Redland CITY COUNCIL

SPID No. 541

Drinking Water Quality Management Plan (DWQMP)

Annual Report

2020/21

Redland City Council
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This report has been prepared in accordance with the Drinking Water Quality Management Plan Report Guidance Note.

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Notation and Abbreviations

<	Less than
>	Greater than
ADWG	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
ALS	Australian Laboratory Services Laboratory Group
CFU/100mL	Colony forming units per 100 millilitres
DNRME	Department of Natural Resources, Mines and Energy
DRDMW	Department of Regional Development, Manufacturing and Water
DWQMP	Drinking Water Quality Management Plan
E. coli	Escherichia coli, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
HHRA	Human Health Risk Assessment
ICPMS	Inductively coupled plasma mass spectrometry
mg/L	Milligrams per litre
NSI	North Stradbroke Island
NTU	Nephelometric Turbidity Units
QUU SAS	Queensland Urban Utilities Scientific Analytical Services
RCC	Redland City Council
SMBI	Southern Moreton Bay Islands
WSSR Act	Water Supply (Safety and Reliability) Act 2008
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 DWQMP as required under the Water Supply *(Safety and Reliability) Act 2008 (the Act)* for the 2020-21 financial year.

The report assists 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 DWQMP report guidance note 2018 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 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 office.

2 Summary of schemes operated

Redland City Council (Council) covers an area of approximately 537 square kilometres and has a population of approximately 157,000 people. Council provides drinking water to Redland City residents through four water supply schemes as shown in Table 2.1 and Figure 2.1.

Table 2.1 - Summary of Schemes (Owned and Operated by Seqwater)

Scheme	*Water Source**
Redland City and Southern Moreton Bay Islands including: - Alexandra Hills water supply zone - Heinemann Rd water supply zone	• Mt Crosby WTP via Eastern Pipeline Interconnector • North Stradbroke Island WTP • Capalaba WTP
Dunwich	• Dunwich WTP
Amity Point	• Amity Point WTP
Point Lookout	• Point Lookout WTP

