Drinking Water Quality Management DWQMP – Annual Report

2021-2022

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
16/12/2022	Annual Report	Kerrie Pearson	Paul Sandbek	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 *Drinking Water Quality Management Plan Report Guidance Note* published by the Department of Natural Resources, Mines and Energy, Queensland, September 2018 accessible at www.business.qld.gov.au (now Department of Regional Development, Manufacturing and Water).

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, ML/day
Bowen	Bowen, Brisk Bay, Merinda	10400 (5000 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 7.4)
Collinsville	Collinsville, Scottsville	1500 (1200 connections)	Bowen River Weir, from Eungella Dam (Sunwater)	Conventional Flocculation and filtration. Disinfected with Sodium Hypochlorite.	6 {Av 2.4)
Proserpine	Proserpine, Mt Julian (supplies Cannonvale/Airlie Beach)	4200 (2000 connections)	Aquifer bores, supplemented from Peter Faust Dam	Conventional Flocculation with Dual media filtration. Disinfected with Sodium Hypochlorite.	14 (Av 5.4)
Coastal	Cannonvale, Airlie Beach, Mt Julian, Jubilee Pocket	14600 (6200 connections)	Aquifer bores	Conventional Flocculation with Dual media filtration. Disinfected with Sodium Hypochlorite.	9.6 (Av 4.4)

Table 1- Drinking Water Supplies

During the 2021-2022 year there were some major changes to the Coastal Water Supply Scheme. These will be included in a future amendment of the DWQMP.

In summary the changes included:

- Bulk supply pipeline – replace existing 225 bulk water supply pipeline from Proserpine WTP to Coastal WTP with a 559 diameter pipe; new pump station to pump 140L/s through the new pipeline; redirect Bore 10 from Coastal to Proserpine WTP. Completed.
- Cannon Valley Reservoirs – Construct 2 new 12ML reservoirs; redirecting water from the new bulk supply pipeline to the new reservoirs only, with the rest of the network then being gravity fed from the Cannon Valley Reservoirs. Completed, but not on-line.
- 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. Completed.
- 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 projects will take the pressure off the Coastal WTP to allow it to be taken off-line for maintenance or other works and not to be in production 24hrs every day. These works are to be finalised with the timings taken into consideration for demand management.

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 – pumps being replaced, further work still in concept design
- Proserpine Bores – design complete, construction scheduled for 2023-24
- Replace Turbidity analysers – Proserpine WTP – analysers and cabinet arrived, yet to be installed.
- Collinsville Solar Project – delayed due to absences of key staff, project has grown and includes delivery delays
- Bulk potable water project in the Coastal and Proserpine reticulation network. 2 x reservoirs construction completed, network configuration completed. Not on-line as yet until actual program of works at Coastal WTP decided and timed.
- Site security – requirements for WTP sites to be decided
- Cybersecurity - ongoing
- Staffing – replacements very difficult to find. Staff rotating to increase multi-skill levels to help with shortages.

2.2 The Monitoring Program

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

2.3 Amendments made to the DWQMP

A review of the DWQMP was conducted and sent with an amendment application on 1 October 2021. This was approved in December 2021.

A further amendment (Version 3.1) was made in April 2022, which was rejected in November 2022 after a Show Cause Notice in September 2022. WRC are continuing to work with the Department to meet an agreeable solution.

The Approved DWQMP as at 30 June 2022 is Version 3, approved in December 2021.

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

All samples taken during this financial year met the recommended health values in the Australian Drinking Water Guidelines.

There were 3 pH values at Collinsville that were below the lower aesthetic pH value of 6.5 from the external samples. These did not correlate to any in-house values from the same day. All external pH values for this set of samples were abnormally low.

An Aluminium value at Collinsville was also above the aesthetic limit at 0.34 mg/L from the external samples (ICP-MS method 27441) taken 19 November 2021. This did not correlate to the result from a different method (method 18195 at 0.06 mg/L) by the external Lab on the same sample or to any in-house value from that day (0.030 and 0.033 mg/L).

Chlorate was detected again in Bowen Reticulated water in January 2022, but was not an exceedance.

3.2 E. coli

There were 2 E.coli detections in April 2022 in Collinsville; these were related to sampling issues (sampling under a tree while raining). Further details can be found in Section 4.

There were no other detections of E.coli for the 2021-22 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

The only notification made this year was involving the detection of *E. coli* – an organism that may not directly represent a hazard to human health but indicates the presence of recent faecal contamination, in Collinsville in April 2022.

Collinsville E.coli detection – April 2022 – DWI-501-22-09589

Samples taken during routine water sampling on Tuesday 26 April 2022 indicated the presence of E.coli at Miller St Reservoir site (sample taken from park across the road from the reservoir) and Walker St site (sampled just before Miller St site). All retests taken returned negative results. During the investigation and debrief session it was discovered that the Miller St sample point is under trees, at the time of sampling it was raining enough that the sampler was getting wet from raindrops falling from the trees, it started raining during sampling at Walker St. This is a potential contamination source. Further work was done on the sampling procedure to include information about potential contamination sources and designated sampling points have been initiated, starting with Collinsville.

