP Section	Details of changes made to DWQMP
Registered service details	<ul style="list-style-type: none"> Water demand projections updated. Updated figures with current network information. Population estimates updated.
Details of infrastructure for providing the service	<ul style="list-style-type: none"> Population estimates updated. Bulk water supply sources schematic updated. Composition of distribution and reticulation network updated. Pipe material breakdown updated. Age profile of the network updated. Pipe age breakdown updated. Network pressure information and figure updated. Water age description and figure updated. Water supply schematics updated.

DWQMP Section	Details of changes made to DWQMP
Identify hazards and hazardous events	<ul style="list-style-type: none"> Water quality data and exceedance information updated. Added reference to Viridis Data Analysis Report 2022 (included as appendix). Water quality summary tables updated to include Total Haloacetic Acids. Seqwater water quality data and exceedances updated. Added new section relating to water quality complaints. Updated summary of sampling completed by Seqwater in Appendix B. Added <i>Naegleria fowleri</i> as a Hazard to be considered. Updated WQ Risk Register attached in Appendix C and referred to throughout DWQMP. Seqwater residual risks and potential hazardous events updated. Hazardous events table removed, and reference made to Hazardous events in WQ Risk Register instead. Key stakeholders (Table 5.10) removed - details provided in WQ Risk Register (Appendix C) instead.
Information gathering – water quality and catchment characteristics	<ul style="list-style-type: none"> Updated Seqwater HACCP flow diagrams
Assessment of risks	<ul style="list-style-type: none"> Methodology information updated. More detail provided around risk assessment workshop and Summary Report DWQMP Risk Assessment August 2022 provided as Appendix. Risk assessment matrix/descriptions removed as these are provided in the WQ Risk Register (Appendix C). Risk assessment results description updated and approval by Group Manager City Water now noted. Service provider risk input updated. WQ Risk Register updated to include 'hazardous events'
Risk management measures	<ul style="list-style-type: none"> Risk management measures updated in WQ Risk Register. Bulk water operating Protocols updated. Updated planned preventative maintenance program information.
Operation and maintenance procedures	<ul style="list-style-type: none"> Changed heading to 'Documented Procedures'. Operating procedures (Table 7.2) updated with latest names, numbers and versions. Added 'date last reviewed' and 'responsible positions for review and implementation'. More detail provided on document management and procedure review process.
Management of incidents and emergencies	<ul style="list-style-type: none"> Table 7.4 updated with correct procedure names, numbers and versions. Updated version of Emergency Response Plan attached. Reference included to Local Disaster Management Plan.
Risk management improvement program	<ul style="list-style-type: none"> RMIP introduction information updated. Updated RMIP actions based on results of risk assessment workshop. RMIP table format changed to include interim, short-term and long-term target dates.
Service wide support – information management	<ul style="list-style-type: none"> Procedure information updated
Operational Monitoring	<ul style="list-style-type: none"> No significant changes.

DWQMP Section	Details of changes made to DWQMP
Verification monitoring	<ul style="list-style-type: none"> • More details included for monitoring locations, parameters tested and frequency. • Further details provided on verification monitoring review. • Ecosafe Summary of Recommendations - moved from Appendix and has extra column showing status of completion status against recommendations. • Verification Monitoring Site figures updated to reflect current monitoring locations, parameters and frequencies. • Verification Monitoring Program sampling frequencies updated.

8 DWQMP audit findings

No external DWQMP audit was carried out in 2022/23. As per the *Information Notice for the Decision to approve the amendment of Redland City Council's approved Drinking Water Quality Management Plan* dated 25 January 2023, the next external DWQMP audit is due by 12 October 2025.

The last External Audit was undertaken in September 2021 by Viridis Consultants and concluded that:

- accurate data has been reported in the DWQMP Annual Reports.
- the implementation of the DWQMP and relevant procedures/systems should be improved to ensure that the overall intended outcome of the DWQMP is consistently achieved.
- the relevance of the plan is adequate, however there are some process improvements identified which can enhance risk management aspects.

The audit resulted in 12 recommendations and 16 opportunities for improvement. The recommendations and opportunities for improvement that have been completed and/or progressed during 2022/2023 are outlined in [Appendix D](#).

Appendix A - Implementation of the DWQMP Risk Management Improvement Program

Table A.1 - Risk Management Improvement Program Implementation Status 2022-23

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
R1	Bulk Supply	Out-of-specification water quality is received from Seqwater due to system issues/failures at Seqwater end resulting in harm to the community. Requires internal and external discussions.	RCC to undertake internal discussions on issue of high pH in Amity Point Zone, which should include discussions with Seqwater.	M	Water Quality Officer	28/02/2023	<ul style="list-style-type: none"> Data analysis undertaken to guide discussions. pH found to be increasing through the network - reservoir and WTP levels are within acceptable ranges. Likely due to aging infrastructure, low/intermittent water consumption and AC pipes. Will continue monitor and investigate options to reduce pH at extremities. Continue to work with Seqwater to improve water quality outcomes. 	30/06/2024	In Progress
R2	Bulk Supply	Improper mixing of treated water from different WTPs by Seqwater impacts water quality. Requires review of incident response protocols and communications.	Review the incident response protocols to assess whether T&O complaints are sufficiently captured to enable formal action/response by Seqwater.	M	Water Quality Officer	31/01/2023	<ul style="list-style-type: none"> Schedule 8 of the Operating Protocol outlines triggers for water quality notifications and communications. MIB and Geosmin monitoring is triggered by Seqwater's 		Complete

