Drinking Water Quality Management Plan (DWQMP) Report

1 July 2016 to 30 June 2017

Rockhampton Regional Council

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Definitions and glossary of terms

ADWG	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
Bq/L	Becquerel per litre
CaCO3	Calcium carbonate
CCTV	Closed-circuit television
DWQMP	Drinking Water Quality Management Plan
E. coli	*Escherichia coli*, an organism that may not directly represent a hazard to human health, but indicates the presence of recent faecal contamination
FRW	Fitzroy River Water
LOR	Limit of reporting
LSC	Livingstone Shire Council
mg/L	Milligrams per litre
ML/d	Megalitres per day
MPN/100ml	Most probable number per 100 millilitres
NTU	Nephelometric turbidity units
RRC	Rockhampton Regional Council
RMIP	Risk Management Improvement Program
SCADA	Supervisory control and data acquisition
TCU	True colour units
WTP	Water Treatment Plant
µg/L	Micrograms per litre
µS/cm	Micro-Siemens per centimetre
<	Less than
≥	Equal to or greater than

1. Introduction

This report documents the performance of Rockhampton Regional Council's drinking water service with respect to water quality and also its 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).

This report assists the Regulator to determine whether the approved amended 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.

2. Overview of operations

This report relates to the drinking water supply schemes which Rockhampton Regional Council (RRC) owned and operated from 1 July 2016 to 30 June 2017. Fitzroy River Water (FRW), a commercialised business unit of the Rockhampton Regional Council, is the drinking water service provider.

The direct physical link of localities within the Livingstone Shire Council (LSC) to the Rockhampton Water Supply Scheme meant that some LSC communities are partially or fully served by the water infrastructure operated by RRC. Only the performance of water supply schemes for which RRC have ownership, operating and maintenance responsibility, i.e. drinking water supplied to RRC ratepayers during this reporting period, is detailed in this report. Table 1 lists the water supply scheme, water source, treatment process, population and average drinking water demand for the water supply schemes covered in this report.

Table 1 Water supply scheme, water supply source, treatment process, population served and average water demand

Scheme	Water Source	Treatment Process	Population	Average Demand (ML/d)
Rockhampton (includes LSC Capricorn Coast)	Fitzroy River	Coagulation, flocculation, sedimentation, filtration, pH correction and disinfection	77,140 (99,710)	49 (60)
Mount Morgan	Dee River	Coagulation, sedimentation, filtration, pH correction and disinfection (UV Disinfection added in late 2017)	3,130	1.0

During this reporting period, Mount Morgan Water Supply Scheme's alternate water source (Fletcher Creek) was not used thus its water quality monitoring results are not incorporated in this report.

3. Actions taken to implement the DWQMP

Generally, the DWQMP describes the operating strategies, operating limits and approaches to water quality monitoring and the overall management of risks to water quality that were in place at the time that the DWQMP was approved. Specific changes or improvements to the drinking water services provided by FRW have occurred via the implementation of the Risk Management Improvement Program (RMIP) as detailed below.

Progress in implementing the Risk Management Improvement Program

Refer to Appendix B for a summary of progress in implementing each of the improvement program actions. The information provided describes the progress made during this reporting period towards the completion of specific tasks identified in the RMIP listed in the approved amended DWQMP.

Appendix B also covers current projects in the Rockhampton Water Supply Scheme that are designed as an additional preventative measure/barrier to provide improved water quality especially during extreme rainfall or major flood events which are usually very short-lived.

Amendments made to the DWQMP

Amendments made for the DWQMP were approved by the Regulator on 12 January 2017. The amendments include an update of information relating to water supply infrastructure, outcomes of a review of the risk assessments completed for each scheme, and minor changes to the verification monitoring program including the inclusion of new reticulation sampling points. The amendments also include an update to the RMIP based on the revised risk assessments and the progress that continues to be made to deliver the RMIP.

4. Compliance with water quality criteria for drinking water

Appendix A provides an overview of the results from the verification monitoring program for the reporting period of 1 July 2016 to 30 June 2017. The verification monitoring program was carried out as per Section 10.2 of the approved amended DWQMP. The drinking water results were compared against the water quality criteria, i.e. the health guideline values in the current Australian Drinking Water Guidelines (ADWG), as well as the standards in the *Public Health Regulation 2005*.

Appendix A Tables 1.1 and 1.2 contain a summary of the results of the verification monitoring program for Rockhampton and Mount Morgan water supply schemes. All drinking water quality results from the standard monitoring program met the recommended values in the ADWG.

Appendix A Tables 2.1 and 2.2 contain a summary of the results of the reticulation *E. coli* verification monitoring program for Rockhampton and Mount Morgan water supply schemes. All samples taken tested negative for *E. coli*.

5. Notification to the Regulator under sections 102 and 102A of the Act

For this reporting period, there were no instances where the Regulator was notified under sections 102 or 102A of the Act.

6. Customer complaints related to water quality

Rockhampton Regional Council is required to report on the number of drinking water quality complaints, general details of complaints and the responses undertaken.

Table 2 and Figure 1 provide a breakdown of the customer complaints relating to drinking water quality during this period.

Table 2 Number of drinking water quality complaints from 1 July 2016 to 30 June 2017.