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	0	9	3	12
Coastal	0	7	1	8
Collinsville	0	0	0	0
Proserpine	0	4	0	4
Total	0	20	4	24

Table 2 – Complaints about water quality

5.1 Suspected Illness

There were no suspected illness complaints attributed to potable water.

5.2 Discoloured Water

There were 5 dirty water complaints received on the one day in Bowen in July 2021, these related to stripping of Iron and Manganese from the trunk main after some Chlorination works, flushing the area achieved clear water with no further complaints received or action required.

The other dirty water complaints in each area during the 2021-22 year were, in each case, just a localised area and was flushed to achieve clear water. No further action was required.

5.3 Taste and Odour

The taste and odour complaints in the Bowen and Coastal areas were determined to be unsubstantiated and no further action was required other than flushing in some cases.

6. DWQMP Review

The review of the DWQMP version 2.2, carried out in September 2021 resulted in an amendment to address minor changes in the water services provided by Whitsunday Regional Council. These are summarised below. The amendment was approved in December 2021 to DWQMP Version 3.

- Schematics for the Bowen, Coastal, Collinsville and Proserpine treatment process and reticulation schemes were updated to reflect minor changes.
    - Proserpine WTP – Potassium Permanganate only dosed if required
    - Coastal WTP – correction of preliminary Hypo dosing point
    - Bowen WTP – surface water intake diesel pump option added
    - Bowen Scheme – minor realignment of emergency feed bores
    - Collinsville WTP – corrections to dosing points and analysers
    - Collinsville Scheme – changes to configuration of reservoirs
- Monitoring trends of source water and treated water updated with more recent data
- Additions to the Risk assessments include
    - PAC dosing at Collinsville WTP removed
    - Staffing risks included
    - Cybersecurity split into two separate risks – site security and cybersecurity
- HACCP plans updated to show alignment with SCADA alarms
- Management of incidents and emergencies streamlined to 3 levels with additional scenarios included (some from learnings from recent incidents). This section is still under review with advice from the Department.
- The Risk Management Improvement Plan was updated including the addition of some new projects.
    - Bowen open water intake
    - Proserpine bores
    - Cannonvale Bulk Potable Water project
    - Turbidity analyser replacement
    - Collinsville solar project
    - Staffing
- Clarification of daily operational monitoring for weekends

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	Comment
In House Test Results	pH	mg/L	0.1	104	414	414	6.5-8.5	0	7.0	7.7	7.4	
	Turbidity	NTU	0.01	104	414	414	5	0	0.02	0.30	0.09	
	Conductivity	µS/cm	1		102	102			212	512	434	
	Colour	Pt/Co	1	104	414	232	15	0	<1	4	0.6	
	Free chlorine residual	mg/L	0.1		414	414			0.21	3.51	1.71	
	Total chlorine residual	mg/L	0.1		98	98			0.39	3.78	2.03	
	Alkalinity	mg/L	0.1	104	149	149			22	131	86	
	Total hardness	mg/L	0.1	104	151	151	200	0	39	101	78	
	Iron	mg/L	0.01	104	414	408	0.3	0	<0.01	0.06	0.018	
	Manganese	mg/L	0.001	104	414	294	0.1 (0.5)	0	<0.001	0.019	0.001	
	Aluminium	mg/L	0.001	104	414	414	0.2	0	0.006	0.076	0.020	
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	0	6.6	7.9	7.2	
	Turbidity	NTU	1	24	24	0	5	0	<1	<1	<1	
	Colour	Pt/Co	1	24	24	1	15	0	<8	<8	<8	
	Conductivity	µS/cm	5	24	24	24			320	500	411	
	Alkalinity	mg/L	5	24	24	24			67	99	86	
	Total hardness	mg/L	5	24	24	24	200	0	61	94	78	
	Total dissolved solids	mg/L	10	24	24	24			180	270	228	
	Chloride	mg/L	2	24	24	24	250	0	46	81	65.0	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	12	19	14.8	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.09	0.13	0.11	
	Nitrate	mg/L	0.05	24	24	24	(50)	0	0.07	0.31	0.18	
	Silica	mg/L	5	24	24	24	80	0	13	17	15.0	
	Sodium	mg/L	0.05	24	24	24	180	0	40	67	52.8	
	Potassium	mg/L	0.05	24	24	24			2.5	3.7	3.0	
	Calcium	mg/L	0.05	24	24	24			13	21	17.1	
	Magnesium	mg/L	0.05	24	24	24			6.7	10	8.5	
	Chlorate	mg/L	0.01	24	24	24			0.2	0.8	0.4	
	Aluminium	mg/L	0.01	24	24	24	0.2	0	0.012	0.051	0.025	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	24	(0.01)	0	0.0002	0.0004	0.0003	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.032	0.055	0.043	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.027	0.035	0.031	
	Cadmium	mg/L	0.0001	24	24	5	(0.002)	0	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	6	(0.05)	0	0.0001	0.0001	0.0001	
	Cobalt	mg/L	0.0001	24	24	1			<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	24	1 (2)	0	0.003	0.037	0.0160	
	Iron	mg/L	0.005	24	24	9	0.3	0	0.005	0.012	0.0075	
	Lead	mg/L	0.0001	24	24	15	(0.01)	0	0.0001	0.0008	0.0004	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0001	0.027	0.0025	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0003	0.0005	0.0004	
	Nickel	mg/L	0.0001	24	24	24	(0.02)	0	0.0001	0.0006	0.0002	
	Selenium	mg/L	0.0001	24	24	0	(0.01)	0	<0.0001	<0.0001	<0.0001	
	Silver	mg/L	0.001	24	24	0	(0.1)	0	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.16	0.24	0.194	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	3			0.0001	0.0008	0.0005	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	0	(0.017)	0	<0.0001	<0.0001	<0.0001	
	Vanadium	mg/L	0.0001	24	24	17			0.0001	0.0002	0.0002	
	Zinc	mg/L	0.001	24	24	22	3	0	0.001	0.007	0.0037	
	Chloroform	µg/L	1	24	24	24			6.0	87.0	35.1	
	Bromodichloro methane	µg/L	1	24	24	24			11.0	56.0	30.3	
	Dibromochloro methane	µg/L	1	24	24	24			12.0	38.0	22.4	
	Bromoform	µg/L	1	24	24	24			1.0	13.0	4.0	
	Total THM's	µg/L	1	24	24	24	(250)	0	36.0	180.0	92.0	
	PFOS	µg/L	0.005		8	0		0	<0.005	<0.005	<0.005	
	Methyl Isoborneol	ng/L	1	2	5	1			<2	3	<2	
	Geosmin	ng/L	1	2	5	2			<2	5	<2	
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L		2	2	2	(500)	0	1	1.9	1.5	Treated & Retic Refer QHFSS SSP0079171