**Refer to Seqwater annual report for details of WTP process and capacity*

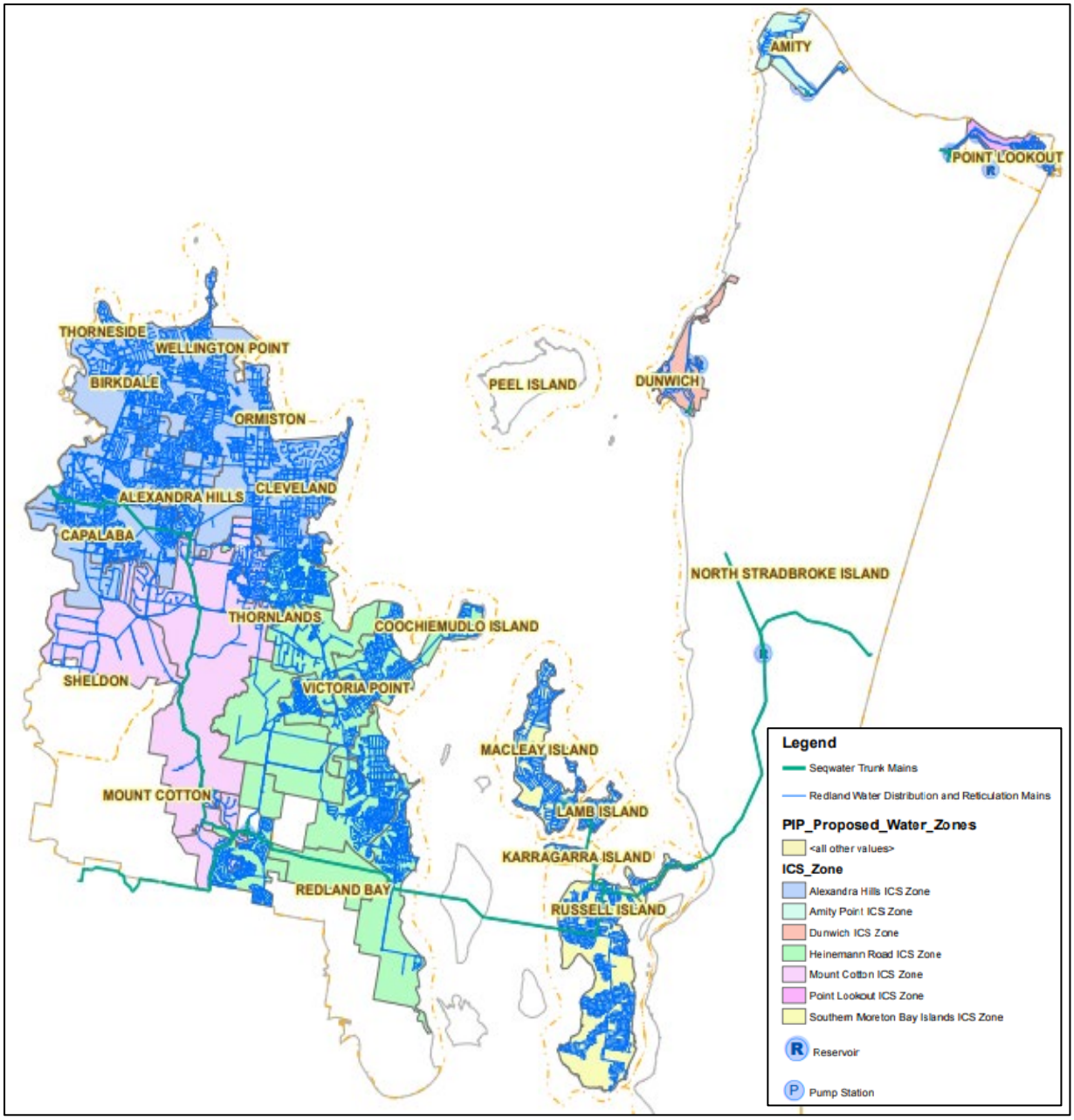

Figure 2.1 - Redland City Council Water Supply Schemes

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 Drinking Water Quality Management Plan (DWQMP) to ensure adherence to the Australian Drinking Water Guidelines (ADWG). Key responsibilities of RCC and Seqwater are summarised in Table 2.2.

Table 2.2 - Seqwater and Redland City Council Responsibilities

Seqwater's Responsibilities	Redland City Council's Responsibilities
• 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.	• 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.

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 drinking water non-compliance 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.

Relevant staff are made aware of their responsibilities in relation to the DWQMP through discussions at toolbox meetings, development and implementation of procedures and Council's 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; and
- General Improvements.

Council conducts regular reviews of its progress against the RMIP to ensure actions from the RMIP are implemented effectively.

The RMIP implementation status is included in Appendix A with some key achievements summarised below:

- Data management, recording, analysis and reporting capabilities have improved following the full transition to the Hach WIMS database that was purchased in 2019.
- The RCC Water and Wastewater Customer Commitment Statement has been updated following extensive community consultation and details response times for water disruption events and is available on Council's website.
- A human health risk assessment for Lead in water supply was undertaken by WSP consultants that determined there are negligible risks to health from the consumption of drinking water containing lead at the concentrations measured at the identified residential locations.
- An additional sample tap was installed in a new subdivision and monitoring commenced in March 2021, with metals analysis conducted quarterly.
- Continuing to work with regional partners to understand limitations on water restrictions with respect to water quality and possible management actions through participation in relevant working groups and committees.

Several actions that were due in 2020/21 had unfortunately been delayed due to staff movements and department restructure, however recent recruitment for vacant roles has now been completed. Outstanding actions will continue to be progressed during 2021/22.

3.2 Revisions made to the verification monitoring program

Ecosafe International was engaged to assist Council with an independent review of its verification monitoring program sampling and testing schedule as part of the Drinking Water Quality Management Plan (DWQMP) review process.

The review was completed in October 2020 and determined that the current 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 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 can be improved. There is also an opportunity to simplify the sampling and testing schedule as changes are made.

Implementation of the changes recommended in this report to testing frequency and the parameters tested at some sampling locations have been progressed throughout 2021 and will enhance the RCC Verification Monitoring Program. The enhanced program will provide the data necessary for RCC to verify compliance of its drinking water schemes to the requirements of the ADWG and to meet regulatory requirements over the next decade.

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

Council undertakes verification monitoring across the drinking water network to ensure the provision of safe and reliable drinking water to our customers. Reticulation system sample sites are selected within each zone to monitor water quality within the distribution system. Some reticulation samples were chosen to give a 'worse-case' picture of water quality, for example in end-of-line areas or areas affected by high water age and others to identify any emerging issues in the system. The parameters that are monitored have been selected based on risks identified in the DWQMP. The verification monitoring locations are included in Appendix C.

The sample collection and field analysis for the verification monitoring program for the entire financial year was contracted out to Queensland Urban Utilities Scientific Analytical Services Laboratory who are NATA accredited.

The results from the verification monitoring program for *E. coli* have been compared against the water quality criteria specified in the DRDMW *Drinking Water Quality Management Plan Report, Guidance Note*, 2018.

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 3.6 updated March 2021

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 incident such as a main break.

During the 2020/2021 financial year, there were no non-compliances against the ADWG from verification monitoring. The verification monitoring summaries are included in Appendix B.

5 Incidents reported to the regulator

This financial year there was one (1) instance where the Regulator was notified under sections 102 or 102A of the Act. This notification involved the detection of Lead from a customer's water meter while investigating a complaint where a resident had tested abnormally high for Lead. This was from ad hoc sampling and was not part of the routine verification monitoring program.

