



# Redland

## CITY COUNCIL

SPID No. 541

### Drinking Water Quality Management Plan (DWQMP)

#### Annual Report

#### 2021/2022

Redland City Council  
PO Box 21  
Cleveland QLD 4163  
07 3829 8999  
[rcc@redland.qld.gov.au](mailto:rcc@redland.qld.gov.au)

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

## Contents

1	Introduction.....	5
2	Summary of schemes operated .....	5
3	DWQMP Implementation .....	7
3.1	Progress in implementing the risk management improvement program.....	8
3.2	Revisions made to the verification monitoring program.....	8
3.3	Revisions made to the operational monitoring program .....	9
4	Verification monitoring - water quality information and summary .....	10
5	Incidents reported to the regulator .....	10
6	Customer complaints related to water quality .....	10
6.1	Suspected illness.....	11
6.2	Discoloured water.....	12
6.3	Taste and odour .....	12
7	DWQMP review outcomes.....	13
8	DWQMP audit findings .....	13
	Appendix A - Implementation of the DWQMP Risk Management Improvement Program .....	17
	Appendix B - Summary of compliance with water quality criteria.....	21
	Appendix C – Verification monitoring sites .....	29
	Appendix D – DWQMP Audit Opportunities for Improvement (OFI).....	31

## List of Figures

Figure 2.1 - Redland City Council Water Supply Zones.....	7
Figure 6.1 - 2021/2022 Water Quality Complaints by Category .....	11
Figure C.1 - Mainland Verification Monitoring Sites .....	29
Figure C.2 - SMBI and NSI Verification Monitoring Sites.....	30

## List of Tables

Table 2.1 - Seqwater and Redland City Council Responsibilities .....	5
Table 2.2 - Summary of Schemes (WTP's Owned and Operated by Seqwater).....	6
Table 2.3 - Suburbs in Bulk Water Supply Zones .....	6
Table 3.1 - Ecosafe Summary of Recommendations .....	9
Table 6.1 - Water Quality Complaints (Total per 1000 Connections).....	11
Table 8.1 - Audit Recommendations .....	14
Table A.1 - Risk Management Improvement Program Implementation Status 2021-22.....	17
Table B.1 - Verification Monitoring Redland City and SMBI Supply Scheme – 2021-2022 .....	21
Table B.2 - Verification Monitoring Amity Point Supply Scheme – 2021-2022 .....	22
Table B.3 - Verification Monitoring Dunwich Supply Scheme – 2021-2022 .....	23
Table B.4 - Verification Monitoring Point Lookout Supply Scheme – 2021-2022 .....	24
Table B.5 - E. coli Compliance with Annual Value Redland City and SMBI Supply Scheme...	25
Table B.6 - E. coli Compliance with Annual Value Amity Point Supply Scheme .....	26
Table B.7 - E. coli Compliance with Annual Value Dunwich Supply Scheme.....	27
Table B.8 - E. coli Compliance with Annual Value Point Lookout Supply Scheme.....	28
Table D.1 - Summary of Audit Opportunities for Improvement .....	31

## 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>	Escherichia coli, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
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
QUU SAS	Queensland 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
WIMS	Water Information Management Solution – Water Quality Database
WTP	Water Treatment Plant

## 1 Introduction

This report documents the performance of Redland City Council's (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) as required under the *Water Supply (Safety and Reliability) Act 2008* (the Act) for the 2021-22 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 and provides a mechanism for water service providers to report publicly on their performance in managing drinking water quality.

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](http://www.rdmw.qld.gov.au).

This DWQMP report includes:

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

Redland City Council (Council) 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 (WTP's Owned and Operated by Seqwater)**

