

# **Drinking Water Quality Management Plan (DWQMP) Report**

2016 - 2017

## **Livingstone Shire Council**

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## GLOSSARY OF TERMS

ADWG 2004	Australian Drinking Water Guidelines (2004). Published by the National Health and Medical Research Council of Australia
ADWG 2011	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
<i>E. coli</i>	<i>Escherichia coli</i> , 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

# 1. Introduction

This report documents the performance of Livingstone Shire Council's drinking water service with respect to water quality and performance in implementing the actions detailed in the drinking water quality management plan (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.

This template has been prepared in accordance with the *Water Industry Regulatory Reform – drinking water quality management plan report factsheet* published by the Department of Energy and Water Supply, Queensland, accessible at [www.dews.qld.gov.au](http://www.dews.qld.gov.au).

## 2. Overview of Operations (optional)

LSC was established after de-amalgamation on 1 January 2014 and has a population of more than 37,000 residents. LSC is located in Central Queensland with a service area of approximately 11,776 km<sup>2</sup>. LSC operates four (4) drinking water schemes:

- Nerimbera and The Caves Water Supply Scheme
- Capricorn Coast Water Supply Scheme
- Marlborough Water Supply Scheme

Operationally, these schemes are unique and each scheme has different considerations.

**The Capricorn Coast Scheme:** This scheme serves the communities of Yeppoon, The Causeway, Kinka Beach, Zilzie, Emu Park and Keppel Sands. The Mercure Capricorn Resort is a major customer at Yeppoon.

The Capricorn Coast Scheme is a multiple entity scheme that has two distinct water supplies. The first supply is Waterpark Creek, which is harvested into the Kelly's Offstream Storage. Water from this storage is conventionally treated and disinfected by the Woodbury Water Treatment Plant (WTP), which is operated by Livingstone Shire Council.

Water from the Woodbury WTP is supplemented by a second water supply via the Rockhampton to Yeppoon Water Supply Pipeline. The ~40 km pipeline supplies water treated conventionally by Fitzroy River Water (FRW), a business unit of Rockhampton Regional Council, at their Glenmore Water Treatment Plant.

**The Caves and Nerimbera Scheme:** The entire water supply for "The Caves area" and "Nerimbera" areas are sourced from, and are zones within the Glenmore Water Treatment Plant reticulation network.

Livingstone Shire Council has no role in treating the water for these zones with the exception of re-chlorination at Mt Charlton reservoir. The local government boundary separates these areas from the Glenmore WTP reticulation network.

The Caves and Nerimbera distribution areas are separate and distinct.

The Caves area, located to the North of Rockhampton, includes the Mt Charlton, Ramsay Creek, Etna Creek, Glenlee, Glendale and Rockyview and The Caves communities. The Capricorn Correctional Centre is a major customer in this zone. Water is supplied to Livingstone Shire Council at the Ramsay St Pump Station. There is a small reticulation area off Argyle St where drinking water returns to FRW control.

Both LSC and FRW agree that there is no further increase in public health risks to FRW due to this arrangement.

Nerimbera is a small community located ~8 km East of Rockhampton town Centre, and pressure is maintained by the Lakes Creek Road Water Pump Station. Livingstone Shire Council has no pumps

or reservoirs in the Nerimbera zone. There is an abattoir located at the far end of this reticulation zone, and this is considered to be a high-risk customer. There is no further treatment or rechlorination in this zone.

Marlborough Water Supply Scheme: This is a bore water catchment to tap scheme that serves the community of Marlborough. Bore water is treated by bag filtration and/or reverse osmosis prior to disinfection. It is fully owned and operated by Livingstone Shire Council.

### **3. Actions taken to implement the DWQMP**

#### **Progress in implementing the risk management improvement program**

The RMIP (Risk Management Improvement Plan) detailed in Appendix B outlines the improvement items completed in the approved DWQMP.

The RMIP also mentions the following items that are currently being addressed but not yet complete:

- Wrong SCADA Limit
- Chlorate Testing
- Mains Break Procedure
- Other WTP Procedures (Marlborough & Woodbury) i.e. Procedure for items with a SCADA callout

The RMIP (Risk Management Improvement Plan) also mentions the following additional improvement items.

- Monitoring Boundary Reservoir
- Develop Reservoir Inspection Program

#### **Revisions made to the operational monitoring program to assist in maintaining the compliance with water quality criteria<sup>1</sup> in verification monitoring.**

The monitoring program was considered adequate

There were no revisions made to the operational monitoring program to assist in maintaining the compliance with water quality criteria in verification monitoring.

#### **Amendments made to the DWQMP.**

There were no amendments made to the DWQMP in the 2016-2017 reporting period.

### **4. Compliance with water quality criteria for drinking water**

See Appendix A - Table 2 & Table 3

The actual verification monitoring program undertaken met the monitoring program described in the DWQMP.