A detailed investigation to ascertain the source of Lead was undertaken. Key findings of the investigation was that the source of Lead is likely to be from fittings used between the main and water meter but there is negligible risk to human health as a result of Lead at the concentrations found at the kitchen tap for this study.

Council will follow up with the fitting supplier regarding the non-compliant fittings and also investigate the possibility of replacing meters and fittings with zero Lead materials. An additional sampling location has been added to the verification monitoring program and Lead has been added to the list of hazards in the DWQMP.

Throughout the investigation, Council provided regular updates to the Regulator, QLD Health and the community, and residents at potentially affected properties were provided with bottled drinking water until further testing confirmed Lead was below ADWG levels.

6 Customer complaints related to water quality

Throughout the year the following complaints in relation 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
Redland City Mainland & SMBI	68,110	1	76	32	1.60
Dunwich	464	0	0	0	0
Point Lookout	1209	0	0	1	0.83
Amity Point	402	0	2	0	2.49
Total*	70185	1	78	33	1.58

** Total connected properties including vacant land.*

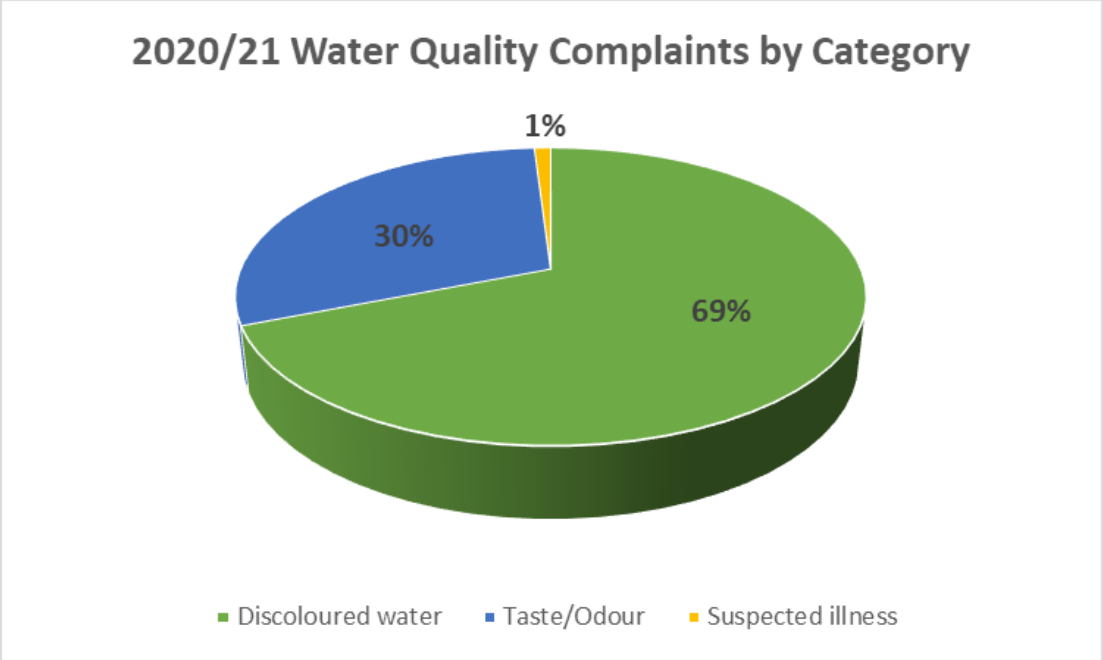

Figure 6.1 - 2020/21 Water Quality Complaints by Category

6.1 Suspected illness

Complaints are sometimes 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 our water supply, typically by taking samples at the customer's water meter and closest verification sampling point, testing parameters vary based on the health complaint.

During 2020/21 there were no confirmed cases of illness arising from the water supply system.

6.2 Discoloured water

As a response to any discoloured water customer complaints, various water mains were flushed in the vicinity of the complaint. A regular mains flushing program is in place to address this issue.

Dirty water complaints were generally related to dead-end mains and distribution system areas with low consumption. Associated areas were flushed to remove the dirty water.

6.3 Taste and odour

The taste and odour complaints received are usually related to the taste of chlorine in the water supply. Investigation of each complaint found no public health risks. Where there was a complaint of an unusual taste or odour that could not be explained, samples were collected and checked using an internal water taste and odour panel to assist in determining the veracity of the complaints.

All samples tested complied with ADWG for parameters tested and staff explained to customers the importance of free chlorine in drinking water.

7 DWQMP review outcomes

An internal review was conducted and an amended DWQMP was submitted to the Regulator on 07/10/2020. The amended Plan was subsequently approved on 22/12/2020. The review included the provision of 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 2022.