Scheme	Suspected Illness	Taste and/or Odour	Appearance and/or Discoloured Water	Total
Rockhampton	0	8	34	**42**
Mount Morgan	0	3	5	**8**
Total	**0**	**11**	**39**	**50**

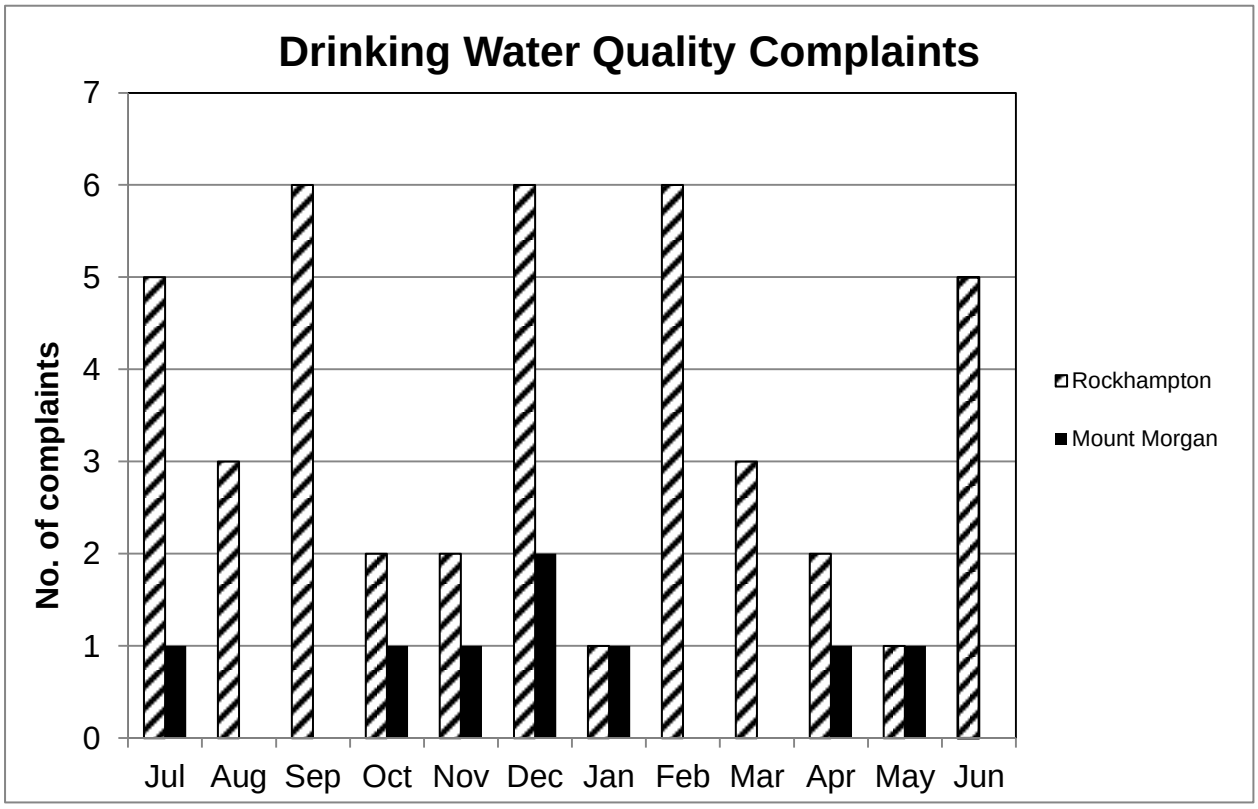

Figure 1. Drinking water quality complaints received between 1 July 2016 and 30 June 2017 for the Rockhampton and Mount Morgan Water Supply Schemes respectively.

Suspected illness

Complaints are sometimes received from customers who suspect their water may be associated with an illness they are experiencing. FRW investigates each complaint relating to alleged illness from the drinking water, typically by testing the customers tap and closest reticulation sampling for the presence of *E. coli* as well as general physico-chemical testing. In addition, FRW staff liaises periodically with local Queensland Health Officers in order to receive updates on any reports of suspected waterborne disease.

During this reporting period, FRW was not aware of any confirmed cases of illness arising from drinking water supplied from Rockhampton and Mount Morgan water supply schemes.

Taste and/or odour

A total number of 11 customer complaints associated with unfavourable taste and/or odour were received during this reporting period. Eight (8) customer complaints were from Rockhampton water supply scheme and 3 customer complaints were received from Mount Morgan water supply scheme.

FRW responded to each complaint by dispatching crews to collect samples for further testing or to flush water mains when necessary to provide improved water quality.

Appearance and/or discoloured water

A total of 39 customer complaints associated with appearance and/or discoloured water were received during this reporting period. Thirty-four (34) customer complaints were received from Rockhampton water supply scheme and of these, 9 were due to the presence of air in the water. Five (5) customer complaints were received from Mount Morgan water supply scheme.

FRW responded to each complaint by dispatching crews to collect samples for further testing or to flush water mains when necessary to provide improved water quality.

7. Findings and recommendations of the DWQMP auditor

The first audit of the approved DWQMP was scheduled for completion by 31 August 2016. RRC completed and submitted the DWQMP Audit Report to the Regulator in April 2016. The purpose of the audit was to verify the accuracy of the monitoring and performance data provided to the Regulator, assess compliance with the DWQMP, and to assess the relevance of the DWQMP in relation to the service provided. A summary of, and recommendations from, the Audit Report are detailed in Section 7 of the DWQMP 2015-16 Annual Report.

In accordance with legislative requirements, the next regular audit of the DWQMP is scheduled for completion by 31 August 2020, with subsequent findings of the audit to be incorporated as appropriate in future revisions of the DWQMP.

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

A review of the DWQMP was completed in August 2016. The purpose of the review was to ensure that the DWQMP remains relevant, having regard to the operation of the drinking water service. The review was conducted by

- Dr Jason Plumb, Manager FRW
- Ariane Leyden, Water Quality Officer.