With regard to Reticulation *E. coli* verification monitoring - Livingstone Shire Council's testing schedule has been determined and based on the total population serviced by it as a Service Provider in accordance with the Public Health Regulation 2005. There is not a requirement per Scheme.

Under the Public Health Regulation 2005 - Section 18 AC, samples of the drinking water must be taken at the frequency stated in schedule 3A, column 2;

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<sup>1</sup> Refer to *Water Quality and Reporting Guideline for a Drinking Water Service* for the water quality criteria for drinking water.

Livingstone Shire Council fits in category b) supplying water to more than 5000 but not more than 100 000 people.

Therefore Livingstone Shire Council is required to sample for E coli at one (1) per week plus one (1) per month for each 5000 people over 5000.

As we have <25000 people, we need to sample one (1) per week plus three (3) (1 each for 5000 to 10000, 10000 to 15000 and 15000 to 20000 people) per month.

Overall, this would mean 52 samples plus  $3 \times 12 = 52 + 36 = 88$  per year.

Under the approved schedule, Livingstone Shire Council collects and tests approx. 159 samples per year and as such clearly meets the requirements of the Public Health Regulation 2005.

However, from Table 3 it can be seen that there were some months where samples were not collected in the following Drinking Water Supply Schemes:

- Drinking Water Scheme: Saint Faith's System - August 2016, January 2017 & June 2017
- Drinking Water Scheme: Taranganbah & Lammermoor System - September 2016 & February 2017
- Drinking Water Scheme: Nerimbera System - March 2017

This has been amended in the 2017-2018 reporting period so that, in addition to the current level of testing, Livingstone Shire Council will ensure at least one (1) sample per month is collected in each of the Drinking Water Supply Schemes.

## **5. Notifications to the Regulator under sections 102 and 102A of the Act**

This financial year there were nil instances where the Regulator was notified under sections 102 or 102A of the Act.

## 6. Customer complaints related to water quality

Livingstone Shire 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:

**Table 1 - complaints about water quality, (including per 1000 customers)**

Suspected Illness	Suspected Illness	Discoloured water	Taste and odour	Total
Cap Coast	Nil	42	4	46
Nerimbera	Nil	Nil	Nil	Nil
The Caves	Nil	4	Nil	4
Marlborough	Nil	Nil	Nil	Nil
Total	Nil	46	4	50

### Suspected Illness

Livingstone Shire Council investigates each complaint relating to alleged illness from our water quality, typically by testing the customers tap and closest reticulation sampling point for presence of E.coli.

From 1/7/2016 to 30/6/2017 inclusive, there were nil confirmed cases of illness arising from the drinking water supply system.

### Discoloured Water

A total of forty-six (46) complaints related to discoloured water were received from within Livingstone Shire Council from 1/7/2016 to 30/6/2017 inclusive.

From Table 1 of these forty six (46) complaints forty two (42) were in the Capricorn Coast Drinking Water Supply Scheme & four (4) were in the Mt Charlton Drinking Water Supply Scheme (The Caves). In both of these schemes, water mains were flushed in the adjacent local area network.

With regard to the Mt Charlton Drinking Water Supply Scheme, Livingstone Shire Council has no control over water quality as received from Bulk Water Service Provider Rockhampton Regional Council.

### Taste and Odour

From Table 1 four (4) customer complaints were related to taste & odour were from residents in the Capricorn Coast Drinking Water Supply Scheme. Complaints were investigated and where necessary appropriate testing was performed.

## **7. Findings and recommendations of the DWQMP auditor**

There were nil Audits conducted in the period 1/7/2016 to 30/6/2017.

The first regular audit of the Drinking Water Quality Management Plan must be conducted by 31 August 2017.

The findings of that Audit will be included in the Annual Report for the next financial year.

## **8. Outcome of the review of the DWQMP and how issues raised have been addressed**

Livingstone Shire Council reviewed the current DWQMP and there were no changes to be made.

Informed Water Supply and Regulation of this outcome (via email) on 5/9/2016.

## 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*.

The reported statistics do not include results derived from repeat samples, or from emergency or investigative samples undertaken in response to an elevated result.

**Table 2 - Verification monitoring results**

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Capricorn Coast	Kelly's Offstream Storage  (Source Water)	Nitrate	mg/L	Monthly	12	12	0	<0.01	0.53	0.0525	0.01	ALS
		Sulphate	mg/L	Monthly	12	12	0	<1	26	6.416667	1	ALS
		Fluoride (naturally occurring)	mg/L	Monthly	12	12	0	<0.1	<0.1	<0.1	0.1	ALS
		Aluminium (acid-soluble)	mg/L	Monthly	12	12	0	0.013	4.56	0.417	0.005	ALS
		Copper	mg/L	Monthly	12	12	0	0.001	0.484	0.20625	0.001	ALS
		Iron	mg/L	Monthly	12	12	0	<0.05	5.17	1.031667	0.05	ALS
		Lead	mg/L	Monthly	12	12	0	<0.001	0.001	<0.001	0.001	ALS
		Manganese	mg/L	Monthly	12	12	0	0.002	0.08	0.015667	0.001	ALS
		Zinc	mg/L	Monthly	12	12	0	<0.005	0.033	0.006417	0.005	ALS
		pH		Monthly	12	12	0	6.17	7.1	6.688333	0.01	ALS
		Turbidity	NTU	Monthly	12	12	0	0.3	5.5	2.116667	0.1	ALS
		Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	Monthly	12	12	0	5	14	8.5	1	ALS
		Calcium	mg/L	Monthly	12	12	0	1	11	3.083333	1	ALS
		Chloride	mg/L	Monthly	12	12	0	26	39	32.25	1	ALS
Colour (True)	PCU	Monthly	12	12	0	2	215	43.91667	1	ALS		