Table 7.1 - Changes Made to the DWQMP

DWQMP Section	Details of changes made to DWQMP
Introduction	• Included reference to new DWQMP Guideline
Service Description	• Demand projections updated
	• Updated Figures with current network information
Details of infrastructure	• Population estimates updated • Bulk Water Supply Sources Schematic Figures updated. • Composition of network statistics and Figures updated • Age Profile of the network and Figure updated • Network pressures Figure updated • Water age description and Figure updated
Identify hazards and hazardous events	• Redland water quality data and exceedance information updated • Included Aesthetic Guideline limits & exceedances in RCC tables • Updated Seqwater Health exceedances • Included summary of sampling completed by Seqwater in Appendix B. • Added Cyber Security and Lead as Hazards considered

DWQMP Section	Details of changes made to DWQMP
Information gathering – water quality and catchment characteristics	• No change
Assessment of risks	• Included Seqwater residual risks as a single table • Consolidated the Redland City Council network risks to a single table • Updated Key Internal Stakeholder Table • Updated the risk assessment methodology to reflect the new RCC methodology in the 2019 Handbook. • Updated the risk matrix and included tables to compare the RCC Likelihood and Consequence Definitions with the Water Quality Equivalent Definition • Included risk treatment requirements • Had a representative from Seqwater attend the workshop
Risk management measures	• Updated Council Procedures with latest numbers and versions • Noted that all water quality verification monitoring is now outsourced to Scientific Analytical Service Laboratory a NATA accredited laboratory.
Operation and maintenance procedures	• Updated Council Procedures with latest numbers and versions
Management of incidents and emergencies	• Deleted all information that is included in the Water and Waste Emergency Response Plan (ERP) and referenced the Emergency Response Plan instead. This is so multiple documents don't need to be updated when a review is made. • The ERP was attached with the DWQMP.
Risk management improvement program	• Included the close out of outstanding actions • Included the new actions arising from the risk assessment review.
Verification monitoring	• No significant changes • Included Ecosafe review, recommendations are yet to be fully implemented.

8 DWQMP audit findings

No external DWQMP audit was carried out in 2020/21. 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, the next external DWQMP audit is due by 12 October 2021[1].

[1] At the time of writing this report, the Audit had been completed and report submitted to the Regulator on 24/09/2021. A summary of this audit will be included in the next DWQMP Annual Report.

Appendix A - Implementation of the DWQMP risk management improvement program

Table A.1 - Risk Management Improvement Program Implementation Status 2020-21

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
RMIP-G18	There is a risk that data isn't captured and managed appropriately to monitor water quality exceedances and trends	Procure database software solution integrated with RCC's BI to manage water quality trends better.	L	Service Manager Compliance and Reporting	30/06/2019	Database purchased and is now operational; data transfer is being implemented. Data is currently being put into both systems, it should be fully operational with the spreadsheets no longer used by the end of the year.		Completed
RMIP-G19	There is a risk that the Water and Waste ERP isn't relevant and understood by relevant stakeholders	Review ERP & Develop training and testing modules	M	Group Manager Operations	30/06/2018	Training is done annually with DWQMP review and the co-ordinated region-wide Operation Hydra. The plan needs to be updated to include cyber security		Completed
WSN03	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.	Prepare Critical Trunk Main Break (including submarine at Coochiemudlo) emergency response plan	L	Service Manager Network Operations	30/12/2020	Partially addressed in the Water and Waste ERP. The Coochie submarine main contingency plan has been prepared.		Completed

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
RMIP-G23 BW01 & WSN07	There is a risk that treated water to the Mainland and SMBI's has high disinfection by-products resulting in community harm. 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	Develop a procedure for High Disinfection By Products (including THM procedure)	M	Service Manager Compliance and Reporting	31/12/2020	Information has been obtained from other service providers to use as input to the new procedure. Delayed due to internal restructure. Vacant Water Quality Officer role recruitment completed. Limited capacity for RCC to influence concentration of THM. This procedure will document what RCC should do in the event of a THM notification from seqwater. Communication protocols with seqwater are established and we are participating in a study.	30/06/2022	In progress
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	The approval process for the permit to works system for operational changes to the system is to be formalised through a documented procedure.	30/06/2022	In progress
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	30/06/2021	Investigating resourcing and system capability and data entry being scheduled.	31/03/2022	In progress