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	Comment
In House Test Results	pH	mg/L	0.1	104	383	383	6.5-8.5	0	7.1	7.9	7.4	
	Turbidity	NTU	0.01	104	383	383	5	0	0.06	0.2	0.10	
	Conductivity	µS/cm	1		120	120			343	740	501	
	Colour	Pt/Co	1	104	383	75	15	0	<1	3	0.3	
	Free chlorine residual	mg/L	0.1		383	383			0.21	2.2	1.31	
	Total chlorine residual	mg/L	0.1		65	65			0.94	2.72	1.46	
	Alkalinity	mg/L	0.1	104	122	122			62	157	98	
	Total hardness	mg/L	0.1	104	122	122	200	0	74	168	114	
	Iron	mg/L	0.01	104	383	359	0.3	0	<0.01	0.04	0.01	
	Manganese	mg/L	0.001	104	383	195	0.1 (0.5)	0	<0.001	0.012	0.001	
	Aluminium	mg/L	0.001	104	383	383	0.2	0	0.005	0.076	0.044	
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	0	6.7	7.8	7.3	
	Turbidity	NTU	1	24	24	0	5	0	<1	<1	<1	
	Colour	Pt/Co	1	24	24	0	15	0	<8	<8	<8	
	Conductivity	µS/cm	5	24	24	24			170	580	488	
	Alkalinity	mg/L	5	24	24	24			45	100	90	
	Total hardness	mg/L	5	24	24	24	200	0	37	137	110	
	Total dissolved solids	mg/L	10	24	24	24			110	350	287	
	Chloride	mg/L	2	24	24	24	250	0	14	110	85.0	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	6.9	19	11.5	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.04	0.12	0.11	
	Nitrate	mg/L	0.05	24	24	24	(50)	0	0.22	9.5	5.83	
	Silica	mg/L	5	24	24	24	80	0	15	46	38.38	
	Sodium	mg/L	0.05	24	24	24	180	0	20	63	53.83	
	Potassium	mg/L	0.05	24	24	24			1.1	1.8	1.39	
	Calcium	mg/L	0.05	24	24	24			9.5	28	22.98	
	Magnesium	mg/L	0.05	24	24	24			3.3	16	12.75	
	Chlorate	mg/L	0.01	24	24	24			0.1	0.5	0.272	
	Aluminium	mg/L	0.01	24	24	24	0.2	0	0.019	0.074	0.052	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	24	(0.01)	0	0.0001	0.0005	0.00029	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.018	0.042	0.0331	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.013	0.029	0.0249	
	Cadmium	mg/L	0.0001	24	24	0	(0.002)	0	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	5	(0.05)	0	0.0001	0.0001	0.0001	
	Cobalt	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	13	1 (2)	0	0.001	0.018	0.0038	
	Iron	mg/L	0.005	24	24	5	0.3	0	0.006	0.021	0.01	
	Lead	mg/L	0.0001	24	24	11	(0.01)	0	0.0001	0.0004	0.00022	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0004	0.048	0.0044	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0001	0.0003	0.0002	
	Nickel	mg/L	0.0001	24	24	16	(0.02)	0	0.0001	0.0003	0.0002	
	Selenium	mg/L	0.0001	24	24	21	(0.01)	0	0.0001	0.0003	0.00018	
	Silver	mg/L	0.001	24	24	0	(0.1)	0	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.077	0.34	0.289	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	2	(0.017)	0	0.0001	0.0001	0.00010	
	Vanadium	mg/L	0.0001	24	24	24			0.0006	0.0021	0.0014	
	Zinc	mg/L	0.001	24	24	16	3	0	0.001	0.009	0.0036	
	Chloroform	µg/L	1	24	24	24			2.0	10.0	4.4	
	Bromodichloro methane	µg/L	1	24	24	24			6.0	188.0	19.3	
	Dibromochloro methane	µg/L	1	24	24	24			13.0	32.0	23.5	
	Bromoform	µg/L	1	24	24	24			9.0	19.0	13.4	
	Total THM's	µg/L	1	24	24	24	(250)	0	30.0	74.0	53.6	
	PFOS	µg/L	0.005		8	0		0	<0.005	<0.005	<0.005	
	Methyl Isoborneol	ng/L	1	2	2	0			<2	<2	<2	
	Geosmin	ng/L	1	2	2	0			<2	<2	<2	
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L		2	2	1	(500)	0	<0.2	0.2	<0.2	Treated Water Refer QHFSS SSP0079171
	Hexazinone	µg/L		2	2	1	(400)	0	<0.01	0.01	<0.01	Treated Water Refer QHFSS SSP0079171