A number of amendments were made to the document including, but not limited to,

- a brief description of current upgrade projects;
- an update of details of the stakeholders involved in managing drinking water infrastructure;
- additional literature on the raw water source for the Rockhampton water supply scheme including naturally-occurring fluoride, iron and manganese concentrations, and potentially toxic cyanobacterial species *Cylindrospermopsis raciborkskii* and *Anabaena circinalis*;
- outcomes of a review of the risk assessments completed for each scheme; and
- changes in the verification monitoring program including the inclusion of new reticulation sampling points.

The amendments made to the DWQMP were approved by the Regulator on 12 January 2017. The next internal review of the DWQMP is due by 31 August 2018.

Appendix A Summary of compliance with water quality criteria

The results from the verification monitoring program for the period of 1 July 2016 to 30 June 2017 have been compared against the levels of the water quality criteria specified by the Regulator in the *Water Quality and Reporting Guidelines for a Drinking Water Service*.

The verification monitoring program for this reporting period was carried out as per Section 10.2 of the approved amended DWQMP. The reported statistics do not include results from repeat samples undertaken in response to an elevated result or from event-related or investigative samples. For this reporting period, there were no samples taken that exceeded the water quality criteria, i.e. the health guideline values in the current ADWG and the standards in the *Public Health Regulation 2005*.

Tables A1.1 and A1.2 contain a summary of water quality monitoring results from Rockhampton and Mount Morgan Water Supply Schemes, respectively, including scheme component, parameter, limit of resolution (LOR), unit of measure, sampling frequency, number of drinking water samples exceeding the levels of the water quality criteria, total number of samples taken, number of samples with values greater than or equal the LOR, minimum concentration or count, maximum concentration or count, average (mean) concentration or count, and laboratory name or data source. The fluoride data presented in Tables A1.1 and A1.2 are for naturally-occurring fluoride. RRC discontinued fluoridating drinking water on 17 June 2013 in accordance with the *Water Fluoridation Regulation*.

Tables A2.1 and A2.2 provide a summary of the reticulation *E. coli* verification monitoring from Rockhampton and Mount Morgan Water Supply Schemes, respectively. The percentage from each water supply scheme was calculated using a twelve (12) month rolling annual value. A total of 624 samples were collected and tested for *E. coli*, with all samples testing negative for this bacterium. This 100% compliance of all samples collected is well above the 98% compliance target specified in the *Public Health Regulation 2005*.

Table A1.1 Rockhampton Water Supply Scheme water quality monitoring results from 1 July 2016 to 30 June 2017

Scheme Name	Scheme Component	Parameter	LOR	Unit	Sampling Frequency	Total no. of samples collected	Total no. of samples with values ≥ the LOR	Minimum	Maximum	Average	Laboratory/ Source
Rockhampton	Source Water	pH	0.01	unit	Monthly	12	12	6.88	7.90	7.47	Symbio Alliance
Rockhampton	Source Water	Colour (True)	2	TCU	Monthly	12	12	30	80	56	Symbio Alliance
Rockhampton	Source Water	Turbidity	0.1	NTU	Monthly	12	12	22.0	816.0	165.6	Symbio Alliance
Rockhampton	Source Water	Electrical Conductivity	5	µS/cm	Monthly	12	12	110	400	209	Symbio Alliance
Rockhampton	Source Water	Solids (Dissolved)	2	mg/L	Monthly	12	12	140	300	222	Symbio Alliance
Rockhampton	Source Water	Chloride	2	mg/L	Monthly	12	12	16	87	39	Symbio Alliance
Rockhampton	Source Water	Fluoride	0.05	mg/L	Monthly	12	11	<0.05	0.11	0.08	Symbio Alliance
Rockhampton	Source Water	Nitrate (as N)	0.005	mg/L	Monthly	12	12	0.022	0.960	0.211	Symbio Alliance
Rockhampton	Source Water	Nitrite (as N)	0.005	mg/L	Monthly	12	7	<0.005	0.014	0.007	Symbio Alliance
Rockhampton	Source Water	Sulphate	5	mg/L	Monthly	12	8	<5	15	7	Symbio Alliance
Rockhampton	Source Water	Aluminium (Acid Soluble)	0.01	mg/L	Monthly	12	12	0.10	1.50	0.54	Symbio Alliance
Rockhampton	Source Water	Iron (Total)	0.005	mg/L	Monthly	12	12	0.550	11.000	2.664	Symbio Alliance
Rockhampton	Source Water	Manganese (Total)	0.0005	mg/L	Monthly	12	12	0.0079	0.2600	0.0591	Symbio Alliance
Rockhampton	Source Water	Copper (Total)	0.0005	mg/L	Monthly	12	12	0.0006	0.0130	0.0044	Symbio Alliance
Rockhampton	Source Water	Lead (Total)	0.0001	mg/L	Monthly	12	12	0.0001	0.0044	0.0011	Symbio Alliance
Rockhampton	Source Water	Zinc (Total)	0.0005	mg/L	Monthly	12	12	0.0029	0.0350	0.0132	Symbio Alliance
Rockhampton	Source Water	Calcium (Total)	0.1	mg/L	Monthly	12	12	1.6	21.0	9.6	Symbio Alliance
Rockhampton	Source Water	Sodium (Total)	1	mg/L	Monthly	12	12	3	38	16	Symbio Alliance
Rockhampton	Source Water	Potassium (Total)	0.2	mg/L	Monthly	12	12	0.5	5.3	3.0	Symbio Alliance
Rockhampton	Source Water	Magnesium (Total)	0.05	mg/L	Monthly	12	12	1.00	17.00	6.33	Symbio Alliance
Rockhampton	Source Water	Hardness (Total)	1	mg/L	Monthly	12	12	8	120	50	Symbio Alliance
Rockhampton	Source Water	Alkalinity (Total) as CaCO3	1	mg/L	Monthly	12	12	32	96	57	Symbio Alliance
Rockhampton	Source Water	Total Organic Carbon	1	mg/L	Quarterly	4	4	7	10	8	Symbio Alliance
Rockhampton	Source Water	Arsenic	0.0005	mg/L	Annually	1	1	0.0017	0.0017	0.0017	Symbio Alliance
Rockhampton	Source Water	Barium	0.0001	mg/L	Annually	1	1	0.0560	0.0560	0.0560	Symbio Alliance
Rockhampton	Source Water	Beryllium	0.0001	mg/L	Annually	1	1	0.0001	0.0001	0.0001	Symbio Alliance
Rockhampton	Source Water	Cadmium	0.0001	mg/L	Annually	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Rockhampton	Source Water	Chromium	0.0005	mg/L	Annually	1	1	0.0034	0.0034	0.0034	Symbio Alliance
Rockhampton	Source Water	Mercury	0.0001	mg/L	Annually	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Rockhampton	Source Water	Nickel	0.0001	mg/L	Annually	1	1	0.0002	0.0002	0.0002	Symbio Alliance
Rockhampton	Source Water	Selenium	0.0005	mg/L	Annually	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance
Rockhampton	Source Water	Perfluorooctanoic Acid	0.01	µg/L	Annually	1	0	<0.01	<0.01	<0.01	Symbio Alliance
Rockhampton	Source Water	Perfluorooctane Sulphate	0.01	µg/L	Annually	1	0	<0.01	<0.01	<0.01	Symbio Alliance
Rockhampton	Source Water	Pesticides (various)	0.2	ug/L	Annually	1	0	<0.2	<0.2	<0.2	Symbio Alliance
Rockhampton	Source Water	Radionuclides (Total Alpha Acitvity)	0.04	Bq/L	5-Yearly	1	0	<0.04	<0.04	<0.04	Queensland Health
Rockhampton	Source Water	Radionuclides (Total Beta Activity)	0.07	Bq/L	5-Yearly	1	1	0.20	0.20	0.20	Queensland Health
Rockhampton	Source Water	pH	0.01	unit	Continuous			6.48	7.95	7.37	FRW SCADA
Rockhampton	Source Water	Turbidity	0.01	NTU	Continuous			19.54	810.56	125.59	FRW SCADA
Rockhampton	Source Water	pH	0.01	unit	Daily	364	364	6.60	8.09	7.36	FRW Inhouse
Rockhampton	Source Water	Turbidity	0.01	NTU	Daily	364	364	15.90	881.00	125.52	FRW Inhouse