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

\*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

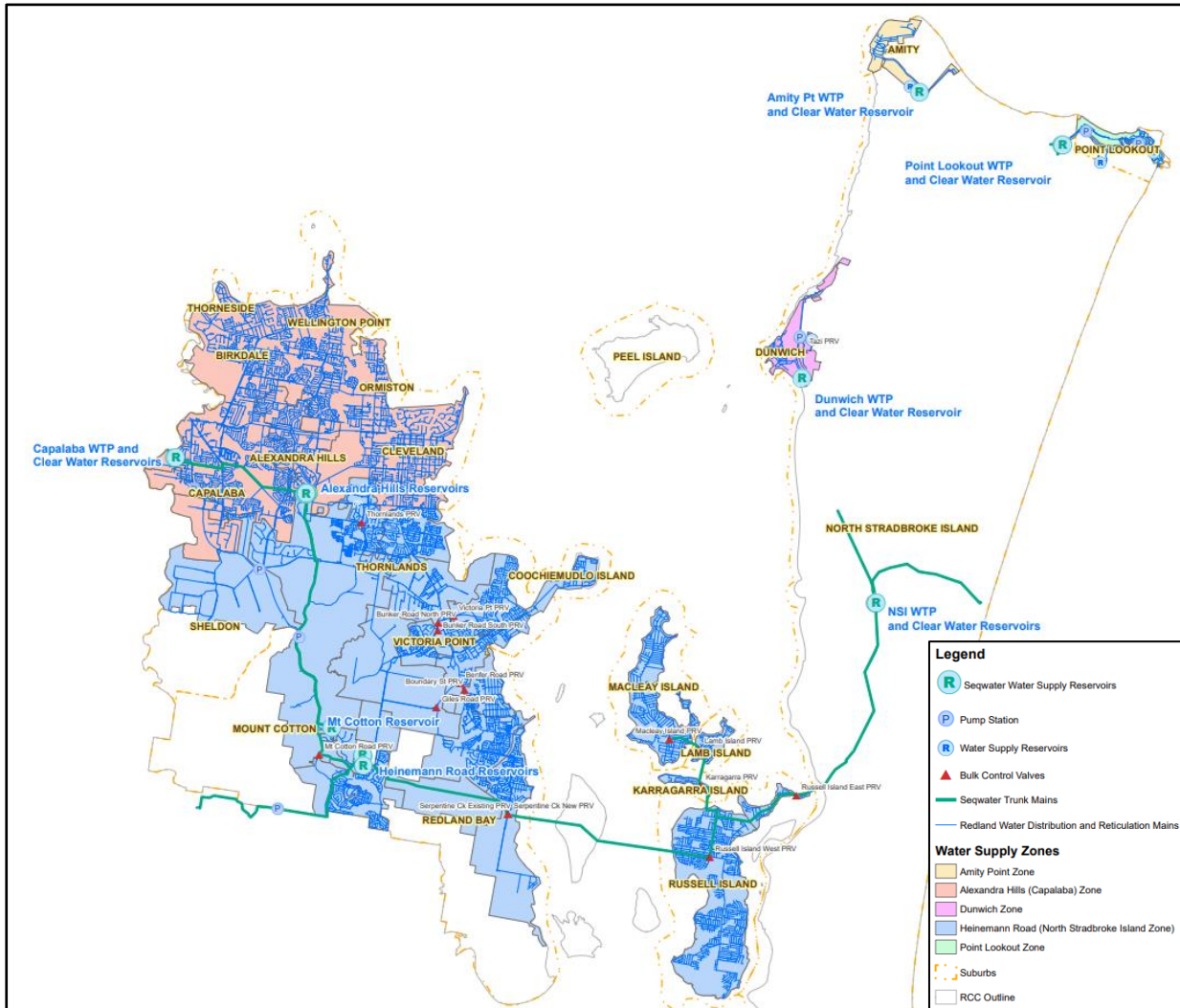


Figure 2.1 - Redland City Council Water Supply Zones

### 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.

During the reporting period, a new dedicated Water Quality Officer position was created and recruited. Their role in relation to implementing the DWQMP has been actively promoted at management and operator meetings to emphasise the importance of operating under the Plan.



Relevant staff are made aware of their responsibilities in relation to the DWQMP through discussions at monthly water (and sewer) toolbox meetings, development and implementation of procedures and Council's 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. 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 DWQMP annual report.

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

- New operational and water quality procedures developed and implemented.
- Many operational and maintenance activities are scheduled in RCC's asset management software 'Assetic'.
- Amendment of the verification monitoring sampling program as per recommendations from Ecosafe report – RCC Sampling Schedule Review (2020).

Most of the RMIP actions have been completed and the outstanding actions will continue to be progressed during 2022/23.

### **3.2 Revisions made to the verification monitoring program**

Ecosafe International was engaged to conduct an independent review of Council's verification monitoring program sampling and testing schedule as part of the DWQMP review process.

The review was completed in October 2020 and determined that the existing *E. coli* test frequency for the mainland schemes including the Southern Moreton Bay Islands (SMBI) and the North Stradbroke Island schemes meets the regulatory requirement for the projected population to 2031.



The review noted the current chemical testing program adequately meets the Redland City Council's duty of care to consumers and its regulatory obligations up to the present but could be improved, as captured in the recommendations.

The recommendations in the Ecosafe report - to amend testing frequency and the parameters tested at some sampling locations - have been implemented and will enhance the RCC Verification Monitoring Program. A summary of the recommendations is provided in [Table 3.1](#). The enhanced program provides the data necessary for RCC to verify compliance of its drinking water schemes to the requirements of the ADWG and to meet regulatory requirements into the future. The current frequency of verification monitoring now exceeds the requirements of s52 of the *Public Health Regulation 2018*.

**Table 3.1 - Ecosafe Summary of Recommendations**

Number	Recommendations	Proposed Priority	Timeline for Action	Status
1	It is recommended that the frequency of <i>E. coli</i> sampling is changed with enough additional sampling events scheduled to compensate for unexpected changes to the sampling schedule due to weather, illness, public holidays etc.	Medium	12-24 months	Complete
2	Inclusion of low frequency testing sites in the weekly testing cycle to aid geographical coverage is recommended	Medium	12-24 months	Complete
3	It is recommended to test all SMBI sites each month in Run A	Medium	12-24 months	Complete
4	It is recommended that chlorine testing is conducted for all sampling points on all runs	Medium	12-24 months	Complete
5	It is recommended that the current quarterly test run is continued at the 8 test sites currently used	Medium	12-24 months	Complete
6	Turbidity testing is recommended at all sites weekly	Medium	12-24 months	Complete
7	Simplification of the current schedule by using a consistent suite of tests is recommended to eliminate anomalies	Medium	12-24 months	Complete
8	It is recommended that fluoride monitoring in the RCC distribution network is maintained at current levels	Medium	12-24 months	Complete
9	Some minor changes to disinfectant by-product sampling locations to improve spatial representation have been recommended	Medium	12-24 months	Complete

### 3.3 Revisions made to the operational monitoring program

Verification monitoring is the only available option to monitor drinking water quality in the Council area. 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.

## 4 Verification monitoring - water quality information and summary

Reticulation system sample sites are selected within each zone to monitor water quality within the distribution system to ensure the provision of safe and reliable drinking water to RCC customers. 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 monitoring program also assesses and confirms the performance of control measures identified in the risk assessment. The parameters monitored are selected based on risks identified in the risk assessment and DWQMP. The verification monitoring locations are included in [Appendix C](#).

The sample collection, field analysis and laboratory testing for the 2021/2022 verification monitoring program was contracted to Urban Utilities Scientific Analytical Services (UUSAS) Laboratory who are NATA accredited. All samples were collected by appropriately qualified staff in accordance with relevant procedures and were transported to the laboratory for analysis.

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 derived from repeat samples, or from emergency or investigative samples undertaken in response to an elevated result or an incident such as a main break.

During the 2021/2022 financial year, there were no non-compliances against the ADWG from verification monitoring. The verification monitoring summaries are included in [Appendix A](#).

## 5 Incidents reported to the regulator

There were no instances where the Regulator was notified under sections 102 or 102A of the Act during this reporting year.

