Drinking Water Quality Management DWQMP – Annual Report

2019-2020

Whitsunday Regional Council

Service Provider No.: 501

Author: Kerrie Pearson
Environmental & Laboratory Coordinator
Date: 16 December 2020

TABLE OF CONTENTS

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
16/12/2020	Annual Report	Kerrie Pearson	Peter Stapleton Janice Wilson John Van Wijk	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.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	10400	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)	4200	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	14600	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

- Maintenance schedule for open water intake diesel pump at Bowen WTP initiated.
- New pump station to transfer water from Proserpine to Coastal has commenced. New bores project has been put forward for future funding.
- Further work on procuring generators for some other sites (including mobile units) complete, with some installations still outstanding.
- Collinsville WTP upgrades have changed priorities.
- Cannonvale Bulk Water Project underway – reservoir land secured, funding for reservoir secured, new Proserpine pipeline underway, Cannonvale network reconfiguration underway.
- External audit of reservoirs complete, vermin proofing completed, maintenance program initiated.
- Security measures (CCTV & Boom gates) installed at some sites, further sites have been delayed due to budget constraints.
- SCADA strategy includes removing generic logins.

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 2020 is 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

There were no notifications to the regulator for this period.

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.

Some events to note during 2019-2020 are summarised below.

Coastal WTP High Raw Water Turbidity – 1 August 2019

During a planned swabbing of the 11 km raw water line feeding Coastal WTP from the Foxdale bores, the swab was missed at an observation point and dirty water (and the swab) entered the plant. The plant was off line for several hours (overnight) to allow for cleaning of tanks etc. before returning to normal operating mode. At no time were any Critical Control Points for the treated water breached, no water quality issues passed the filter barriers. The treated water turbidity reached a maximum of 0.34 NTU during this period.

Wet weather event – January 2020

During the week 25 January 2020 to 30 January 2020 the Whitsunday region experienced a significant weather event as the result of a monsoon trough moving across the region. Bowen area received over 180mm of rain, Cannonvale / Airlie Beach (Coastal WTP) over 200mm and Proserpine approximately 160mm of rain over the period. Collinsville received almost 60mm. No issues were experienced at any of the Water Treatment Plants except Collinsville, see below, or in the networks during this period.

Collinsville WTP High Raw Water Turbidity – 27 January 2020

After the significant wet weather event in late January 2020, noted above, the raw water turbidity entering Collinsville WTP increased to approximately 2500+NTU. At no time were any Critical Control Points for the treated water breached, no water quality issues passed the filter barriers.

Wet weather event – March 2020

During early March 2020 the Whitsunday region experienced a significant weather event as the result of a monsoon trough sitting over the region related to Tropical Cyclone Gretel. Bowen area received over 250mm of rain, Cannonvale / Airlie Beach (Coastal WTP) over 500mm and Proserpine approximately 400mm over the period. Collinsville received approximately 140mm. No issues were experienced at any of the Water Treatment Plants or in the networks during this period.

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	14	0	14
Coastal	1	5	2	8
Collinsville	1	1	0	2
Proserpine	0	1	0	1
Total	2	21	2	25

Table 2 – Complaints about water quality

5.1 Suspected Illness

The two complaints about the water causing skin irritation and unwell children were determined to not be water related. No further action was required.

5.2 Discoloured Water

21 dirty water complaints were received from throughout the Whitsunday Regional Council area during the 2019-20 year. In each case the localised area was flushed to achieve clear water. No further action was required. There were 13 dirty water complaints in Bowen in the space of a week in early April 2020 due to a major main burst and the required repair works, flushing the area rectified the issue.

5.3 Taste and Odour

One taste related complaint was from a new resident to the area, the other was a Chlorine smell that was determined to be within normal operating levels. No further action was required.

6. DWQMP Review

There was no official review of the DWQMP carried out in the 2019-2020 year.

An external audit is due 30 June 2021, with a review due 4 October 2021.