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
							Cyanobacteria Mgt Plan OR complaints received from consumers. <ul style="list-style-type: none"> Schedules 2 and 3 of the Bulk Water Supply Agreement also outline the water quality criteria and reporting/notification requirements. 		
			Establish formal communication on complaints related to T&O resulting from improper water mixing or blending.	M	Water Quality Officer	31/06/2023	<ul style="list-style-type: none"> T&O Complaints are escalated to Seqwater if there are multiple received from the same area, as outlined in RCC's Procedure: WAT-004-001-018-PR <i>Investigation of Drinking Water Quality Complaints</i> 		Complete
R3	Network	Sloughing or biofilm stripping due to a change in the flow, velocity and direction of water in the Redland water mains impacts water quality harm to the community. Requires consideration of HPC testing, investigation of pressure monitoring and staff training/awareness.	Consider testing for heterotrophic plate counts (HPC) in the network as part of the verification monitoring program. Use results to establish a trigger to guide need for further investigation and action based on HPC results (E.g., flushing, discussions with Seqwater on increasing chlorine, need for asset replacement etc)	M	Water Quality Officer	28/03/2023	<ul style="list-style-type: none"> HPC testing has been added to the Verification Monitoring Program Schedule and is being tested on a quarterly basis. Trigger action response plan to be developed once more data collected. 	30/06/2024	In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
			Investigate opportunities for managing and monitoring pressure, velocity and flow changes in the network, including the required staff training and awareness.	M	Service Manager Network Operations	30/09/2024	<ul style="list-style-type: none"> Pressure logger trial commenced in June 2023 within the network at Redland Bay and Victoria Point. Pressure is monitored at existing pump station installations. 		In Progress
R4	Network	Trunk main(s) is damaged due to human intervention or mechanical failure resulting in no supply of water for a timeframe exceeding Council's agreed service standard. Requires clearer messaging to customers through review and update of council forms/facts sheets.	Investigate options to make it clearer for customers on the need to contact Council before digging (E.g., use of larger fonts for this in forms/materials), including reviewing all relevant forms which still reference 'Dial before you Dig' website.	M	Water Quality Officer Service Manager Water and Wastewater Infrastructure Asset Management (WWIAM)	31/6/2023	<ul style="list-style-type: none"> Many council forms that reference Dial before you Dig also reference RCC as the contact for water and sewer infrastructure. Some however do not refer to both. Currently liaising with designated Form editors to make recommended changes. 	31/1/2024	In Progress
			Review and update all relevant forms/fact sheets which still reference 'Dial before you Dig' website.	M	Water Quality Officer Service Manager Water and Wastewater Infrastructure Asset Management (WWIAM)	31/12/2023	<ul style="list-style-type: none"> Currently liaising with designated Form editors to make recommended changes 	31/3/2024	In Progress
R5	Network	Critical trunk main(s) is damaged due to human intervention or mechanical failure resulting in contaminated and dirty water and harm to the community. Requires	Complete review and update of WAT-004-001-025-PR Disinfection of Tools & Equipment Used in Drinking Reticulation System and WI01-WAT-	M	Water Quality Officer	30/11/2022	<ul style="list-style-type: none"> Procedure reviewed and updated November 2022 		Complete

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
		update of procedures, ERP and providing relevant staff training.	004-001-025 Disinfection of Tools and Equipment – Work Instruction						
			Deliver training in relation to new disinfection procedure/work instruction.	M	Water Quality Officer Service Manager Network Operations	31/03/2023	<ul style="list-style-type: none"> Training delivered to relevant staff in person and online via Council's Learning Hub 		Complete
			Complete the DWQMP audit 2021 improvement action on storage of pipes and fittings. Potential locations and costs to be investigated.	M	Service Manager Network Operations	30/06/2023	<ul style="list-style-type: none"> New location for pipe storage chosen at an existing undercover facility at Cleveland STP. Racking has now been installed and containers have been ordered for fixtures/fittings. Discussions now occurring regarding actual moving of pipework and fittings. Expected completion End of Nov 23 		Complete
			Emergency Response Plan to incorporate Critical Trunk Main Break Response	M	Service Manager Network Operations	30/09/2023	<ul style="list-style-type: none"> Criticality assigned to all water supply assets. ERP to be updated. 	30/06/24	In Progress
R6	Network	Contaminated water will enter the RCC water supply system due to no/or poorly maintained backflow prevention devices resulting in water supply which causes harm to the community (including filling	Formalise and document the backflow prevention program, including roles, responsibilities, record keeping and resourcing needs for	L	Team Leader Plumbing Services Service Manager Network Operations	30/06/2024	<ul style="list-style-type: none"> Maintenance is based on requirements outlined in the <i>Plumbing and Drainage Act 2018</i>. 	30/06/24	In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
		stations, cross connections). Requires formalisation of backflow prevention program.	a). testable BFD for customers, including identifying customers who require testable devices, testable BFD register and monitoring annual testing compliance and b). RCC owned BFDs, including testing and monitoring requirements, water filling stations.				<ul style="list-style-type: none"> All RPZ valves tested with a form 9 submitted annually. Procedures in place to track compliance of annual inspections of customer BFDs and record keeping. Annual inspections of Council owned BFDs scheduled in Assetic 		
R8	Network	Unsuitable commissioning protocols are adopted by Council, contractors and third parties working within the Redland City Council distribution system due to lack of inspection and oversight, human error or poor-quality control systems resulting in a contaminated water supply. Requires update of procedures and providing relevant training.	Complete review and update of WAT-004-001-025-PR Disinfection of Tools & Equipment Used in Drinking Reticulation System and WI01-WAT-004-001-025 Disinfection of Tools and Equipment – Work Instruction.	M	Water Quality Officer	30/11/2022	<ul style="list-style-type: none"> Procedure and work instruction both reviewed and updated in November 2022. 		Complete
			Deliver training in relation to new disinfection procedure/work instruction.	M	Water Quality Officer Service Manager Network Operations	31/03/2023	<ul style="list-style-type: none"> Training components delivered to operators face to face and online in January 2023 		Complete
R9	Reservoirs	Water stagnation may occur due to long reservoir detention times resulting in a contaminated water supply (such as high disinfection by products) and harm to the community. Requires finalisation of THM Procedure.	Prepare a procedure for High Disinfection By Products	L	Water Quality Officer	31/01/2023	<ul style="list-style-type: none"> WAT-004-001-030-PR THM Triggers and Incidents Procedure developed and approved in December 2022 		Complete
R10	Reservoirs	Contamination incident may occur due to an act of terrorism or a criminal act resulting in a contaminated water supply	Emergency Response Plan to incorporate Loss of Supply due to Contamination	M	Water Quality Officer Service Manager Network Operations	30/06/2023	<ul style="list-style-type: none"> ERP currently caters for some catastrophic events. 	30/03/2024	In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
		causing community and reputational harm (Reservoir security breach). Requires review/update of ERP.					<ul style="list-style-type: none"> Water Quality Incident response and non-compliance procedures referenced in ERP. More specific contingency plan to be developed 		
R11	Network	Stagnated water due to long detention times and dead-end flows impacts water quality resulting in low levels of chlorine in the system causing harm to the community. Requires improvements to WQ data software, update of ERP, internal discussions and investigation of auto flushers.	Set up alerts from the water quality data software in relation to low chlorine levels detected in the network.	M	Water Quality Officer	31/01/2023	<ul style="list-style-type: none"> New WQ database now being used (SWIM Local). Can set highlight for low chlorine results, but no email/SMS capacity at this stage. 	30/06/2024	In Progress
			Emergency Response Plan to incorporate Loss of Supply due to Contamination	M	Water Quality Officer Service Manager Network Operations	31/03/2023	<ul style="list-style-type: none"> ERP currently caters for some catastrophic events. Water Quality Incident response and non-compliance procedures referenced in ERP. More specific contingency plan to be developed 	30/03/2024	In Progress
			Undertake internal discussions on options to improve chlorine at the ends of Wellington Point.	M	Water Quality Officer Service Manager Network Operations	31/03/2023	<ul style="list-style-type: none"> Internal meetings held to discuss options. Relevant staff have been liaising with other utilities about pros and cons of operating network disinfection systems, 	30/06/2024	In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
							including a field visit to some operational examples on the Gold Coast.		
			Investigate use of auto-flushers in areas of concern (E.g., Wellington Point) in an attempt to reduce water age and improve chlorine residual.	M	Service Manager Network Operations	31/10/2023	<ul style="list-style-type: none"> Pipeline diameter and distance deemed too large for this to be effective. Other options being investigated, such as dosing systems. 	30/06/2024	Complete
R12	Reservoirs	Redland City Council reservoirs are contaminated by environmental events resulting in a contaminated water supply and harm to the community. (reservoir integrity breach). Requires update of ERP and improvements to reservoir inspection program.	Emergency Response Plan to incorporate Loss of Supply due to Contamination	M	Service Manager Network Operations	31/06/2023	<ul style="list-style-type: none"> ERP currently caters for some catastrophic events. Water Quality Incident response and non-compliance procedures referenced in ERP. More specific contingency plan to be developed. 	31/03/2024	In Progress
			Complete the detailed reservoir assessments/ inspections which have been planned (including integrity of the reservoirs against vermin and roof runoff). Rectify any issues identified and based on findings review the reservoir inspection and maintenance (including cleaning) program.	M	Service Manager Network Operations	31/06/2025	<ul style="list-style-type: none"> SMEC consultants undertook external visual assessments of the 5 NSI Reservoirs in Nov 2022. Additional UAV inspection/photos of 2 reservoir roofs undertaken by Council surveyors. Follow up works to rectify identified issues are being 	30/06/2025	In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
							planned and prioritised based on risk. <ul style="list-style-type: none"> Preventive maintenance activities to be discussed and scheduled. 		
R13	Reservoirs	Redland City Council reservoir has a structural integrity failure leading to loss of supply to the community. (Asset condition). Requires update of ERP and formalisation of asset condition assessment program.	Emergency Response Plan to incorporate Structural Failure of Reservoir	M	Asset Engineer (WWIAM)	30/06/2023	<ul style="list-style-type: none"> ERP currently caters for some catastrophic events. A more specific contingency plan to be developed, rather than a separate ERP. ERP currently being reviewed and will reference other plans once they are finalised. 	30/06/24	In Progress
			Formulate the condition assessment program for drinking water supply reservoir assets and commence rectification program for issues identified.	M	Asset Engineer (WWIAM)	30/06/2023	<ul style="list-style-type: none"> Annual budget now allocated for condition assessment for all water supply assets. SMEC undertook reservoir assessments in Nov 2022. Additional UAV inspection of 2 reservoir roofs by Council surveyors Follow up works to rectify identified issues will be 	30/06/2024	In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
							prioritised and planned based on risk. <ul style="list-style-type: none"> Preventive maintenance activities to be discussed and scheduled. 		
R14	Whole of System	Distribution assets are not maintained and fail due to financial restrictions and/or lack of resources resulting in lack of supply and or faulty mains and equipment allowing a contaminated water supply. (Asset condition). Requires resourcing of maintenance schedule and formalisation of asset condition assessment program.	Implement a maintenance schedule with sufficient resources to ensure distribution assets are maintained to the required standard.	M	Group Manager City Water	30/06/2023	<ul style="list-style-type: none"> ASMP review completed as required by corporate integrated planning calendar. Annual budget allocated to undertake condition assessment of assets. Budget allocated for asset maintenance programs. 		Complete/ Ongoing
			Formulate the condition assessment program for drinking water assets (other than reservoirs) and commence rectification program for issues identified.	M	Service Manager Water and Wastewater Infrastructure Asset Mgt / Asset Engineer (WWIAM)	30/06/2024	<ul style="list-style-type: none"> Annual budget now allocated for condition assessment for all water supply assets. Works to rectify identified issues will be prioritised and planned based on risk. Preventive maintenance activities to be discussed and scheduled. 		In Progress
R15	Whole of System	Severe water restrictions will be imposed due to drought combined	Investigate water capture during flushing and re-use.	L	Service Manager Network Operations	31/12/2023	<ul style="list-style-type: none"> Currently no in-house capabilities to do this 	30/06/2024	In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
		with limited flushing resulting in high water age and poor water quality resulting in contaminated water supply and harm to the community. Requires investigation of water capture/reuse during flushing.					but will be investigated further as part of any drought contingency planning.		
R16	Whole of System	Loss of supply due to cyber security stopping pump operation impacts supply resulting in loss of water supply and harm to the community. Requires update of procedure and ERP and enhancements to SCADA/OT network.	Develop formal incident response procedure for water supply pump station failure and incorporate into ERP	L	Service Manager Compliance and Reporting	30/06/2023	<ul style="list-style-type: none"> Preventative inspections and mechanical maintenance of the water pump/booster sites conducted every 12 weeks and electrical maintenance every 6 months. Pump and motor condition baseline for vibration and temp established and monitored. Sufficient mechanical and electrical spares are stocked. Pump station incident response procedure still to be developed and will be referenced in updated ERP. 	30/06/2024	In Progress
			Perform enhancement to Councils SCADA / OT network.	L	Principal Cyber Security Adviser	30/06/2024	<ul style="list-style-type: none"> Dedicated projects are underway to deliver uplift of cyber security to RCC's networks. 		In Progress