## 6 Customer complaints related to water quality

Redland City Council 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,
- 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:

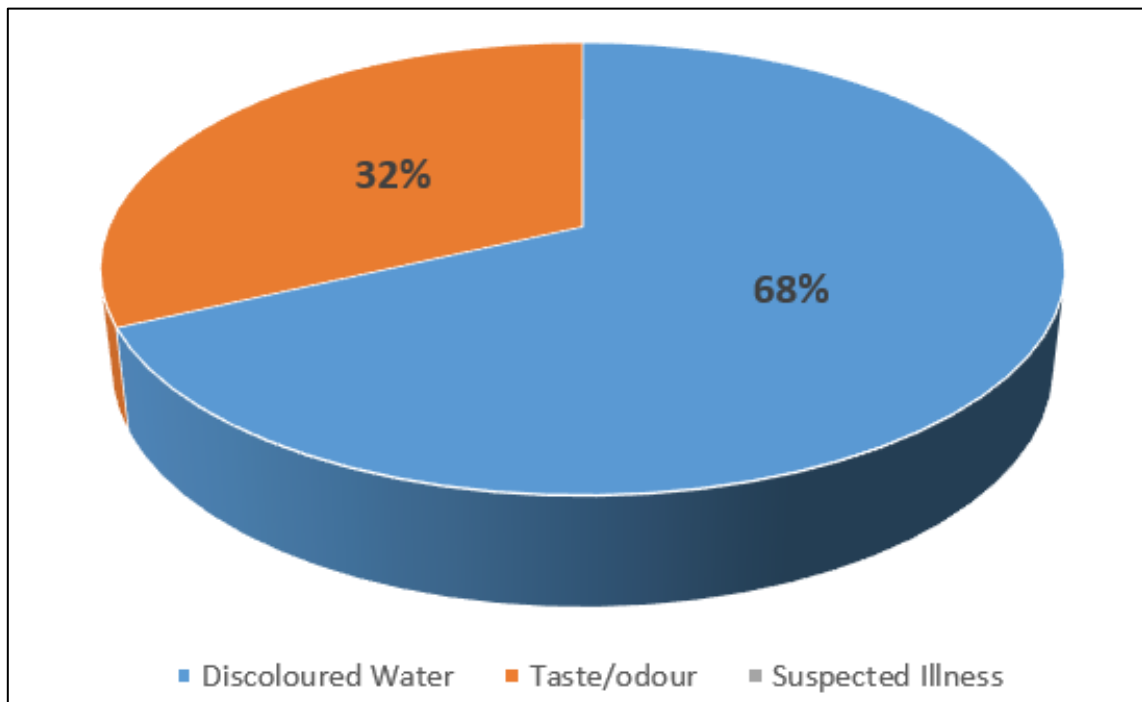
- Discoloured water
- Taste/odour
- Suspected illness

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

**Table 6.1 - Water Quality Complaints (Total per 1000 Connections)**

Water Supply Scheme	Connections*	Health Concern	Discoloured Water	Taste and Odour	Total Per 1000 connections
<b>Redland City Mainland &amp; SMBI</b>	66,079	0	102	48	2.27
<b>Dunwich</b>	517	0	0	0	0
<b>Point Lookout</b>	1,013	0	0	0	0
<b>Amity Point</b>	396	0	0	0	0
<b>Total*</b>	68,005	0	102	48	2.21

\* Total connected properties including vacant land.



**Figure 6.1 - 2021/2022 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 2021/22.

## **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 usually 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 are usually 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 anything concerning.

There was a sharp increase in taste and odour complaints in January 2022 that was a result of elevated organic compounds in the bulk supply from Seqwater causing an 'earthy' flavour. This water was being distributed to the Redlands supply network via the Eastern Pipeline Interconnector and 10ML/day was being transferred to Heinemann Reservoir. This volume was subsequently reduced to 5ML/day and more water was supplied to Heinemann Reservoir from NSI which helped to dilute the water and resulted in fewer complaints being received. Further information was provided to the community via RCC's website and Facebook pages, with links to Seqwater's information explaining that the water was still safe to drink but may taste different.

There were a few instances of fuel-like taste/odours being reported 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

No review was required or conducted during 2021/2022.

A regular review was completed prior to 12 October 2022 and outcomes will be reported in the 2022/2023 annual report.

## 8 DWQMP audit findings

As per the *Information Notice for the Decision to approve the amendment of Redland City Council's approved Drinking Water Quality Management Plan* dated 24 December 2020, an external DWQMP audit was due by 12 October 2021.

The External Audit was undertaken in September 2021 by Viridis Consultants with a scope to:

- verify the accuracy of monitoring and performance data given to the regulator.
- assess compliance with the DWQMP.
- assess compliance with the DWQMP approval conditions; and
- assess the relevance of the DWQMP in relation to the drinking water service.

Based on the results of the audit, it was 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.

Recommendations (REC) are provided for auditable requirements which do not comply, classed as either minor or major non-compliances. The audit resulted in 12 recommendations and the progress of actions against these are outlined in [Table 8.1](#). Opportunities for improvement (OFI) are identified for activities which comply but may also be improved. There were 16 opportunities for improvement identified and these are listed in [Appendix D](#). Many of these have been completed or are being progressed.

Following the audit, a new dedicated Water Quality Officer role was created and recruited to sit within the Compliance and Reporting Unit. The audit recommendations were uploaded into 'Team Central' and action officers assigned. Team Central is RCC's audit and issues tracking database that records progress against implementation of actions and recommendations.

Council's Internal Audit Unit has also assisted with the management of the audit recommendations within 'Team Central'. This process ensures that Council's Executive Leadership Team are informed of the progress of the audit response.

The Water Quality Officer coordinated the implementation of actions arising from the audit recommendations with assistance from other relevant staff.

**Table 8.1 – Audit Recommendations**

Auditable Item	Recommendation	Status of actions	Responsible officer / position
<b>Data Accuracy</b> – Verification data generated	<b>REC 1:</b> Review the Annual Report template in WIMS to ensure that it generates all verification data as per the DWQMP for inclusion in DWQMP Annual Reports.	<b>Completed</b> The annual report template in WIMS was reviewed and updated in September 2021.	Business Support Officer
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 2:</b> 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.	<b>In Progress</b> <ul style="list-style-type: none"> <li>• Procedure review and gap analysis undertaken with relevant procedures identified for development/updating.</li> <li>• Updated procedures now available on the Intranet for easier staff access.</li> <li>• Awareness of Drinking Water Quality requirements are being promoted at regular operations toolbox meetings.</li> <li>• Training undertaken with relevant staff in February 2022 for use of new water quality meters.</li> </ul>	WQ Officer, Service Manager Compliance and Reporting, Service Manager Network Operations
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 3:</b> Maintain records for water testing undertaken in the field following flushing (routine and following repairs). Test for free chlorine, pH and turbidity following repairs and flushing (procure relevant field kits).	<b>Completed</b> <ul style="list-style-type: none"> <li>• Field kits purchased in January 2022 and distributed to operations staff.</li> <li>• Work Instructions developed and training conducted with relevant operations staff in February 2022</li> <li>• Flushing form in Assetic updated to include fields for WQ testing data.</li> <li>• Flushing Mains Procedure updated.</li> </ul>	Water Quality Officer and Service Manager Network Operations
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 4:</b> Implement service and calibration program for the field water testing kits.	<b>Completed</b> <ul style="list-style-type: none"> <li>• Quarterly Calibration checks of the pH and Chlorine/ Turbidity Meters now part of Lab Contract.</li> <li>• Records on calibrations and services will be recorded in Assetic.</li> </ul>	Water Quality Officer
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 5:</b> 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	<b>In Progress</b> <ul style="list-style-type: none"> <li>• Suggested improvements included in updated procedure and work instruction.</li> <li>• Importance of disinfection practices discussed at operator toolbox meetings.</li> <li>• The procedure and work instruction will be made</li> </ul>	Service Manager Network Operations, Service Manager Compliance and Reporting, Water Quality Officer