BW02, BW03, BW05, WSN08, WSN09 & WSN10	There is a risk that: - Water supplied has elevated water age resulting in a loss of adequate secondary disinfection residual. - Water is contaminated from the bulk water supply due to a failure of SEQ water processes. - Water received at Point Lookout, Dunwich or Amity Point is contaminated water from the bulk water supply due to a failure of seqwater processes. - A contamination incident may occur in the distribution network due to an act of terrorism or a criminal act resulting in a contaminated water supply. - There will be stagnated water due to long detention times and dead end flows resulting in low levels of Chlorine in the system. - Redland City Council reservoirs are contaminated due to human error, terrorism attack or environmental events. Resulting in: - Public health, reputation risk and business disruption in the community. - Harm to the community. - Contaminated water supply.	Prepare Emergency Response Plan - Loss of Supply due to contamination	M	Group Manager City Water	30/06/2021	Water and Waste ERP addresses loss of supply due to contamination. This ERP was reviewed and tested via a discussion exercise with relevant stakeholders on 1/11/21.		Completed

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
WSN02 & WSN03	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 standards. 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.	Breakage response times to be detailed in the RCC Service Level Agreement.	M	Service Manager Network Operations	30/06/2021	RCC Water and Wastewater Customer Commitment Statement updated and includes response times.		Completed
WSN02 & WSN03	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 standards. 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.	Preventative Maintenance and Replacement Program to be put in 'Assetic'	M	Service Manager Network Operations	31/12/2022	Merging of all Assetic programs to be considered – hydrants, valves, flushing	30/06/2022	In progress
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 standards.	Update and implement WAT-004-001-011-PR Assistance to Home Dialysis Machine	M	Service Manager Compliance and Reporting	31/10/2020	Draft procedure prepared and awaiting approval.	31/12/2021	In progress

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
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	Developing Partnering Agreement with City Planning & Assessment	30/06/2022	In progress
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.	Undertake a human health risk assessment for Lead in water supply	H	Service Manager Compliance and Reporting	10/10/2020	Report completed by WSP as part of incident investigation. It concluded that there are negligible risks to health from the consumption of drinking water containing lead at the concentrations measured at the identified residential locations.		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.	If practical replace future meters and fittings with "Lead free" - Timing will depend on Human Health Risk Assessment results	M	Service Manager Network Operations	31/12/2025	This will be considered pending regulator advice. No action at this stage.		Closed

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
WSN07	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	Investigate the possibility of adjusting the off-takes from the trunk main along Old Cleveland Road East to reduce detention times and DBP's	M	Service Manager City Assets	30/06/2021	Modelling undertaken and determined the closing of valves along the trunk mains does not improve the water age, and introduces some customer service standard failures which would require further investigation.		Closed
WSN09	There is a risk that there will be stagnated water due to long detention times and dead end flows resulting in low levels of Chlorine in the system causing harm to the community	Change from common inlet/outlet pipes to/from RCC reservoirs to separate pipes	M	Service Manager Network Operations	31/12/2021	Further investigation determined this is not required. Register to be updated accordingly.		Closed
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	Water and Waste ERP currently caters for some catastrophic events. A more specific contingency plan to be developed, rather than a separate ERP. Existing preventative maintenance mechanisms include condition reports and Inspection schedules	30/06/2022	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	Develop Business Planning and Finance Department funding strategies to justify and support sufficient budget allocation to maintain distribution assets to the required standard	H	Group Manager City Water	31/12/2020	The Asset Management Framework outlines roles and responsibilities for effective and efficient asset management and includes strategic direction for funding current and future assets.		Completed

Risk ID	Issues/Risks	Proposed Action	Priority	Responsibility	Due Date	Review Comments	New close out Date	Status
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	31/12/2020	ASMP review completed as required by corporate integrated planning calendar. Asset class plans under development. Awaiting further input from City Water.	31/03/2022	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	Implement a maintenance schedule with sufficient resources to ensure distribution assets are maintained to the required standard.	H	Group Manager City Water	31/12/2020	ASMP review completed as required by corporate integrated planning calendar. Asset Class plans are under development. Awaiting further input from City Water	31/03/2022	In progress
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	Work with regional partners to understand limitations on water restrictions with respect to water quality and possible management actions.	M	Service Manager Compliance and Reporting	30/06/2021	RCC are on a number of groups and committees. Water Sector Resilience Group, Water Supply Leaders Group, ROMM, Water Quality Advisor Committee.		Ongoing
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.	Add new sample point for metals in a new subdivision	M	Service Manager Compliance and Reporting	31/12/2020	Sample Tap M60 installed in new subdivision at Viewland Cres Thornlands. Monitoring began in March 2021, with metals analysis conducted quarterly.		Completed

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	31/12/2021	Reviews and updates progressing in consultation with relevant stakeholders. WW Risk register to be updated with more specific actions at next review.	30/06/2022	In progress
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	Continuing to collaborate with Federal Government Agencies and other stakeholders.	31/12/2022	In progress
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	Develop formal incident response procedure for water supply pump station failure	M	Service Manager Compliance and Reporting	30/06/2021	Addressed in Water and Waste ERP		Closed
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	30/06/2021	Changes not required to be implemented until 2022 due to population limits not yet being reached.	30/06/22	On Hold