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	366	366	0	7.00	7.45	7.225
	Turbidity	NTU	0.01	366	366	0	0.01	0.62	0.10
	Conductivity	µS/cm	1	96	96	0	208	689	392
	Colour	Pt/Co	1	365	190	0	<1	7	0.56
	Free chlorine residual	mg/L	0.1	365	365	0	0.13	3.08	2.49
	Total chlorine residual	mg/L	0.1	26	26	0	2.21	3.07	2.75
	Alkalinity	mg/L	0.1	98	98	0	52.1	116.4	80
	Total hardness	mg/L	0.1	99	99	0	37.0	105.2	75
	Iron	mg/L	0.01	366	345	0	<0.01	0.09	0.015
	Manganese	mg/L	0.001	366	267	0	<0.001	0.047	0.001
	Aluminium	mg/L	0.001	366	366	0	0.003	0.136	0.039
NATA Lab Results	pH	mg/L	0.1	23	23	0	6.84	7.85	7.25
	Turbidity	NTU	1	23	8	0	0	0	<0.01
	Colour	Pt/Co	1	23	23	2	1	21	6.13
	Conductivity	µS/cm	5	23	0	0	310	455	373.09
	Alkalinity	mg/L	5	23	23	0	62	97	75.65
	Total hardness	mg/L	5	23	23	0	58	104	72.74
	Total dissolved solids	mg/L	10	23	23	0	178	251	207.65
	Chloride	mg/L	2	23	0	0	49	86	61.43
	Sulphate	mg/L	2	23	16	0	9	16	12.39
	Fluoride	mg/L	0.05	23	23	0	0.08	0.12	0.10
	Nitrate	mg/L	0.05	23	23	0	0.09	0.79	0.30
	Silica	mg/L	5	23	12	0	14	18	15.09
	Sodium	mg/L	0.05	23	23	0	39	59	46.39
	Potassium	mg/L	0.05	23	23	0	2.3	2.9	2.53
	Calcium	mg/L	0.05	23	23	0	12	23	16.26
	Magnesium	mg/L	0.05	23	23	0	6.2	11	7.8
	Chlorate	mg/L	0.01	23	14	0	0.21	1.2	0.483
	Aluminium	mg/L	0.01	23	23	0	0.011	0.081	0.033
	Antimony	mg/L	0.0001	23	23	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	23	0	0	0.0002	0.0004	0.0003
	Barium	mg/L	0.001	23	23	0	0.031	0.049	0.039
	Beryllium	mg/L	0.0001	23	23	0	0	0	<0.0001
	Boron	mg/L	0.001	23	0	0	0.023	0.034	0.030
	Cadmium	mg/L	0.0001	23	23	0	0	0	<0.0001
	Chromium	mg/L	0.0001	23	0	0	0.0001	0.0001	0.0001
	Cobalt	mg/L	0.0001	23	5	0	0	0	<0.0001
	Copper	mg/L	0.001	23	0	0	0.002	0.037	0.0152
	Iron	mg/L	0.005	23	23	0	0.006	0.021	0.0115
	Lead	mg/L	0.0001	23	13	0	0.0001	0.0008	0.0005
	Mercury	mg/L	0.0001	23	12	0	0	0	<0.0001
	Manganese	mg/L	0.001	23	0	0	0.0003	0.031	0.0074
	Molybdenum	mg/L	0.0001	23	23	0	0.0002	0.0005	0.0004
	Nickel	mg/L	0.0001	23	23	0	0.0001	0.0003	0.0002
	Selenium	mg/L	0.0001	23	23	0	0	0	<0.0001
	Silver	mg/L	0.001	23	0	0	0	0	<0.001
	Strontium	mg/L	0.01	23	0	0	0.16	0.24	0.190
	Thallium	mg/L	0.0001	23	23	0	0	0	<0.0001
	Tin	mg/L	0.0001	23	0	0	0.0006	0.0013	0.0008
	Titanium	mg/L	0.001	23	3	0	0	0	<0.001
	Uranium	mg/L	0.0001	23	0	0	0	0	<0.0001
	Vanadium	mg/L	0.0001	23	0	0	0.0001	0.0004	0.0002
	Zinc	mg/L	0.001	23	22	0	0.001	0.008	0.0032
	Chloroform	µg/L	1	23	23	0	9.0	100.0	37.9
	Bromodichloro methane	µg/L	1	23	23	0	18.0	59.0	31.8
	Dibromochloro methane	µg/L	1	23	23	0	13.0	34.0	22.0
	Bromoform	µg/L	1	23	23	0	2.0	8.0	3.8
	Total THM's	µg/L	1	23	23	0	50.0	190.0	95.5
	PFOS	µg/L	0.005	2	0	0	<0.005	<0.005	<0.005