	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.	available on the intranet and training to be rolled out to operators in 2023.	
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 6:</b> Review and improve the storage of pipes and fittings (sealed, capped and not left outside) at the Stores Yard. Document the practice.	<b>In Progress</b> <ul style="list-style-type: none"> <li>Building request to be raised for a better dedicated storage solution that can be indoors/undercover with racks to keep pipes off the ground.</li> <li>Other options being considered that can also reduce risk such as storing off ground to prevent vermin, visual checks, swabbing, and/or cleaning before installation.</li> </ul>	Service Manager Network Operations
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 7:</b> Complete the planned task to use Assetic for the weekly reservoir inspections for improved monitoring on task completion and ready access to records.	<b>Completed</b> <ul style="list-style-type: none"> <li>Weekly inspection form developed and is live in Assetic.</li> <li>Training undertaken with relevant operators.</li> </ul>	Service Manager Network Operations
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 8:</b> Establish periodic reservoir cleaning and internal inspection program (at frequency of 3-5 years).	<b>In Progress</b> <ul style="list-style-type: none"> <li>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.</li> <li>New methods for internal inspections are being investigated, such as submarine rovers.</li> </ul>	Service Manager Network Operations
<b>Compliance with the Plan</b> – implementation of operational and maintenance procedures	<b>REC 9:</b> Review and finalise the procedure, WAT-004-001-019-PR Inspection and Cleaning of Drinking Water Reservoir.	<ul style="list-style-type: none"> <li>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.</li> </ul>	Service Manager Network Operations
<b>Compliance with the Plan</b> – implementation of process for managing incidents and emergencies	<b>REC 10:</b> Test the incident and emergency response protocols as planned (in October 21), and then periodically at the frequency stated in the Water and Waste Emergency Response Plan.	<b>Completed/Ongoing</b> <ul style="list-style-type: none"> <li>ERP test exercise held 1/11/2021. The test was conducted as a discussion exercise around an <i>E.coli</i> incident scenario with attendees from relevant internal and external stakeholders.</li> <li>Test exercises will be scheduled on an annual basis in accordance with the Plan.</li> </ul>	Water Quality Officer, Service Manager Compliance and Reporting



<p><b>Compliance with the Plan</b> – implementation of operational and verification monitoring plan</p>	<p><b>REC 11:</b> Review the verification monitoring schedule annually to ensure that the sample runs do not fall on a public holiday, or if it does then the next available business day for sampling is still within the same week to ensure full implementation of the verification monitoring program. Document this review requirement as a process going forward.</p>	<p><b>Completed/Ongoing</b></p> <ul style="list-style-type: none"> <li>• Verification monitoring schedule reviewed annually and confirmation received from Lab in Sep 2021 that required sampling can still occur on/around public holidays</li> <li>• An annual action has been set up in 'Protech' to check sampling status with Lab.</li> </ul>	<p>Water Quality Officer, Business Support Officer</p>
<p><b>Compliance with the Plan</b> – implementation of risk management improvement program</p>	<p><b>REC 12:</b> Document the process to regularly monitor the implementation of the improvement actions, including follow up on actions due and assigning revised timeframes with justification for actions not being able to be completed within the original assigned timeframe.</p>	<p><b>Completed/Ongoing</b></p> <ul style="list-style-type: none"> <li>• WAT-004-001-029-PR Implementation of Risk Management Improvement Program created to outline process of how RMIP actions should be assigned and monitored.</li> <li>• RMIP actions are entered into 'Protech' (RCC's risk management software)</li> <li>• Quarterly, minuted, meetings held with relevant staff to discuss progress of RMIP actions.</li> </ul>	<p>Water Quality Officer, Service Manager Compliance and Reporting</p>

## Appendix A - Implementation of the DWQMP Risk Management Improvement Program

**Table A.1 - Risk Management Improvement Program Implementation Status 2021-22**

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
RMIP-G23 BW01 & WSN07	<p>There is a risk that treated water to the Mainland and SMBI's has high disinfection by-products resulting in community harm.</p> <p>There is a risk that 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</p>	Develop a procedure for High Disinfection By Products (including THM procedure)	M	Service Manager Compliance and Reporting	30/06/2022	<ul style="list-style-type: none"> <li>New THM procedure developed.</li> <li>THM Working Group established with Seqwater and RCC to discuss THM management issues and options.</li> <li>RCC is participating in a study with QLD Health and University of QLD</li> </ul>		Completed
WSN01	There is a risk that widespread biofilm stripping may occur due to a change in the flow , velocity and direction of water in the Redland Water mains resulting in dirty water complaints and/or harm to the community	Document the approval process for changes to, or work on, the water reticulation system.	M	Service Manager City Assets	30/06/2022	<ul style="list-style-type: none"> <li>The approval process for operational changes to the system is now managed through Assetic.</li> </ul>		Completed
WSN01	There is a risk that widespread biofilm stripping may occur due to a change in the flow , velocity and direction of water in the Redland Water mains resulting in dirty water complaints and/or harm to the community	Develop and schedule a planned mains flushing program in 'Assetic'	M	Service Manager Network Operations	31/03/2022	<p>Planned mains flushing programs are in place for:</p> <ul style="list-style-type: none"> <li>identified problem locations mainland (monthly flushing)</li> <li>North Stradbroke Island – yearly flushing</li> <li>Russell Island – yearly flushing</li> </ul>		Completed