Appendix B - Summary of compliance with water quality criteria

Table B.1 - Verification Monitoring Redland City and SMBI Supply Scheme – 2020-2021

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No of Samples Taken	No of Samples in which Parameter Detected	Health Guidelines Limits	No of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	22	22			38	72	53
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	23			0.0220	0.0620	0.0330
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	0	0.01		<0.0010	<0.0010	0.0000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	23	4		0.01100	0.05000	0.02878
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	0	0.002		<0.00100	<0.00100	0.00000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	23	23			14.0	41.0	22.3
Chloride	QUU SAS	mg/L	1	Quarterly	22	22			21	61	39
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	2,270	2,188	5		<0.1	2.9	0.8
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	5	0.05		<0.0010	0.0014	0.0003
Colour - True	QUU SAS	HU	2	Quarterly	22	0			<1.0	<1.0	0.0
Conductivity at 25 deg C	QUU SAS	µS/cm	1	Quarterly	22	22			170	410	288
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	24	24	2		0.0023	0.0160	0.0065
Total Cyanide	ALS	mg/L	0.004	Quarterly	22	0	0.08		<0.001	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	134	134	1.5		0.22	1.10	0.76
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	23	23			45	120	75
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	23			0.00600	0.05100	0.01340
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	24	4	0.01		<0.0010	0.0027	0.0003
Mercury	QUU SAS	mg/L	0.0001	Quarterly	23	1	0.001		<0.000010	0.000010	0.000000
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	23	23			1.20	7.80	4.64
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	23	0.5		0.002	0.016	0.005
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	0	0.05		<0.0010	<0.0010	0.0000
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	0	0.02		<0.0010	<0.0010	0.0000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	22	22	50		0.028	0.520	0.286
pH	QUU SAS	pH Unit	0.1	Weekly	2,124	2,124			6.53	7.94	7.26
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	23	23			0.51	3.10	1.67
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	23	0	0.01		<0.0010	<0.0010	0.0000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	23	23			4.23	10.00	8.14
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	23	23			12	41	24
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	22	22			3.0	76.0	20.9
Total Dissolved Salt	QUU SAS	mg/L	5	Quarterly	22	22			110	260	184
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	108	21			<60	132	34.36
THMs Total	QUU SAS	µg/L	<10	Monthly	131	116	250		<10	200	73
Turbidity	QUU SAS	NTU	0.1	Weekly	761	705			<0.10	1.00	0.17
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	24	22			<0.0010	0.0140	0.0042

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 – 2020-21

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No of Samples Taken	No of Samples in which Parameter Detected	Health Guidelines Limits	No of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4			16	30	22
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4			0.0290	0.0440	0.0368
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4		0.01400	0.01600	0.01500
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.002		<0.00100	<0.00100	0.00000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4			7.5	9.7	8.4
Chloride	QUU SAS	mg/L	1	Quarterly	4	4			30	34	32
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	146	146	5		0.4	1.5	1.1
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.05		<0.0010	<0.0010	0.0000
Colour - True	QUU SAS	HU	2	Quarterly	4	0			<1.0	<1.0	0.0
Conductivity at 25 deg C	QUU SAS	µS/cm	1	Quarterly	4	4			160	190	168
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	2		0.0022	0.0054	0.0040
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	0	0.08		<0.001	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	52	52	1.5		0.62	0.96	0.76
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			26	31	28
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4			0.01700	0.02400	0.02000
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Mercury	QUU SAS	mg/L	0.0001	Quarterly	4	0	0.001		<0.000010	<0.000100	0.000000
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4			1.70	1.90	1.78
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.5		<0.001	<0.001	0.000
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.05		<0.0010	<0.0010	0.0000
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.02		<0.0010	<0.0010	0.0000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	4	4	50		0.170	0.210	0.190
pH	QUU SAS	pH Unit	0.1	Weekly	125	125			6.86	9.15	7.72
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4			0.59	0.62	0.60
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4			7.02	7.70	7.38
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			18	20	19
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			3.6	3.9	3.8
Total Dissolved Salt	QUU SAS	mg/L	5	Quarterly	4	4			100	120	108
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	12	0			0	0	0
THMs Total	QUU SAS	µg/L	<10	Monthly	12	11	250		<10	33	20
Turbidity	QUU SAS	NTU	0.1	Weekly	52	52			0.12	0.88	0.24
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	3			<0.0010	0.0019	0.0013

