Drinking Water Quality Management DWQMP – Annual Report

2023-2024

Whitsunday Regional Council

Service Provider No.: 501

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Glossary of Terms

ADWG 2011	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
E. coli	*Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
HACCP	Hazard Analysis and Critical Control Points certification for protecting drinking water quality
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
MPN/100mL	Most probable number per 100 millilitres
CFU/100mL	Colony forming units per 100 millilitres
<	Less than
>	Greater than

Date	Report	Author	Reviewed By	Authorised by COO
16/12/2024	Annual Report	Kerrie Pearson	Michael Gallagher	Troy Pettiford

Introduction

This report documents the performance of Whitsunday Regional Council's 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).

The report assists the Regulator to determine whether the approved DWQMP and any approval conditions have been complied with and provides a mechanism for providers to report publicly on their performance in managing drinking water quality.

Whitsunday Regional Council is operating under an approved DWQMP to ensure consistent supply of safe quality drinking water in order to protect public health. This is done through proactive identification and minimisation of public health related risks associated with drinking water.

It has been prepared in accordance with the *Guideline for the preparation, review and audit of Drinking Water Quality Management Plans, Version 3* published by the Department of Regional Development, Manufacturing and Water, Queensland, October 2022 accessible at www.business.qld.gov.au.

1. Overview of Operations

Water and wastewater is managed within Whitsunday Regional Council by a separate business unit “Whitsunday Water” since July 2015.

Whitsunday Water maintains and operates 4 water treatment plants, supplying water to a seasonally fluctuating population of over 35 000 people, including residential, commercial, tourism and industrial customers.

Scheme	Communities Served	Population served	Source	Treatment	Treatment Capacity, (Produced) ML/day
Bowen	Bowen, Brisk Bay, Merinda	10200 (5200 connections)	Sub-surface / open water intake in the Proserpine River	Conventional Flocculation with lamella plate settling and Dual media filtration. Disinfected with Sodium Hypochlorite.	16.5 (Av 7.7)
Collinsville	Collinsville, Scottsville	1800 (1240 connections)	Bowen River Weir, from Eungella Dam (Sunwater)	Conventional Flocculation and filtration. Disinfected with Sodium Hypochlorite.	6 {Av 2.8)
Proserpine	Proserpine, Mt Julian (73% supply to Cannonvale/Airlie Beach)	4500 (2000 connections)	Aquifer bores, supplemented from Peter Faust Dam	Conventional Flocculation with Dual media filtration. Disinfected with Sodium Hypochlorite.	14 (Av 5.9; 1.6 for Proserpine)
Coastal	Cannonvale, Airlie Beach, Mt Julian, Jubilee Pocket	14100 (6500 connections)	Aquifer bores	Conventional Flocculation with Dual media filtration. Disinfected with Sodium Hypochlorite.	9.6 (Av 3.8; 7.9 for Coastal)

Table 1- Drinking Water Supplies

Major changes in recent years include:

- Bulk supply pipeline from Proserpine WTP to Coastal WTP with new pump station to pump through the new pipeline. Completed.
- Cannon Valley Reservoirs – Construction of 2 new 12ML reservoirs completed but they are not yet online.
- Cannonvale water network augmentation project – to construct various trunk water mains and interconnecting links to optimise the utilisation of the existing reservoirs and partition the network. Underway. Design for reconfiguration works due 2024-25 with construction due 2025-26. Optimisation and modelling of network with new reservoirs due 2025-26. Delays due to demand overlap concerns and existing network issues.
- Replacement of the existing 5 low lift pumps at the Bowen Water Treatment Plant. Completed, now in defects liability period.
- New Proserpine River open water intake pump/structure for Bowen Water Treatment Plant including replacement of the existing high lift pump station building switchboard to incorporate new pumps and open water tank. Underway, due for completion 2025-26.
- Construction of additional raw water production bores to improve water reliability, water security, and to accommodate growth of the Coastal and Proserpine water catchments. 6 production bores completed, detailed design and construction of pipework due for completion 2025-26.

- Replacement of the existing pumps at the coastal water treatment plant to enable pumping to the new Cannon Valley reservoirs. Underway, reconfiguration required, due for completion 2025-26.
- Cannonvale reservoir reconfiguration to allow refurbishment, repair and reconfigure its inlet and outlet. This can only take place after the new Cannon Valley reservoirs are on-line.

These will be included in future amendments of the DWQMP.

2. DWQMP Implementation

Water quality has been ensured by the implementation of safeguards and barriers identified in the DWQMP. Water quality in all areas has been kept to high standards with the implementation of sampling regimes, maintenance schedules and hazard identifications highlighted in the DWQMP.

2.1 Implementing the Risk Management Improvement Program

Refer to Appendix B for a summary of progress in implementing each of the Improvement Program actions.

All risk management improvement programs outlined in the DWQMP are being or have been implemented or are part of an ongoing maintenance strategy.

Items in the Risk Management Improvement Plan (RMIP) that have been updated include:

- Bowen open water intake – Planning and appropriate approvals are underway. Low lift pumps replacement is now in defects liability period. Bores beside the river have been unsuccessful for production.
- Proserpine Bores – Production Bores completed. Civil works ongoing. Investigation of licencing options is underway. Open water intake deferred.
- Turbidity Analysers standardisation across WIM alliance region has become a lower priority for the Alliance.
- Collinsville Water Treatment Plant – works commenced on optimisation of plant processes
- Collinsville Solar Project –completed (including upsizing of transformer). High lift pumps upgraded.
- Storage reservoir works
    - Collinsville, Miller St – completed
    - Collinsville, Mt Devlin – completed
    - Bowen, 12ML - completed
    - Bowen, 3ML – Full structural assessment required, scheduled for 2024-25
    - Cannonvale – Roof repair completed. Further repairs dependent on when Cannon Valley reservoirs are on-line. Completion due by June 2026
    - Shute Harbour (Mt Roper) – Front fence and CCTV completed. Further works due for completion by June 2025.
- Site security – Stage 1 – CCTVs at high-risk sites (including diesel tanks) completed. Further stages as budget allows.
- Cybersecurity - ongoing

2.2 The Monitoring Program

Operational monitoring and verification monitoring programs have continued unchanged throughout the year.

2.3 Amendments made to the DWQMP

Version 3.3 of the DWQMP was approved in June 2024.

A review of the DWQMP (new version 3.1) was conducted and submitted with an amendment application in October 2023. An Information Requirement Notice was issued in December 2023 with further information requested in April 2024.

The Approved DWQMP as at 30 June 2024 is version 3.3, approved in June 2024.

3. Compliance with Water Quality Criteria

The water quality criteria mean health guideline values in the most current Australian Drinking Water Guidelines, as well as the standards in the Public Health Regulation 2005.

A summary of water quality characteristics for each scheme is contained in Appendix A.

3.1 Chemical

This year the water from the Bowen WTP had high THM's over the hotter months. Chlorate was also detected again in the reticulated water in January and March 2024. Refer to DWI-501-24-10856, discussed later. There were no other values above the aesthetic or health guideline values. Copper present in the water increased slightly from last year while the tin decreased. Hardness in the water also increased this year compared to last year. These differences reflect the variability in water from an open water source and also the variability that can be seen through the long pipeline to Bowen township.

Water from the Coastal WTP had no values above the aesthetic or health guideline values. There was little variability in results from last year. There were a few more detections of pesticide residues this year although none of the values were close to guideline values.