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
WSN02 & WSN03	<p>There is a risk that a 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.</p> <p>There is a risk that a critical trunk main(s) is damaged due to human intervention or mechanical failure resulting in contaminated and dirty water and harm to the community.</p>	Preventative Maintenance and Replacement Program to be put in 'Assetic'	M	Service Manager Network Operations	31/12/2022	<ul style="list-style-type: none"> <li>5 year Hydrant inspection program has been developed in Assetic for the mainland and has been implemented. Every hydrant to be inspected at least once every 5 years. This is in addition to the QFES inspection program</li> <li>Water meter replacement program for meters under 40mm remains outside of Assetic however the 40mm+ meters requiring replacement due to age are now being managed though Assetic</li> </ul>		Completed
WSN02	There is a risk that a 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.	Update and implement WAT-004-001-011-PR Assistance to Home Dialysis Machine Users	M	Service Manager Compliance and Reporting	31/12/2022	<ul style="list-style-type: none"> <li>Procedure updated and approved in March 2022.</li> <li>Procedure now available in Objective and RCC's Intranet for easier access and has been implemented across RCC's City Water and Billing services teams.</li> </ul>		Completed
WSN05	There is a risk that unsuitable materials are adopted by Council, contractors and third parties working within the Redlands Water distribution system due to lack of inspection and oversight, human error or poor quality control systems resulting in a contaminated water supply.	RCC City Water to be involved in development approval inspections and sign-offs.	H	Group Manager City Water	30/06/2022	<ul style="list-style-type: none"> <li>City Water is now involved in inspection sign offs as required.</li> <li>RCC member of PASS group that reviews products for inclusion in SEQ D&amp;C Code IPAM List</li> </ul>		Completed

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
WSN11	There is a risk that a Redland City Council reservoir has a structural integrity failure leading to loss of supply to the community.	Prepare Emergency Response Plan - Structural failure of reservoir	M	Group Manager City Assets	30/06/2022	<ul style="list-style-type: none"> <li>Water and Waste ERP currently caters for some catastrophic events. A more specific contingency plan to be developed, rather than a separate ERP.</li> <li>Existing preventative maintenance mechanisms include condition reports and Inspection schedules.</li> <li>Budget has been allocated to undertake condition assessment of assets.</li> <li>Developed first pass condition assessment of Reservoirs.</li> </ul>	30/06/2023	In progress
WSN12	There is a risk that 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 Management Plans are reviewed and updated to ensure distribution assets are maintained to the required standard.	H	Service Manager City Assets	31/03/2022	<ul style="list-style-type: none"> <li>Asset and Service Management Plans (ASMP) reviewed and updated regularly as required by corporate integrated planning calendar.</li> <li>Budget has been allocated to undertake condition assessment of assets.</li> </ul>		Completed/Ongoing
WSN12	There is a risk that 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.	Implement a maintenance schedule with sufficient resources to ensure distribution assets are maintained to the required standard.	H	Group Manager City Water	31/03/2022	<ul style="list-style-type: none"> <li>ASMP review completed as required by corporate integrated planning calendar.</li> <li>Budget has been allocated to undertake condition assessment of assets.</li> </ul>		Completed/Ongoing

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
WSN14	There is a risk of loss of supply due to cyber security stopping pump operation causing loss of water supply and harm to the community	Perform enhancement to Councils SCADA / OT network.	L	Cyber Security Specialist	30/06/2022	<ul style="list-style-type: none"> <li>Enhancements to control servers managing SCADA network to align with modern, secure and supported infrastructure has been done.</li> </ul>		Completed
WSN14	There is a risk of loss of supply due to cyber security stopping pump operation causing loss of water supply and harm to the community	Collaborate with Federal Government Agencies to uplift water operations and infrastructure to Federal Government standards	L	Cyber Security Specialist	31/12/2022	<ul style="list-style-type: none"> <li>Continuing to collaborate with Federal Government Agencies and other stakeholders.</li> <li>Cybersecurity response activity (HydraEx/Aqua) with the water team, led by ACSC (Seqwater and other utilities were also participants).</li> <li>Improvements made to identity and access management.</li> <li>Cyber security and resilience audit undertaken</li> </ul>		Completed/ Ongoing
N/A	There is a risk that the frequency and parameters tested for the verification monitoring program does not meet regulatory requirements	Adjust verification monitoring sampling program as per recommendations from Ecosafe report – RCC Sampling Schedule Review (2020)	M	Service Manager Compliance and Reporting	30/06/2022	<ul style="list-style-type: none"> <li>All recommended changes incorporated into 2022/23 VMP sampling schedule with UUSAS Lab</li> <li>Service contract amended in June 2022 to include changes.</li> </ul>		Completed