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
							<ul style="list-style-type: none"> SCADA improvements projects underway. 		
R17	Whole of System	Ineffective implementation of the procedures/DWQMP due to lack of staff training to perform their duties resulting in potential for poor water quality and harm to the community (e.g. with operations, formal tickets, DWQMP requirements). Requires investigation into E learning opportunities and establishment of internal audit program.	Investigate training on tools disinfection to be managed via e-Learning, to enable refresher reminders to be monitored and completed.	M	Service Manager Network Operations	31/03/2023	<ul style="list-style-type: none"> Online training component has been added to the Mandatory training requirements of relevant staff. They will receive an annual refresher reminder. 		Complete
			Establish an internal audit program to periodically (E.g., annually) assess compliance with the DWQMP and associated procedures.	M	Service Manager Compliance and Reporting	31/12/2023	<ul style="list-style-type: none"> 2 x Compliance and Reporting staff have undertaken Lead Auditor training in order to prepare for and conduct internal audits. Internal audit program to be scheduled in early 2024. 	31/3/2024	In Progress
R18	Whole of System	Unreliable results are used to guide actions due to lack of an effective calibration program for field test instruments resulting in potential for poor water quality and harm to the community. Requires reminders to adhere to calibration schedule.	Include a reminder for the quarterly calibration due dates in Protecht.	M	Service Manager Compliance and Reporting	31/10/2023	<ul style="list-style-type: none"> Calibration schedule set up with Lab via Contract. 		Complete
R19	Whole of System	Failure to react to a water quality event or incident in a timely and coordinated manner due to lack of training or periodic mock exercises resulting in compromised water	Investigate if periodic refreshers on water quality/DWQMP awareness training for key City Water staff via a	M	Water Quality Officer	30/06/2023	<ul style="list-style-type: none"> e-Learning for tools disinfection has been set up and utilised by relevant staff. Other relevant procedures 		Complete