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name	
Capricorn Coast	Kelly's Offstream Storage  (Source Water)	Conductivity	µS/cm	Monthly	12	12	0	131	211	150.1667	1	ALS	
		Magnesium	mg/L	Monthly	12	12	0	2	3	2.25	1	ALS	
		Nitrite	mg/L	Monthly	12	12	0	<0.01	<0.01	<0.01	0.01	ALS	
		Potassium	mg/L	Monthly	12	12	0	<1	<1	<1	1	ALS	
		Sodium	mg/L	Monthly	12	12	0	18	25	21.16667	1	ALS	
		Total Dissolved Solids	mg/L	Monthly	12	12	0	75	431	124.5833	5	ALS	
		Hardness (Total as CaCO3)	mg/L	Monthly	12	12	0	<1	36	16.08333	1	ALS	
		Total Organic Carbon	mg/L	Quarterly	4	4	0	4	5	4.25	1	ALS	
		Arsenic	mg/L	Yearly	1	1	0	0.003	0.003	0.003	0.001	ALS	
		Cadmium	mg/L	Yearly	1	1	0	<0.0001	<0.0001	<0.0001	0.0001	ALS	
		Chromium	mg/L	Yearly	1	1	0	<0.001	<0.001	<0.001	0.001	ALS	
		Nickel	mg/L	Yearly	1	1	0	<0.001	<0.001	<0.001	0.001	ALS	
		Selenium	mg/L	Yearly	1	1	0	<0.1	<0.1	<0.1	0.01	ALS	
		Mercury	mg/L	Yearly	1	1	0	<0.0001	<0.0001	<0.0001	0.0001	ALS	
	pH		Daily	365	365	0	5.5	7.20	6.38	0.01	Inhouse Telemetry		
	Turbidity	NTU	Daily	364	364	0	0.76	8.74	2.05	0.01	Inhouse Telemetry		
		Woodbury Water Treatment Plant	Nitrate	mg/L	Monthly	12	12	0	<0.05	0.28	0.04	0.01	ALS
			Sulphate	mg/L	Monthly	12	12	0	2	30	23.25	1	ALS
			Trihalomethanes (Total)	ug/L	Quarterly	4	4	0	<5	57	33.25	5	ALS
			Fluoride (naturally occurring)	mg/L	Monthly	12	12	0	<0.1	<0.1	<0.1	0.1	ALS
			Aluminium (acid-soluble)	mg/L	Monthly	12	12	0	0.019	0.137	0.061917	0.005	ALS
			Copper	mg/L	Monthly	12	12	0	<0.001	0.286	0.027727	0.001	ALS
	Iron		mg/L	Monthly	12	12	0	<0.05	0.75	<0.05	0.05	ALS	
	Lead		mg/L	Monthly	12	12	0	<0.001	<0.001	<0.001	0.001	ALS	
	Manganese		mg/L	Monthly	12	12	0	<0.001	0.011	0.005	0.001	ALS	
	Zinc	mg/L	Monthly	12	12	0	<0.005	0.01	<0.005	0.005	ALS		
	pH		Monthly	12	12	0	5.37	7.61	6.836667	0.01	ALS		