## Appendix B - Summary of compliance with water quality criteria

**Table B.1 - Verification Monitoring Redland City and SMBI Supply Scheme – 2021-2022**

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples Taken	No. of samples required to be collected as per DWQMP	No. of Samples in which Parameter Detected	ADWG Health Guideline Limits	No. of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	28	20	28			39	67	50
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	32			0.019	0.44	0.0509
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	0	0.01	-	<0.001	<0.001	0.0000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	32	4	-	0.01	0.045	0.02703
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	0	0.002	-	<0.001	<0.001	0.00000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	32	20	32			18	45	24
Chloride	QUU SAS	mg/L	1	Quarterly	28	20	28			20	94	38
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	2,474	2288	2,218	5	-	<0.1	2.5	0.8
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	9	0.05	-	<0.0010	0.0014	0.0004
Colour - True	QUU SAS	HU	2	Quarterly	28	20	1			<1.0	1.7	0.1
Conductivity at 25°C	QUU SAS	µS/cm	1	Quarterly	28	20	28			170	380	276
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	32	2	-	0.0019	0.0170	0.0068
Total Cyanide	ALS	mg/L	0.004	Quarterly	28	20	0	0.08	-	<0.004	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	139	104	139	1.5	-	0.06	0.90	0.73
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	32	20	32			51	130	79
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	32			0.005	0.020	0.00949
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	4	0.01	-	<0.0010	0.0015	0.0002
Mercury	QUU SAS	mg/L	0.0001	Quarterly	32	20	0	0.001	-	<0.00001	<0.00001	0.00
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	32	20	32			1.10	9.90	4.59
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	32	0.5	-	0.001	0.009	0.004
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	0	0.05	-	<0.001	<0.001	0.00
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	0	0.02	-	<0.001	<0.001	0.00
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	28	20	28	50	-	0.075	0.63	0.324
pH	QUU SAS	pH Unit	0.1	Weekly	2,474	2288	2,279			6.63	8.30	7.24
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	32	20	32			0.53	3.00	1.77
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	0	0.01	-	<0.001	<0.001	0.000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	32	20	32			4.10	11.00	7.43
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	32	20	32			12	38	24
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	28	20	28			2.7	88	25.1
Total Dissolved Solids	QUU SAS	mg/L	5	Quarterly	28	20	28			110	250	177
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	132	96	21			<60	155	18.92
THMs Total	QUU SAS	µg/L	<10	Monthly	175	96	148	250	-	<10	190	65
Turbidity	QUU SAS	NTU	0.1	Weekly	785	784	736			<0.10	3.70	0.20
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	32	20	30			<0.001	0.0095	0.0039

Note: Where the result is less than the limit of reporting a value of 0 has been adopted for the average calculation

**Table B.2 - Verification Monitoring Amity Point Supply Scheme – 2021-2022**

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples Taken	No. of samples required to be collected as per DWQMP	No. of Samples in which Parameter Detected	ADWG Health Guideline Limits	No. of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4	4			27	30	28
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.031	0.041	0.0363
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4	4	-	0.014	0.016	0.015
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.002	-	<0.001	<0.001	0.000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4	4			10	14	11.8
Chloride	QUU SAS	mg/L	1	Quarterly	4	4	4			33	34	34
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	173	168	173	5	-	0.2	1.9	1.1
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.05	-	<0.001	<0.001	0.000
Colour - True	QUU SAS	HU	2	Quarterly	4	4	0			<1.0	<1.0	0.0
Conductivity at 25°C	QUU SAS	µS/cm	1	Quarterly	4	4	4			180	190	185
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4	2	-	0.0014	0.0044	0.0030
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	4	0	0.08	-	<0.004	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	53	52	53	1.5	-	0.09	0.87	0.74
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			33	41	36
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.014	0.023	0.019
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Mercury	QUU SAS	mg/L	0.0001	Quarterly	4	4	0	0.001	-	<0.00001	<0.00001	0.000
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4	4			1.50	1.80	1.70
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.5	-	<0.001	<0.001	0.000
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.05	-	<0.001	<0.001	0.000
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.02	-	<0.001	<0.001	0.000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	4	4	4	50	-	0.2	0.25	0.23
pH	QUU SAS	pH Unit	0.1	Weekly	173	168	173			6.70	9.22	8.13
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4	4			0.58	0.69	0.63
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4	4			4.70	7.70	6.43
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			19	20	20
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			3.8	4.3	4.1
Total Dissolved Solids	QUU SAS	mg/L	5	Quarterly	4	4	4			110	120	115
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	12	12	0			<60	<60	<60
THMs Total	QUU SAS	µg/L	<10	Monthly	12	12	11	250	-	<10	33	19
Turbidity	QUU SAS	NTU	0.1	Weekly	53	52	53			0.10	0.54	0.20
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	2			<0.0010	0.0013	0.0006

Note: Where the result is less than the limit of reporting a value of 0 has been adopted for the average calculation



**Table B.3 - Verification Monitoring Dunwich Supply Scheme – 2021-2022**

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples Taken	No. of samples required to be collected as per DWQMP	No. of Samples in which Parameter Detected	ADWG Health Guideline Limits	No. of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4	4			20	22	21
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.006	0.013	0.0088
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4	4	-	0.013	0.013	0.013
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.002	-	<0.001	<0.001	0.000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4	4			9.1	10	9.7
Chloride	QUU SAS	mg/L	1	Quarterly	4	4	4			22	23	23
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	134	128	134	5	-	0.2	1.8	1.2
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.05	-	<0.001	<0.001	0.000
Colour - True	QUU SAS	HU	2	Quarterly	4	4	0			<1.0	<1.0	0.0
Conductivity at 25°C	QUU SAS	µS/cm	1	Quarterly	4	4	4			120	260	165
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4	2	-	0.0072	0.014	0.0095
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	4	0	0.08	-	<0.004	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	53	52	53	1.5	-	0.40	1.20	0.81
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			26	29	28
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.014	0.036	0.0265
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Mercury	QUU SAS	mg/L	0.0001	Quarterly	4	4	0	0.001	-	<0.00001	<0.00001	0.000
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4	4			0.63	0.82	0.77
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.5	-	<0.001	<0.001	0.000
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.05	-	<0.001	<0.001	0.000
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.02	-	<0.001	<0.001	0.000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	4	4	4	50	-	0.063	0.084	0.072
pH	QUU SAS	pH Unit	0.1	Weekly	134	128	134			6.93	8.40	7.39
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4	4			0.39	0.44	0.41
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4	4			6.40	9.40	8.43
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			13	13	13
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	3			<2.0	2.2	1.7
Total Dissolved Solids	QUU SAS	mg/L	5	Quarterly	4	4	4			80	170	107
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	12	12	0			<60	<60	<60
THMs Total	QUU SAS	µg/L	<10	Monthly	12	12	7	250	-	<10	27	11
Turbidity	QUU SAS	NTU	0.1	Weekly	53	52	45			<0.10	9.20	0.35
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.0014	0.0018	0.0016

Note: Where the result is less than the limit of reporting a value of 0 has been adopted for the average calculation

