Drinking Water Quality Management DWQMP – Annual Report

2018-2019

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

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.dnrme.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, ML/day
Bowen	Bowen, Brisk Bay, Merinda	10700	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
Collinsville	Collinsville, Scottsville	1500	Bowen River Weir, from Eungella Dam (Sunwater)	Conventional Flocculation and filtration. Disinfected with Sodium Hypochlorite.	6
Proserpine	Proserpine, Mt Julian (can supply Cannonvale/Airlie Beach)	4700	Aquifer bores, supplemented from Peter Faust Dam	Conventional Flocculation with Dual media filtration. Disinfected with Sodium Hypochlorite.	14
Coastal	Cannonvale, Airlie Beach, Mt Julian, Jubilee Pocket	13700	Aquifer bores	Conventional Flocculation with Dual media filtration. Disinfected with Sodium Hypochlorite.	9.6

Table 1- Drinking Water Supplies

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 have been implemented or are part of an ongoing maintenance strategy.

Major actions taken include

- Open water intake at Bowen WTP is now operational
- Concept design completed for new bores and pump station to replace existing decommissioned bore 1 and bore 2 & 3
- Generators now installed at all major facilities
- Design complete and initial project implementation for Cannonvale Bulk Water Project – build Cannon Valley reservoir, Cannonvale network reconfiguration and renew Proserpine pipeline
- External audit of reservoirs scheduled
- Security measures (CCTV & Boom gates) installation commenced

2.2 The Monitoring Program

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

2.3 Amendments made to the DWQMP

The finalised review of the DWQMP was submitted on 28 June 2019, version 2.2 was also submitted along with an amendment application. Additional information was requested 3 September 2019.

An amended DWQMP, version 2.3 was submitted 6 September 2019. Approval for version 2.3 was given on 24 September 2019.

The Approved DWQMP as at 30 June 2019 is Version 2.1. With Version 2.3 approved in September 2019.

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 values in the Australian Drinking Water Guidelines.

3.2 E. coli

There were no E.coli detected in any sample taken during this 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 Regulator requested an update on Whitsunday Regional Council's water supply status during the monsoonal rain event during January 2019. There were no water quality issues during the event, power was not lost to any components of our schemes and isolation due to flooding was countered with contingency plans (alternate routes).

There were no notifications 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.

There were no non-compliances with water quality criteria.

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	4	0	5
Coastal	0	21	1	22
Collinsville	0	1	0	1
Proserpine	0	3	0	3
Total	1	29	1	31

Table 2 – Complaints about water quality

5.1 Suspected Illness

The one complaint about the water causing skin irritation was determined to not be water related. No further action was required.

5.2 Discoloured Water

29 dirty water complaints were received from throughout the Whitsunday Regional Council area during the 2018-19 year. In each case the localised area was flushed to achieve clear water. No further action was required.

5.3 Taste and Odour

The only taste related complaint was rectified by flushing the localised main. No further action was required.

6. DWQMP Review

The review of the DWQMP version 2.1, carried out in June 2019 resulted in several amendments to address minor changes in the water services provided by Whitsunday Regional Council. These are summarised below.

- Schematics for the Bowen, Coastal and Proserpine reticulation schemes were updated to reflect minor changes in the reticulation network. Mt Nutt reservoir in Bowen is off line, private estate reservoirs were added to the Coastal scheme and Bore 1 in Proserpine is decommissioned.
- Schematics for Coastal and Collinsville WTP's were updated. Coastal WTP has new analysers at the CWT (Clear Water Tank). The supernatant return point was corrected for the Collinsville WTP.
- Additions to the risk assessments include
    - Open water intake as an alternate source for Bowen WTP
    - Cybersecurity (SCADA Control) at Bowen, Coastal and Proserpine WTP's
    - Emerging contaminants
- Emergency procedures have been amended to include HACCP limit breaches, Cybersecurity scenarios and contact details were updated.
- The Risk Management Improvement Program was updated including completed projects and new projects.
- Blue Green Algae and PFAS and other contaminants of emerging concern were added to Verification monitoring.