Risk ID	Scheme Name/ Component	Issues/Risks	Proposed Action	Priority	Responsible Position	Due Date	Review Comments	New close out Date	Status
		quality supplied to customers causing harm or complaints. Requires more staff awareness and training.	digital platform (e.g. e-Learning) will be beneficial.				will likely be added as they are progressively updated.		
			Include water quality as part of the larger periodic council-wide disaster exercise.	M	Service Manager Compliance and Reporting	30/06/2024	<ul style="list-style-type: none"> Relevant City Water staff attended SEQ Hydra emergency exercise. City Water to liaise with Disaster Mgt Team to incorporate water quality aspects into future exercises. 		In Progress
R21	Whole of System	The health of customers is impacted due to lack of any education and awareness programs for customers on their responsibilities (E.g., with internal plumbing etc) resulting in loss of confidence with Council supplied water. Requires regular review/update of community education and awareness materials.	Develop a process for periodic review of water quality and supply related information and fact sheets on RCC's website to ensure currency and relevance (by who and when).	L	Service Manager Compliance and Reporting	31/12/2023	<ul style="list-style-type: none"> RCC Comms team sends an annual email reminder to all departments to review and update their website content. Relevant staff can also update information anytime as required. WQ Officer currently liaising with Comms Team to develop new fact sheets and information on RCC's WQ page. Formal procedure outlining this responsibility to be developed. 	30/06/2024	In Progress

Appendix B - Summary of compliance with water quality criteria

Table B.1 - Verification Monitoring Redland City and SMBI Supply Scheme – 2022-2023

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	30	28	-	-	22	73	50	71
Aluminium	QUU SAS	mg/L	0.001	Quarterly	30	28	-	-	0.018	0.053	0.03	0.048
Arsenic	QUU SAS	mg/L	0.001	Quarterly	30	28	0.01	0	<0.001	<0.001	0.000	0.000
Boron	QUU SAS	mg/L	0.001	Quarterly	30	28	4	0	0.01	0.027	0.0169	0.027
Cadmium	QUU SAS	mg/L	0.001	Quarterly	30	28	0.002	0	<0.001	<0.001	0.000	0.000
Calcium	QUU SAS	mg/L	0.1	Quarterly	30	28	-	-	18	45	24.6	32.8
Chloride	QUU SAS	mg/L	1	Quarterly	30	28	-	-	20	60	37	59
Chromium	QUU SAS	mg/L	0.001	Quarterly	30	28	0.05	0	<0.001	<0.001	0.000	0.000
Conductivity	QUU SAS	µS/cm	1	Quarterly	30	28	-	-	170	450	276	411
Copper	QUU SAS	mg/L	0.001	Quarterly	30	28	2	0	0.0025	0.013	0.0059	0.0104
Fluoride	QUU SAS	mg/L	0.05	Weekly	178	146	1.5	0	0.05	0.92	0.68	0.86
Free Chlorine	QUU SAS	mg/L	0.01	Weekly	2925	2884	5	0	<0.1	2.7	0.9	1.4
Iron	QUU SAS	mg/L	0.001	Quarterly	30	28	-	-	0.0047	0.036	0.0124	0.0328
Lead	QUU SAS	mg/L	0.001	Quarterly	30	28	0.01	0	<0.001	<0.001	0.000	0.000
Magnesium	QUU SAS	mg/L	0.01	Quarterly	30	28	-	-	1	10	4.1	9.4
Manganese	QUU SAS	mg/L	0.001	Quarterly	30	28	0.5	0	0.001	0.012	0.004	0.011
Mercury	QUU SAS	µg/L	0.01	Quarterly	30	28	1	0	<0.01	<0.01	0.00	0.00
Molybdenum	QUU SAS	mg/L	0.001	Quarterly	30	28	0.05	0	<0.001	<0.001	0.000	0.000
Nickel	QUU SAS	mg/L	0.001	Quarterly	30	28	0.02	0	<0.001	<0.001	0.000	0.000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.02	Quarterly	30	28	50	0	0.024	0.6	0.312	0.505
Nitrite N by FIA	QUU SAS	mg/L	0.002	Quarterly	30	28	-	-	0.002	0.003	0.002	0.003
Nitrite+Nitrate as N	QUU SAS	mg/L	0.004	Quarterly	30	28	-	-	0.02	0.6	0.31	0.51
Permanent Hardness	QUU SAS	mg/L	2	Quarterly	30	28	-	-	50	130	78	120

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
pH	QUU SAS	pH Unit	0.1	Weekly	2925	2884	-	-	6.36	8.27	7.23	7.52
Potassium	QUU SAS	mg/L	0.01	Quarterly	30	28	-	-	0.38	2	1.09	1.9
Selenium	QUU SAS	mg/L	0.001	Quarterly	30	28	0.01	0	<0.001	<0.001	0.000	0.000
Silica	QUU SAS	mg/L	0.1	Quarterly	30	28	-	-	2.5	11	9.3	11
Sodium	QUU SAS	mg/L	1	Quarterly	30	28	-	-	11	36	22	35
Sulphate	QUU SAS	mg/L	1	Quarterly	30	28	-	-	3	73	23	61
Total Dissolved Solids (TDS)	QUU SAS	mg/L	5	Quarterly	30	28	-	-	66	250	153	241
Total Cyanide	ALS	mg/L	0.004	Quarterly	30	28	0.08	0	<0.004	<0.004	0.000	0.000
Total Hardness	QUU SAS	mg/L	2	Quarterly	30	28	-	-	51	130	79	116
True Colour	QUU SAS	PCU	1	Quarterly	30	28	-	-	1	3.5	1.1	1.3
Turbidity	QUU SAS	NTU	0.1	Weekly	2925	2884	-	-	<0.1	16	0.22	0.43
Zinc	QUU SAS	mg/L	0.001	Quarterly	30	28	-	-	<0.001	0.016	0.004	0.009
Total Trihalomethanes (THM)	QUU SAS	µg/L	10	Monthly	186	160	250	0	<10	190	90	170
<i>Bromodichloromethane</i>	QUU SAS	µg/L	2	Monthly	186	160	250	0	<2	55	27	49
<i>Bromoform</i>	QUU SAS	µg/L	2	Monthly	186	160	250	0	<2	9	3	6
<i>Chlorodibromomethane</i>	QUU SAS	µg/L	2	Monthly	186	160	250	0	<2	42	15.3	29
<i>Chloroform</i>	QUU SAS	µg/L	3	Monthly	186	160	250	0	<3	130	45	108
Total Haloacetic Acids	QUU SAS	µg/L	60	Monthly	178	160	-	-	<60	259	83	152
<i>Bromochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	178	160	-	-	<10	38	13	17
<i>Dibromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	178	160	-	-	<10	16	10	11
<i>Dichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	178	160	100	0	<10	107	32	87
<i>Monobromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	178	160	-	-	<10	79	13	29
<i>Monochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	178	160	150	0	<10	14	10	10
<i>Trichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	100	0	<10	<10	0	0