**Table B.4 - Verification Monitoring Point Lookout Supply Scheme – 2021-2022**

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No. of Samples Taken	No. of samples required to be collected as per DWQMP	No. of Samples in which Parameter Detected	ADWG Health Guideline Limits	No. of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4	4			15	17	16
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.017	0.025	0.0203
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4	4	-	0.017	0.020	0.01875
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.002	-	<0.001	<0.001	0.000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4	4			6.3	7.3	6.8
Chloride	QUU SAS	mg/L	1	Quarterly	4	4	4			46	49	47
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	170	168	170	5	-	0.2	2.1	1.1
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.05	-	<0.001	<0.001	0.000
Colour - True	QUU SAS	HU	2	Quarterly	4	4	0			<1.0	<1.0	0.0
Conductivity at 25°C	QUU SAS	µS/cm	1	Quarterly	4	4	4			210	220	213
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4	2	-	0.013	0.024	0.0183
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	4	0	0.08	-	<0.004	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	52	52	52	1.5	-	0.09	1.20	0.77
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			26	28	28
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.0057	0.0074	0.00675
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Mercury	QUU SAS	mg/L	0.0001	Quarterly	4	4	0	0.001	-	<0.00001	<0.00001	0.00000
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4	4			2.50	2.80	2.60
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	3	0.5	-	<0.001	0.001	0.001
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.05	-	<0.001	<0.001	0.000
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.02	-	<0.001	<0.001	0.000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	4	4	4	50	-	0.061	0.069	0.064
pH	QUU SAS	pH Unit	0.1	Weekly	170	168	170			6.98	8.76	7.65
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4	4			0.95	1.10	1.04
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	0	0.01	-	<0.001	<0.001	0.000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4	4			6.60	10.00	8.60
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			26	29	27
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	4	4	4			5.3	5.7	5.5
Total Dissolved Solids	QUU SAS	mg/L	5	Quarterly	4	4	4			130	140	133
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	12	12	0			<60	<60	<60
THMs Total	QUU SAS	µg/L	<10	Monthly	12	12	1	250	-	<10	11	1
Turbidity	QUU SAS	NTU	0.1	Weekly	52	52	49			<0.10	0.25	0.15
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4			0.0057	0.0100	0.008

Note: Where the result is less than the limit of reporting a value of 0 has been adopted for the average calculation

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

<i>Year</i>	<i>2021-2022</i>											
<i>Month</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>June</i>
No. of samples collected	58	52	51	62	51	62	52	51	56	58	55	54
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	613	621	623	634	637	647	655	661	661	660	664	662
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.6 - E. coli Compliance with Annual Value Amity Point Supply Scheme**

<i>Year</i>	<i>2021-2022</i>											
<i>Month</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>June</i>
No. of samples collected	16	13	17	13	12	16	13	13	15	14	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	131	136	145	148	152	158	163	168	170	168	168	172
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**

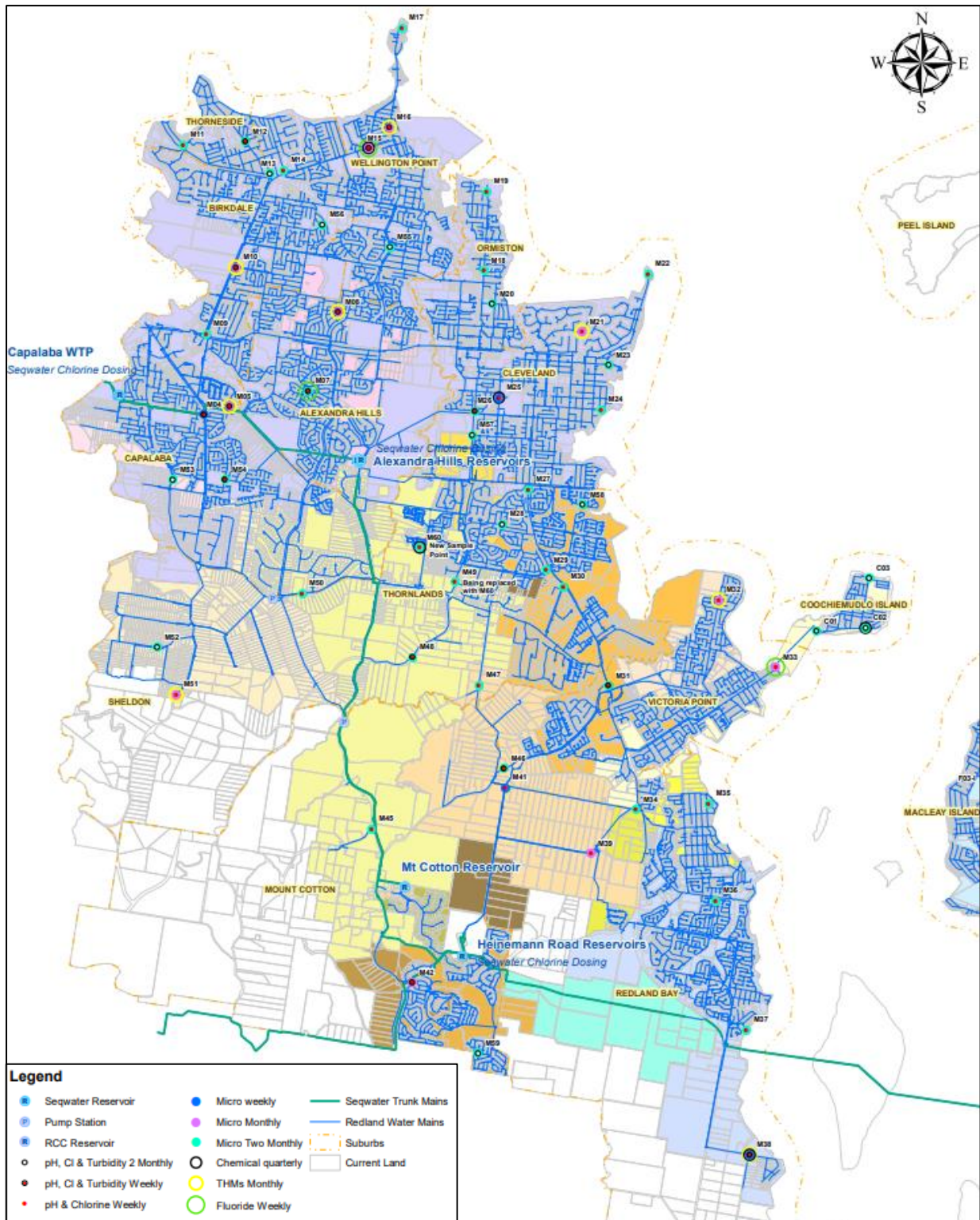
Year	2021-2022											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	10	8	10	8	8	10	8	8	10	8	8	10
No. of samples collected in which <i>E. coli</i> is detected (i.e., a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12-month period	103	103	106	104	104	104	104	104	106	104	104	106
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	2021-2022											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	13	10	13	10	10	12	10	9	12	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	113	115	120	121	123	125	127	128	130	128	128	132
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