An amendment of DWQMP version 2.1 was requested in June 2019. After further information was provided, version 2.3 was approved in September 2019.

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

	Parameter	Unit of Measure	LOR	Total Samples Collected	No. Samples in which parameter was detected	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results
In-House Test Results	pH	mg/L	0.1	365	365	0	7.09	7.40	7.21
	Turbidity	NTU	0.01	364	364	0	0.01	0.57	0.07
	Conductivity	µS/cm	1	102	102	0	201	514	381
	Colour	Pt/Co	1	365	341	0	0.00	2.00	0.94
	Free chlorine residual	mg/L	0.1	365	365	0	1.99	3.59	2.71
	Total chlorine residual	mg/L	0.1	24	24	0	2.51	3.61	2.99
	Alkalinity	mg/L	0.1	101	101	0	52.8	110.4	80.9
	Total hardness	mg/L	0.1	101	101	0	60.8	112.5	83.4
	Iron	mg/L	0.01	365	351	0	0.000	0.090	0.014
	Manganese	mg/L	0.001	365	365	0	0.001	0.018	0.001
	Aluminium	mg/L	0.001	365	365	0	0.001	0.055	0.034
NATA Lab Results	pH	mg/L	0.1	24	24	0	6.9	7.9	7.4
	Turbidity	NTU	1	24	1	0	1	1	1
	Colour	Pt/Co	1	24	13	0	1	9	1.8
	Conductivity	µS/cm	5	24	24	0	327	515	411.4
	Alkalinity	mg/L	5	24	24	0	72	97	83
	Total hardness	mg/L	5	24	24	0	67	105	84
	Total dissolved solids	mg/L	10	24	24	0	180	275	224
	Chloride	mg/L	2	24	24	0	8	93	66
	Sulphate	mg/L	2	24	24	0	9	15	11
	Fluoride	mg/L	0.05	24	24	0	0.06	0.14	0.10
	Nitrate	mg/L	0.05	24	1	0	0.6	0.6	0.6
	Silica	mg/L	5	24	24	0	14	18	15
	Sodium	mg/L	0.05	24	24	0	38	61	48
	Potassium	mg/L	0.05	24	24	0	2.2	3	2.5
	Calcium	mg/L	0.05	24	24	0	15	25	19.1
	Magnesium	mg/L	0.05	24	24	0	6.9	11	8.8
	Chlorate	mg/L	0.01	22	22	0	0.16	0.95	0.50
	Aluminium	mg/L	0.01	24	24	0	0.01	0.042	0.025
	Antimony	mg/L	0.0001	24	0	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	24	24	0	0.0002	0.0004	0.0003
	Barium	mg/L	0.001	24	24	0	0.031	0.247	0.0512
	Beryllium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Boron	mg/L	0.001	24	24	0	0.026	0.051	0.030
	Cadmium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Chromium	mg/L	0.0001	24	8	0	0.0001	0.0009	0.0003
	Cobalt	mg/L	0.0001	24	1	0	0.0001	0.0001	0.0001
	Copper	mg/L	0.001	24	24	0	0.003	0.19	0.048
	Iron	mg/L	0.005	24	11	0	0.005	0.061	0.023
	Lead	mg/L	0.0001	24	12	0	0.0004	0.0019	0.0010
	Mercury	mg/L	0.0001	24	0	0	0	0	<0.0001
	Manganese	mg/L	0.001	24	22	0	0.0001	0.0065	0.0017
	Molybdenum	mg/L	0.0001	24	24	0	0.0002	0.0005	0.0004
	Nickel	mg/L	0.0001	24	24	0	0.0002	0.0007	0.0003
	Selenium	mg/L	0.0001	24	4	0	0.0001	0.0003	0.00018
	Silver	mg/L	0.001	24	0	0	0	0	<0.001
	Strontium	mg/L	0.01	24	24	0	0.16	0.26	0.21
	Thallium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Tin	mg/L	0.0001	24	2	0	0.0005	0.0005	0.0005
	Titanium	mg/L	0.001	24	0	0	0	0	<0.001
	Uranium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Vanadium	mg/L	0.0001	24	17	0	0.0001	0.0009	0.0003
	Zinc	mg/L	0.001	24	23	0	0.001	0.041	0.011
	Chloroform	µg/L	1	24	24	0	11	73	30.8
	Bromodichloro methane	µg/L	1	24	24	0	19	58	31.1
	Dibromochloro methane	µg/L	1	24	24	0	17	41	25.7
	Bromoform	µg/L	1	24	24	0	3	9	4.5