Water from Collinsville WTP had no values above the aesthetic or health guideline values. The water showed very similar characteristics to previous years with the only noticeable change being a slight decrease in some metals, including chromium, copper, iron and vanadium as well as sulphate.

Water from the Proserpine WTP had no values above the aesthetic or health guideline values. There was little variability in results from last year.

There were detections of PFAS components in all schemes this year, with the exception of Collinsville, with none of the detections close to guideline values.

3.2 E. coli

There were no detections of E.coli for the 2023-24 financial year.

3.3 Fluoride

Fluoride is not added to water within the Whitsunday Regional Council area, so levels detected are natural background levels.

4. Notifications to the Regulator

There were two notifications made this year, both involving Bowen water supply scheme over the wet season.

DWI-501-23-10742

After storm activity in the area the Bowen WTP stopped automatically overnight and the raw and treated water turbidity at the Bowen WTP increased slightly. The chlorine in the treated water storage tank fell below our Critical Control limit. Chlorine in the Bowen network was significantly lower than normal. No bacteriological counts were recorded during the event. Immediate actions included testing of chlorine levels and bacterial counts frequency was increased and continued over several days. Network chlorinators were increased and extensive flushing around the network was also carried out until Chlorine levels were returned to normal levels.

Root causes were found to be a failure of the clarification process at the Bowen WTP and no interlock between the transfer pumps and plant operation, which means that water can still transfer even if there are problems at the plant. Investigations will continue into the interlock protocols and a dosing point, with PID loop back to plant, along the 65km pipeline to Bowen.

DWI-501-24-10856

Routine monthly samples taken from the Bowen reticulation network in January 2024 returned a single high THM and Chlorate result. The treated water storage sample at the plant was also high but within guideline limits. This may be due to water being soured solely from the river spears, instead of the normal mix of spears and open water intake from the river, due to the diesel pump being removed from the riverbank during wet season to decrease the chance of flooding. This would have impacted the balance of organic load in the water creating the THM's.

Chlorate levels tend to increase during the peak of summer when the Chlorine (Sodium Hypochlorite) degrades with the heat combined with the ageing of the water during the 65km pipeline to Bowen township.

Further samples taken from throughout the reticulation system showed no further high levels. Actions taken included the reinstatement of the open water diesel pump to reintroduce a mix of spears and open water raw water and engaging a consultant to optimise the treatment options for pre-oxidation to find an alternative to Chlorine. In the longer term the 65km main will be pigged and an investigation carried out into the viability of installing a Chlorine dosing unit along the main to allow for a lower Chlorine dose at the plant. It was found that Potassium Permanganate provided the best Iron and Manganese removal when used in pre-oxidation, further work will be required to determine the optimal dose (to lower the risk of overdosing) taking into account the actual hydraulic retention time of the process.

5. Customer Complaints Related to Water Quality

Whitsunday Regional Council is required to report on the number of complaints, general details of complaints, and the responses undertaken.

Throughout the year the following complaints about water quality were received:

	Suspected Illness	Dirty water	Taste and odour	Total
Bowen	1	16	1	18
Coastal	0	8	0	8
Collinsville	0	2	0	2
Proserpine	0	4	0	4
Total	1	30	1	32

Table 2 – Complaints about water quality

5.1 Suspected Illness

The suspected illness complaint in Bowen was attributed to customer sensitivity not potable water characteristics.

5.2 Discoloured Water

There was a higher number of dirty water complaints in the Bowen area during the 2023-24 year, about half can be attributed to the low chlorine incident over the Christmas period when extensive flushing was carried out, this resulted in some dirty water into some homes, further flushing achieved clear water. The other cases were not related in either location, timing or source characteristics. For each instance the line was flushed to achieve clear water, and no further action was required.

The dirty water complaints in the Coastal, Collinsville and Proserpine areas were, in each case, a localised issue from recent works or repairs in the area and was flushed to achieve clear water. No further action was required.

5.3 Taste and Odour

The taste and odour complaint in Bowen area was determined to be unsubstantiated and no further action was required other than flushing.

6. DWQMP Review

The review of the DWQMP version 3, carried out in September 2023 resulted in an amendment to address changes in the water services provided by Whitsunday Regional Council. An Information Requirement Notice was issued in December 2023 with further information requested in April 2024. The amendment was approved in June 2024 to DWQMP Version 3.3.

Details of the amendment are summarised below:

- General details updated including
  - Population, connections and demand updated with most recent data.
  - Rainfall and temperature data updated
  - Asset data collection system details updated
- Schematics for the Bowen, Coastal, Collinsville and Proserpine treatment process and reticulation schemes were updated to reflect minor changes.
  - Proserpine WTP – correct location of analysers; decommissioning of Booster 1 and commissioning of Booster 2 (new pump station) to Coastal scheme.
  - Proserpine Scheme – inclusion of bulk potable pipeline to Coastal scheme and redirection of Bore 10 from Coastal to Proserpine
  - Coastal WTP – inclusion of bulk potable pipeline from Proserpine WTP; minor changes to overflow routes
  - Coastal Scheme – inclusion of bulk potable pipeline from Proserpine WTP and redirection of Bore 10 from Coastal to Proserpine; inclusion of Cannon Valley reservoirs (construction complete but not in service as yet)
  - Bowen WTP – correct location of analysers
  - Bowen Scheme – no changes
  - Collinsville WTP – correct locations of analysers
  - Collinsville Scheme – no changes
- Monitoring trends of source water and treated water updated with more recent data and included annual NATA results
- Changes to the Risk assessments include
  - Tables of previous Risk assessment teams moved to Appendix G
  - Removal of irrelevant catchments risks – e.g. dam risks from Proserpine & Coastal bore field catchments, River risks from Coastal bore field
  - Addition of bore pump failure
  - Removal of dosing risks for chemicals not used at Coastal and Collinsville WTP (Soda Ash, Potassium Permanganate & PAC)
  - Removal of supernatant return risks at Coastal WTP as there is no return from the ponds
  - Further hazards included to the inadequate water supply from the river for Bowen WTP
  - Low or loss of supply to large customers along the Bowen pipeline added as a high risk
  - High risk of sudden and extreme changes in raw water Turbidity at Collinsville WTP after rainfall events added
  - Lack of critical spares for Collinsville WTP added as a high risk
  - Single supplier of chemicals to Collinsville WTP presents a risk
  - Distance of Collinsville plants from other council area poses a very high risk as available backups are not local.
- Management of incidents and emergencies section has been completely rewritten to include the Whitsunday Water Business Continuity Plan (BCP) (Appendix H) as the major document used during an incident/emergency.
  - Incident Response Plans created, Appendix I

    - Press releases included in Appendix E
    - Regulatory reporting section in BCP with specifics included in Section 9.4
- The Risk Management Improvement Plan was updated including
    - New Projects
        - Repair works to reservoirs – Collinsville Miller St; Collinsville Mt Devlin; Bowen 12ML; Bowen 3ML; Cannonvale
    - Completed Projects
        - Initial items in SCADA strategy quick wins completed
        - Staff roles filled (still trainee vacant) and staff rotation commenced
    - Updated projects
        - Cannonvale Bulk Potable Water project – work continuing on reconfiguration of network
        - Bowen open water intake – civil works now at concept stage, works progressing
        - Proserpine Bores – Bore 10 redirected, open water intake under investigation
        - Turbidity analyser replacement – project widened across region through WIM alliance
        - Collinsville solar project under construction, scope revised to fit with current funding
- Operational and Verification monitoring requirements tabulated (using guideline format) and result spreadsheets now available on WRC shared locations

Details of the Information Requirement Notice are summarised below.