Note: Where the result is less than the limit of reporting, a value of 0 has been adopted for the average and 95th percentile calculations

Table B.2 - Verification Monitoring Amity Point Supply Scheme – 2022-2023

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4	-	-	26	28	27	28
Aluminium	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.033	0.036	0.035	0.036
Arsenic	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Boron	QUU SAS	mg/L	0.001	Quarterly	4	4	4	0	0.014	0.015	0.0143	0.0148
Cadmium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.002	0	<0.001	<0.001	0.000	0.000
Calcium	QUU SAS	mg/L	0.1	Quarterly	4	4	-	-	11	13	11.8	12.8
Chloride	QUU SAS	mg/L	1	Quarterly	4	4	-	-	31	37	34	37
Chromium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.05	0	<0.001	<0.001	0.000	0.000
Conductivity	QUU SAS	µS/cm	1	Quarterly	4	4	-	-	160	190	183	190
Copper	QUU SAS	mg/L	0.001	Quarterly	4	4	2	0	0.0031	0.0047	0.0038	0.0046
Fluoride	QUU SAS	mg/L	0.05	Weekly	52	52	1.5	0	0.45	0.85	0.77	0.84
Free Chlorine	QUU SAS	mg/L	0.01	Weekly	208	208	5	0	0.4	1.4	1.07	1.3
Iron	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.011	0.016	0.0138	0.0158
Lead	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Magnesium	QUU SAS	mg/L	0.01	Quarterly	4	4	-	-	1.4	1.8	1.6	1.8
Manganese	QUU SAS	mg/L	0.001	Quarterly	4	4	0.5	0	<0.001	<0.001	0.000	0.000
Mercury	QUU SAS	µg/L	0.01	Quarterly	4	4	1	0	<0.01	<0.01	0.00	0.00
Molybdenum	QUU SAS	mg/L	0.001	Quarterly	4	4	0.05	0	<0.001	<0.001	0.000	0.000
Nickel	QUU SAS	mg/L	0.001	Quarterly	4	4	0.02	0	<0.001	<0.001	0.000	0.000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.02	Quarterly	4	4	50	0	0.27	0.28	0.273	0.278
Nitrite N by FIA	QUU SAS	mg/L	0.002	Quarterly	4	4	-	-	0.002	0.002	0.002	0.002
Nitrite+Nitrate as N	QUU SAS	mg/L	0.004	Quarterly	4	4	-	-	0.27	0.28	0.27	0.28
Permanent Hardness	QUU SAS	mg/L	2	Quarterly	4	4	-	-	35	40	37	40
pH	QUU SAS	pH Unit	0.1	Weekly	208	208	-	-	7.17	9.11	8.27	9.05

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
Potassium	QUU SAS	mg/L	0.01	Quarterly	4	4	-	-	0.45	0.63	0.56	0.62
Selenium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Silica	QUU SAS	mg/L	0.1	Quarterly	4	4	-	-	6.3	7.9	7.03	7.76
Sodium	QUU SAS	mg/L	1	Quarterly	4	4	-	-	19	21	20	21
Sulphate	QUU SAS	mg/L	1	Quarterly	4	4	-	-	4	4	4	4
Total Dissolved Solids (TDS)	QUU SAS	mg/L	5	Quarterly	4	4	-	-	65	110	93	108
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	4	0.08	0	<0.004	<0.004	0.000	0.000
Total Hardness	QUU SAS	mg/L	2	Quarterly	4	4	-	-	34	40	36	39
True Colour	QUU SAS	PCU	1	Quarterly	4	4	-	-	<1	<1	0	0
Turbidity	QUU SAS	NTU	0.1	Weekly	208	208	-	-	0.1	2.5	0.19	0.3
Zinc	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	<0.001	0.002	0.002	0.002
Total Trihalomethanes (THM)	QUU SAS	µg/L	10	Monthly	12	12	250	0	12	32	21	31
<i>Bromodichloromethane</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	<2	3	3	3
<i>Bromoform</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	6	21	12	19
<i>Chlorodibromomethane</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	5.2	11	7.7	10.3
<i>Chloroform</i>	QUU SAS	µg/L	3	Monthly	12	12	250	0	<3	<3	0	0
Total Haloacetic Acids	QUU SAS	µg/L	60	Monthly	12	12	-	-	<60	<60	0	0
<i>Bromochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Dibromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Dichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	100	0	<10	<10	0	0
<i>Monobromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Monochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	150	0	<10	<10	0	0
<i>Trichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	100	0	<10	<10	0	0

Note: Where the result is less than the limit of reporting, a value of 0 has been adopted for the average and 95th percentile calculations

Table B.3 - Verification Monitoring Dunwich Supply Scheme – 2022-2023

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4	-	-	20	21	20	21
Aluminium	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.005	0.007	0.006	0.007
Arsenic	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Boron	QUU SAS	mg/L	0.001	Quarterly	4	4	4	0	0.01	0.012	0.0108	0.0118
Cadmium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.002	0	<0.001	<0.001	0.000	0.000
Calcium	QUU SAS	mg/L	0.1	Quarterly	4	4	-	-	8.6	9.8	9.2	9.7
Chloride	QUU SAS	mg/L	1	Quarterly	4	4	-	-	21	23	22	23
Chromium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.05	0	<0.001	<0.001	0.000	0.000
Conductivity	QUU SAS	µS/cm	1	Quarterly	4	4	-	-	120	120	120	120
Copper	QUU SAS	mg/L	0.001	Quarterly	4	4	2	0	0.01	0.014	0.0123	0.0138
Fluoride	QUU SAS	mg/L	0.05	Weekly	52	52	1.5	0	0.65	0.89	0.83	0.88
Free Chlorine	QUU SAS	mg/L	0.01	Weekly	260	260	5	0	0.1	1.9	1.23	1.7
Iron	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.012	0.028	0.0168	0.0259
Lead	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Magnesium	QUU SAS	mg/L	0.01	Quarterly	4	4	-	-	0.6	0.9	0.7	0.9
Manganese	QUU SAS	mg/L	0.001	Quarterly	4	4	0.5	0	<0.001	<0.001	0.000	0.000
Mercury	QUU SAS	µg/L	0.01	Quarterly	4	4	1	0	<0.01	<0.01	0.00	0.00
Molybdenum	QUU SAS	mg/L	0.001	Quarterly	4	4	0.05	0	<0.001	<0.001	0.000	0.000
Nickel	QUU SAS	mg/L	0.001	Quarterly	4	4	0.02	0	<0.001	<0.001	0.000	0.000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.02	Quarterly	4	4	50	0	0.069	0.085	0.076	0.084
Nitrite N by FIA	QUU SAS	mg/L	0.002	Quarterly	4	4	-	-	0.002	0.002	0.002	0.002
Nitrite+Nitrate as N	QUU SAS	mg/L	0.004	Quarterly	4	4	-	-	0.07	0.09	0.08	0.08
Permanent Hardness	QUU SAS	mg/L	2	Quarterly	4	4	-	-	24	29	27	29
pH	QUU SAS	pH Unit	0.1	Weekly	260	260	-	-	6.58	8.17	7.29	7.59