Table 3b - Verification monitoring results - Coastal Scheme									
	Parameter	Unit of Measure	LOR	Total Samples Collected	No. Samples in which parameter was detected	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results
In-House Test Results	pH	mg/L	0.1	365	365	0	7.23	7.49	7.33
	Turbidity	NTU	0.01	365	365	0	0.05	0.99	0.09
	Conductivity	µS/cm	1	100	100	0	368	537	472
	Colour	Pt/Co	1	365	351	0	0.00	1.00	0.96
	Free chlorine residual	mg/L	0.1	365	365	0	1.23	1.98	1.58
	Total chlorine residual	mg/L	0.1	50	50	0	1.47	2.01	1.74
	Alkalinity	mg/L	0.1	99	99	0	76	99	88.4
	Total hardness	mg/L	0.1	99	99	0	90	136	108.9
	Iron	mg/L	0.01	364	338	0	0.000	0.040	0.012
	Manganese	mg/L	0.001	364	364	0	0.001	0.020	0.002
	Aluminium	mg/L	0.001	365	365	0	0.017	0.092	0.046
NATA Lab Results	pH	mg/L	0.1	24	24	0	6.9	7.7	7.4
	Turbidity	NTU	1	24	1	0	1	1	1
	Colour	Pt/Co	1	24	20	0	1	6	1.7
	Conductivity	µS/cm	5	24	24	0	375	533	476.1
	Alkalinity	mg/L	5	24	24	0	84	102	90
	Total hardness	mg/L	5	24	24	0	88	120	107
	Total dissolved solids	mg/L	10	24	24	0	221	312	280
	Chloride	mg/L	2	24	24	0	56	97	81
	Sulphate	mg/L	2	24	24	0	10	13	12
	Fluoride	mg/L	0.05	24	24	0	0.09	0.14	0.11
	Nitrate	mg/L	0.05	24	24	0	3.8	7.2	6.05
	Silica	mg/L	5	24	24	0	30	44	39
	Sodium	mg/L	0.05	24	24	0	40	59	52
	Potassium	mg/L	0.05	24	24	0	1.1	1.5	1.3
	Calcium	mg/L	0.05	24	24	0	19	25	22
	Magnesium	mg/L	0.05	24	24	0	9.7	14	12
	Chlorate	mg/L	0.01	22	22	0	0.17	0.57	0.38
	Aluminium	mg/L	0.01	24	24	0	0.039	0.068	0.05
	Antimony	mg/L	0.0001	24	0	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	24	24	0	0.0002	0.0003	0.0002
	Barium	mg/L	0.001	24	24	0	0.026	0.033	0.029
	Beryllium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Boron	mg/L	0.001	24	24	0	0.025	0.037	0.028
	Cadmium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Chromium	mg/L	0.0001	24	2	0	0.0001	0.0001	0.0001
	Cobalt	mg/L	0.0001	24	0	0	0	0	<0.0001
	Copper	mg/L	0.001	24	24	0	0.001	0.027	0.007
	Iron	mg/L	0.005	24	6	0	0.005	0.01	0.008
	Lead	mg/L	0.0001	24	14	0	0.0001	0.0007	0.00032
	Mercury	mg/L	0.0001	24	0	0	0	0	<0.0001
	Manganese	mg/L	0.001	24	24	0	0.0003	0.0058	0.0012
	Molybdenum	mg/L	0.0001	24	24	0	0.0002	0.0004	0.0003
	Nickel	mg/L	0.0001	24	19	0	0.0001	0.0003	0.0002
	Selenium	mg/L	0.0001	24	20	0	0.0002	0.0004	0.0002
	Silver	mg/L	0.001	24	0	0	0	0	<0.001
	Strontium	mg/L	0.01	24	24	0	0.23	0.33	0.29
	Thallium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Tin	mg/L	0.0001	24	0	0	0	0	<0.0001
	Titanium	mg/L	0.001	24	0	0	0	0	<0.001
	Uranium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Vanadium	mg/L	0.0001	24	24	0	0.0012	0.0025	0.0016
	Zinc	mg/L	0.001	24	22	0	0.001	0.009	0.004
	Chloroform	µg/L	1	24	24	0	5	17	9.6
	Bromodichloro methane	µg/L	1	24	24	0	13	27	19.0
	Dibromochloro methane	µg/L	1	24	24	0	17	35	26.6
	Bromoform	µg/L	1	24	24	0	7	17	11.0