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Capricorn Coast	Woodbury Water Treatment Plant	Turbidity	NTU	Monthly	12	12	0	0.1	1.2	0.491667	0.1	ALS
		Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	Monthly	12	12	0	2	30	13.58333	1	ALS
		Calcium	mg/L	Monthly	12	12	0	1	12	9.5	1	ALS
		Chloride	mg/L	Monthly	12	12	0	28	43	34.5	1	ALS
		Colour (True)	PCU	Monthly	12	12	0	2	60	7.25	1	ALS
		Conductivity	µS/cm	Monthly	12	12	0	139	243	205.5833	1	ALS
		Magnesium	mg/L	Monthly	12	12	0	2	3	2.25	1	ALS
		Nitrite	mg/L	Monthly	12	12	0	<0.01	<0.10	<0.01	0.01	ALS
		Potassium	mg/L	Monthly	12	12	0	<1	<1	<1	1	ALS
		Sodium	mg/L	Monthly	12	12	0	20	43	25.25	1	ALS
		Total Dissolved Solids	mg/L	Monthly	12	12	0	79	141	123.75	5	ALS
		Hardness (Total as CaCO <sub>3</sub> )	mg/L	Monthly	12	12	0	11	42	32.91667	1	ALS
		Total Organic Carbon	mg/L	Quarterly	4	4	0	<1	2	1.25	1	ALS
		Arsenic	mg/L	Yearly	2	2	0	<0.001	<0.001	<0.001	0.001	ALS
		Cadmium	mg/L	Yearly	2	2	0	<0.0001	<0.0001	<0.0001	0.0001	ALS
		Chromium	mg/L	Yearly	2	2	0	<0.001	0.002	0.001	0.001	ALS
		Nickel	mg/L	Yearly	2	2	0	<0.001	<0.001	<0.001	0.001	ALS
		Selenium	mg/L	Yearly	2	2	0	<0.01	<0.01	<0.01	0.01	ALS
		Mercury	mg/L	Yearly	2	2	0	<0.0001	<0.0001	<0.0001	0.0001	ALS
	Chlorine (free)	mg/L	Daily	365	365	0	1.06	2.18	1.74	0.01	Inhouse Telemetry	
	pH		Daily	365	365	0	7.1	7.69	7.31	0.01	Inhouse Telemetry	
	Reticulation	Chlorine (free)	mg/L	Weekly	128	128	0	0.04	1.37	0.48	0.01	Inhouse
		pH		Weekly	128	128	0	6.9	8.9	8.11	0.01	Inhouse
Turbidity		NTU	Weekly	128	128	0	0.018	280	6.02	0.1	Inhouse	
Trihalomethanes (Total) (Schofield Parade Nth)		µg/L	Quarterly	4	4	0	122	170	146.75	5	ALS	
Trihalomethanes (Total) (Pacific Heights)		µg/L	Quarterly	4	4	0	125	134	127.5	5	ALS	

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Marlborough	Source Water	Nitrate	mg/L	Monthly	12	12	0	0.11	0.64	0.505	0.01	ALS
		Sulphate	mg/L	Monthly	12	12	0	20	23	21	1	ALS
		Fluoride (naturally occurring)	mg/L	Monthly	12	12	0	0.1	0.2	0.14	0.1	ALS
		Aluminium (acid-soluble)	mg/L	Monthly	12	12	0	<0.005	0.005	<0.005	0.005	ALS
		Copper	mg/L	Monthly	12	12	0	<0.001	0.003	<0.001	0.001	ALS
		Iron	mg/L	Monthly	12	12	0	<0.05	<0.05	<0.05	0.05	ALS
		Lead	mg/L	Monthly	12	12	0	<0.001	<0.001	<0.001	0.001	ALS
		Manganese	mg/L	Monthly	12	12	0	<0.001	<0.001	<0.001	0.001	ALS
		Zinc	mg/L	Monthly	12	12	0	<0.005	0.016	<0.005	0.005	ALS
		pH		Monthly	12	12	0	7.84	8.42	8.23	0.01	ALS
		Turbidity	NTU	Monthly	12	12	0	0.1	2.4	0.55	0.1	ALS
		Alkalinity (Total as CaCO3)	mg/L	Monthly	12	12	0	385	492	451.58	1	ALS
		Calcium	mg/L	Monthly	12	12	0	21	25	22.92	1	ALS
		Chloride	mg/L	Monthly	12	12	0	171	193	179.75	1	ALS
		Colour (True)	PCU	Monthly	12	12	0	2	3	2.25	1	ALS
		Conductivity	µS/cm	Monthly	12	12	0	1270	1300	1285.83	1	ALS
		Magnesium	mg/L	Monthly	12	12	0	95	116	102.58	1	ALS
		Nitrite	mg/L	Monthly	12	12	0	<0.01	<0.01	<0.01	0.01	ALS
		Potassium	mg/L	Monthly	12	12	0	<1	1	1	1	ALS
		Sodium	mg/L	Monthly	12	12	0	100	114	105.83	1	ALS
		Total Dissolved Solids	mg/L	Monthly	12	12	0	600	738	702.75	5	ALS
		Hardness (Total as CaCO3)	mg/L	Monthly	12	12	0	449	535	479.67	1	ALS
		Total Organic Carbon	mg/L	Quarterly	4	4	0	<5	8	5.33	1	ALS
		Arsenic	mg/L	Yearly	1	1	0	0.002	0.002	0.002	0.001	ALS
Cadmium	mg/L	Yearly	1	1	0	<0.0001	<0.0001	<0.0001	<0.0001	ALS		
Chromium	mg/L	Yearly	1	1	0	0.005	0.005	0.005	0.001	ALS		
Nickel	mg/L	Yearly	1	1	0	0.001	0.001	0.001	0.001	ALS		
Selenium	mg/L	Yearly	1	1	0	<0.01	<0.01	<0.01	0.01	ALS		
Mercury	mg/L	Yearly	1	1	0	<0.0001	<0.0001	<0.0001	0.0001	ALS		