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	Comment
In House Test Results	pH	mg/L	0.1	104	372	372	6.5-8.5	0	6.8	7.8	7.3	
	Turbidity	NTU	0.01	104	372	372	5	0	0.05	0.19	0.09	
	Conductivity	µS/cm	1		85	85			97	248	155	
	Colour	Pt/Co	1	104	372	46	15	0	<1	5	0.8	
	Free chlorine residual	mg/L	0.1		373	373			0.8	2	1.3	
	Total chlorine residual	mg/L	0.1		48	48			1	1.9	1.5	
	Alkalinity	mg/L	0.1	104	86	86			25	66	41	
	Total hardness	mg/L	0.1	104	0	0	200					
	Iron	mg/L	0.01	104	372	371	0.3	0	<0.01	0.1	0.012	
	Manganese	mg/L	0.001	104	372	368	0.1 (0.5)	0	<0.001	0.011	0.003	
	Aluminium	mg/L	0.001	104	372	372	0.2	0	0.0016	0.047	0.018	
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	**3**	6.3	7.3	6.8	
	Turbidity	NTU	1	24	24	0	5	0	1	1	1	
	Colour	Pt/Co	1	24	24	0	15	0	<8	<8	<8	
	Conductivity	µS/cm	5	24	24	24			130	500	195	
	Alkalinity	mg/L	5	24	24	24			26	91	44	
	Total hardness	mg/L	5	24	24	24	200	0	33	118	49	
	Total dissolved solids	mg/L	10	24	24	24			82	290	119	
	Chloride	mg/L	2	24	24	24	250	0	12	93	16.8	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	7.1	58	25.0	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.03	0.11	0.047	
	Nitrate	mg/L	0.05	24	24	24	(50)	0	0.1	5.9	0.493	
	Silica	mg/L	5	24	24	24	80	0	8.6	38	13.8	
	Sodium	mg/L	0.05	24	24	24	180	0	11	55	19.0	
	Potassium	mg/L	0.05	24	24	24			0.79	2.2	1.38	
	Calcium	mg/L	0.05	24	24	24			7.9	25	12.3	
	Magnesium	mg/L	0.05	24	24	24			2.9	14	4.46	
	Chlorate	mg/L	0.01	24	24	24			0.13	0.31	0.199	
	Aluminium	mg/L	0.01	24	24	24	0.2	**1**	0.008	0.34	0.0331	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	11	(0.01)	0	0.0001	0.0004	0.00017	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.012	0.07	0.0259	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.011	0.025	0.015	
	Cadmium	mg/L	0.0001	24	24	0	(0.002)	0	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	3	(0.05)	0	0.0001	0.0001	0.0001	
	Cobalt	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	24	1 (2)	0	0.002	0.057	0.0122	
	Iron	mg/L	0.005	24	24	11	0.3	0	0.005	0.029	0.0098	
	Lead	mg/L	0.0001	24	24	10	(0.01)	0	0.0001	0.0002	0.00014444	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0003	0.012	0.0025	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0001	0.0004	0.0003	
	Nickel	mg/L	0.0001	24	24	22	(0.02)	0	0.0001	0.0006	0.00024	
	Selenium	mg/L	0.0001	24	24	0	(0.01)	0	0.0001	0.0001	0.0001	
	Silver	mg/L	0.001	24	24	0	(0.1)	0	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.063	0.3	0.108	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	0	(0.017)	0	<0.0001	<0.0001	<0.0001	
	Vanadium	mg/L	0.0001	24	24	24			0.0007	0.0024	0.0014	
	Zinc	mg/L	0.001	24	24	23	3	0	0.001	0.023	0.0104	
	Chloroform	µg/L	1	24	24	24			3.0	95.0	33.8	
	Bromodichloro methane	µg/L	1	24	24	24			4.0	56.0	14.3	
	Dibromochloro methane	µg/L	1	24	24	24			2.0	27.0	4.9	
	Bromoform	µg/L	1	24	24	2			3.0	3.0	3.0	
	Total THM's	µg/L	1	24	24	24	(250)	0	10.0	180.0	53.1	
	PFOS	µg/L	0.005		8	0		0	<0.005	<0.005	<0.005	
	Methyl Isoborneol	ng/L	1	2	2	0			<2	<2	<2	
	Geosmin	ng/L	1	2	2	0			<2	<2	<2	
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L		2	2	2	(500)	0	0.5	0.8	0.7	Treated & Retic Refer QHFSS SSP0079171