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	6.98	7.68	7.39
	Turbidity	NTU	0.01	365	365	0	0.058	1.2	0.10
	Conductivity	µS/cm	1	97	97	0	113.6	595	503
	Colour	Pt/Co	1	365	237	0	0	8	0.68
	Free chlorine residual	mg/L	0.1	365	365	0	1.16	2.13	1.63
	Total chlorine residual	mg/L	0.1	45	45	0	1.46	2.15	1.80
	Alkalinity	mg/L	0.1	99	99	0	80.2	159.2	99.2
	Total hardness	mg/L	0.1	98	98	0	84	175.2	118.1
	Iron	mg/L	0.01	362	332	0	0	0.05	0.014
	Manganese	mg/L	0.001	362	278	0	0	0.015	0.001
	Aluminium	mg/L	0.001	362	362	0	0.01	0.147	0.058
NATA Lab Results	pH	mg/L	0.1	24	24	0	7.19	7.82	7.54
	Turbidity	NTU	1	24	13	0	1	1	1
	Colour	Pt/Co	1	24	24	0	1	3	1.85
	Conductivity	µS/cm	5	24	0	0	451	599	510.75
	Alkalinity	mg/L	5	24	24	0	85	115	98.04
	Total hardness	mg/L	5	24	24	0	101	136	114.92
	Total dissolved solids	mg/L	10	24	24	0	271	363	306
	Chloride	mg/L	2	24	0	0	71	110	88.83
	Sulphate	mg/L	2	24	24	0	10	14	11.67
	Fluoride	mg/L	0.05	24	24	0	0.08	0.14	0.11
	Nitrate	mg/L	0.05	24	24	0	5.4	9.8	7.02
	Silica	mg/L	5	24	0	0	4.3	53	42.35
	Sodium	mg/L	0.05	24	24	0	51	67	57.29
	Potassium	mg/L	0.05	24	24	0	0.9	3.3	1.28
	Calcium	mg/L	0.05	24	24	0	21	28	23.75
	Magnesium	mg/L	0.05	24	24	0	12	16	13.71
	Chlorate	mg/L	0.01	24	4	0	0.24	0.63	0.395
	Aluminium	mg/L	0.01	24	24	0	0.038	0.074	0.0593
	Antimony	mg/L	0.0001	24	24	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	24	0	0	0.0002	0.0003	0.00027
	Barium	mg/L	0.001	24	24	0	0.022	0.033	0.0273
	Beryllium	mg/L	0.0001	24	24	0	0	0	<0.0001
	Boron	mg/L	0.001	24	0	0	0.021	0.031	0.0273
	Cadmium	mg/L	0.0001	24	24	0	0	0	<0.0001
	Chromium	mg/L	0.0001	24	0	0	0.0001	0.0001	0.0001
	Cobalt	mg/L	0.0001	24	6	0	0	0	<0.0001
	Copper	mg/L	0.001	24	0	0	0.001	0.004	0.002
	Iron	mg/L	0.005	24	18	0	0	0	<0.005
	Lead	mg/L	0.0001	24	0	0	0.0001	0.0002	0.00013
	Mercury	mg/L	0.0001	24	9	0	0	0	<0.0001
	Manganese	mg/L	0.001	24	0	0	0.0002	0.0023	0.0009
	Molybdenum	mg/L	0.0001	24	24	0	0.0002	0.0003	0.0003
	Nickel	mg/L	0.0001	24	24	0	0.0001	0.0003	0.0002
	Selenium	mg/L	0.0001	24	21	0	0.0001	0.0003	0.0002
	Silver	mg/L	0.001	24	20	0	0	0	<0.001
	Strontium	mg/L	0.01	24	0	0	0.28	0.4	0.314
	Thallium	mg/L	0.0001	24	24	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	0.0001	0.0001	0.0001
	Vanadium	mg/L	0.0001	24	8	0	0.0012	0.003	0.0018
	Zinc	mg/L	0.001	24	24	0	0.001	0.004	0.0016
	Chloroform	µg/L	1	24	24	0	3.0	35.0	8.1
	Bromodichloro methane	µg/L	1	24	24	0	9.0	29.0	15.7
	Dibromochloro methane	µg/L	1	24	24	0	6.0	41.0	24.1
	Bromoform	µg/L	1	23	23	0	9.0	17.0	12.8
	Total THM's	µg/L	1	24	24	0	40.0	100.0	60.0
	PFOS	µg/L	0.005	2	0	0	<0.005	<0.005	<0.005