Table A1.1 Rockhampton Water Supply Scheme water quality monitoring results from 1 July 2016 to 30 June 2017 (*continued*)

Scheme Name	Scheme Component	Parameter	LOR	Unit	Sampling Frequency	No. of samples exceeding water quality criteria	Total no. of samples collected	Total no. of samples with values ≥ the LOR	Minimum	Maximum	Average	Laboratory/Source
Rockhampton	WTP	pH	0.01	unit	Monthly	No value	12	12	6.54	7.88	7.54	Symbio Alliance
Rockhampton	WTP	Colour (True)	2	TCU	Monthly	No value	12	0	<2	<2	<2	Symbio Alliance
Rockhampton	WTP	Turbidity	0.1	NTU	Monthly	No value	12	10	<0.1	0.8	0.2	Symbio Alliance
Rockhampton	WTP	Electrical Conductivity	5	µS/cm	Monthly	No value	12	12	140	410	234	Symbio Alliance
Rockhampton	WTP	Solids (Dissolved)	2	mg/L	Monthly	No value	12	12	77	230	142	Symbio Alliance
Rockhampton	WTP	Chloride	2	mg/L	Monthly	No value	12	12	21	160	55	Symbio Alliance
Rockhampton	WTP	Fluoride	0.05	mg/L	Monthly	0	12	9	<0.05	0.10	0.07	Symbio Alliance
Rockhampton	WTP	Nitrate (as N)	0.005	mg/L	Monthly	0	12	12	0.071	0.340	0.188	Symbio Alliance
Rockhampton	WTP	Nitrite (as N)	0.005	mg/L	Monthly	0	12	1	<0.005	0.010	<0.005	Symbio Alliance
Rockhampton	WTP	Sulphate	5	mg/L	Monthly	0	12	4	<5	16	7	Symbio Alliance
Rockhampton	WTP	Aluminium (Acid Soluble)	0.01	mg/L	Monthly	No value	12	2	<0.01	0.01	<0.01	Symbio Alliance
Rockhampton	WTP	Iron (Total)	0.005	mg/L	Monthly	No value	12	2	<0.005	0.023	<0.005	Symbio Alliance
Rockhampton	WTP	Manganese (Total)	0.0005	mg/L	Monthly	0	12	10	<0.0005	0.0012	0.0008	Symbio Alliance
Rockhampton	WTP	Copper (Total)	0.0005	mg/L	Monthly	0	12	12	0.0017	0.0091	0.0031	Symbio Alliance
Rockhampton	WTP	Lead (Total)	0.0001	mg/L	Monthly	0	12	12	0.0002	0.0009	0.0004	Symbio Alliance
Rockhampton	WTP	Zinc (Total)	0.0005	mg/L	Monthly	No value	12	12	0.0013	0.0110	0.0044	Symbio Alliance
Rockhampton	WTP	Calcium (Total)	0.1	mg/L	Monthly	No value	12	12	8.8	20.0	12.6	Symbio Alliance
Rockhampton	WTP	Sodium (Total)	1	mg/L	Monthly	No value	12	12	10	36	19	Symbio Alliance
Rockhampton	WTP	Potassium (Total)	0.2	mg/L	Monthly	No value	12	12	2.2	5.1	3.3	Symbio Alliance
Rockhampton	WTP	Magnesium (Total)	0.05	mg/L	Monthly	No value	12	12	3.00	16.00	6.44	Symbio Alliance
Rockhampton	WTP	Hardness (Total)	1	mg/L	Monthly	No value	12	12	35	120	58	Symbio Alliance
Rockhampton	WTP	Alkalinity (Total) as CaCO3	1	mg/L	Monthly	No value	12	12	31	95	52	Symbio Alliance
Rockhampton	WTP	Total Organic Carbon	1	mg/L	Quarterly	No value	4	4	2	3	3	Symbio Alliance
Rockhampton	WTP	Trihalomethanes	4	µg/L	Quarterly	0	4	4	26	83	52	Symbio Alliance
Rockhampton	Reticulation	Trihalomethanes - Gracemere	4	µg/L	Quarterly	0	4	4	80	170	116	Symbio Alliance
Rockhampton	WTP	Arsenic	0.0005	mg/L	Annually	0	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance
Rockhampton	WTP	Barium	0.0001	mg/L	Annually	0	1	1	0.0390	0.0390	0.0390	Symbio Alliance
Rockhampton	WTP	Beryllium	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Rockhampton	WTP	Cadmium	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Rockhampton	WTP	Chromium	0.0005	mg/L	Annually	0	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance
Rockhampton	WTP	Mercury	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Rockhampton	WTP	Nickel	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Rockhampton	WTP	Selenium	0.0005	mg/L	Annually	0	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance
Rockhampton	WTP	Perfluorooctanoic Acid	0.01	µg/L	Annually	No value	1	0	<0.01	<0.01	<0.01	Symbio Alliance
Rockhampton	WTP	Perfluorooctane Sulphate	0.01	µg/L	Annually	No value	1	0	<0.01	<0.01	<0.01	Symbio Alliance