Table 3c - Verification monitoring results - Collinsville Scheme

	Parameter	Unit of Measure	LOR	Total Samples Collected	No. Samples in which parameter was detected	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results
In-House Test Results	pH	mg/L	0.1	365	365	0	6.80	7.72	7.25
	Turbidity	NTU	0.01	365	365	0	0.059	0.36	0.13
	Conductivity	µS/cm	1	106	105	0	131.9	405	209
	Colour	Pt/Co	1	365	71	0	0	6	0
	Free chlorine residual	mg/L	0.1	365	365	0	1	2.48	1.8
	Total chlorine residual	mg/L	0.1	53	52	0	1.32	2.76	2.1
	Alkalinity	mg/L	0.1	102	102	0	28	248	67.3
	Total hardness	mg/L	0.1	0					
	Iron	mg/L	0.01	365	335	0	0	0.03	0.011
	Manganese	mg/L	0.001	365	340	0	0	0.017	0.008
	Aluminium	mg/L	0.001	365	363	0	0	0.055	0.029
NATA Lab Results	pH	mg/L	0.1	24	24	0	6.64	7.44	7.12
	Turbidity	NTU	1	24	0	0	0	0	<1
	Colour	Pt/Co	1	24	8	0	1	5	1.6
	Conductivity	µS/cm	5	24	24	0	171	364	233
	Alkalinity	mg/L	5	24	24	0	19	122	59
	Total hardness	mg/L	5	24	24	0	39	129	66
	Total dissolved solids	mg/L	10	24	24	0	103	204	139
	Chloride	mg/L	2	24	24	0	14	26	19
	Sulphate	mg/L	2	24	24	0	10	56	25
	Fluoride	mg/L	0.05	24	18	0	0.05	0.1	0.07
	Nitrate	mg/L	0.05	24	8	0	0.5	1.3	0.89
	Silica	mg/L	5	24	24	0	10	19	15
	Sodium	mg/L	0.05	24	24	0	13	30	20
	Potassium	mg/L	0.05	24	24	0	0.9	2.4	1.5
	Calcium	mg/L	0.05	24	24	0	10	32	16.3
	Magnesium	mg/L	0.05	24	24	0	3.2	12	6.14
	Chlorate	mg/L	0.01	22	22	0	0.1	0.54	0.25
	Aluminium	mg/L	0.01	24	24	0	0.009	0.75	0.081
	Antimony	mg/L	0.0001	24	0	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	24	11	0	0.0001	0.0004	0.0003
	Barium	mg/L	0.001	24	24	0	0.014	0.24	0.044
	Beryllium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Boron	mg/L	0.001	24	24	0	0.013	0.029	0.019
	Cadmium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Chromium	mg/L	0.0001	24	2	0	0.0002	0.0002	0.0002
	Cobalt	mg/L	0.0001	24	2	0	0.0001	0.0001	0.0001
	Copper	mg/L	0.001	24	24	0	0.001	0.05	0.010
	Iron	mg/L	0.005	24	9	0	0.006	0.014	0.008
	Lead	mg/L	0.0001	24	7	0	0.0001	0.0003	0.0002
	Mercury	mg/L	0.0001	24	2	0	0.0003	0.0003	0.0003
	Manganese	mg/L	0.001	24	24	0	0.0003	0.013	0.0044
	Molybdenum	mg/L	0.0001	24	22	0	0.0001	0.0005	0.0003
	Nickel	mg/L	0.0001	24	23	0	0.0001	0.0005	0.0003
	Selenium	mg/L	0.0001	24	1	0	0.0002	0.0002	0.0002
	Silver	mg/L	0.001	24	0	0	0	0	<0.001
	Strontium	mg/L	0.01	24	0	0	0.078	0.26	0.127
	Thallium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Tin	mg/L	0.0001	24	0	0	0	0	<0.0001
	Titanium	mg/L	0.001	24	0	0	0	0	<0.001
	Uranium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Vanadium	mg/L	0.0001	24	24	0	0.0004	0.0026	0.0013
	Zinc	mg/L	0.001	24	23	0	0.002	0.023	0.008
	Chloroform	µg/L	1	24	24	0	3	42	19.9
	Bromodichloro methane	µg/L	1	24	24	0	3	24	11.4
	Dibromochloro methane	µg/L	1	24	24	0	1	11	4.8
	Bromoform	µg/L	1	24	1	0	0	0	<1