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	364	364	0	6.8	7.63	7.26
	Turbidity	NTU	0.01	364	364	0	0.006	0.345	0.10
	Conductivity	µS/cm	1	92	92	0	102.4	288	183
	Colour	Pt/Co	1	364	40	0	0	3	0.17
	Free chlorine residual	mg/L	0.1	364	364	0	0.37	2.18	1.60
	Total chlorine residual	mg/L	0.1	41	41	0	1.53	2.31	1.85
	Alkalinity	mg/L	0.1	93	93	0	30	110	56.20
	Total hardness	mg/L	0.1	0					
	Iron	mg/L	0.01	364	364	0	0.01	0.02	0.011
	Manganese	mg/L	0.001	364	363	0	0	0.011	0.004
	Aluminium	mg/L	0.001	364	364	0	0.0025	0.065	0.025
NATA Lab Results	pH	mg/L	0.1	24	24	0	6.5	7.53	6.69
	Turbidity	NTU	1	24	8	0	0	0	<0.01
	Colour	Pt/Co	1	24	24	0	1	2	1.5
	Conductivity	µS/cm	5	24	0	0	136	299	199.2
	Alkalinity	mg/L	5	24	24	0	22	93	46.8
	Total hardness	mg/L	5	24	24	0	34	103	53.8
	Total dissolved solids	mg/L	10	24	24	0	87	177	122.3
	Chloride	mg/L	2	24	0	0	14	24	17.9
	Sulphate	mg/L	2	24	16	0	12	37	22.8
	Fluoride	mg/L	0.05	24	24	0	0.03	0.08	0.049
	Nitrate	mg/L	0.05	24	18	0	0.13	0.57	0.304
	Silica	mg/L	5	24	1	0	13	17	15.7
	Sodium	mg/L	0.05	24	24	0	12	26	17.8
	Potassium	mg/L	0.05	24	24	0	0.88	1.9	1.39
	Calcium	mg/L	0.05	24	24	0	8.2	25	13.1
	Magnesium	mg/L	0.05	24	24	0	3.1	9.8	5.08
	Chlorate	mg/L	0.01	24	12	0	0.13	0.47	0.248
	Aluminium	mg/L	0.01	24	24	0	0.006	0.048	0.0215
	Antimony	mg/L	0.0001	24	24	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	24	0	0	0.0001	0.0004	0.0002
	Barium	mg/L	0.001	24	16	0	0.012	0.034	0.0197
	Beryllium	mg/L	0.0001	24	24	0	0	0	<0.0001
	Boron	mg/L	0.001	24	0	0	0.011	0.25	0.026
	Cadmium	mg/L	0.0001	24	24	0	0	0	<0.0001
	Chromium	mg/L	0.0001	24	0	0	0	0	<0.0001
	Cobalt	mg/L	0.0001	24	0	0	0	0	<0.0001
	Copper	mg/L	0.001	24	0	0	0.003	0.017	0.0063
	Iron	mg/L	0.005	24	24	0	0.006	0.018	0.01
	Lead	mg/L	0.0001	24	4	0	0.0001	0.0001	0.0001
	Mercury	mg/L	0.0001	24	5	0	0	0	<0.0001
	Manganese	mg/L	0.001	24	0	0	0.00007	0.013	0.0031
	Molybdenum	mg/L	0.0001	24	24	0	0.0002	0.0005	0.0003
	Nickel	mg/L	0.0001	24	24	0	0.0001	0.0003	0.0002
	Selenium	mg/L	0.0001	24	21	0	0	0	<0.0001
	Silver	mg/L	0.001	24	0	0	0	0	<0.001
	Strontium	mg/L	0.01	24	0	0	0.06	0.19	0.101
	Thallium	mg/L	0.0001	24	24	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	0	0	0.0006	0.0026	0.0013
	Zinc	mg/L	0.001	24	24	0	0.001	0.033	0.0107
	Chloroform	µg/L	1	24	24	0	5.0	69.0	23.8
	Bromodichloro methane	µg/L	1	24	24	0	5.0	28.0	14.4
	Dibromochloro methane	µg/L	1	24	24	0	2.0	29.0	7.1
	Bromoform	µg/L	1	3	3	0	1.0	10.0	4.0
	Total THM's	µg/L	1	24	24	0	12.0	92.0	46.0
	PFOS	µg/L	0.005	2	0	0	<0.005	<0.005	<0.005