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Marlborough	Marlborough Water Treatment Plant	Nitrate	mg/L	Monthly	12	12	0	0.02	0.42	0.29	0.01	ALS
		Sulphate	mg/L	Monthly	12	12	0	5	10	7	1	ALS
		Trihalomethanes (Total)	µg/L	Quarterly	4	4	0	<5	64	<5	5	ALS
		Fluoride	mg/L	Monthly	12	12	0	<0.1	<0.1	<0.1	0.1	ALS
		Aluminium (acid-soluble)	mg/L	Monthly	12	12	0	<0.005	<0.005	<0.005	0.005	ALS
		Copper	mg/L	Monthly	12	12	0	0.002	0.06		0.001	ALS
		Iron	mg/L	Monthly	12	12	0	<0.05	<0.05	<0.05	0.05	ALS
		Lead	mg/L	Monthly	12	12	0	<0.001	<0.001	<0.001	0.001	ALS
		Manganese	mg/L	Monthly	12	12	0	<0.001	0.006	<0.001	0.001	ALS
		Zinc	mg/L	Monthly	12	12	0	<0.005	0.017	0	0.005	ALS
		pH		Monthly	12	12	0	7.8	8.3	8.14	0.01	ALS
		Turbidity	NTU	Monthly	12	12	0	<0.1	1	0.39	0.1	ALS
		Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	Monthly	12	12	0	141	220	176.83	1	ALS
		Calcium	mg/L	Monthly	11	11	0	7	10	8.36	1	ALS
		Chloride	mg/L	Monthly	12	12	0	54	90	69	1	ALS
		Colour (True)	PCU	Monthly	12	12	0	2	3	2.33	1	ALS
		Conductivity	µS/cm	Monthly	12	12	0	445	642	541.42	1	ALS
		Magnesium	mg/L	Monthly	11	11	0	31	48	37.64	1	ALS
		Nitrite	mg/L	Monthly	12	12	0	<0.01	<0.01	<0.01		ALS
		Potassium	mg/L	Monthly	11	11	0	<1	<1	<1	1	ALS
		Sodium	mg/L	Monthly	11	11	0	40	56	48.27	1	ALS
		Total Dissolved Solids	mg/L	Monthly	12	12	0	258	363	303.75	5	ALS
		Hardness (Total as CaCO <sub>3</sub> )	mg/L	Monthly	11	11	0	145	223	175.73	1	ALS
		Total Organic Carbon	mg/L	Quarterly	4	4	0	<5	3	1.75	1	ALS
		Arsenic	mg/L	Yearly	1	1	0	<0.001	<0.001	<0.001	0.001	ALS
		Cadmium	mg/L	Yearly	1	1	0	<0.0001	<0.0001	<0.0001	0.0001	ALS
Chromium	mg/L	Yearly	1	1	0	0.002	0.002	0.002	0.001	ALS		
Nickel	mg/L	Yearly	1	1	0	<0.001	<0.001	<0.001	0.001	ALS		
Selenium	mg/L	Yearly	1	1	0	<0.01	<0.01	<0.01	0.01	ALS		

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Marlborough		Mercury	mg/L	Yearly	1	1	0	<0.0001	<0.0001	<0.0001	0.0001	ALS
		Chlorine (free)	mg/L	Daily	365	365	0	0.32	1.19	0.80	0.01	Inhouse Telemetry
		pH		Daily	365	365	0	6.9	7.68	7.24	0.01	Inhouse Telemetry
		Turbidity	NTU	Daily	365	365	0	0.3	1.84	0.49	0.1	Inhouse Telemetry
		Conductivity	µS/cm	Daily	365	365	0	207.37	423.04	730.12	1	Inhouse Telemetry
	Reticulation	Chlorine (free)	mg/L	Weekly	10	10	0	0.51	0.91	0.65	0.01	Inhouse
		pH		Weekly	11	11	0	7	8	7.47	0.01	Inhouse
		Turbidity	NTU	Weekly	12	12	0	0.07	0.2	0.13	0.1	Inhouse
		Escherichia coli (E.coli)	MPN/100mL	Weekly	12	12	0	<1	<1	<1	1	Ecoscope
		Trihalomethanes (Total) (Marlborough School)	µg/L	Quarterly	4	4	0	<5	10	6	5	ALS
Glenmore (RRC)	Source Water	Nitrate	mg/L	Monthly	12	12	0	0.042	0.96	0.21	0.01	Symbio Labs
		Sulphate	mg/L	Monthly	12	12	0	<5.0	11	4.15	1	Symbio Labs
		Fluoride	mg/L	Monthly	12	12	0	<0.05	0.1	0.07	0.1	Symbio Labs
		Aluminium (acid-soluble)	mg/L	Monthly	12	12	0	0.1	1.5	0.55	0.005	Symbio Labs
		Copper	mg/L	Monthly	12	12	0	0.00056	0.018	0.01	0.001	Symbio Labs
		Iron	mg/L	Monthly	12	12	0	0.55	14	3.76	0.05	Symbio Labs
		Lead	mg/L	Monthly	12	12	0	0.00014	0.0044	0	0.001	Symbio Labs
		Manganese	mg/L	Monthly	12	12	0	0.0079	0.26	0.08	0.001	Symbio Labs
		Zinc	mg/L	Monthly	12	12	0	0.0034	0.035	0.02	0.005	Symbio Labs
		pH		Monthly	12	12	0	6.61	7.82	7.36	0.01	Symbio Labs
		Turbidity	NTU	Monthly	12	12	0	66	1000	247.08	0.1	Symbio Labs
		Alkalinity (Total as CaCO3)	mg/L	Monthly	12	12	0	24	94	50.5	1	Symbio Labs
		Calcium	mg/L	Monthly	12	12	0	1.6	14	8.03	1	Symbio Labs
		Chloride	mg/L	Monthly	12	12	0	10	67	32.08	1	Symbio Labs
		Colour (True)	PCU	Monthly	12	12	0	30	80	57.92	1	Symbio Labs
		Conductivity	µS/cm	Monthly	12	12	0	75	270	182.08	1	Symbio Labs
Magnesium	mg/L	Monthly	12	12	0	1	9.2	4.99	1	Symbio Labs		