- Management of Incidents and Emergencies required further review to provide clear guidance on the full range of potential incidents and events, including but not limited to
    - Table of the levels used – approved by Water Supply Regulation officers prior to inclusion
    - Harmful Algal blooms – Incident Response Plan created
    - Further specific potential incidents – Further Incident Response Plans created
- How risks that are not directly under our control are to be managed – several strategies have been implemented to mitigate the risk
- Catchment protection categories need to be documented – Appendix J included detailing the data used for categorisation of each catchment with a summary section for each scheme in the main body of the plan.

Further information was requested, and provided, to clarify some of the information previously provided.

- Ensure that reporting to WSR is included in the appropriate places in the Incident levels table to remove any confusion
- Ensure key triggers in the Drinking Water Quality Incident Response Plan are consistent with the Incident levels table
- Ensure that reporting to WSR is included in the appropriate place in the Loss of Disinfection Incident Response Plan
- Include both Raw and Treated water in the Algae Incident Response Plan
- Provide the latest version of the Business Continuity Plan.

Appendix A – Summary of Compliance with Water Quality Criteria

The results from the verification monitoring program have been compared against the levels of the water quality criteria specified by the Regulator in the *Water Quality and Reporting Guideline for a Drinking Water Service*.

Verification monitoring was carried out as per the program stated in the DWQMP.

A summary of water quality characteristics for each scheme are contained in the following tables.

Table 3a - Verification monitoring results - Bowen Scheme Potable Water

	Parameter	Unit of Measure	LOR	No. Samples to be collected from Approved Plan	Actual Total Samples Collected	No. Samples in which parameter was detected	ADWG Aesthetic (Health) Guideline	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results	95th Percentile	Comment
In House Test Results	pH	mg/L	0.1	104	406	406	6.5-8.5	0	7.0	7.8	7.5		
	Turbidity	NTU	0.01	104	409	409	5	0	0.02	1.94	0.13		
	Conductivity	µS/cm	1		149	149		48	204	590	414		
	Colour	Pt/Co	1	104	409	292	15	0	0	12	0.9		
	Free chlorine residual	mg/L	0.1		410	410		0	0.08	3.62	1.71		
	Total chlorine residual	mg/L	0.1		102	102		0	0.37	3.68	2.03		
	Alkalinity	mg/L	0.1	104	149	149		0	47	138	90		
	Total hardness	mg/L	0.1	104	148	148	200	0	50	149	91		
	Iron	mg/L	0.01	104	410	402	0.3	0	0.0	0.07	0.016		
	Manganese	mg/L	0.001	104	410	403	0.1 (0.5)	0	0.000	0.09	0.005		
	Aluminium	mg/L	0.001	104	410	410	0.2	0	0.008	0.144	0.029		
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	0	6.6	8.0	7.3	7.8	
	Turbidity	NTU	1	24	24	0	5	0	<1	<1	<1	<1	
	Colour	Pt/Co	1	24	24	0	15	0	<1	<1	<1	<1	
	Conductivity	µS/cm	5	24	24	24			280	600	436	599	
	Alkalinity	mg/L	5	24	24	24			64	130	93	130	
	Total hardness	mg/L	5	24	24	24	200	0	55	123	87	122	
	Total dissolved solids	mg/L	10	24	24	24		0	160	320	238	320	
	Chloride	mg/L	2	24	24	24	250	0	39	100	69.6	100.0	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	9.4	15	12.5	15.0	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.08	0.13	0.10	0.12	
	Nitrate	mg/L	0.05	24	24	23	(50)	0	0.07	0.62	0.27	0.59	
	Silica	mg/L	5	24	24	24	80	0	14	18	15.8	18.0	
	Sodium	mg/L	0.05	24	24	24	180	0	34	75	52.4	74.6	
	Potassium	mg/L	0.05	24	24	24			2.4	4.1	2.9	3.9	
	Calcium	mg/L	0.05	24	24	24			12	28	19.4	27.0	
	Magnesium	mg/L	0.05	24	24	24			6	13	9.3	13.0	
	Chlorate	mg/L	0.01	24	24	24			0.22	*1.02*	0.44	0.83	
	Aluminium	mg/L	0.01	24	24	24	0.2	0	0.014	0.068	0.033	0.061	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	24	(0.01)	0	0.0002	0.0004	0.0003	0.0004	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.031	0.061	0.045	0.060	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.026	0.035	0.031	0.035	
	Cadmium	mg/L	0.0001	24	24	0	(0.002)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	3	(0.05)	0	0.0001	0.0001	0.0001	0.0001	
	Cobalt	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	24	1 (2)	0	0.005	0.14	0.0435	0.1085	
	Iron	mg/L	0.005	24	24	7	0.3	0	0.005	0.016	0.0083	0.0151	
	Lead	mg/L	0.0001	24	24	23	(0.01)	0	0.0001	0.0013	0.0004	0.0009	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0002	0.065	0.0057	0.0139	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0002	0.0005	0.0003	0.0005	
	Nickel	mg/L	0.0001	24	24	22	(0.02)	0	0.0001	0.0014	0.0002	0.0004	
	Selenium	mg/L	0.0001	24	24	0	(0.01)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Silver	mg/L	0.001	24	22	0	(0.1)	0	<0.001	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.14	0.29	0.208	0.279	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	3			0.0001	0.0002	0.0002	0.0002	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	0	(0.017)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Vanadium	mg/L	0.0001	24	24	17			0.0001	0.0003	0.0002	0.0003	
	Zinc	mg/L	0.001	24	24	24	3	0	0.001	0.022	0.0066	0.0190	
	Chloroform	µg/L	1	24	24	24		0	16	180	60.4		
	Bromodichloro methane	µg/L	1	24	24	24		0	22	89	39.2		
	Dibromochloro methane	µg/L	1	24	24	24		0	9	42	21.2		
	Bromoform	µg/L	1	24	24	22		0	<1	8	2.7		
	Total THM's	µg/L	1	24	24	24	(250)	1	64	*300*	124.0		
	PFOS + PFHxS	µg/L	0.005	8	8	0	0.07	0	<0.005	0.06	<0.005		Treated 0.06 6:2 FTS; Reticulated 0.01 6:2 FTS August 2023
	Methyl Isoborneol	ng/L	1	2	5	1			<2	2	<2		
	Geosmin	ng/L	1	2	5	3			<2	4	1.7		
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L	0.2	2	2	2	(500)	0	0.2	0.7	0.5		Reticulated & Treated Refer QHFSS SSP0088602
	Desethyl Atrazine	µg/L	0.01	2	2	0	20	0	<0.01	<0.01	<0.01		
	Atrazine, 2-hydroxyl	µg/L	0.01	2	2	2	200	0	0.02	0.02	0.02		
	Metolachlor	µg/L	0.02	2	2	0	(300)	0	<0.02	<0.02	<0.02		
	Imazapic	µg/L	0.01	2	2	0	(1000)	0	<0.01	<0.01	<0.01		
	Triclopyr	µg/L	0.07	2	2	0	(0.02)	0	<0.07	<0.07	<0.07		
	Hexazinone	µg/L	0.01	2	2	0	(0.4)	0	<0.01	<0.01	<0.01		
	Others detected:-	µg/L											