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	Comment
In House Test Results	pH	mg/L	0.1	104	405	405	6.5-8.5	0	7.1	8.0	7.5	
	Turbidity	NTU	0.01	104	405	405	5	0	0.05	0.24	0.08	
	Conductivity	µS/cm	1		147	147			383	687	478	
	Colour	Pt/Co	1	104	406	406	15	0	<1	2	0.2	
	Free chlorine residual	mg/L	0.1		406	406			0.51	2.01	1.17	
	Total chlorine residual	mg/L	0.1		91	91			0.66	1.61	1.22	
	Alkalinity	mg/L	0.1	104	136	136			67.2	170	106	
	Total hardness	mg/L	0.1	104	146	146	200	0	62	144	102	
	Iron	mg/L	0.01	104	406	363	0.3	0	<0.01	0.1	0.011	
	Manganese	mg/L	0.001	104	406	176	0.1 (0.5)	0	<0.001	0.017	0.001	
	Aluminium	mg/L	0.001	104	406	406	0.2	0	0.002	0.224	0.056	
NATA Lab Results	pH	mg/L	0.1	24	24	24	6.5-8.5	0	6.8	8.0	7.4	
	Turbidity	NTU	1	24	24	0	5	0	<1	<1	<1	
	Colour	Pt/Co	1	24	24	0	15	0	<8	<8	<8	
	Conductivity	µS/cm	5	24	24	24			390	510	461	
	Alkalinity	mg/L	5	24	24	24			75	110	98	
	Total hardness	mg/L	5	24	24	24	200	0	73	113	102	
	Total dissolved solids	mg/L	10	24	24	24			240	320	280.8	
	Chloride	mg/L	2	24	24	24	250	0	61	81	70.3	
	Sulphate	mg/L	2	24	24	24	250 (500)	0	14	19	16.5	
	Fluoride	mg/L	0.05	24	24	24	(1.5)	0	0.11	0.14	0.127	
	Nitrate	mg/L	0.05	24	24	24	(50)	0	2.7	8	5.44	
	Silica	mg/L	5	24	24	24	80	0	31	53	40.6	
	Sodium	mg/L	0.05	24	24	24	180	0	46	62	53.8	
	Potassium	mg/L	0.05	24	24	24			0.79	1.7	1.26	
	Calcium	mg/L	0.05	24	24	24			14	24	20.79	
	Magnesium	mg/L	0.05	24	24	24			9.1	14	12.26	
	Chlorate	mg/L	0.01	24	24	24			0.2	0.7	0.353	
	Aluminium	mg/L	0.01	24	24	24	0.2	0	0.038	0.17	0.066	
	Antimony	mg/L	0.0001	24	24	0	(0.003)	0	<0.0001	<0.0001	<0.0001	
	Arsenic	mg/L	0.0001	24	24	24	(0.01)	0	0.0002	0.0004	0.0003	
	Barium	mg/L	0.001	24	24	24	(2)	0	0.021	0.032	0.027	
	Beryllium	mg/L	0.0001	24	24	0	(0.06)	0	<0.0001	<0.0001	<0.0001	
	Boron	mg/L	0.001	24	24	24	(4.0)	0	0.023	0.031	0.0266	
	Cadmium	mg/L	0.0001	24	24	2	(0.002)	0	<0.0001	<0.0001	<0.0001	
	Chromium	mg/L	0.0001	24	24	2	(0.05)	0	0.0001	0.0001	0.0001	
	Cobalt	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Copper	mg/L	0.001	24	24	23	1 (2)	0	0.001	0.004	0.0021	
	Iron	mg/L	0.005	24	24	1	0.3	0	0.011	0.012	0.0115	
	Lead	mg/L	0.0001	24	24	9	(0.01)	0	0.0001	0.0003	0.0002	
	Mercury	mg/L	0.0001	24	24	0	(0.001)	0	<0.0001	<0.0001	<0.0001	
	Manganese	mg/L	0.001	24	24	24	0.1 (0.5)	0	0.0001	0.027	0.00193	
	Molybdenum	mg/L	0.0001	24	24	24	(0.05)	0	0.0002	0.0004	0.00028	
	Nickel	mg/L	0.0001	24	24	12	(0.02)	0	0.0001	0.0002	0.00015	
	Selenium	mg/L	0.0001	24	24	24	(0.01)	0	0.0002	0.0004	0.00028	
	Silver	mg/L	0.001	24	24	0	(0.1)	0	<0.001	<0.001	<0.001	
	Strontium	mg/L	0.01	24	24	24			0.16	0.32	0.268	
	Thallium	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Tin	mg/L	0.0001	24	24	0			<0.0001	<0.0001	<0.0001	
	Titanium	mg/L	0.001	24	24	0			<0.001	<0.001	<0.001	
	Uranium	mg/L	0.0001	24	24	3	(0.017)	0	0.0001	0.0002	0.00013	
	Vanadium	mg/L	0.0001	24	24	24			0.0016	0.0034	0.00234	
	Zinc	mg/L	0.001	24	24	17	3	0	0.001	0.003	0.0019	
	Chloroform	µg/L	1	24	24	24			1.0	11.0	3.5	
	Bromodichloro methane	µg/L	1	24	24	24			3.0	22.0	9.8	
	Dibromochloro methane	µg/L	1	24	24	24			9.0	34.0	20.0	
	Bromoform	µg/L	1	24	24	24			8.0	22.0	12.7	
	Total THM's	µg/L	1	24	24	24	(250)	0	23.0	76.0	45.8	
	PFOS	µg/L	0.005		8	0		0	<0.005	<0.005	<0.005	
	Methyl Isoborneol	ng/L	1	2	2	0			<2	<2	<2	
	Geosmin	ng/L	1	2	2	0			<2	<2	<2	
	Pesticide Residues - Dalapon (2,2-DPA)	µg/L		2	2	2	(500)		0.2	0.2	0.2	Reticulated Refer QHFSS SSP0079171
	Desethyl Atrazine	µg/L		2	2	2			0.01	0.01	0.01	Treated Refer QHFSS SSP0079171