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
Potassium	QUU SAS	mg/L	0.01	Quarterly	4	4	-	-	0.3	0.38	0.34	0.37
Selenium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Silica	QUU SAS	mg/L	0.1	Quarterly	4	4	-	-	8	9.8	8.85	9.65
Sodium	QUU SAS	mg/L	1	Quarterly	4	4	-	-	11	13	12	13
Sulphate	QUU SAS	mg/L	1	Quarterly	4	4	-	-	2	2	2	2
Total Dissolved Solids (TDS)	QUU SAS	mg/L	5	Quarterly	4	4	-	-	32	83	62	81
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	4	0.08	0	<0.004	<0.004	0.000	0.000
Total Hardness	QUU SAS	mg/L	2	Quarterly	4	4	-	-	25	28	26	28
True Colour	QUU SAS	PCU	1	Quarterly	4	4	-	-	<1	<1	0	0
Turbidity	QUU SAS	NTU	0.1	Weekly	260	260	-	-	<0.1	0.49	0.13	0.21
Zinc	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.002	0.003	0.002	0.003
Total Trihalomethanes (THM)	QUU SAS	µg/L	10	Monthly	12	12	250	0	<10	20	14	19
<i>Bromodichloromethane</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	<2	7	5	6
<i>Bromoform</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	<2	3	3	3
<i>Chlorodibromomethane</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	4	7.6	6.1	7.5
<i>Chloroform</i>	QUU SAS	µg/L	3	Monthly	12	12	250	0	<3	4	3	4
Total Haloacetic Acids	QUU SAS	µg/L	60	Monthly	12	12	-	-	<60	<60	0	0
<i>Bromochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Dibromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Dichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	100	0	<10	<10	0	0
<i>Monobromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Monochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	150	0	<10	<10	0	0
<i>Trichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	100	0	<10	<10	0	0

Note: Where the result is less than the limit of reporting, a value of 0 has been adopted for the average and 95th percentile calculations

Table B.4 - Verification Monitoring Point Lookout Supply Scheme – 2022-2023

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4	-	-	15	15	15	15
Aluminium	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.018	0.019	0.019	0.019
Arsenic	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.001	0.001
Boron	QUU SAS	mg/L	0.001	Quarterly	4	4	4	0	0.016	0.019	0.0175	0.0175
Cadmium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.002	0	<0.001	<0.001	0.000	0.000
Calcium	QUU SAS	mg/L	0.1	Quarterly	4	4	-	-	6	7.1	6.4	6.4
Chloride	QUU SAS	mg/L	1	Quarterly	4	4	-	-	43	46	44	44
Chromium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.05	0	<0.001	<0.001	0.000	0.000
Conductivity	QUU SAS	µS/cm	1	Quarterly	4	4	-	-	190	210	205	205
Copper	QUU SAS	mg/L	0.001	Quarterly	4	4	2	0	0.015	0.02	0.0173	0.0173
Fluoride	QUU SAS	mg/L	0.05	Weekly	52	52	1.5	0	0.61	0.92	0.84	0.84
Free Chlorine	QUU SAS	mg/L	0.01	Weekly	208	208	5	0	0.4	1.5	1.15	1.15
Iron	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.0057	0.0085	0.0066	0.0066
Lead	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Magnesium	QUU SAS	mg/L	0.01	Quarterly	4	4	-	-	2	2.5	2.3	2.3
Manganese	QUU SAS	mg/L	0.001	Quarterly	4	4	0.5	0	<0.001	0.002	0.001	0.001
Mercury	QUU SAS	µg/L	0.01	Quarterly	4	4	1	0	<0.01	<0.01	0.00	0.00
Molybdenum	QUU SAS	mg/L	0.001	Quarterly	4	4	0.05	0	<0.001	<0.001	0.000	0.000
Nickel	QUU SAS	mg/L	0.001	Quarterly	4	4	0.02	0	<0.001	<0.001	0.000	0.000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.02	Quarterly	4	4	50	0	0.064	0.069	0.066	0.066
Nitrite N by FIA	QUU SAS	mg/L	0.002	Quarterly	4	4	-	-	0.002	0.002	0.002	0.002
Nitrite+Nitrate as N	QUU SAS	mg/L	0.004	Quarterly	4	4	-	-	0.06	0.07	0.07	0.07
Permanent Hardness	QUU SAS	mg/L	2	Quarterly	4	4	-	-	26	28	27	27
pH	QUU SAS	pH Unit	0.1	Weekly	208	208	-	-	6.97	8.45	7.49	7.49

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples taken	No. of Samples required as per DWQMP	ADWG Health Guideline Limit	No. of Samples Exceeding Health Guideline Value	Min Value	Max Value	Average Value	95th %ile Value
Potassium	QUU SAS	mg/L	0.01	Quarterly	4	4	-	-	0.69	0.99	0.84	0.84
Selenium	QUU SAS	mg/L	0.001	Quarterly	4	4	0.01	0	<0.001	<0.001	0.000	0.000
Silica	QUU SAS	mg/L	0.1	Quarterly	4	4	-	-	7.9	10	8.75	8.75
Sodium	QUU SAS	mg/L	1	Quarterly	4	4	-	-	25	28	27	27
Sulphate	QUU SAS	mg/L	1	Quarterly	4	4	-	-	5	6	5	5
Total Dissolved Solids (TDS)	QUU SAS	mg/L	5	Quarterly	4	4	-	-	73	150	113	113
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	4	0.08	0	<0.004	<0.004	0.000	0.000
Total Hardness	QUU SAS	mg/L	2	Quarterly	4	4	-	-	24	28	26	26
True Colour	QUU SAS	PCU	1	Quarterly	4	4	-	-	<1	<1	0	0
Turbidity	QUU SAS	NTU	0.1	Weekly	208	208	-	-	<0.1	16	0.25	0.25
Zinc	QUU SAS	mg/L	0.001	Quarterly	4	4	-	-	0.005	0.01	0.007	0.007
Total Trihalomethanes (THM)	QUU SAS	µg/L	10	Monthly	12	12	250	0	<10	<10	0	0
<i>Bromodichloromethane</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	<2	3	2	2
<i>Bromoform</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	<2	3	2	3
<i>Chlorodibromomethane</i>	QUU SAS	µg/L	2	Monthly	12	12	250	0	<2	4.9	2.6	4.3
<i>Chloroform</i>	QUU SAS	µg/L	3	Monthly	12	12	250	0	<3	<3	0	0
Total Haloacetic Acids	QUU SAS	µg/L	60	Monthly	12	12	-	-	<60	<60	0	0
<i>Bromochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Dibromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Dichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	100	0	<10	<10	0	0
<i>Monobromoacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	-	-	<10	<10	0	0
<i>Monochloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	150	0	<10	<10	0	0
<i>Trichloroacetic Acid</i>	QUU SAS	µg/L	10	Monthly	12	12	100	0	<10	<10	0	0