Table 3b - Verification monitoring results - Coastal Scheme Potable Water

	Parameter	Unit of Measure	LOR	No. Samples to be collected from Approved Plan	Actual Total Samples Collected	No. Samples in which parameter was detected	ADWG Aesthetic (Health) Guideline	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results	95th Percentile	Comment
In House Test Results	pH	mg/L	0.1	104	394	394	6.5-8.5	0	6.9	7.9	7.3		
	Turbidity	NTU	0.01	104	395	395	5	0	0.01	0.571	0.13		
	Conductivity	µS/cm	1		99	99			352	871	527		
	Colour	Pt/Co	1	104	395	110	15	0	0	7	0.3		
	Free chlorine residual	mg/L	0.1		397	397			0.4	2.41	1.25		
	Total chlorine residual	mg/L	0.1		84	84			0.54	2.48	1.46		
	Alkalinity	mg/L	0.1	104	118	118			44	139	107		
	Total hardness	mg/L	0.1	104	117	117	200	0	72	157	115		
	Iron	mg/L	0.01	104	394	386	0.3	0	0	0.05	0.02		
	Manganese	mg/L	0.001	104	393	371	0.1 (0.5)	0	0	0.116	0.018		
	Aluminium	mg/L	0.001	104	389	389	0.2	0	0.003	0.208	0.057		
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	0	6.8	7.9	7.4	7.8	
	Turbidity	NTU	1	24	24	0	5	0	<1	<1	<1	<1	
	Colour	Pt/Co	1	24	24	0	15	0	<1	<1	<1	<1	
	Conductivity	µS/cm	5	24	24	24			350	570	504	560	
	Alkalinity	mg/L	5	24	24	24			79	110	95	109	
	Total hardness	mg/L	5	24	24	24	200	0	80	133	112	130	
	Total dissolved solids	mg/L	10	24	24	24		0	220	330	295	329	
	Chloride	mg/L	2	24	24	24	250	0	51	110	86.1	110.0	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	4.6	17	11.3	15.9	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.08	0.14	0.11	0.14	
	Nitrate	mg/L	0.05	24	24	24	(50)	0	4.7	8.5	6.30	8.27	
	Silica	mg/L	5	24	24	24	80	0	34	48	40.58	47.85	
	Sodium	mg/L	0.05	24	24	24	180	0	41	61	55.04	60.85	
	Potassium	mg/L	0.05	24	24	24			1	1.7	1.30	1.67	
	Calcium	mg/L	0.05	24	24	24			17	28	23.29	27.00	
	Magnesium	mg/L	0.05	24	24	24			9	15	13.22	15.00	
	Chlorate	mg/L	0.01	24	24	24			0.13	0.47	0.245	0.447	
	Aluminium	mg/L	0.01	24	24	24	0.2	0	0.031	0.15	0.070	0.134	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	24	(0.01)	0	0.0001	0.0004	0.00026	0.00030	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.025	0.044	0.0337	0.0430	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.023	0.029	0.0264	0.0289	
	Cadmium	mg/L	0.0001	24	24	0	(0.002)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	1	(0.05)	0	0.0003	0.0003	0.0003	0.0003	
	Cobalt	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	13	1 (2)	0	0.001	0.004	0.0022	0.0034	
	Iron	mg/L	0.005	24	24	6	0.3	0	0.005	0.016	0.0105	0.01575	
	Lead	mg/L	0.0001	24	24	10	(0.01)	0	0.0001	0.0002	0.00016	0.00020	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0003	0.0046	0.0012	0.0033	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0002	0.0004	0.0003	0.0003	
	Nickel	mg/L	0.0001	24	24	16	(0.02)	0	0.0001	0.0002	0.0001	0.0002	
	Selenium	mg/L	0.0001	24	24	23	(0.01)	0	0.0001	0.0003	0.00020	0.00030	
	Silver	mg/L	0.001	24	24	0	(0.1)	0	<0.001	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.2	0.35	0.296	0.340	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	4	(0.017)	0	0.0001	0.0001	0.00010	0.00010	
	Vanadium	mg/L	0.0001	24	24	24			0.0004	0.0028	0.0015	0.0027	
	Zinc	mg/L	0.001	24	24	16	3	0	0.001	0.02	0.0043	0.0103	
	Chloroform	µg/L	1	24	24	24		0	1	10	4.6		
	Bromodichloro methane	µg/L	1	24	24	24		0	6	24	12.7		
	Dibromochloro methane	µg/L	1	24	24	24		0	13	45	23.7		
	Bromoform	µg/L	1	24	24	24		0	4	23	12.8		
	Total THM's	µg/L	1	24	24	24	(250)	0	32	100	53.8		
	PFOS + PFHxS	µg/L	0.005	8	8	0	0.07	0	<0.005	0.03	<0.005		Treated 0.03 6:2 FTS; Reticulated 0.01 6:2 FTS August 2023
	Methyl Isoborneol	ng/L	1	2	2	0		0	<2	<2	<2		
	Geosmin	ng/L	1	2	2	0		0	<2	<2	<2		
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L	0.2	2	2	0	(500)	0	<0.2	<0.2	<0.2		Reticulated & Treated Refer QHFSS SSP0088602
	Desethyl Atrazine	µg/L	0.01	2	2	2	20	0	0.01	0.01	0.01		
	Atrazine, 2-hydroxyl	µg/L	0.01	2	2	2	200	0	0.01	0.02	0.02		
	Metolachlor	µg/L	0.02	2	2	2	(300)	0	0.02	0.04	0.03		
	Imazapic	µg/L	0.01	2	2	0	(1000)	0	<0.01	<0.01	<0.01		
	Triclopyr	µg/L	0.07	2	2	0	(0.02)	0	<0.07	<0.07	<0.07		
	Hexazinone	µg/L	0.01	2	2	2	(0.4)	0	0.02	0.02	0.02		
	Others detected:- Metolachlor ESA	µg/L	0.01	2	2	2			0.03	0.14	0.09		