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Glenmore (RRC)	Source Water	Nitrite	mg/L	Monthly	12	12	0	<0.005	0.014	0.01		Symbio Labs
		Potassium	mg/L	Monthly	12	12	0	0.23	5.3	2.77	1	Symbio Labs
		Sodium	mg/L	Monthly	12	12	0	1.1	25	13.13	1	Symbio Labs
		Total Dissolved Solids	mg/L	Monthly	12	12	0	24	300	202.83	5	Symbio Labs
		Hardness (Total as CaCO <sub>3</sub> )	mg/L	Monthly	12	12	0	8	73	40.58	1	Symbio Labs
		Total Organic Carbon	mg/L	Quarterly	4	4	0	2.5	7.4	5.8	1	Symbio Labs
		Arsenic	mg/L	Yearly	3	3	0	<0.05	0.0017	0.0017	0.001	Symbio Labs
		Cadmium	mg/L	Yearly	5	5	0	<0.0001	<0.0001	<0.0001	0.0001	Symbio Labs
		Chromium	mg/L	Yearly	5	5	0	0.0019	0.016	0.01	0.001	Symbio Labs
		Nickel	mg/L	Yearly	5	5	0	0.00016	0.02	0.01	0.001	Symbio Labs
		Selenium	mg/L	Yearly	5	5	0	<0.0005	0.0007	<0.0005	0.01	Symbio Labs
	Mercury	mg/L	Yearly	5	5	0	<0.0001	<0.000	<0.0001	0.0001	Symbio Labs	
	Water Treatment Plant	Nitrate	mg/L	Monthly	12	12	0	0.07	0.34	0.188	0.01	Symbio Labs
		Sulphate	mg/L	Monthly	12	12	0	<5.0	14	\$2.22	1	Symbio Labs
		Trihalomethanes (Total)	µg/L	Quarterly	4	4	0	26	83	51.75	5	Symbio Labs
		Fluoride	mg/L	Monthly	12	12	0	<0.05	0.08	0.05	0.1	Symbio Labs
		Aluminium (acid-soluble)	mg/L	Monthly	12	12	0	<0.010	0.012	<0.010	0.005	Symbio Labs
		Copper	mg/L	Monthly	12	12	0	0	0.0091	0.0029	0.001	Symbio Labs
		Iron	mg/L	Monthly	12	12	0	<0.005	0.023	<0.005	0.05	Symbio Labs
		Lead	mg/L	Monthly	12	12	0	0.00016	0.0009	0.00033	0.001	Symbio Labs
		Manganese	mg/L	Monthly	12	12	0	<0.0005	0.0012	0.00065	0.001	Symbio Labs
		Zinc	mg/L	Monthly	12	12	0	0.00058	0.011	0.00428	0.005	Symbio Labs
		pH		Monthly	12	12	0	6.54	7.88	7.47	0.01	Symbio Labs
		Turbidity	NTU	Monthly	12	12	0	<0.1	0.8	0.18333	0.1	Symbio Labs
		Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	Monthly	12	12	0	24	67	46.4166	1	Symbio Labs
Calcium		mg/L	Monthly	12	12	0	4.6	16	11.3583	1	Symbio Labs	
Chloride	mg/L	Monthly	12	12	0	18	160	49.0833	1	Symbio Labs		
Colour (True)	PCU	Monthly	11	11	0	<2	<2	<2	1	Symbio Labs		
Conductivity	µS/cm	Monthly	12	12	0	100	280	208	1	Symbio Labs		