Note: Where the result is less than the limit of reporting, a value of 0 has been adopted for the average and 95th percentile calculations

Table B.5 - E. coli Compliance with Annual Value Redland City and SMI Supply Scheme

Year	2022-2023											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	74	70	67	79	60	82	81	64	73	68	91	78
No. of samples collected in which <i>E. coli</i> is detected (i.e., a failure)	0	0	0	0	0	0	0	0	0	0	0	1
No. of samples collected in previous 12-month period	672	690	706	723	732	752	781	794	811	821	857	887
No. of failures for previous 12-month period	0	0	0	0	0	0	0	0	0	0	0	1
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99.9%
Compliance with 98% Annual Value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table B.6 - E. coli Compliance with Annual Value Amity Point Supply Scheme

Year	2022-2023											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	13	13	17	13	13	16	13	13	16	13	13	17
No. of samples collected in which <i>E. coli</i> is detected (i.e., a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12-month period	169	169	169	169	170	170	170	170	171	170	170	170
No. of failures for previous 12-month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Compliance with 98% Annual Value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table B.7 - E. coli Compliance with Annual Value Dunwich Supply Scheme

Year	2022-2023											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	8	8	10	8	8	10	8	8	10	8	8	10
No. of samples collected in which <i>E. coli</i> is detected (i.e., a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12-month period	104	104	104	104	104	104	104	104	104	104	104	104
No. of failures for previous 12-month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Compliance with 98% Annual Value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table B.8 - *E. coli* Compliance with Annual Value Point Lookout Supply Scheme

Year	2022-2023											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	10	10	13	10	10	12	10	10	13	10	10	13
No. of samples collected in which <i>E. coli</i> is detected (i.e., a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12-month period	129	129	129	129	129	129	129	130	131	131	131	131
No. of failures for previous 12-month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Compliance with 98% Annual Value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Appendix C – Verification monitoring sites

Figure C.1 - Mainland Verification Monitoring Sites

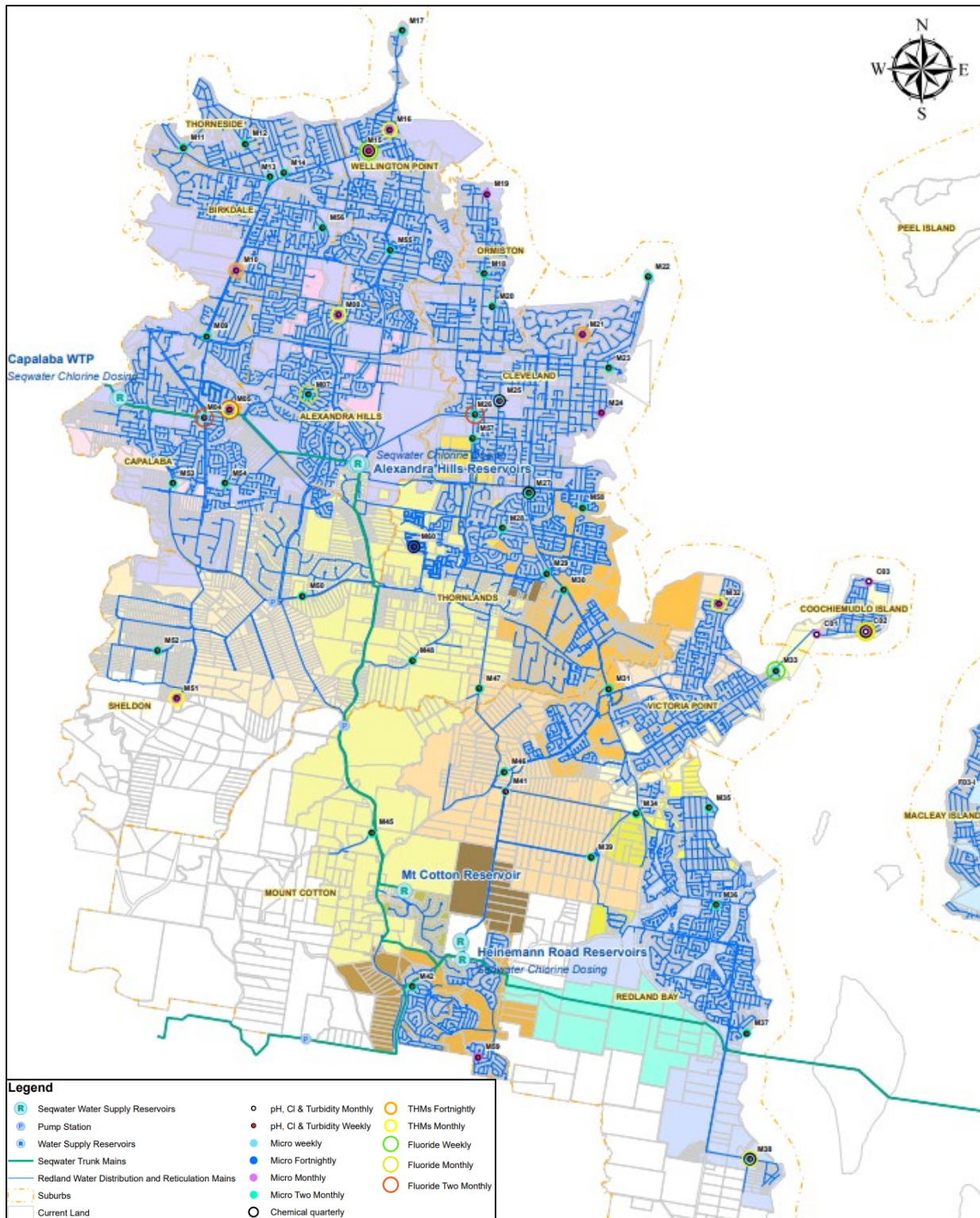
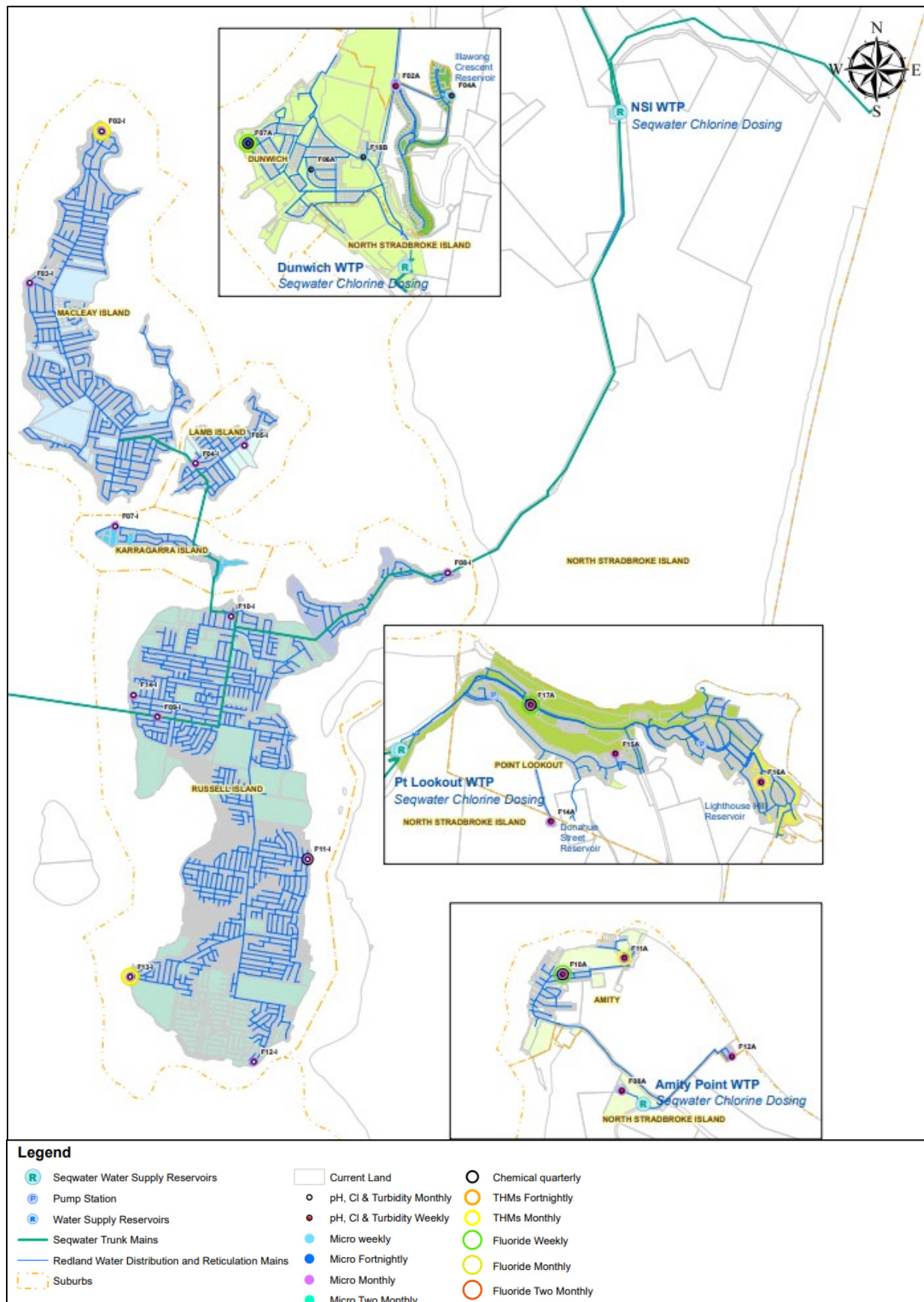