Table 3c - Verification monitoring results - Collinsville Scheme Potable Water

	Parameter	Unit of Measure	LOR	No. Samples to be collected from Approved Plan	Actual Total Samples Collected	No. Samples in which parameter was detected	ADWG Aesthetic (Health) Guideline	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results	95th Percentile	Comment
In House Test Results	pH	mg/L	0.1	216	418	415	6.5-8.5	0	7	7.96	7.6		
	Turbidity	NTU	0.01	216	418	414	5	0	0.07	1.03	0.17		
	Conductivity	µS/cm	1		156	153			115	363	211		
	Colour	Pt/Co	1	216	417	168	15	0	0	8	1.5		
	Free chlorine residual	mg/L	0.1		418	409			0.2	1.86	1.1		
	Total chlorine residual	mg/L	0.1		133	103			0.49	2.75	1.7		
	Alkalinity	mg/L	0.1	216	155	152			38	76	59		
	Total hardness	mg/L	0.1	216	0		200						
	Iron	mg/L	0.01	216	417	402	0.3	0	0	0.07	0.021		
	Manganese	mg/L	0.001	216	416	387	0.1 (0.5)	0	0	0.01	0.004		
	Aluminium	mg/L	0.001	216	417	415	0.2	0	0.007	0.2	0.019		
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	0	6.7	7.7	7.2	7.6	
	Turbidity	NTU	1	24	24	0	5	0	<0.1	<0.1	<0.1	<0.1	
	Colour	Pt/Co	1	24	24	0	15	0	<1	<1	<1	<1	
	Conductivity	µS/cm	5	24	24	24			110	240	153	230	
	Alkalinity	mg/L	5	24	24	24			33	89	49	87	
	Total hardness	mg/L	5	24	24	24	200	0	27	83	44	80	
	Total dissolved solids	mg/L	10	24	24	24		0	72	140	94	139	
	Chloride	mg/L	2	24	24	24	250	0	14	23	16.9	20.0	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	1.5	4.7	2.4	4.4	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.04	0.11	0.061	0.090	
	Nitrate	mg/L	0.05	24	24	24	(50)	0	0.08	0.36	0.210	0.350	
	Silica	mg/L	5	24	24	24	80	0	7.2	18	14.8	17.0	
	Sodium	mg/L	0.05	24	24	24	180	0	11	18	13.1	16.9	
	Potassium	mg/L	0.05	24	24	24			0.87	2.2	1.34	2.19	
	Calcium	mg/L	0.05	24	24	24			6.4	21	11.0	19.6	
	Magnesium	mg/L	0.05	24	24	24			2.6	7.7	4.09	7.45	
	Chlorate	mg/L	0.01	24	24	24			0.1	0.38	0.220	0.369	
	Aluminium	mg/L	0.01	24	24	24	0.2	0	0.009	0.069	0.0251	0.0575	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	13	(0.01)	0	0.0001	0.0005	0.00022	0.00050	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.01	0.03	0.0165	0.0287	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.012	0.027	0.017	0.025	
	Cadmium	mg/L	0.0001	24	24	0	(0.002)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	0	(0.05)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Cobalt	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	24	1 (2)	0	0.001	0.011	0.0045	0.0100	
	Iron	mg/L	0.005	24	24	6	0.3	0	0.006	0.009	0.0073	0.0088	
	Lead	mg/L	0.0001	24	24	1	(0.01)	0	0.0003	0.0003	0.0003	0.0003	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0002	0.0073	0.0019	0.0068	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0001	0.0006	0.0003	0.0005	
	Nickel	mg/L	0.0001	24	24	14	(0.02)	0	0.0001	0.0004	0.00020	0.00034	
	Selenium	mg/L	0.0001	24	24	0	(0.01)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Silver	mg/L	0.001	24	22	0	(0.1)	0	<0.001	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.05	0.17	0.090	0.169	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	0	(0.017)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Vanadium	mg/L	0.0001	24	24	24			0.0003	0.0014	0.0008	0.0013	
	Zinc	mg/L	0.001	24	24	24	3	0	0.001	0.035	0.0058	0.0177	
	Chloroform	µg/L	1	24	24	24		0	3	55	20.7		
	Bromodichloro methane	µg/L	1	24	24	24		0	4	19	10.9		
	Dibromochloro methane	µg/L	1	24	24	24		0	1	7	4.5		
	Bromoform	µg/L	1	24	24	2		0	<1	1	<1		
	Total THM's	µg/L	1	24	24	24	(250)	0	11	78	36.6		
	PFOS + PFHxS	µg/L	0.005	8	8	0	0.07	0	<0.005	<0.005	<0.005		
	Methyl Isoborneol	ng/L	1	2	2	0		0	<2	<2	<2		
	Geosmin	ng/L	1	2	2	0		0	<2	<2	<2		
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L	0.2	2	2	2	(500)	0	0.2	0.5	0.4		Reticulated & Treated Refer QHFSS SSP0088602
	Desethyl Atrazine	µg/L	0.01	2	2	0	20	0	<0.01	<0.01	<0.01		
	Atrazine, 2-hydroxyl	µg/L	0.01	2	2	0	200	0	<0.01	<0.01	<0.01		
	Metolachlor	µg/L	0.02	2	2	0	(300)	0	<0.02	<0.02	<0.02		
	Imazapic	µg/L	0.01	2	2	0	(1000)	0	<0.01	<0.01	<0.01		
	Triclopyr	µg/L	0.07	2	2	0	(0.02)	0	<0.07	<0.07	<0.07		
	Hexazinone	µg/L	0.01	2	2	0	(0.4)	0	<0.01	<0.01	<0.01		
	Others detected:-	µg/L											

Table 3d - Verification monitoring results - Proserpine Scheme Potable Water

	Parameter	Unit of Measure	LOR	No. Samples to be collected from Approved Plan	Actual Total Samples Collected	No. Samples in which parameter was detected	ADWG Aesthetic (Health) Guideline	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results	95th Percentile	Comment
In House Test Results	pH	mg/L	0.1	104	404	404	6.5-8.5	0	7.1	8.1	7.6		
	Turbidity	NTU	0.01	104	404	404	5	0	0.02	0.92	0.10		
	Conductivity	µS/cm	1		138	138			422	564	493		
	Colour	Pt/Co	1	104	403	87	15	0	0	3	0.3		
	Free chlorine residual	mg/L	0.1		407	407			0.076	2.23	1.16		
	Total chlorine residual	mg/L	0.1		97	97			0.087	2.28	1.33		
	Alkalinity	mg/L	0.1	104	129	129			88.4	191.2	114		
	Total hardness	mg/L	0.1	104	130	130	200	0	15.6	158.4	113		
	Iron	mg/L	0.01	104	404	384	0.3	0	0	0.05	0.012		
	Manganese	mg/L	0.001	104	404	384	0.1 (0.5)	0	0	0.057	0.015		
	Aluminium	mg/L	0.001	104	404	404	0.2	0	0.013	0.148	0.072		
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	0	7.0	8.0	7.6	7.9	
	Turbidity	NTU	1	24	24	0	5	0	<1	<1	<1	<1	
	Colour	Pt/Co	1	24	24	0	15	0	<1	<1	<1	<1	
	Conductivity	µS/cm	5	24	24	24			460	530	508	529	
	Alkalinity	mg/L	5	24	24	24			89	110	108	110	
	Total hardness	mg/L	5	24	24	24	200	0	92	115	109	114	
	Total dissolved solids	mg/L	10	24	24	24		0	280	320	307.9	320.0	
	Chloride	mg/L	2	24	24	24	250	0	70	84	79.0	83.9	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	9.8	17	14.0	17.0	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.1	0.14	0.13	0.14	
	Nitrate	mg/L	0.05	24	24	24	(50)	0	4.6	8.1	6.9	7.9	
	Silica	mg/L	5	24	24	24	80	0	42	51	48	51	
	Sodium	mg/L	0.05	24	24	24	180	0	54	63	59	62	
	Potassium	mg/L	0.05	24	24	24			0.9	1.2	1.0	1.1	
	Calcium	mg/L	0.05	24	24	24			18	23	21.9	23.0	
	Magnesium	mg/L	0.05	24	24	24			12	14	13.4	14.0	
	Chlorate	mg/L	0.01	24	24	24			0.17	0.52	0.33	0.51	
	Aluminium	mg/L	0.01	24	24	24	0.2	0	0.058	0.12	0.08	0.12	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	24	(0.01)	0	0.0003	0.0004	0.0003	0.0004	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.022	0.026	0.024	0.026	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.024	0.03	0.0275	0.0300	
	Cadmium	mg/L	0.0001	24	24	0	(0.002)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	0	(0.05)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Cobalt	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	9	1 (2)	0	0.001	0.004	0.0019	0.0036	
	Iron	mg/L	0.005	24	24	1	0.3	0	0.007	0.007	0.007	0.007	
	Lead	mg/L	0.0001	24	24	1	(0.01)	0	0.0001	0.0001	0.0001	0.0001	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0002	0.014	0.002	0.011	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0002	0.0003	0.00026	0.00030	
	Nickel	mg/L	0.0001	24	24	14	(0.02)	0	0.0001	0.0002	0.00012	0.00020	
	Selenium	mg/L	0.0001	24	24	24	(0.01)	0	0.0003	0.0004	0.00034	0.00040	
	Silver	mg/L	0.001	24	24	0	(0.1)	0	<0.001	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.24	0.31	0.288	0.309	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	<0.0001	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	23	(0.017)	0	0.0001	0.0002	0.00013	0.00020	
	Vanadium	mg/L	0.0001	24	24	24			0.0016	0.0031	0.00273	0.00309	
	Zinc	mg/L	0.001	24	24	9	3	0	0.001	0.006	0.002	0.004	
	Chloroform	µg/L	1	24	24	24		0	1	10	3.4		
	Bromodichloro methane	µg/L	1	24	24	24		0	4	25	10.8		
	Dibromochloro methane	µg/L	1	24	24	24		0	10	44	22.8		
	Bromoform	µg/L	1	24	24	24		0	8	21	14.5		
	Total THM's	µg/L	1	24	24	24	(250)	0	23	98	51.3		
	PFOS + PFHxS	µg/L	0.005	8	8	0	0.07	0	<0.005	0.03	<0.005		Reticulated 0.03 6:2 FTS Aug 2023, 0.002 PFOA Feb 2024
	Methyl Isoborneol	ng/L	1	2	2	0		0	<2	<2	<2		
	Geosmin	ng/L	1	2	2	0		0	<2	<2	<2		
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L	0.2	2	2	0	(500)	0	<0.2	<0.2	<0.2		Reticulated & Treated Refer QHFSS SSP0088602
	Desethyl Atrazine	µg/L	0.01	2	2	1	20	0	0.01	0.01	0.01		
	Atrazine, 2-hydroxyl	µg/L	0.01	2	2	2	200	0	0.01	0.01	0.01		
	Metolachlor	µg/L	0.02	2	2	2	(300)	0	0.05	0.05	0.05		
	Imazapic	µg/L	0.01	2	2	0	(1000)	0	<0.01	<0.01	<0.01		
	Triclopyr	µg/L	0.07	2	2	0	(0.02)	0	<0.07	<0.07	<0.07		
	Hexazinone	µg/L	0.01	2	2	2	(0.4)	0	0.02	0.02	0.02		
	Others detected:- Metolachlor ESA	µg/L	0.01	2	2	2			0.24	0.27	0.26		
	Metolachlor OXA	µg/L	0.01	2	2	2			0.07	0.08	0.08		