Table 3d - Verification monitoring results - Proserpine Scheme

	Parameter	Unit of Measure	LOR	Total Samples Collected	No. Samples in which parameter was detected	No. of samples exceeding water quality criteria	Minimum Result	Maximum Result	Average of Results
In-House Test Results	pH	mg/L	0.1	363	363	0	7.20	7.48	7.37
	Turbidity	NTU	0.01	364	364	0	0.04	0.10	0.07
	Conductivity	µS/cm	1	100	100	0	258	397	325
	Colour	Pt/Co	1	364	337	0	0.00	1.00	0.93
	Free chlorine residual	mg/L	0.1	364	364	0	0.065	1.87	1.52
	Total chlorine residual	mg/L	0.1	38	38	0	1.46	1.96	1.71
	Alkalinity	mg/L	0.1	99	99	0	58	94	72.8
	Total hardness	mg/L	0.1	99	99	0	31.6	92.8	76.6
	Iron	mg/L	0.01	363	346	0	0.000	0.020	0.011
	Manganese	mg/L	0.001	363	362	0	0.000	0.007	0.001
	Aluminium	mg/L	0.001	363	363	0	0.0034	0.075	0.046
NATA Lab Results	pH	mg/L	0.1	24	24	0	6.69	7.84	7.34
	Turbidity	NTU	1	24	1	0	1	1	1
	Colour	Pt/Co	1	24	10	0	1	3	1.7
	Conductivity	µS/cm	5	24	24	0	291	406	351.4
	Alkalinity	mg/L	5	24	24	0	55	79	69
	Total hardness	mg/L	5	24	24	0	62	88	74
	Total dissolved solids	mg/L	10	24	24	0	160	239	204
	Chloride	mg/L	2	24	24	0	46	68	57
	Sulphate	mg/L	2	24	24	0	10	12	11
	Fluoride	mg/L	0.05	24	24	0	0.06	0.14	0.11
	Nitrate	mg/L	0.05	24	20	0	0.8	2.4	1.92
	Silica	mg/L	5	24	24	0	14	35	28
	Sodium	mg/L	0.05	24	24	0	31	46	40
	Potassium	mg/L	0.05	24	24	0	1.4	1.8	1.6
	Calcium	mg/L	0.05	24	24	0	13	18	15.1
	Magnesium	mg/L	0.05	24	24	0	6.9	11	8.9
	Chlorate	mg/L	0.01	22	22	0	0.2	0.76	0.42
	Aluminium	mg/L	0.01	24	24	0	0.024	0.067	0.048
	Antimony	mg/L	0.0001	24	0	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	24	24	0	0.0002	0.0003	0.0002
	Barium	mg/L	0.001	24	24	0	0.025	0.041	0.031
	Beryllium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Boron	mg/L	0.001	24	24	0	0.024	0.04	0.028
	Cadmium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Chromium	mg/L	0.0001	24	3	0	0.0001	0.0005	0.00027
	Cobalt	mg/L	0.0001	24	0	0	0	0	<0.0001
	Copper	mg/L	0.001	24	24	0	0.001	0.052	0.014
	Iron	mg/L	0.005	24	5	0	0.005	0.084	0.022
	Lead	mg/L	0.0001	24	10	0	0.0002	0.0007	0.0004
	Mercury	mg/L	0.0001	24	1	0	0.0002	0.0002	0.0002
	Manganese	mg/L	0.001	24	24	0	0.0002	0.01	0.0018
	Molybdenum	mg/L	0.0001	24	24	0	0.0002	0.0004	0.0003
	Nickel	mg/L	0.0001	24	17	0	0.0001	0.0009	0.0003
	Selenium	mg/L	0.0001	24	17	0	0.0002	0.0004	0.0002
	Silver	mg/L	0.001	24	0	0	0	0	<0.001
	Strontium	mg/L	0.01	24	24	0	0.15	0.22	0.19
	Thallium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Tin	mg/L	0.0001	24	0	0	0	0	<0.0001
	Titanium	mg/L	0.001	24	0	0	0	0	<0.001
	Uranium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Vanadium	mg/L	0.0001	24	24	0	0.0005	0.0028	0.0015
	Zinc	mg/L	0.001	24	14	0	0.001	0.007	0.003
	Chloroform	µg/L	1	24	24	0	2	20	7.4
	Bromodichloro methane	µg/L	1	24	24	0	6	23	13.8
	Dibromochloro methane	µg/L	1	24	24	0	14	29	20.7
	Bromoform	µg/L	1	24	24	0	4	12	8.0