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	366	366	0	7.04	7.56	7.36
	Turbidity	NTU	0.01	366	366	0	0.025	0.96	0.08
	Conductivity	µS/cm	1	94	94	0	242	435	370
	Colour	Pt/Co	1	366	121	0	0	4	0.38
	Free chlorine residual	mg/L	0.1	366	366	0	1.14	1.96	1.51
	Total chlorine residual	mg/L	0.1	33	33	0	1.31	1.98	1.68
	Alkalinity	mg/L	0.1	101	101	0	42	199	84.3
	Total hardness	mg/L	0.1	97	97	0	40.6	115.6	78.9
	Iron	mg/L	0.01	366	332	0	0	0.05	0.012
	Manganese	mg/L	0.001	366	201	0	0	0.014	0.001
	Aluminium	mg/L	0.001	366	366	0	0.011	0.109	0.056
NATA Lab Results	pH	mg/L	0.1	24	24	0	6.79	7.86	7.49
	Turbidity	NTU	1	24	9	0	0	0	<0.01
	Colour	Pt/Co	1	24	24	0	1	2	1.44
	Conductivity	µS/cm	5	24	0	0	323	441	394.21
	Alkalinity	mg/L	5	24	24	0	69	87	77.96
	Total hardness	mg/L	5	24	24	0	63	87	77.42
	Total dissolved solids	mg/L	10	24	24	0	194	279	239.54
	Chloride	mg/L	2	24	0	0	52	73	65.58
	Sulphate	mg/L	2	24	24	0	10	14	12.08
	Fluoride	mg/L	0.05	24	24	0	0.09	0.12	0.111
	Nitrate	mg/L	0.05	24	24	0	1.5	5.3	3.07
	Silica	mg/L	5	24	10	0	28	50	36.9
	Sodium	mg/L	0.05	24	24	0	40	59	49.0
	Potassium	mg/L	0.05	24	24	0	0.92	3.1	1.47
	Calcium	mg/L	0.05	24	24	0	13	18	15.08
	Magnesium	mg/L	0.05	24	24	0	7.5	11	9.63
	Chlorate	mg/L	0.01	24	11	0	0.32	0.74	0.477
	Aluminium	mg/L	0.01	24	24	0	0.037	0.084	0.055
	Antimony	mg/L	0.0001	24	24	0	0	0	<0.0001
	Arsenic	mg/L	0.0001	24	0	0	0.0002	0.0005	0.0003
	Barium	mg/L	0.001	24	24	0	0.023	0.038	0.028
	Beryllium	mg/L	0.0001	24	24	0	0	0	<0.0001
	Boron	mg/L	0.001	24	0	0	0.021	0.034	0.0283
	Cadmium	mg/L	0.0001	24	24	0	0	0	<0.0001
	Chromium	mg/L	0.0001	24	0	0	0.0001	0.0001	0.0001
	Cobalt	mg/L	0.0001	24	2	0	0	0	<0.0001
	Copper	mg/L	0.001	24	0	0	0.001	0.01	0.0030
	Iron	mg/L	0.005	24	23	0	0	0	<0.005
	Lead	mg/L	0.0001	24	0	0	0.0001	0.0002	0.0002
	Mercury	mg/L	0.0001	24	5	0	0	0	<0.0001
	Manganese	mg/L	0.001	24	0	0	0.0001	0.0043	0.00148
	Molybdenum	mg/L	0.0001	24	24	0	0.0002	0.0004	0.00030
	Nickel	mg/L	0.0001	24	24	0	0.0001	0.0002	0.00015
	Selenium	mg/L	0.0001	24	20	0	0.0002	0.0004	0.00025
	Silver	mg/L	0.001	24	1	0	0	0	<0.001
	Strontium	mg/L	0.01	24	0	0	0.16	0.22	0.198
	Thallium	mg/L	0.0001	24	24	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	0	0	0.0011	0.0022	0.00158
	Zinc	mg/L	0.001	24	24	0	0.001	0.003	0.00189
	Chloroform	µg/L	1	23	23	0	2.0	27.0	7.5
	Bromodichloro methane	µg/L	1	24	24	0	4.0	33.0	13.8
	Dibromochloro methane	µg/L	1	24	24	0	10.0	36.0	21.8
	Bromoform	µg/L	1	24	24	0	5.0	14.0	10.7
	Total THM's	µg/L	1	24	24	0	24.0	98.0	53.3
	PFOS	µg/L	0.005	4	1	0	<0.005	0.005	<0.005