Table 4 - Reticulation *E.coli* verification monitoring

Drinking water scheme:	Year	Month	No. of samples from Approved Plan	No. of samples collected	No. of samples collected in which E. coli is detected (i.e. a failure)	No. of samples collected in previous 12 month period	No. of failures for previous 12 month period	% of samples that comply	Compliance with 98% annual value
Bowen Scheme	2023	July	21	21	0	269	0	100	YES
		Aug	21	24	0	269	0	100	YES
		Sept	21	21	0	269	0	100	YES
		Oct	21	24	0	269	0	100	YES
		Nov	21	21	0	269	0	100	YES
		Dec	21	21	0	269	0	100	YES
	2024	Jan	21	24	0	269	0	100	YES
		Feb	21	21	0	269	0	100	YES
		Mar	21	21	0	264	0	100	YES
		Apr	21	23	0	266	0	100	YES
		May	21	22	0	264	0	100	YES
		June	21	21	0	264	0	100	YES
Coastal Scheme	2023	July	20	20	0	250	0	100	YES
		Aug	20	22	0	250	0	100	YES
		Sept	20	21	0	252	0	100	YES
		Oct	20	23	0	256	0	100	YES
		Nov	20	20	0	250	0	100	YES
		Dec	20	20	0	270	0	100	YES
	2024	Jan	20	23	0	253	0	100	YES
		Feb	20	22	0	260	0	100	YES
		Mar	20	20	0	255	0	100	YES
		Apr	20	23	0	258	0	100	YES
		May	20	20	0	255	0	100	YES
		June	20	20	0	254	0	100	YES
Collinsville Scheme	2023	July	18	18	0	240	0	100	YES
		Aug	18	21	0	240	0	100	YES
		Sept	18	18	0	240	0	100	YES
		Oct	18	21	0	240	0	100	YES
		Nov	18	18	0	230	0	100	YES
		Dec	18	18	0	230	0	100	YES
	2024	Jan	18	21	0	228	0	100	YES
		Feb	18	18	0	228	0	100	YES
		Mar	18	19	0	229	0	100	YES
		Apr	18	21	0	232	0	100	YES
		May	18	18	0	229	0	100	YES
		June	18	18	0	229	0	100	YES
Proserpine Scheme	2023	July	18	19	0	247	0	100	YES
		Aug	18	22	0	246	0	100	YES
		Sept	18	19	0	246	0	100	YES
		Oct	18	22	0	249	0	100	YES
		Nov	18	19	0	244	0	100	YES
		Dec	18	19	0	244	0	100	YES
	2024	Jan	18	22	0	242	0	100	YES
		Feb	18	19	0	241	0	100	YES
		Mar	18	19	0	241	0	100	YES
		Apr	18	22	0	244	0	100	YES
		May	18	19	0	240	0	100	YES
		June	18	19	0	240	0	100	YES

Table 5 - Raw Water Monitoring Results

Parameter	Unit	Bowen Raw	Coastal Raw	Collinsville Raw	Proserpine Raw
Date Sampled		07/05/2024	07/05/2024	07/05/2024	07/05/2024
Methyl Isoborneol (MIB)	ng/L	<2	<2	<2	<2
Geosmin	ng/L	<2	<2	<2	<2
Non Purgeable Organic Carbo	mg/L	3.9	1.5	2.4	1.7
Dissolved NPOC	mg/L	3.3	1.1	1.7	1.2
Date Sampled		07/05/2024	07/05/2024	07/05/2024	07/05/2024
Total Alpha Activity	Bq/L	<0.1	<0.1	<0.1	<0.1
Total Beta Activity	Bq/L	<0.1	<0.1	<0.1	<0.1
K40 Corrected Beta Activity	Bq/L	<0.1	<0.1	<0.1	<0.1
Herbicides -					
Metolachlor	µg/L	<0.02	*0.02*	<0.02	*0.05*
Bromacil	µg/L	<0.02	*0.27*	<0.02	*0.06*
Desethyl Atrazine	µg/L	<0.01	*0.01*	<0.01	*0.01*
Atrazine, 2-hydroxyl	µg/L	*0.02*	*0.01*	<0.01	*0.02*
Hexazinone	µg/L	<0.01	*0.02*	<0.01	*0.02*
Metolachlor ESA	µg/L	<0.01	*0.03*	<0.01	*0.24*
Metolachlor OXA	µg/L	<0.01	<0.01	<0.01	*0.07*

Table 6 - Bowen Raw Water Blue Green Algae Results

Bowen Raw Water Blue Green Algae (cells/mL)		
08/08/2023	22400	Toxins <0.03 ug/L
14/11/2023	72400	Toxins <0.03 ug/L
16/01/2024	<20	
13/02/2024	<20	
07/05/2024	<20	