Table 4 - Reticulation *E.coli* verification monitoring

Drinking water scheme:	Year	Month	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	2018	July	21	0	267	0	100	YES
		Aug	24	0	263	0	100	YES
		Sept	21	0	258	0	100	YES
		Oct	21	0	256	0	100	YES
		Nov	17	0	254	0	100	YES
		Dec	21	0	242	0	100	YES
	2019	Jan	21	0	239	0	100	YES
		Feb	25	0	248	0	100	YES
		Mar	20	0	248	0	100	YES
		Apr	20	0	253	0	100	YES
		May	24	0	250	0	100	YES
		June	21	0	256	0	100	YES
Coastal Scheme	2018	July	20	0	253	0	100	YES
		Aug	23	0	250	0	100	YES
		Sept	20	0	246	0	100	YES
		Oct	20	0	242	0	100	YES
		Nov	17	0	239	0	100	YES
		Dec	20	0	259	0	100	YES
	2019	Jan	20	0	229	0	100	YES
		Feb	18	0	232	0	100	YES
		Mar	21	0	237	0	100	YES
		Apr	12	0	234	0	100	YES
		May	24	0	230	0	100	YES
		June	21	0	236	0	100	YES
Collinsville Scheme	2018	July	18	0	210	0	100	YES
		Aug	19	0	210	0	100	YES
		Sept	19	0	212	0	100	YES
		Oct	18	0	209	0	100	YES
		Nov	17	0	209	0	100	YES
		Dec	18	0	210	0	100	YES
	2019	Jan	18	0	208	0	100	YES
		Feb	20	0	215	0	100	YES
		Mar	18	0	215	0	100	YES
		Apr	18	0	220	0	100	YES
		May	18	0	215	0	100	YES
		June	18	0	219	0	100	YES
Proserpine Scheme	2018	July	18	0	199	0	100	YES
		Aug	21	0	202	0	100	YES
		Sept	18	0	204	0	100	YES
		Oct	18	0	205	0	100	YES
		Nov	12	0	203	0	100	YES
		Dec	18	0	203	0	100	YES
	2019	Jan	17	0	198	0	100	YES
		Feb	21	0	205	0	100	YES
		Mar	17	0	209	0	100	YES
		Apr	16	0	214	0	100	YES
		May	22	0	211	0	100	YES
		June	19	0	217	0	100	YES