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Glenmore (RRC)	Water Treatment Plant	Magnesium	mg/L	Monthly	12	12	0	3	8.7	5.43	1	Symbio Labs
		Nitrite	mg/L	Monthly	12	12	0	<0.005	0.01	<0.005		Symbio Labs
		Potassium	mg/L	Monthly	12	12	0	1.9	5.1	3.16	1	Symbio Labs
		Sodium	mg/L	Monthly	12	12	0	5	26	16.21	1	Symbio Labs
		Total Dissolved Solids	mg/L	Monthly	12	12	0	70	190	128.25	5	Symbio Labs
		Hardness (Total as CaCO <sub>3</sub> )	mg/L	Monthly	11	11	0	28	76	49.64	1	Symbio Labs
		Total Organic Carbon	mg/L	Quarterly	4	4	0	2.2	3.3	2.8	1	Symbio Labs
		Arsenic	mg/L	Yearly	3	3	0	<0.0005	<0.05	<0.05	0.001	Symbio Labs
		Cadmium	mg/L	Yearly	5	5	0	<0.0001	<0.0001	<0.0001	0.0001	Symbio Labs
		Chromium	mg/L	Yearly	5	5	0	<0.0005	<0.0005	<0.0005	0.001	Symbio Labs
		Nickel	mg/L	Yearly	5	5	0	<0.0001	0.00043	0.00034	0.001	Symbio Labs
		Selenium	mg/L	Yearly	5	5	0	<0.0005	<0.0005	<0.0005	0.01	Symbio Labs
		Mercury	mg/L	Yearly	5	5	0	<0.0001	<0.0001	<0.0001	0.0001	Symbio Labs

**Table 3 - Reticulation *E. coli* verification monitoring**

Drinking Water Scheme:	Saint Faith's System												
	Year Month	2016						2017					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	3	0	4	1	2	3	0	4	1	1	4	0	
No. of samples collected in which <i>E. coli</i> is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0	
No. of samples collected in previous 12 month period	27	22	23	24	21	24	22	23	24	21	24	22	
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0	
% of samples that comply (monthly samples)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Compliance with 98% annual value (previous 12 months)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
The Public Health Regulation 2005 requires that 98 per cent of samples taken in a 12 month period should contain no <i>E. Coli</i> . This requirement is referred to as the 'annual value' in Schedule 3A of the regulation. This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).													

Drinking Water Scheme:	Taranganba and Lammermoor System												
	Year Month	2016						2017					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	1	5	0	4	2	1	5	0	3	3	1	4	
No. of samples collected in which <i>E. coli</i> is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0	
No. of samples collected in previous 12 month period	30	30	26	26	28	25	28	26	25	28	26	29	
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0	
% of samples that comply (monthly samples)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Compliance with 98% annual value (previous 12 months)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
The Public Health Regulation 2005 requires that 98 per cent of samples taken in a 12 month period should contain no <i>E. Coli</i> . This requirement is referred to as the 'annual value' in schedule 3A of the regulation. This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).													

Drinking Water Scheme:	Emu Park and Keppel Sands System												
	Year Month	2016						2017					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	4	5	4	5	4	4	5	4	4	4	5	4	
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0	
No. of samples collected in previous 12 month period	53	50	49	50	49	49	50	49	49	49	50	51	
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0	
% of samples that comply (monthly samples)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Compliance with 98% annual value (previous 12 months)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
The Public Health Regulation 2005 requires that 98 per cent of samples taken in a 12 month period should contain no E. Coli. This requirement is referred to as the 'annual value' in schedule 3A of the regulation. This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).													

Drinking Water Scheme:	Yeppoon Pipeline												
	Year Month	2016						2017					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	2	2	1	3	2	2	2	2	2	1	3	2	
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0	
No. of samples collected in previous 12 month period	27	24	22	23	22	22	22	22	22	22	23	24	
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0	
% of samples that comply (monthly samples)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Compliance with 98% annual value (previous 12 months)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
The Public Health Regulation 2005 requires that 98 per cent of samples taken in a 12 month period should contain no E. Coli. This requirement is referred to as the 'annual value' in schedule 3A of the regulation. This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).													

Drinking Water Scheme:	Nerimbera												
	Year Month	2016						2017					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	1	1	1	1	1	1	1	1	0	1	1	1	
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0	
No. of samples collected in previous 12 month period	17	13	11	11	11	11	11	11	10	10	10	11	
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0	
% of samples that comply (monthly samples)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Compliance with 98% annual value (previous 12 months)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
The Public Health Regulation 2005 requires that 98 per cent of samples taken in a 12 month period should contain no E. Coli. This requirement is referred to as the 'annual value' in schedule 3A of the regulation. This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).													

Drinking Water Scheme:	Mount Charlton System												
	Year Month	2016						2017					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	1	1	1	1	1	1	1	1	1	1	1	1	
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0	
No. of samples collected in previous 12 month period	17	13	11	11	11	11	12	11	11	12	12	12	
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0	
% of samples that comply (monthly samples)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Compliance with 98% annual value (previous 12 months)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
The Public Health Regulation 2005 requires that 98 per cent of samples taken in a 12 month period should contain no E. Coli. This requirement is referred to as the 'annual value' in schedule 3A of the regulation. This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).													