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 – 2020-21

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No of Samples Taken	No of Samples in which Parameter Detected	Health Guidelines Limits	No of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4			21	24	22
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4			0.0065	0.0130	0.0105
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4		0.01200	0.01300	0.01225
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.002		<0.00100	<0.00100	0.00000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4			8.2	9.4	8.8
Chloride	QUU SAS	mg/L	1	Quarterly	4	4			22	24	23
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	129	129	5		0.1	1.7	1.3
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.05		<0.0010	<0.0010	0.0000
Colour - True	QUU SAS	HU	2	Quarterly	4	1			<1.0	1.2	0.3
Conductivity at 25 deg C	QUU SAS	µS/cm	1	Quarterly	4	4			120	180	140
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	2		0.0074	0.0140	0.0100
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	0	0.08		<0.001	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	51	51	1.5		0.65	1.10	0.79
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			24	28	26
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4			0.00990	0.02200	0.01473
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Mercury	QUU SAS	mg/L	0.0001	Quarterly	4	0	0.001		<0.000010	<0.000100	0.000000
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4			0.92	1.00	0.98
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.5		<0.001	<0.001	0.000
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.05		<0.0010	<0.0010	0.0000
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.02		<0.0010	<0.0010	0.0000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	4	4	50		0.070	0.084	0.075
pH	QUU SAS	pH Unit	0.1	Weekly	111	111			6.82	8.10	7.43
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4			0.38	0.41	0.40
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4			8.88	9.70	9.32
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			12	13	13
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	4	2			<2.0	2.1	1.1
Total Dissolved Salt	QUU SAS	mg/L	5	Quarterly	4	4			80	110	88
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	12	0			0	0	0
THMs Total	QUU SAS	µg/L	<10	Monthly	12	4	250		<10	25	6
Turbidity	QUU SAS	NTU	0.1	Weekly	51	40			<0.10	0.82	0.15
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	3			<0.0010	0.0039	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 – 2020-2021

Parameter	Laboratory Name	Unit of Measure	Limit of Reporting	Frequency of Sampling	Total No of Samples Taken	No of Samples in which Parameter Detected	Health Guidelines Limits	No of Samples Exceeding Health Guidelines Value	Min Value	Max Value	Average Value
Alkalinity	QUU SAS	mg/L	1	Quarterly	4	4			12	17	15
Aluminium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4			0.0170	0.0240	0.0213
Arsenic ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Boron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	4		0.01700	0.02000	0.01825
Cadmium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.002		<0.00100	<0.00100	0.00000
Calcium ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4			5.6	6.8	6.3
Chloride	QUU SAS	mg/L	1	Quarterly	4	4			46	47	46
Free Chlorine	QUU SAS	mg/L	0.1	Weekly	149	149	5		0.2	2.1	1.1
Chromium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.05		<0.0010	<0.0010	0.0000
Colour - True	QUU SAS	HU	2	Quarterly	4	1			<1.0	1.0	0.3
Conductivity at 25 deg C	QUU SAS	µS/cm	1	Quarterly	4	4			210	210	210
Copper ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4	2		0.0150	0.0240	0.0213
Total Cyanide	ALS	mg/L	0.004	Quarterly	4	0	0.08		<0.001	<0.004	0.000
Fluoride	QUU SAS	mg/L	0.1	Weekly	50	50	1.5		0.69	1.00	0.81
Total Hardness ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			25	28	27
Iron ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4			0.00630	0.01100	0.00818
Lead ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Mercury	QUU SAS	mg/L	0.0001	Quarterly	4	0	0.001		<0.000010	<0.000010	0.000000
Magnesium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4			2.60	2.80	2.75
Manganese ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	3	0.5		<0.001	0.001	0.001
Molybdenum ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.05		<0.0010	<0.0010	0.0000
Nickel ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.02		<0.0010	<0.0010	0.0000
Nitrate N by FIA (Calc)	QUU SAS	mg/L	0.001	Quarterly	4	4	50		0.052	0.061	0.056
pH	QUU SAS	pH Unit	0.1	Weekly	128	128			6.58	8.56	7.57
Potassium ICPMS	QUU SAS	mg/L	0.01	Quarterly	4	4			0.94	1.10	1.00
Selenium ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	0	0.01		<0.0010	<0.0010	0.0000
Silica ICPMS	QUU SAS	mg/L	0.1	Quarterly	4	4			8.70	9.70	9.23
Sodium ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			26	29	27
Sulphate ICPMS	QUU SAS	mg/L	1	Quarterly	4	4			4.8	5.7	5.3
Total Dissolved Salt	QUU SAS	mg/L	5	Quarterly	4	4			130	140	133
Total Haloacetic Acids	QUU SAS	µg/L	<60	Monthly	12	0			0	0	0
THMs Total	QUU SAS	µg/L	<10	Monthly	12	1	250		<10	11	1
Turbidity	QUU SAS	NTU	0.1	Weekly	50	50			0.10	0.51	0.18
Zinc ICPMS	QUU SAS	mg/L	0.001	Quarterly	4	4			0.0040	0.0150	0.0098

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 SMBI Supply Scheme

Year	2020-2021											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	50	44	49	51	48	52	44	45	56	59	51	56
No. of samples collected in which *E. coli* 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	573	568	571	573	573	585	578	578	589	596	599	605
No. of failures for previous 12 month period (including incident month)	1	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	99.83%	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