Table A1.1 Rockhampton Water Supply Scheme water quality monitoring results from 1 July 2016 to 30 June 2017 (*continued*)

Scheme Name	Scheme Component	Parameter	LOR	Unit	Sampling Frequency	No. of samples exceeding water quality criteria	Total no. of samples collected	Total no. of samples with values ≥ the LOR	Minimum	Maximum	Average	Laboratory/Source
Rockhampton	WTP	pH	0.01	unit	Continuous	No value			7.25	7.79	7.67	FRW SCADA
Rockhampton	WTP	Turbidity	0.01	NTU	Continuous	No value			0.07	0.58	0.13	FRW SCADA
Rockhampton	WTP	Electrical Conductivity	0.01	µS/cm	Continuous	No value			65.02	410.36	244.28	FRW SCADA
Rockhampton	WTP	Chlorine	0.01	mg/L	Continuous	0			0.92	1.09	1	FRW SCADA
Rockhampton	WTP	pH	0.01	unit	Daily	No value	364	364	7.20	7.88	7.65	FRW Inhouse
Rockhampton	WTP	Turbidity	0.01	NTU	Daily	No value	364	364	0.07	0.50	0.13	FRW Inhouse
Rockhampton	WTP	Electrical Conductivity	0.01	µS/cm	Daily	No value	364	364	95.10	432.00	253.72	FRW Inhouse
Rockhampton	WTP	Chlorine (Free)	0.01	mg/L	Daily	0	364	364	0.77	1.36	0.98	FRW Inhouse
Rockhampton	Reticulation	*Escherichia coli*	1	MPN/100ml	Weekly	0	468	0	<1	<1	<1	Ecoscope Environmental
Rockhampton	Reticulation	Chlorine (Free)	0.01	mg/L	Weekly	0	559	558	0.00	2.60	0.78	FRW *in situ*

Table A1.2 Mount Morgan Water Supply Scheme water quality monitoring results from 1 July 2016 to 30 June 2017