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	2021	July	21	21	0	271	0	100	YES
		Aug	21	17	0	267	0	100	YES
		Sept	21	22	0	265	0	100	YES
		Oct	21	21	0	265	0	100	YES
		Nov	21	24	0	266	0	100	YES
		Dec	21	18	0	262	0	100	YES
	2022	Jan	21	21	0	261	0	100	YES
		Feb	21	19	0	259	0	100	YES
		Mar	21	26	0	255	0	100	YES
		Apr	21	21	0	255	0	100	YES
		May	21	23	0	259	0	100	YES
		June	21	22	0	255	0	100	YES
Coastal Scheme	2021	July	20	20	0	245	0	100	YES
		Aug	20	20	0	245	0	100	YES
		Sept	20	23	0	244	0	100	YES
		Oct	20	20	0	244	0	100	YES
		Nov	20	20	0	244	0	100	YES
		Dec	20	19	0	263	0	100	YES
	2022	Jan	20	19	0	247	0	100	YES
		Feb	20	17	0	244	0	100	YES
		Mar	20	18	0	239	0	100	YES
		Apr	20	20	0	239	0	100	YES
		May	20	17	0	238	0	100	YES
		June	20	24	0	237	0	100	YES
Collinsville Scheme	2021	July	18	18	0	231	0	100	YES
		Aug	18	16	0	229	0	100	YES
		Sept	18	18	0	227	0	100	YES
		Oct	18	18	0	227	0	100	YES
		Nov	18	20	0	229	0	100	YES
		Dec	18	15	0	226	0	100	YES
	2022	Jan	18	18	0	223	0	100	YES
		Feb	18	15	0	218	0	100	YES
		Mar	18	23	0	217	0	100	YES
		Apr	18	23	2	222	2	99.1	YES
		May	18	21	0	228	2	99.1	YES
		June	18	18	0	223	2	99.1	YES
Proserpine Scheme	2021	July	18	19	0	235	0	100	YES
		Aug	18	22	0	238	0	100	YES
		Sept	18	19	0	236	0	100	YES
		Oct	18	19	0	236	0	100	YES
		Nov	18	22	0	239	0	100	YES
		Dec	18	21	0	242	0	100	YES
	2022	Jan	18	19	0	242	0	100	YES
		Feb	18	18	0	241	0	100	YES
		Mar	18	25	0	244	0	100	YES
		Apr	18	19	0	244	0	100	YES
		May	18	19	0	246	0	100	YES
		June	18	22	0	244	0	100	YES