Figure C.2 - SMI and NSI Verification Monitoring Sites



Appendix D - DWQMP 2021 Audit Recommendations and Opportunities for Improvement

Table D.1 - Summary of Audit Recommendations

Auditable Item	Recommendation	Status of actions	Responsible officer / position
Compliance with the Plan – implementation of operational and maintenance procedures	REC 2: Identify all procedures relevant for the DWQMP and develop any key missing procedures. Make the procedures easily accessible to relevant staff (e.g. on the intranet with links) and undertake awareness/training on the procedures.	Complete <ul style="list-style-type: none"> • Procedure review and gap analysis undertaken with relevant procedures identified for development/updating. • Updated procedures now available on the Intranet for easier staff access. • Awareness of Drinking Water Quality requirements are being promoted at regular operations toolbox meetings. • Training undertaken with relevant staff in February 2022 for use of new water quality meters. • Overdue procedure reviews and updates now completed 	WQ Officer, Service Manager Compliance and Reporting, Service Manager Network Operations
Compliance with the Plan – implementation of operational and maintenance procedures	REC 5: Implement disinfection practice for tools, fittings and equipment used for repairs to avoid risk from cross contamination and unhygienic practices. Review WAT-004-001-025-PR Disinfection of Tools & Equipment Used in Drinking Reticulation System to reflect the practices adopted or adapted, including use of approved disinfection chemical in contact with drinking water.	Complete <ul style="list-style-type: none"> • Procedure and work instruction both reviewed and updated in November 2022. • Training components delivered to operators face to face and online in January 2023 • Disinfection practices now being implemented in the field 	Service Manager Network Operations, Service Manager Compliance and Reporting, Water Quality Officer
Compliance with the Plan – implementation of operational and maintenance procedures	REC 6: Review and improve the storage of pipes and fittings (sealed, capped and not left outside) at the Stores Yard. Document the practice.	In Progress <ul style="list-style-type: none"> • New location for pipe storage chosen at an existing undercover facility at Cleveland STP. • Racking has now been installed and containers have been ordered for fixtures/fittings. • Discussions now occurring regarding actual moving of pipework and fittings. • Expected completion End of Nov 23. 	Service Manager Network Operations

		<ul style="list-style-type: none"> • Procedure to be developed for future and ongoing management and maintenance of new storage areas. 	
Compliance with the Plan – implementation of operational and maintenance procedures	REC 8: Establish periodic reservoir cleaning and internal inspection program (at frequency of 3-5 years).	In Progress <ul style="list-style-type: none"> • Procedure WAT-004-001-019-PR Inspection and Cleaning of Drinking Water Reservoir updated in Jan 2022 to include a risk-based inspection/cleaning frequency. • New methods for internal inspections are being investigated, such as submarine rovers. 	Service Manager Network Operations

Table D.2 - Summary of Audit Opportunities for Improvement

OFI #	OFI Action	Status
2	Investigate and implement improvements to the tracking of compliance monitoring of testable backflow prevention device (BFD) to enable easy verification and overview of current status.	In Progress
3	Document the backflow prevention program.	In Progress
4	Investigate use of drones for more thorough visual reservoir external inspections (e.g. every 6-months) [on top of the weekly ground level inspections already being done].	Complete / Ongoing
8	Document the process / steps for undertaking an effective review of the DWQMP and the risk assessment workshop, including detailed analysis of water quality data (trend charts and zone level details) and workshop participants (involve operational level staff for more informed discussions), review of schematics, invitation to bulk water provider, record keeping etc.	Complete
14	Establish a formal process / mechanism for contractor awareness on the DWQMP and how they could impact drinking water quality and public health (contractors working on water assets).	In Progress
15	Test also for total chlorine in the reticulation (on top of free chlorine). The ADWG value for assessing health compliance is for total chlorine. There should be a trigger for low free chlorine E.g., at <0.2 mg/L in the network.	Complete (Added to 2023/24 VMP)

Note: These tables only include the open recommendations and opportunities for improvement as of the start of the 2022/23 FY. All those completed by end of 2021/22 FY are not included in this report/appendix.