Scheme Name	Scheme Component	Parameter	LOR	Unit	Sampling Frequency	Total no. of samples collected	Total no. of samples with values ≥ the LOR	Minimum	Maximum	Average	Laboratory/Source
Mount Morgan	Source Water	pH	0.01	unit	Monthly	12	12	6.89	8.35	7.71	Symbio Alliance
Mount Morgan	Source Water	Colour (True)	2	TCU	Monthly	12	12	10	120	41	Symbio Alliance
Mount Morgan	Source Water	Turbidity	0.1	NTU	Monthly	12	12	1.5	35.0	6.6	Symbio Alliance
Mount Morgan	Source Water	Electrical Conductivity	5	µS/cm	Monthly	12	12	93	240	197	Symbio Alliance
Mount Morgan	Source Water	Solids (Dissolved)	2	mg/L	Monthly	12	12	100	170	130	Symbio Alliance
Mount Morgan	Source Water	Chloride	2	mg/L	Monthly	12	12	6	42	27	Symbio Alliance
Mount Morgan	Source Water	Fluoride	0.05	mg/L	Monthly	12	12	0.05	0.08	0.07	Symbio Alliance
Mount Morgan	Source Water	Nitrate (as N)	0.005	mg/L	Monthly	12	4	<0.005	0.160	0.026	Symbio Alliance
Mount Morgan	Source Water	Nitrite (as N)	0.005	mg/L	Monthly	12	4	<0.005	0.045	0.011	Symbio Alliance
Mount Morgan	Source Water	Sulphate	5	mg/L	Monthly	12	8	<5	8	6	Symbio Alliance
Mount Morgan	Source Water	Aluminium (Acid Soluble)	0.01	mg/L	Monthly	11	6	<0.01	0.16	0.04	Symbio Alliance
Mount Morgan	Source Water	Iron (Total)	0.005	mg/L	Monthly	12	12	0.074	1.800	0.451	Symbio Alliance
Mount Morgan	Source Water	Manganese (Total)	0.0005	mg/L	Monthly	12	12	0.0180	0.0960	0.0438	Symbio Alliance
Mount Morgan	Source Water	Copper (Total)	0.0005	mg/L	Monthly	12	12	0.0018	0.0270	0.0049	Symbio Alliance
Mount Morgan	Source Water	Lead (Total)	0.0001	mg/L	Monthly	12	8	<0.0001	0.0007	0.0002	Symbio Alliance
Mount Morgan	Source Water	Zinc (Total)	0.0005	mg/L	Monthly	12	12	0.0056	0.0510	0.0131	Symbio Alliance
Mount Morgan	Source Water	Calcium (Total)	0.1	mg/L	Monthly	12	12	1.0	15.0	10.4	Symbio Alliance
Mount Morgan	Source Water	Sodium (Total)	1	mg/L	Monthly	12	12	2	20	13	Symbio Alliance
Mount Morgan	Source Water	Potassium (Total)	0.2	mg/L	Monthly	12	11	<0.2	2.1	1.6	Symbio Alliance
Mount Morgan	Source Water	Magnesium (Total)	0.05	mg/L	Monthly	12	12	0.61	8.70	6.38	Symbio Alliance
Mount Morgan	Source Water	Hardness (Total)	1	mg/L	Monthly	12	12	5	73	52	Symbio Alliance
Mount Morgan	Source Water	Alkalinity (Total) as CaCO3	1	mg/L	Monthly	12	12	32	105	63	Symbio Alliance
Mount Morgan	Source Water	Total Organic Carbon	1	mg/L	Quarterly	4	4	8	9	8	Symbio Alliance
Mount Morgan	Source Water	Arsenic	0.0005	mg/L	Annually	1	1	0.0005	0.0005	0.0005	Symbio Alliance
Mount Morgan	Source Water	Barium	0.0001	mg/L	Annually	1	1	0.0060	0.0060	0.0060	Symbio Alliance
Mount Morgan	Source Water	Beryllium	0.0001	mg/L	Annually	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	Source Water	Cadmium	0.0001	mg/L	Annually	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	Source Water	Chromium	0.0005	mg/L	Annually	1	1	0.0006	0.0006	0.0006	Symbio Alliance
Mount Morgan	Source Water	Mercury	0.0001	mg/L	Annually	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	Source Water	Nickel	0.0001	mg/L	Annually	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	Source Water	Selenium	0.0005	mg/L	Annually	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance
Mount Morgan	Source Water	Pesticides (various)	0.2	µg/L	Annually	1	0	<0.2	<0.2	<0.2	Symbio Alliance
Mount Morgan	Source Water	Radionuclides (Total Alpha Activity)	0.04	Bq/L	5-Yearly	1	0	<0.04	<0.04	<0.04	Queensland Health
Mount Morgan	Source Water	Radionuclides (Total Beta Activity)	0.07	Bq/L	5-Yearly	1	0	<0.04	<0.04	<0.04	Queensland Health
Mount Morgan	Source Water	pH	0.01	unit	Continuous			6.57	8.20	7.43	FRW SCADA
Mount Morgan	Source Water	Turbidity	0.01	NTU	Continuous			1.11	67.06	5.02	FRW SCADA
Mount Morgan	Source Water	Electrical Conductivity	0.01	µS/cm	Continuous			81.24	322.99	193.71	FRW SCADA
Mount Morgan	Source Water	pH	0.01	unit	Daily	362	362	6.67	8.23	7.47	FRW Inhouse
Mount Morgan	Source Water	Turbidity	0.01	NTU	Daily	362	362	1.19	126.00	5.87	FRW Inhouse

Table A1.2 Mount Morgan Water Supply Scheme water quality monitoring results from 1 July 2016 to 30 June 2017 (*continued*)