Table 5 - Raw Water Monitoring Results					
Parameter	Unit	Bowen Raw	Coastal Raw	Collinsville Raw	Proserpine Raw
Date Sampled		24/05/2022	24/05/2022	24/05/2022	24/05/2022
Methyl Isoborneol (MIB)	ng/L	<2	<2	3	<2
Geosmin	ng/L	<2	<2	<2	<2
Non Purgeable Organic Carbo	mg/L	2.7	<0.5	1.9	1
Dissolved NPOC	mg/L	2.7	<0.5	1.8	1
Date Sampled		17/05/2022	17/05/2022	17/05/2022	17/05/2022
Total Alpha Activity	Bq/L	<0.1	<0.1	<0.1	<0.1
Total Beta Activity	Bq/L	<0.1	<0.1	0.2	<0.1
K40 Corrected Beta Activity	Bq/L	<0.1	<0.1	0.2	<0.1
Herbicides -					
Bromacil	µg/L	<0.01	0.07	<0.01	0.09
Desethyl Atrazine	µg/L	<0.01	0.01	<0.01	0.01
Imazapic	µg/L	<0.01	0.01	<0.01	<0.01

Table 6 - Bowen Raw Water Blue Green Algae Results		
Bowen Raw Water Blue Green Algae (cells/mL)		
17/08/2021	<20	
16/11/2021	129000	No Toxins detected in Treated Water
22/03/2022	<20	
24/05/2022	<20	

Appendix B – Implementation of the DWQMP Risk Management Improvement Program

The RMIP is included below as well as separately for ease of readability.

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	Supply loss & pump damage	Medium	Monitor flows and pump efficiencies. Replace pump impellers. Start design work on options.	Remove sand from around spears and rock gabling in 2018	-Open water intake, - major maintenance around spears (remove geo-fabric & rock repack)	- Nov 2018 - May 2019	~~- Aug 2019 (maintenance)~~ ~~- June 2022~~ - Jun 2023	Est $800K for intake $500K for river spear maint	Treatment Operations Manager, Planning & Assets Engineer, Capital Works Manager	Initial-Open water intake design work commenced and initial tender released 2018-Open water intake utilising a diesel pump operational. Civil construction works delayed up to 3 years as tender prices significantly higher than anticipated. 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. Assessing electric pump to replace diesel pump - Ongoing Maintenance of spears - ongoing Future works - increase spear capacity, still in concept design
Reticulation	**30**	Inadequate Water Supply	Supply loss & pump damage	Medium			New bores (and pump station) to replace Bore 1, 2, 3 - lower risk water - closer proximity to WTP	2022-23			Planning & Assets Engineer	2018-Concept design completed Pump Station complete, undergoing commissioning. 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
WTP	**2**	Power failure	Loss of supply	High	Electrician to attend site	Generators to be installed at sites, see actions taken	Emergency Management Plan	Dec-16	Dec 2019 June 2022	Staff time	Operator; Senior staff	Initial-Generators to be installed at Foxdale bores, Coastal WTP, Bowen WTP Generator at Proserpine booster Solar Farm at Bowen WTP to supply plant & grid 2018-Generators installed at Foxdale bores, Dodd St bores, Coastal WTP, Bowen WTP. Solar farm at Bowen WTP operational. Additional generators ordered for Proserpine WTP, Collinsville WTP, Proserpine high lift and a mobile unit. Generators installed at Proserpine WTP, Proserpine High Lift pump and 3 x mobile units. Collinsville unit utilitsed on other project until Collinsville Solar Project underway See RMIP#33 Completed
	3	Instrumentation Failure	Loss of online monitoring	Low		Coastal WTP - Install new analysers at Clear Water Tank	Coastal WTP - upgrade PLC and control telemetry at bores		Short Term July 2018 Long Term July 2019		Treatment Operations Manager	Initial-Analysers received 2018-Completed. Additional work - connecting all bores to SCADA Completed
	32	Instrumentation Failure	Loss of online monitoring	Low			Replace Turbidity Analysers with HACH units as required.		Jun-23			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