Appendix B – Implementation of the DWQMP Risk Management Improvement Program

APPENDIX B - Risk Management Improvement Plan

Completed

Ongoing

Lastest comments

Scheme Component / Sub- component		Hazardous event	Hazard	Priority	Interim Action(s)	Short-term Action(s)	Long-term Action(s)	Original Target date/s	Revised Target Date	Cost	Responsibility	Actions Taken
Catchment - Proserpine River	**1**	Inadequate Water Supply - Bowen WTP	Supply loss & pump damage	Medium	Monitor flows and pump efficiencies. Replace pump impellers. Start design work on options. Completed	Remove sand from around spears and rock gabling in 2018 Completed	-Open water intake, - major maintenance around spears (remove geo-fabric & rock repack)	- Nov 2018 - May 2019	~~- Aug 2019 (maintenance)~~ ~~- June 2022~~ ~~- Jun 2023~~ - Jun 2024	Est $800K for intake $500K for river spear maint	Treatment Operations Manager, Planning & Assets Engineer, Capital Works Manager, Principal Engineer (Treatment)	Initial-Open water intake design work commenced and initial tender released. Preliminary works commenced. 2018-Open water intake utilising a diesel pump operational. Civil construction works delayed up to 3 years as tender prices significantly higher than anticipated. 2023 - Civil works now at concept stage, works progressing. Maintenance done in 2018, will be carried out again 2019. 3 stage capital process-Building; electrical; mechanical; starting Jan 2022 Replacement of existing pumps underway In place and operational. Installed but in defects period Assessing electric pump to replace diesel pump - Ongoing Maintenance of spears - ongoing Future works - increase spear capacity, still in concept design, open water intake - planning and approvals underway & options for bores beside river - bore testing unsuccessful.
Catchment - Proserpine Bores	**30**	Inadequate Water Supply - Proserpine WTP	Supply loss & pump damage	Medium	Engaged subject matter expert to carry out investigation and design	Bore investigation underway	New bores (~~and pump station~~) to replace Bore 1, 2, 3 - lower risk water - closer proximity to Proserpine WTP - Investigate open water intake as a supply option	2022-23	2024-25	Est $2.5M	Planning & Assets Engineer	2018-Concept design completed ~~Pump Station complete, undergoing commissioning. Refer No. 29~~ Planning for bores underway; ~~funding application in process for construction of 4 bores (1 bore funded)~~ Design phase underway on schedule; Capital works due for completion 23-24 Bore 10 redirected Open water intake has been deferred at this stage. Production bores completed, civil works ongoing, licence options to be investigated (Capital available 25-26 for bores 1,2,3 replacement)
WTP	**32**	Instrumentation Failure	Loss of online monitoring	Low			Replace Turbidity Analysers with HACH units as required.		~~June 2023~~ Dec 2023		Principal Engineer (Treatment)	~~Due to unavailability of service technician (COVID lockdowns) will change to service provider with local technicians.~~ Cabinet and meters delivered, installation scheduled by June 23 Proserpine WTP completed Standardisation across region through WIM Alliance - lowered priority in WIM Alliance
Collinsville WTP	**5**	Filtration Failure	Turbidity etc.	Low		Turbidity Analysers at each Filter	Control system to have more control over plant		Short Term ~~July 2018~~ Long Term ~~July 2019~~ ~~Dec 2022~~ Dec 2023		Treatment Operations Manager Principal Engineer (Treatment)	Initial-Analysers received 2018-Turbidity analysers installed. SCADA control scheduled for completion September 2019. SCADA control delayed due to incorportion into Solar panel project with completion due end 2022. Further delays due to absences of key staff. Existing Radtel to stay with ClearScada overlays, there may be constraints on what can be done. Secondary control completed on each filter to enable plant shutdown Works commenced on optimisation of plant processes 24-25
Collinsville WTP	**33**	Electrical components failure - pump, power	Loss of Supply			Collinsville Solar Project		Jun-22	Dec 2023	$900k	~~Treatment Operations Manager~~ Capital Works Project Manager	Solar energy project to run both Collinsville WTP ~~and STP~~ with electrical upgrades at both plants, incorporating SCADA control, generator will be incorporated. No STP will be included at this stage. Delayed due to absences of key staff (including Project Manager). ~~Initial project was simple, but has grown to include rewiring and existing transformer needs to be replaced (26 week wait)~~ Scope revised to fit within scope and existing funding. No rewiring etc. In house project manager and superintendant employed to complete package of works. Solar completed High lift pumps upgraded Power to plant upgraded (transformer undersized)

Storage Reservoirs	**20**	Human access to reservoirs	Bacterial, Viral and Protozoan contamination due to animal or human entry	High	Inspection of all reservoir roof structures, security and vermin proofing	Immediate minor repairs to identified issues where possible	Full asset check of all reservoir structures, vermin proofing material and site security, with asset list and mapping creation. Also preventative maintenance schedule created	Dec-15	Ongoing	Staff time + what ever tasks are required.	Treatment Operations Manager & field staff, Network Operations Managers	Initial-Inspections complete. Roof repairs done. Monthly Reservoir inspections commenced. Repairs to vermin proofing from cyclone Debbie required - Scheduled for October - December 2017. 2018-Ongoing External audit of all reservoirs scheduled for 2019 (including safety and security). Report will feed into the database for scheduling of works required. Inspections ongoing - Operators-water quality; Networks-structural/mechanical External audit money used for maintenance and audit carried out by our own staff. Remaining findings included into maintenance schedule. Repair works to commence on Mt Devlin reservoir. Refer to No. 35
Security	**31**	Cybersecurity	Breach into SCADA - at WTP's or in Network	High		CCTV & Boom gates at plants. External Audit of all sites	Implement audit actions	Short Term - end 2019; Long Term 2020	Jun-24		Treatment Operations Manager; Network Operations Managers	2018-CCTV & Boomgates installation commenced. External audit scope devised. Site Safety - STP's completed. Business case to be developed for high risk water sites (eg Proserpine WTP as is a multi use depot) for electronic gates. Multiple locks are in use in some areas - to be removed. CCTV not working consistently, footage not available. Working with Facilities on CCTV Slide gates preferable to boom gates Cybersecurity - SCADA Strategy and 16 quick wins inititated. Ongoing. Completed (initial items) Stage 1 - some CCTV's installed for specific locations (diesel tanks etc) Further stages as budget allows
Staff Training and Awareness	**34**	Staffing	Insufficient staffing redundancy	High	Quality over Quantity		Fully Trained operators for relief use at any site				Treatment Operations Manager	No redundancy staff available for periods of absence. Collinsville WTP - only available backup has experience but no qualifications. Replacement staff very difficult to get. Only Trainee not filled. Advertised again. Continuing with staff rotation program to enable staff multiskilling. Now BAU Collinsville now has other experienced operators capable to run plant
Storage Reservoirs	**35**	Human access to reservoirs	Bacterial, Viral and Protozoan contamination due to animal or human entry	High			Repair works to reservoirs	Mt Devlin - June 2024 Bowen - June 2025 Cannonvale - June 2026 Shute Harbour- June 2025			Capital Works Project Manager	Collinsville, Miller St - completed Collinsville, Mt Devlin - RPEQ certified inspection identified additional works to meet regulations & specs. Works tendered to replace roof, vermin proofing and repairs up to required specs. Completed Bowen, 12ML - Reroofing, stair and roof access Completed Bowen, 3ML - Roof replacement, roof & stair access & leak detection and repair Full Structural assessment 24-25 Cannonvale - Structural inspection and subsequent repair, dependent on Cannon Valley reservoirs on line. Roof repairs completed, furhter works after Cannon Valley reservoirs on line Shute Harbour (Mt Roper) - access fencing Front fence & CCTV completed, remainder due 24-25
Collinsville WTP	**4**	Contamination by Fresh Water Shellfish	Taste & Odour	Low	Shellfish removed as soon as observed. Regular inspections. Chlorination.	- PAC dosing initiated as required to remove taste and odour compounds			Ongoing	Operational cost as required	Operator	Initial-Ongoing maintenance; PAC dosing can be utilised to reduce taste and odour compounds Ongoing Complete Drain and clean of clarifier 2020 (travelling bridge also adjusted) Maintenance ongoing
Reticulation	**6**	Chlorine Overdose	Taste / Odour	Low	Sodium hypochlorite dosing based on flow rate in WTP. Online chlorine analysers at plant have high chlorine CCP alarm that initiates plant shutdown. Daily sampling undertaken.	Telemetry to be installed to new online instrumentation within the reticulation.	Investigate effect of closing down re-chlorination stations & installation of more online analysers at strategic locations around the region.	Jun-19	Jun-22	$10K for telemetry on new analysers.	Treatment Operations Manager	Initial-Online chlorine residual analysers have been installed within the Bowen, Proserpine & Cannonvale reticulation. Extra (Auto) sodium hypochlorite monitoring & dosing equipment installed at Bowen reservoir & Flemington rd chlorinator. 2018-Bowen reservoir completed. Flemington Rd chlorinator to be decommissioned. Railway Rd (Merinda) dosing stations upgraded. Telemetry for all analysers scheduled for 2021-22. Southern reticulation network upgrade scheduled, See #29. Ongoing