Scheme Name	Scheme Component	Parameter	LOR	Unit	Sampling Frequency	No. of samples exceeding water quality criteria	Total no. of samples collected	Total no. of samples with values ≥ the LOR	Minimum	Maximum	Average	Laboratory/Source
Mount Morgan	WTP	pH	0.01	unit	Monthly	No value	12	12	6.70	7.56	7.26	Symbio Alliance
Mount Morgan	WTP	Colour (True)	2	TCU	Monthly	No value	12	0	<2	<2	<2	Symbio Alliance
Mount Morgan	WTP	Turbidity	0.1	NTU	Monthly	No value	12	12	0.3	1.4	0.7	Symbio Alliance
Mount Morgan	WTP	Electrical Conductivity	5	µS/cm	Monthly	No value	12	12	260	340	313	Symbio Alliance
Mount Morgan	WTP	Solids (Dissolved)	2	mg/L	Monthly	No value	12	12	150	230	188	Symbio Alliance
Mount Morgan	WTP	Chloride	2	mg/L	Monthly	No value	12	12	22	47	35	Symbio Alliance
Mount Morgan	WTP	Fluoride	0.05	mg/L	Monthly	0	12	4	<0.05	0.06	0.05	Symbio Alliance
Mount Morgan	WTP	Nitrate (as N)	0.005	mg/L	Monthly	0	12	12	0.027	0.300	0.113	Symbio Alliance
Mount Morgan	WTP	Nitrite (as N)	0.005	mg/L	Monthly	0	12	0	<0.005	<0.005	<0.005	Symbio Alliance
Mount Morgan	WTP	Sulphate	5	mg/L	Monthly	0	12	12	42	66	50	Symbio Alliance
Mount Morgan	WTP	Aluminium (Acid Soluble)	0.01	mg/L	Monthly	No value	12	11	<0.010	0.70	0.51	Symbio Alliance
Mount Morgan	WTP	Iron (Total)	0.005	mg/L	Monthly	No value	12	10	<0.005	0.083	0.030	Symbio Alliance
Mount Morgan	WTP	Manganese (Total)	0.0005	mg/L	Monthly	0	12	12	0.0024	0.0110	0.0065	Symbio Alliance
Mount Morgan	WTP	Copper (Total)	0.0005	mg/L	Monthly	0	12	12	0.0014	0.0550	0.0067	Symbio Alliance
Mount Morgan	WTP	Lead (Total)	0.0001	mg/L	Monthly	0	12	3	<0.0001	0.0048	0.0005	Symbio Alliance
Mount Morgan	WTP	Zinc (Total)	0.0005	mg/L	Monthly	No value	12	12	0.0024	0.0530	0.0141	Symbio Alliance
Mount Morgan	WTP	Calcium (Total)	0.1	mg/L	Monthly	No value	12	12	5.2	14.0	11.1	Symbio Alliance
Mount Morgan	WTP	Sodium (Total)	1	mg/L	Monthly	No value	12	12	33	44	38	Symbio Alliance
Mount Morgan	WTP	Potassium (Total)	0.2	mg/L	Monthly	No value	12	12	1.3	2.3	1.7	Symbio Alliance
Mount Morgan	WTP	Magnesium (Total)	0.05	mg/L	Monthly	No value	12	12	3.10	8.80	6.81	Symbio Alliance
Mount Morgan	WTP	Hardness (Total)	1	mg/L	Monthly	No value	12	12	36	72	59	Symbio Alliance
Mount Morgan	WTP	Alkalinity (Total) as CaCO3	1	mg/L	Monthly	No value	12	12	39	84	62	Symbio Alliance
Mount Morgan	WTP	Total Organic Carbon	1	mg/L	Quarterly	No value	4	4	4.2	5.6	5	Symbio Alliance
Mount Morgan	WTP	Trihalomethanes	4	µg/L	Quarterly	0	4	4	95	110	100	Symbio Alliance
Mount Morgan	Reticulation	Trihalomethanes - Smalls Road	4	µg/L	Quarterly	0	4	4	85	160	126	Symbio Alliance
Mount Morgan	WTP	Arsenic	0.0005	mg/L	Annually	0	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance
Mount Morgan	WTP	Barium	0.0001	mg/L	Annually	0	1	1	0.0058	0.0058	0.0058	Symbio Alliance
Mount Morgan	WTP	Beryllium	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	WTP	Cadmium	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	WTP	Chromium	0.0005	mg/L	Annually	0	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance
Mount Morgan	WTP	Mercury	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	WTP	Nickel	0.0001	mg/L	Annually	0	1	0	<0.0001	<0.0001	<0.0001	Symbio Alliance
Mount Morgan	WTP	Selenium	0.0005	mg/L	Annually	0	1	0	<0.0005	<0.0005	<0.0005	Symbio Alliance

Table A1.2 Mount Morgan Water Supply Scheme water quality monitoring results from 1 July 2016 to 30 June 2017 (*continued*)

Scheme Name	Scheme Component	Parameter	LOR	Unit	Sampling Frequency	No. of samples exceeding water quality criteria	Total no. of samples collected	Total no. of samples with values ≥ the LOR	Minimum	Maximum	Average	Laboratory/Source
Mount Morgan	WTP	pH	0.01	unit	Continuous	No value			6.49	7.40	6.89	FRW SCADA
Mount Morgan	WTP	Turbidity	0.01	NTU	Continuous	No value			0.24	1.41	0.56	FRW SCADA
Mount Morgan	WTP	Electrical Conductivity	0.01	µS/cm	Continuous	No value			183.97	573.40	314.14	FRW SCADA
Mount Morgan	WTP	Chlorine	0.01	mg/L	Continuous	0			0.92	1.47	1.32	FRW SCADA
Mount Morgan	WTP	pH	0.01	unit	Daily	No value	363	363	6.74	7.67	7.17	FRW Inhouse
Mount Morgan	WTP	Turbidity	0.01	NTU	Daily	No value	363	363	0.20	2.44*	0.76	FRW Inhouse
Mount Morgan	WTP	Electrical Conductivity	0.01	µS/cm	Daily	No value	363	363	110.00	626.00	315.73	FRW Inhouse
Mount Morgan	WTP	Chlorine (Free)	0.01	mg/L	Daily	0	363	363	0.36	2.07	1.29	FRW Inhouse
Mount Morgan	Reticulation	*Escherichia coli*	1	MPN/100ml	Weekly	0	156	0	<1	<1	<1	Ecoscope Environmental
Mount Morgan	Reticulation	Chlorine (Free)	0.01	mg/L	Weekly	0	156	154	0.00	2.12	0.84	FRW *in situ*