Drinking Water Scheme:	Marlborough Reticulation												
	Year Month	2016						2017					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	1	1	1	1	1	1	1	1	1	1	1	1	
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0	
No. of samples collected in previous 12 month period	17	13	11	12	12	12	12	12	12	12	12	12	
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0	
% of samples that comply (monthly samples)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Compliance with 98% annual value (previous 12 months)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
The Public Health Regulation 2005 requires that 98 per cent of samples taken in a 12 month period should contain no E. Coli. This requirement is referred to as the 'annual value' in schedule 3A of the regulation. This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).													

## Appendix B – Implementation of the DWQMP Risk Management Improvement Program

Table 4 – Progress against the risk management improvement program in the approved DWQMP

Item	Relevant Scheme	Unmitigated Risk level	Mitigated Risk level	Actions			Priority	Responsibility	Action/Comments
				Immediate Actions	Short Term (6 months)	Long Term (18 months)			
Filtration turbidity set point - Woodbury	Capricorn Coast	Extreme 20	High 10	change setpoint to 0.5 NTU	Investigate ability to drop to 0.3 NTU	possible requirement to change filter media	1, 2 and 3	Supervisor Treatment / Mgr WW	Changed to 0.3 NTU ON 10/11/2017.
Calculate Woodbury disinfection CT	Capricorn Coast	Extreme 25	Medium 6		calculate CT to ensure adequacy at worst case concentration and minimum CWT level		2	Water Supply & Sewage Engineer	CT Calculation Completed 8/12/2017
Roof of header tank	Capricorn Coast	Extreme 25	Medium 6		Replace roof on header tank to prevent recontamination		2	Mgr WW	Completed April 2017
Wrong SCADA limit	Capricorn Coast	Extreme 25	High 10	investigate locking out Critical SCADA limits to remove operator level access			1	Mgr WW	To be included with Cyber Security review.
Mains Flushing	All	Medium 8	Medium 8			Develop mains flushing program (all schemes)	3	Mgr WW	Completed
Renegotiate Bulk Water Agreement to include water quality	Capricorn Coast, The Caves, Nerimbera	Medium 9	Medium 9			Bulk water agreement to be renegotiated to include water quality	3	Mgr WW	Current Agreement expires 31/12/2019
Chlorate	All	Medium 6	Medium 6			one off testing to see if this is a potential issue	3	Water Quality Officer	Testing to be performed before December 2017.
Butterfly Valves	Marlborough	Medium 8	Medium 8			Install valves at Marlborough CWR such that each CWT can be isolated	3	Mgr WW	The outlet of all three (3) clear water tanks has isolation valves. Tanks 1 & 2 @ have independent fill valves with isolation valves. Tank 3 has a common inlet/outlet valve with isolation valve.
Mains Break Procedure	All	Extreme 25	Medium 6	check for old procedures with FRW, templates from QWD, IPWEA	Finalise procedure	Include in document management system	1, 2 and 3	Coord Support Services/ Mgr WW	Draft procedure developed – requires further review.

Item	Relevant Scheme	Unmitigated Risk level	Mitigated Risk level	Actions			Priority	Responsibility	Action/Comments
				Immediate Actions	Short Term (6 months)	Long Term (18 months)			
Filtration procedure	Capricorn Coast	Extreme 25	High 10	check for old procedures with FRW, templates from QWD, IPWEA	Finalise procedure	Include in document management system	1, 2 and 3	Coord Support Services/ Mgr WW	Developed February 2017 Procedure No. GDE 011
Disinfection procedure	Capricorn Coast	Extreme 25	Medium 6	check for old procedures with FRW, templates from QWD, IPWEA	Finalise procedure	Include in document management system	1, 2 and 3	Coord Support Services/ Mgr WW	Developed February 2017 Procedure No.GDE.017
Redosing procedure	Capricorn Coast, The Caves	High 10	Medium 8	check for old procedures with FRW, templates from QWD, IPWEA	Finalise procedure	Include in document management system	1, 2 and 3	Coord Support Services/ Mgr WW	Developed September 2017 Procedure No. GDE 012 (Version3)
Other WTP procedures	Marlborough and Woodbury	Medium	Medium		Procedures for items with a SCADA callout	Procedures for other routine processes	2 and 3	Coord Support Services/ Mgr WW	Notification Escalation Procedure to be developed.
Monitoring Boundary Reservoir	Capricorn Coast	Medium	Medium		Rockhampton Regional Council to finalise installation of monitoring equipment @ Boundary Reservoir	Once installed include in document management system	1	Mgr WW	Ongoing discussion with Rockhampton Regional Council
Develop Reservoir Inspection Program	All	Medium	Medium		Finalise procedure	Include in document management system	3	Mgr WW	Currently being developed