Reticulation	**7**	Chlorination failure / Loss of Residual / Chlorinator failure	Public health	High	Sodium hypochlorite dosing based on flow rate in WTP. Online chlorine analysers at plant have low chlorine CCP alarm that initiates plant shutdown. Daily sampling undertaken.	Telemetry to be installed to new online instrumentation within the reticulation.	Investigate effect of closing down re-chlorination stations & installation of more online analysers at strategic locations around the region.	Jul-19		$10K for telemetry on new analysers.	Treatment Operations Manager	As per No. 6
Reticulation	**9**	Backflow	public health / Aesthetics	High	All RPZDs to be tested	RPZD testing schedule to be implemented with checks to ensure tests are completed in time. Faulty devices to be repaired or replaced.	Assets mapped and listed and annual preventative maintenance implemented into councils systems. Investigate if RPZ are present as part of meter assembly during meter reading.	Nov-15	Nov-19	Staff time	Treatment Operations Manager, Trade Waste Coordinator, Network Operations Managers	Initial-Incomplete lists have been developed for Northern and Southern areas. Consolidating this role into a regional one through the trade waste coordinator. 2018-This role has moved back to Water Operations. Audit completed, lists to be compiled into the new Council system. Ongoing Maintenance plan underway
Reticulation	**10**	High flow (sediments mobilised, slimes detached)	Aesthetics / Suspended Solids / Taste, Odour & Colour	Medium	Flushing program	Pigging program	Pigging program		Ongoing	Staff time	Planning & Assets Engineer, Network Operations Managers	Initial-Pigging program underway 2018-Ongoing Includes bore mains. Ongoing
Reticulation	**11**	Slimes detaching	Aesthetics / Suspended Solids / Taste, Odour & Colour	Medium	Flushing program	Pigging program	Pigging program		Ongoing	Staff time	Planning & Assets Engineer, Network Operations Managers	Initial-Pigging program underway 2018-Ongoing Ongoing
Bowen - Proserpine main	**17**	Farmers over use of treated water	Water supply cut-off / Public health	High	Monitoring of usage and communication with farmers using WRWW treated water.	Future planning of use by farmers, with farmers	Farmers and state government to use alternatives to treated water.	tbc	Dec-16	Staff time	Planning & Assets Engineer	Initial-Only 1 user allocation still in effect 2018-Monitoring on other potential users.
Bowen - Proserpine main	**18**	Farmers contaminating Drinking water supply	Public health	Medium	Communication with Farmers	Farmers to be asked to create SOPs for their usage of supply	Council to review farmers SOPs & processes for turning water on/off & usage. Also farmers to eventually use alternatives to treated drinking water.	tbc	Dec-16	Staff time	Planning & Assets Engineer	Initial-Only 1 user allocation still in effect 2018-Monitoring on other potential users.
Storage Reservoirs	**21**	Animal Access to reservoirs.	Bacterial, Viral and Protozoan contamination n due to animal or human entry	High	Inspection of all reservoir roof structures, security and vermin proofing	Immediate minor repairs to identified issues where possible	Full asset check of all reservoir structures, vermin proofing material and site security, with asset list and mapping creation. Also preventative maintenance schedule created & implemented	Dec-15	Ongoing	Staff time + what ever tasks are required.	Treatment Operations Manager & field staff, Network Operations Managers	Initial-Inspections complete. Roof repairs done. Monthly Reservoir inspections commenced. Repairs to vermin proofing from cyclone Debbi required - Scheduled for October - December 2017. 2018-Ongoing Ongoing
Storage Reservoirs	**22**	Short circuiting of reservoirs	Bacterial, Viral, Protozoa	Medium	Reservoirs to be operated to ensure turnover (when network allows).	Possible pipework changes	Install mixers if appropriate. Installing sample taps at reservoirs to enable monthly sampling.	2017-18	Ongoing Monitoring	Staff time	Treatment Operations Manager.	Initial-Reservoirs appear to have appropriate mixing via operational level controls. Regular sampling to ensure residual maintained carried out each month. 2018-Ongoing Ongoing
Security	**25**	Water quality	Water quality	High			In-depth Risk assessment and control measures to improve security at drinking water supply system sites and WTPs processes.	Jun-16	Ongoing		Treatment Operations Manager, Network Operations Managers, Team Leaders	Initial-Risk assessments contained within DWQMP. Monthly Reservoir checks improve security on site. 2018-Ongoing Ongoing
Operation and Maintenance Procedures	**26**			High	Draft set of procedures to be reviewed and updated.	Additional procedures required identified, drafted, reviewed and implemented	Regular review	Dec-15	Ongoing	Staff time	Treatment Operations Manager; Network Operations Managers, Field Staff, Environmental Management Coordinator	Initial-A list of procedures (included in DWQMP) will be reviewed on 2 yearly basis. Further procedures identified in risk assessments will be developed as required. 2018-Ongoing Ongoing

Staff Training and Awareness	**27**	Staff training and awareness	Staff training and awarenes ss	High			Implement training and awareness workshops once management plan approved in toolbox talks. Assess training need through internal audits and general feedback. KPI toolbox talk, updated ADWG related toolbox talks	Dec-15	Ongoing	Staff time	Treatment Operations Manager; Senior Staff, Field Staff, Environmental Management Coordinator	Initial-Gap analysis training conducted in September 2017 to certify operators under new national training package (NWP15). Refresher may be required for new staff, and new staff will also be updated under the new training package. 2018-Ongoing Ongoing
Customer Awareness Processes	**28**	Customer awareness	Custome r awarene ss	Mediu m			Customer process definition and provide details to customer in customer service standards on levels of service they can expect.	Dec-15	Ongoing	Staff time	Treatment Operations Manager; Environmental Management Coordinator, Website client liaison.	Initial-Complete. Updated standards uploaded onto Whitsunday Regional Councils website as required. 2018-Ongoing Ongoing