Appendix B – Implementation of the DWQMP Risk Management Improvement Program

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

APPENDIX B - Risk Management Improvement Plan

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 (2018-19)	Previous 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	Est $800K for intake $500K for river spear maint	Treatment Operations Manager, Planning & Assets Engineer, Capital Works Manager	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.	- Open water intake design work commenced and initial tender released
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	Concept design completed	
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	Staff time	Operator; Senior staff	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 to be installed at Foxdale bores, Coastal WTP, Bowen WTP Generator at Proserpine booster Solar Farm at Bowen WTP to supply plant & grid
	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	Completed. Additional work - connecting all bores to SCADA	Analysers received
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	Ongoing	- Ongoing maintenance - PAC dosing can be utilised to reduce taste and odour compounds
	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		Treatment Operations Manager	Turbidity analysers installed. SCADA control scheduled for completion September 2019.	Analysers received
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	Bowen reservoir completed. Flemington Rd chlorinator to be decommissioned. Railway Rd (Merinda)dosing stations upgraded. Telemetry for all analysers scheculed for 2021-22. Southern reticulation network upgrade scheduled, See #29.	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.
	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	See above.	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.
	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.	Design complete. Initial project implementation.	
	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	Completed.	A chlorination of New mains procedure has been developed. A mains burst / repair procedure will be developed.
	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	This role has moved back to Water Operations. Audit completed, lists to be compiled into the new Council system.	Incomplete lists have been developed for Northern and Southern areas. Consolidating this role into a regional one through the trade waste coordinator.
	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	Ongoing Includes bore mains.	Pigging program underway

	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	Ongoing	Pigging program underway
	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	Completed. See #8	A chlorination of New mains procedure has been developed. A mains burst / repair procedure will be developed.
	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	Completed.	A chlorination of New mains procedure has been developed.
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	See #9	Consolidating this role into a regional one through the trade waste coordinator.
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	Completed. Included in maintenance program.	Line has been checked; Check valve being installed south of Whitsunday Shores (2/3 along main)
	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	See above.	All stations done, worst section of line has been pigged.
	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	Monitoring on other potential users.	Only 1 user allocation still in effect
	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	Monitoring on other potential users.	Only 1 user allocation still in effect
Storage Reservoirs	19	Pay out of under grade reservoirs.	Public health - Bacterial, Viral and Protozoan contamination due to payout of reservoirs in the event of high demand or main break	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.	Completed. Brisk Bay Res off line until repalcement scheduled for 2023-24	Assessments complete. Bowen Res - work complete. Hydraulic modelling of Bowen Retic needs re-calibration for other reservoirs. Brisk Bay Res - scheduled for 2017-18
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	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 complete. Roof repairs done. Monthly Reservoir inspections commenced. Repairs to vermin proofing from cyclone Debbi required - Scheduled for October - December 2017.
	21	Animal 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 & implemented	Dec-15	Ongoing	Staff time + what ever tasks are required.	Treatment Operations Manager & field staff, Network Operations Managers	Ongoing	Inspections complete. Roof repairs done. Monthly Reservoir inspections commenced. Repairs to vermin proofing from cyclone Debbi required - Scheduled for October - December 2017.
	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.	Ongoing	Reservoirs appear to have appropriate mixing via operational level controls. Regular sampling to ensure residual maintained carried out each month.

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	Completed.	Monthly Reservoir checks have commenced. Action plans will be developed out of these to rectify issues. Emergency Management Plan
	24	Natural Disasters	Cyclone, Earthquake, Flooding etc.	High	Emergency Management Plan	Emergency Management Plan	Emergency Management Plan	Jun-16	Ongoing	Staff time	All Staff	Completed.	Emergency Management Plan in effect. Developing a site based cyclone / wet-weather procedure.
	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	Ongoing	Risk assessments contained within DWQMP. Monthly Reservoir checks improve security on site.
	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	CCTV & Boomgates installation commenced. External audit scope devised.	
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	Ongoing	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.
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	Ongoing	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.
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.	Ongoing	Complete. Updated standards uploaded onto Whitsunday Regional Councils website as required.