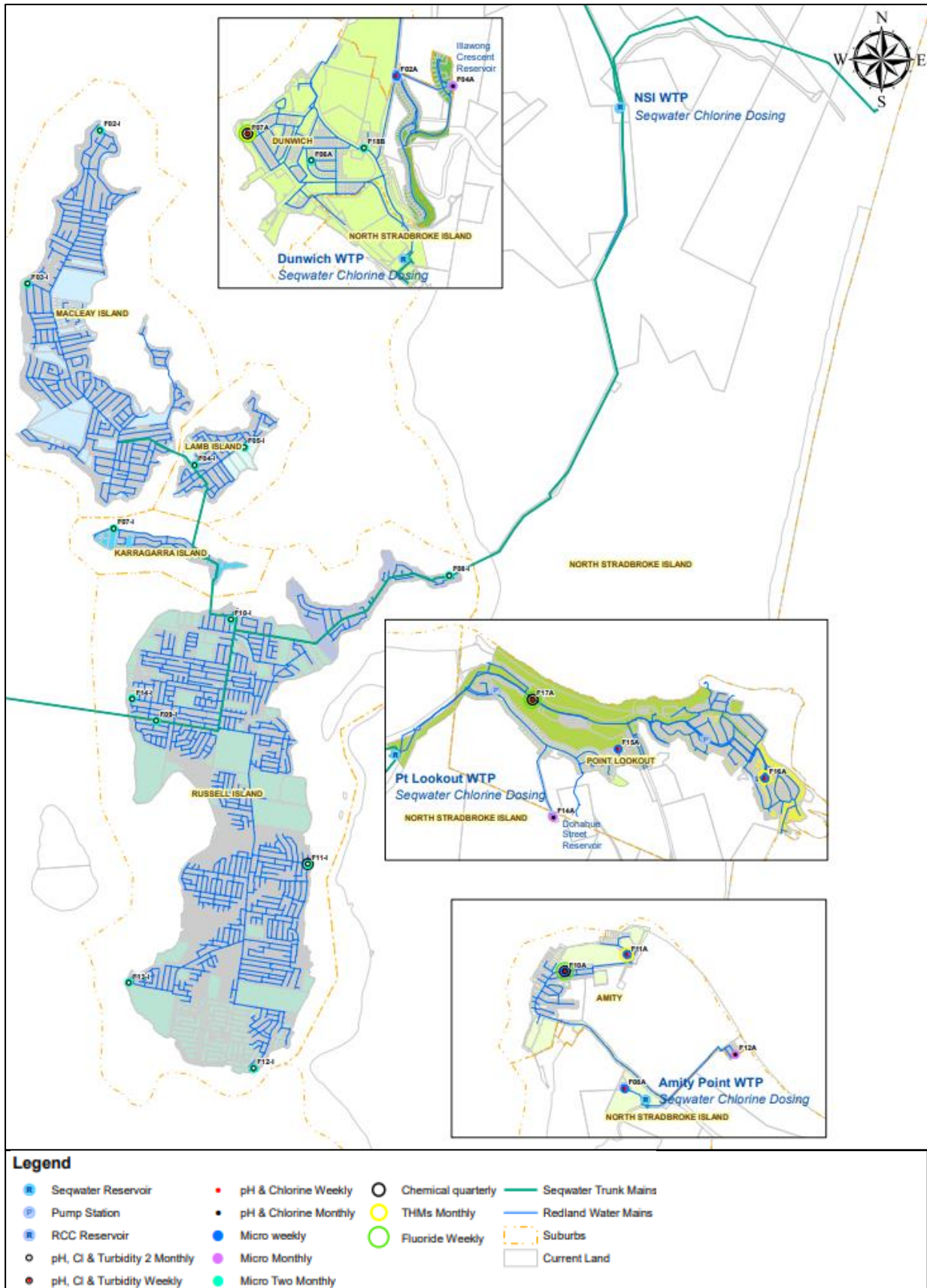
## Appendix C – Verification monitoring sites

Figure C.1 - Mainland Verification Monitoring Sites





**Figure C.2 - SMBI and NSI Verification Monitoring Sites**



## Appendix D – DWQMP Audit Opportunities for Improvement (OFI)

**Table D.1 - Summary of Audit Opportunities for Improvement**

OFI #	OFI Action	Status
1	Investigate the very low pH value in the 19-20 report and whether data validation functionality needs to be added to WIMS.	Completed
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].	In Progress
5	Review the drinking water quality non-compliance procedure to include maintaining the Incident Register.	Completed
6	Establish a process to review the verification monitoring plan periodically (e.g. annual or every two years) in line with population growth and new estates/zones which may be added to the network.	Completed
7	Review the incident management documents to specify 'Events' and Event reporting (as per the DWQMP approval conditions).	Completed
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.	In Progress
9	Reiterate to Seqwater to send all operating protocol notifications to RedlandWaterNotifications@redland.qld.gov.au, as per the Operating Protocol.	Completed
10	Investigate use of WIMS for more in-depth analysis of data e.g. chlorine levels in different zones, which can guide the need for further actions (like flushing).	Completed
11	For the risk assessment, consider the following: - there is potentially more than one relevant limiting hazard for a hazardous event for holistic discussions e.g. also consider opportunistic pathogens as the limiting hazard for low chlorine in the reticulation and consider pathogens (e.g. bacteria) as the limiting hazard for contamination in reservoir. - include additional whole of service hazardous events in relation to drinking water quality management e.g. staff training, calibration (field kits), complaints management, contractor management, customer education, loss of power and supply etc.	Completed
12	Apply the risk method in full, including uncertainty assessment as per the DWQMP (Table 6.4).	Completed
13	Establish a formal process / mechanism for periodic refreshers to all relevant staff on DWQMP awareness and how they fit into the DWQMP framework.	Completed
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.	In Progress
16	Assess need to test for radionuclides as stated currently in the DWQMP. Risk is more from the water source hence this would be risk assessed and managed by Seqwater being the bulk provider.	Completed