Year	2020-2021											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	10	8	8	10	8	10	8	8	13	16	13	13
No. of samples collected in which *E. coli* 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	102	102	102	102	106	104	104	109	115	120	125
No. of failures for previous 12 month period (including incident month)	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	2020-2021											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	10	8	7	10	8	10	8	8	8	10	8	8
No. of samples collected in which *E. coli* 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	101	100	100	100	104	103	103	103	103	103	103
No. of failures for previous 12 month period (including incident month)	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	2020-2021											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	9	8	8	9	8	10	8	8	10	12	10	9
No. of samples collected in which *E. coli* 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	107	105	106	105	105	109	106	105	106	107	109	109
No. of failures for previous 12 month period (including incident month)	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

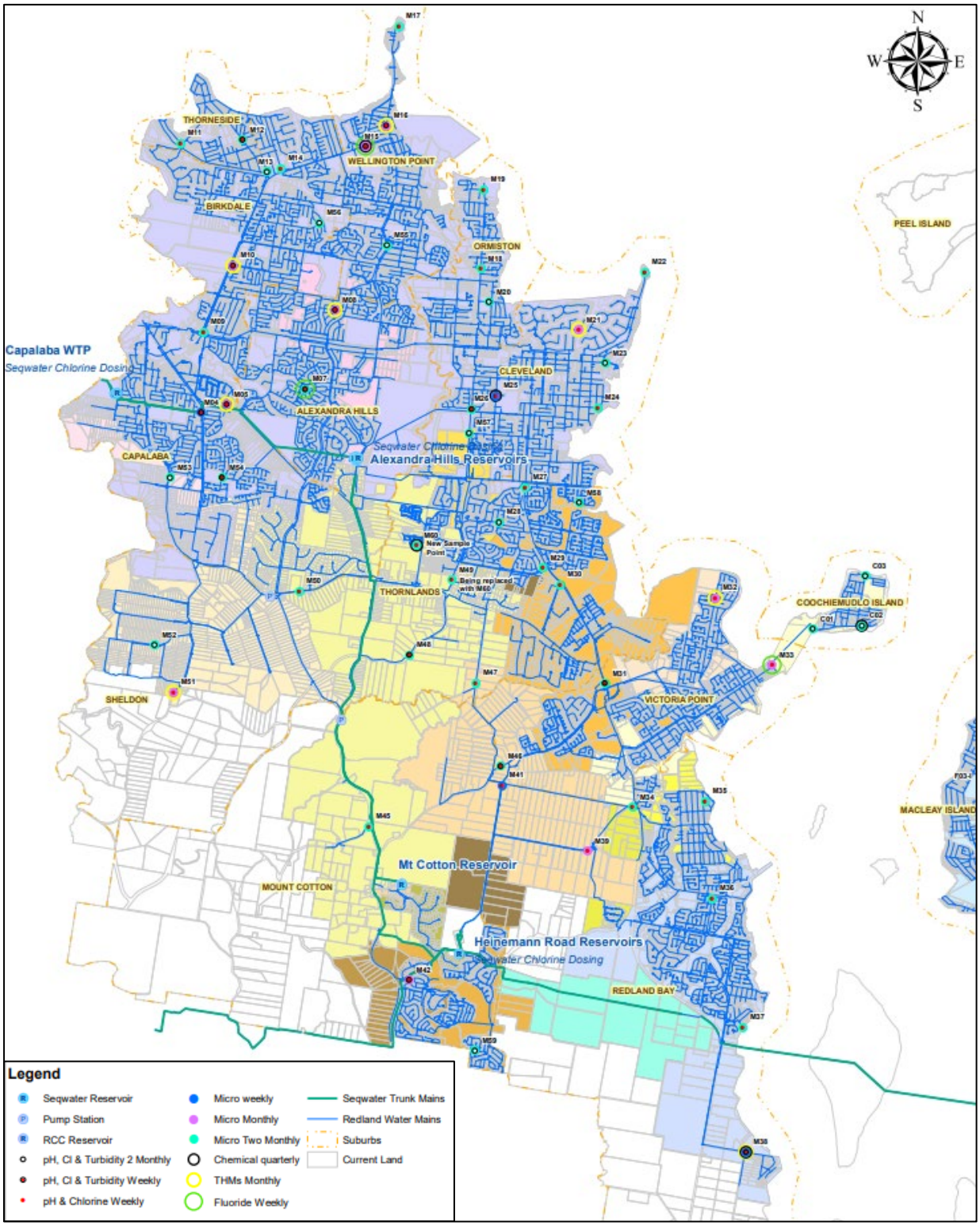

Figure C.2 - SMBI and NSI Verification Monitoring Sites