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	2019	July	24	0	259	0	100	YES
		Aug	21	0	256	0	100	YES
		Sept	21	0	256	0	100	YES
		Oct	24	0	259	0	100	YES
		Nov	21	0	263	0	100	YES
		Dec	24	0	266	0	100	YES
	2020	Jan	18	0	263	0	100	YES
		Feb	21	0	259	0	100	YES
		Mar	24	0	263	0	100	YES
		Apr	21	0	264	0	100	YES
		May	21	0	261	0	100	YES
		June	24	0	264	0	100	YES
Coastal Scheme	2019	July	20	0	236	0	100	YES
		Aug	20	0	233	0	100	YES
		Sept	20	0	233	0	100	YES
		Oct	24	0	237	0	100	YES
		Nov	20	0	240	0	100	YES
		Dec	15	0	255	0	100	YES
	2020	Jan	25	0	240	0	100	YES
		Feb	21	0	243	0	100	YES
		Mar	22	0	244	0	100	YES
		Apr	23	0	255	0	100	YES
		May	21	0	252	0	100	YES
		June	21	0	252	0	100	YES
Collinsville Scheme	2019	July	20	0	221	0	100	YES
		Aug	18	0	220	0	100	YES
		Sept	22	0	223	0	100	YES
		Oct	16	0	221	0	100	YES
		Nov	18	0	222	0	100	YES
		Dec	19	0	223	0	100	YES
	2020	Jan	16	0	221	0	100	YES
		Feb	17	0	218	0	100	YES
		Mar	20	0	220	0	100	YES
		Apr	18	0	220	0	100	YES
		May	18	0	220	0	100	YES
		June	20	0	222	0	100	YES
Proserpine Scheme	2019	July	22	0	221	0	100	YES
		Aug	19	0	219	0	100	YES
		Sept	19	0	220	0	100	YES
		Oct	22	0	224	0	100	YES
		Nov	19	0	231	0	100	YES
		Dec	14	0	227	0	100	YES
	2020	Jan	25	0	235	0	100	YES
		Feb	19	0	233	0	100	YES
		Mar	22	0	238	0	100	YES
		Apr	19	0	241	0	100	YES
		May	19	0	238	0	100	YES
		June	19	0	238	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 (2019)	Actions Taken (2018)	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	Maintenance schedule initiated for Diesel pump. Ongoing routine maintenance for spears.	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	Construction of pump station commenced. New bores project put forward for future funding.	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 available, installation at some sites to be completed.	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, Dodd St 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	Additional work to be completed. (bores 2,3,7,9,8,22A completed)	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	Not required in recent history	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 analyser installation not complete. SCADA control on hold due to higher priority works required. Further works to be developed for 2020-2023 as part of Treatment strategy 2020-2025	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	Flemington Rd decommissioned. Railway Rd upgraded, no telemetry as yet.	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	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.	Bore 10 disconnected from network. Reservoir land secured. Grant funding for reservoir program and final budget secured. Cannonvale Bulk Water pipeline commenced (to be completed 2021) Reconfiguration works to remove cross connections underway (50% of program to be completed 2021) remaining projects put forward for future council funding	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. Aquacard (QldWater) training completed by all staff	Completed.	A chlorination of New mains procedure has been developed. A mains burst / repair procedure will be developed.

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	Ongoing. RPZD testing carried out.	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. Pigging procedure developed for Coastal WTP (to be carried out every August before peak demands)	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	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	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	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	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, maintenance program ongoing	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	Completed	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	Ongoing	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	Ongoing	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 on 10 year replacement program	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	External audit completed. All vermin proofing completed. Maintenance and inspection programs ongoing.	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	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 Shute Harbour Res is monitored closely as water age is larger.	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.	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	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 Fence repairs have been carried out as required.	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 and boomgates installed at some sites, budget restraints have delayed further sites. Desktop audit completed. Generic SCADA logins to be removed as part of SCADA strategy	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	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 Awareness sessions each review Treatment Strategy 2020-2025 includes Operator training to Cert III level, intiated. Some operators have achieved WIOA (drinking water) certification	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	Ongoing	Complete. Updated standards uploaded onto Whitsunday Regional Councils website as required.