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
	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	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.
	33	Electrical components failure	Loss of Supply			Collinsville Solar Project		Jun-22	Dec 2023		Treatment Operations Manager	Solar energy project to run both Collinsville WTP and STP with electrical upgrades at both plants, incorporating SCADA control, generator will be incorporated. 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)
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
	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 above
	29	Chlorination failure / Loss of Residual / Chlorinator failure	Public health	High	Isolate Bore 10 from direct connection to potable water network (currently high pressure potable water going to bore)	Initiate Cannonvale Bulk Water Project. Purchase land for Cannon Valley Reservoir. Cannonvale Bulk Water porject - Cannonvale network configuration to isolate bulk supply from trunk and reticulation networks, to reduce pressure spikes in network and provide equal water age.	Deliver Cannonvale Bulk Water Project, build Cannon Valley reservoir and renew pipeline from Proserpine.	Short Term 2020-21 Long Term 2021-22			Planning & Assets Engineer – Network Operations Managers COO.	2018-Design complete. Initial project implementation. Bore 10 isolated from network and redirected to Proserpine WTP. Reservoirs x 2 under construction, completion due June 2022 Network reconfiguration after construction completion. June 2022 - Construction complete; Necessary reconfiguration complete. Not on-line as yet. More work required on program and timings for the works required at Coastal WTP. Completed
	8	Main bursts / Repairs	Aesthetics / suspended solids / taste & odour	Medium	Monitor flow, reservoir levels, pressure, turbidity. Re-chlorination	Develop a mains burst / repair procedure. Training of operations staff on importance of Hygiene practices (Chlorination of lines following repair, chlorine test on reconnection)	Investigate best-practice chlorination of mains following a repair.	Dec-16	Dec-17	Staff time	Treatment Operations Manager, Network Operations Managers	2018-Completed
	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
	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
	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

	12	Cross Contamination (close sewer proximity)	Bacterial, Viral, Protozoa			Develop a mains burst / repair procedure. Training of operations staff on importance of Hygiene practices (Chlorination of lines following repair, chlorine test on reconnection)	Investigate best-practice chlorination of mains following a repair.		Dec-17	Staff time	Treatment Operations Manager, Network Operations Managers	Initial-A chlorination of New mains procedure has been developed. A mains burst / repair procedure will be developed. 2018-Completed. See #8
	13	New main connections (contaminating existing system)	Aesthetics / Suspended Solids / Taste, Odour & Colour			Procedure for re-chlorination of new main prior to connection			Complete		Treatment Operations Manager, Network Operations Managers	Initial-A chlorination of New mains procedure has been developed. 2018-Completed. See #8
Recycled Water	14	Cross Connection to recycled water infrastructure	Bacterial, Viral, Protozoa	Low			RPZD's required and to be checked annually	Jun-17	Jun-18	Staff time	Treatment Operations Manager, Network Operations Managers, Team Leaders	Initial-Consolidating this role into a regional one through the trade waste coordinator. 2018-Completed. See #9
Bowen - Proserpine main	15	Main break	Water supply cut off / public health	High	Adhoc repair	Visual check of line and valves.	Full asset check of all line and valves, with asset list and mapping creation. Also preventative maintenance schedule created & implemented	June-16	Dec-17	$40K	Planning & Assets Engineer	Initial-Line has been checked; Check valve being installed south of Whitsunday Shores (2/3 along main) 2018-Completed. Included in maintenance program.
	16	Sediment scouring / slime slough	Aesthetics / suspended solids / taste & odour	Medium	Turbidity monitors; lines flushed	Pigging to be undertaken to remove sediment build up	Pigging stations to be constructed		Ongoing	$8K	Planning & Assets Engineer	Initial-All stations done, worst section of line has been pigged. 2018-As Above
	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.
	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	19	Pay out of under grade reservoirs.	Public health - Bacterial, Viral and Protozoan contamination due to	High	At-grade reservoirs have been isolated from system	Assessment of system storage to be completed to determine if at-grade reservoirs need to be on line. Additional sample points to be installed.	If reservoirs are required for satisfactory system operation, reconfiguration of valving to be carried out to ensure water cycles through reservoirs	Dec-15	Jul-18	Staff time	Planning & Assets Engineer – Network Operations Managers COO.	Initial-Assessments complete. Bowen Res - work complete. Hydraulic modelling of Bowen Retic needs re-calibration for other reservoirs. Brisk Bay Res - scheduled for 2017-18 2018-Completed. Brisk Bay Res off line until replacement scheduled for 2023-24
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.
	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
	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	**23**	Terrorism, sabotage	Chemical / Biological	Medium		Review of security at treatment plant sites to ensure access of unauthorised persons is adequately controlled	Preventative maintenance Schedule implemented in councils systems	Dec-15	Dec-17	Staff time	Treatment Operations Manager; Network Operations Managers	Initial-Monthly Reservoir checks have commenced. Action plans will be developed out of these to rectify issues. Emergency Management Plan 2018-Completed
	24	Natural Disasters	Cyclone, Earthquake, Flooding etc.	High	Emergency Management Plan	Emergency Management Plan	Emergency Management Plan	Jun-16	Ongoing	Staff time	All Staff	Initial-Emergency Management Plan in effect. Developing a site based cyclone / wet-weather procedure. 2018-Completed
	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
	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			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. Cybersecurity - SCADA Strategy and 16 quick wins inititated. 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 awareness	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
	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. Continuing with staff rotation program to enable staff multiskilling
Customer Awareness Processes	**28**	Customer awareness	Customer awareness	Medium			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