* Suspected incorrect laboratory test result with data inconsistent with FRW SCADA data

Table A2.1 Rockhampton Water Supply Scheme reticulation *E. coli* verification monitoring from 1 July 2016 to 30 June 2017

Drinking water scheme: **Rockhampton Water Supply Scheme**

Year	***1 July 2016 to 30 June 2017***											
Month	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***
No. of samples collected	36	45	36	36	45	36	36	36	45	36	45	36
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	468	468	468	468	468	468	468	459	468	468	468	468
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

CALCULATE PERCENTAGE USING A TWELVE (12) MONTH 'ROLLING' ANNUAL VALUE

The *Public Health Regulation 2005* (the regulation) requires that 98 per cent of samples taken in a 12 month period should contain no *E. Coli*. This requirement is refered 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).

Table A2.2 Mount Morgan Water Supply Scheme reticulation *E. coli* verification monitoring from 1 July 2016 to 30 June 2017

Drinking water scheme: **Mount Morgan Water Supply Scheme**

Year	***1 July 2016 to 30 June 2017***											
Month	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***
No. of samples collected	12	15	12	12	15	12	12	12	15	12	15	12
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	147	152	156	156	156	156	156	153	156	156	156	156
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

CALCULATE PERCENTAGE USING A TWELVE (12) MONTH 'ROLLING' ANNUAL VALUE

The *Public Health Regulation 2005* (the regulation) requires that 98 per cent of samples taken in a 12 month period should contain no *E. Coli*. This requirement is refered 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

Tables B1.1 and B1.2 below describe the significant progress that has been made during this reporting period towards the completion of specific actions identified in the Risk Management Improvement Program in the approved amended DWQMP. These are the 8 individual risks detailed in Section 6 of the approved amended DWQMP which were considered to be unacceptable levels of risk as they have a Residual Risk Rating above low. The actions detailed in Tables B1.1 and B1.2 are designed to further mitigate each risk.

Table B1.3 details some current upgrade projects in the Rockhampton Water Supply Scheme. The existing preventative measures/barriers in each of the listed scheme component/hazard are sufficient to mitigate risks, i.e. the Residual Risk Rating is already low. These additional upgrade projects are designed as an additional preventative measure/barrier and to provide improved water quality especially during extreme rainfall or major flood events which are usually very short-lived.

Table B1.1 Progress against the risk management improvement program and current upgrade projects in the Rockhampton Water Supply Scheme

Risk No.	Scheme Component / Sub-Component	Action(s)	Target Date(s)	Status as at 30 November 2017	(If implementing these actions will take longer than anticipated, please provided detail, as it may affect the approved amended DWQMP)
R08	Source - Contamination of raw water with EC or TDS	Continue to lobby regulator for tighter water quality limits on mine water discharges	Ongoing (as required)	Continuing as required	As this is an ongoing matter, it is anticipated that the action will continue to form part of the RMIP
R30	Reservoirs – Inadequate security against deliberate act of sabotage or terrorism	Identify high risk sites and install CCTV at these sites	June 2017	Budget allocation secured for 2015-16 and 2016-17 for project commencement.	Physical and electronic security upgrades at various reservoirs are currently in progress.

Table B1.2 Progress against the risk management improvement program in the Mount Morgan Water Supply Scheme

Risk No.	Scheme Component / Sub-Component	Action(s)	Target Date(s)	Status as at 30 November 2017	(If implementing these actions will take longer than anticipated, please provided detail, as it may affect the approved amended DWQMP)
MM12	Treatment – Lack of effective treatment for protozoan pathogens	Filter refurbishment and media replacement and installation of UV disinfection system	June 2017	Completed	
MM13	Treatment – Process control failure for the removal of cyanobacteria	Use newly installed online analysis to drive further process optimisation. Filter refurbishment and media replacement and installation of UV disinfection system	June 2016	Completed	
MM14	Treatment – Lack of effective treatment for viral pathogens	Installation of UV disinfection system	June 2017	Completed	
MM18	Treatment – Process control failure leading to excessive turbidity	Use newly installed online analysis to drive further process optimisation. Filter refurbishment and media replacement and installation of UV disinfection system	June 2016	Completed	Ongoing optimisation following installation of the UV system and replacement of filter media.
MM20	Treatment – Process control failure leading to coagulant underdose	Convert coagulant dosing to liquid alum for on-line flow metering and better measurement of chemical usage	December 2016	Work in progress	Completion is expected in February 2018 following some delays in the completion of other projects.
MM32	Reservoirs – Inadequate security against deliberate act of sabotage or terrorism	Identify high risk sites and install CCTV at these sites	December 2016	Work in progress	Installation work currently in progress with physical and electronic upgrades expected to be complete by March 2018 following finalisation of Qld Government approval.

Table B1.3 Current upgrade projects in the Rockhampton Water Supply Scheme

Scheme Component / Hazard	Action(s)	Target Date(s)	Status as at 30 November 2017	Expected Completion
Source – High iron and manganese	Pre-treatment oxidation using chlorine dioxide	December 2017	Installation of chlorine dioxide unit	Commissioning and full operation is expected in January 2018.
Source – High organics	Pre-treatment oxidation using chlorine dioxide	December 2017	Installation of chlorine dioxide unit	Commissioning and full operation is expected in January 2018.
Distribution – Excessive disinfection by-products	Use chlorine dioxide to pre-treat and disinfect high organic load raw water	December 2017	Installation of chlorine dioxide unit	Commissioning and full operation is expected in January 2018.