



Drinking Water Quality Management Plan (DWQMP) Annual Report

1 July 2019 to 30 June 2020

Central Highlands Regional Council

SPID: 481

PO Box 21

EMERALD QLD 4720

Phone: 1300 242 686

Fax: 1300 242 687

Web: www.centralhighlands.qld.gov.au

Table of Contents

1	Introduction	4
2	Summary of Schemes Operated	4
3	DWQMP Implementation	5
3.1	Progress in implementing the risk management improvement program	5
3.2	Revisions made to the operational monitoring program to maintain compliance with the water quality criteria in verification monitoring	5
3.3	Amendments made to the DWQMP	5
4	Verification Monitoring - Water Quality Information and Summary	6
5	Incidents Reported to the Regulator.....	7
5.1	Non-compliances with the water quality criteria and corrective and preventive actions undertaken	7
5.2	Prescribed incidents or events reported to the regulator and corrective and preventive actions undertaken	7
6	Customer Complaints.....	8
6.1	Health Concern	10
6.2	Dirty Water	10
6.3	Taste and Odour	10
6.4	Other	11
7	DWQMP Review Outcomes.....	11
8	DWQMP Audit Findings.....	11
Appendix A – Summary of Compliance with Water Quality Criteria		12
Appendix B – Reticulation E. coli verification monitoring		19
Appendix C – Implementation of the DWQMP Risk Management Improvement Program		31

List of Figures

Figure 1 – Monthly complaints about water quality	9
Figure 2 – Complaints about water quality by scheme.....	9

List of Tables

Table 1 – Summary of water supply schemes	4
Table 2 – Non-compliance reported to the regulator.....	7
Table 3 – Customer complaints about water quality (including per 1000 customers).....	8
Table 4.1 to 4.14 – Verification monitoring results	12
Table 5.1 to 5.12 – Reticulation E. coli verification monitoring.....	19
Table 6.1 to 6.14 – Progress against the RMIP program in the approved DWQMP.....	31

Glossary of terms

ADWG	Australian Drinking Water Guidelines (2018). Published by the National Health and Medical Research Council of Australia
CCP	Critical Control Point
CFU/100mL	Colony Forming Units per 100 millilitres
CHRC	Central Highlands Regional Council
DWQMP	Drinking Water Quality Management Plan
<i>E. coli</i>	<i>Escherichia coli</i> , a bacterium that is considered to indicate the presence of faecal contamination and is a potential health risk
LOR	Limit of Reporting
mg/L	Milligrams per litre
ML	Megalitre
µg/L	Micrograms per litre
NTU	Nephelometric Turbidity Units
ND	Not Detected
PFAS	Per-fluoroalkyl and poly-fluoroalkyl substances
pH	Power of Hydrogen
QHFSS	Queensland Health Forensic and Scientific Services
<i>R. raciborskii</i> and <i>Cylindro</i>	<i>Raphidiopsis</i> (formerly <i>Cylindrospermopsis</i>) <i>raciborskii</i> , a freshwater cyanobacteria known to produce the toxin cylindrospermopsin and a potential health risk
RMIP	Risk Management Improvement Program
THM	Trihalomethanes
WTP	Water Treatment Plant
>	Greater than
≥	Greater than or equal to
<	Less than

1 Introduction

This report documents the performance of Central Highlands Regional Council's drinking water service.

It details performance of the water quality and the implementation of actions detailed in the Drinking Water Quality Management Plan (DWQMP) required under the *Water Supply (Safety and Reliability) Act 2008* (the Act).

The report assists the regulator to determine compliance with the current approved DWQMP and provides a public report on the council's management of drinking water.

2 Summary of Schemes Operated

This report relates to the drinking water supply schemes that the Central Highlands Regional Council owned and operated from 1 July 2019 to 30 June 2020.

Table 1 lists the water supply scheme, water source, water treatment process, population and drinking water treatment capacity for the water supply schemes covered in this report.

Table 1 – Summary of water supply schemes

Scheme Name	Communities Supplied	Water Source	Treatment Processes	Population Served [#]	Treatment Capacity*
Anakie	Anakie	May Creek Bore	Disinfection	100	0.4
Bauhinia	Bauhinia Downs	Artesian Bore	Disinfection	25	0.1
Blackwater	Blackwater	Mackenzie River	Coagulation, Filtration, pH correction, Fluoridation and Disinfection	4822	15
	Bluff			267	
Capella	Capella	Capella Creek / Mackenzie River	Coagulation, Filtration, pH correction and Disinfection	964	0.9
Comet	Comet	Comet River	Coagulation, Filtration, pH correction and Disinfection	147	0.3
Dingo	Dingo	Springton Creek / Dingo Creek	Coagulation, Filtration, and Disinfection	145	0.4
Duaringa	Duaringa	Dawson River	Coagulation, Filtration and Disinfection	195	0.7
Emerald	Emerald	Nogoa River	Coagulation, Filtration, pH correction, Fluoridation and Disinfection	14,290	38
Rolleston	Rolleston	Comet River / Sub-artesian Bores	Coagulation, Filtration, and Disinfection	255	0.3
Sapphire / Rubyvale	Sapphire / Rubyvale	Retreat Creek Bores	Fluoridation and Disinfection	1,156	2.1
Springsure	Springsure	Shallow Basalt / Deeper Sandstone Bores	Aeration and Disinfection	857	2
Tieri	Tieri	Mackenzie River	Coagulation, Filtration, pH correction, Fluoridation and Disinfection	1,031	3.6

[#] Available populations as at July 2020 sourced @

<https://www.qgso.qld.gov.au/statistics/theme/population/population-estimates/regions>.

* Treatment capacity is in ML/day

3 DWQMP Implementation

The DWQMP describes the operating strategies, operating limits and approaches to water quality monitoring and the overall management of risks to water quality.

Specific changes or improvements to the drinking water services provided by council have occurred with the implementation of a risk management improvement program (RMIP).

3.1 Progress in implementing the risk management improvement program

A summary of that progress and descriptions of the progress made towards the completion of specific tasks can be found in Appendix C. As per section 13 of the overarching volume of the DWQMP the items have been prioritised as short, medium and long-term actions. Short-term actions will be undertaken as soon as possible (and completed within 6-12 months), medium-term actions are intended to be completed in the current financial year or within 12-18 months, and long-term actions follow on from short/medium items and will be introduced as items in future council budgets to secure funding.

3.2 Revisions made to the operational monitoring program to maintain compliance with the water quality criteria in verification monitoring

The operational monitoring program was updated this reporting period and parameters expanded in most locations. Critical limits were reviewed for consistency where possible and as stated in the plan “the critical limits generally do not change, other than to improve processes” and their associated risks.

Additional testing was added to verification monitoring, frequency updated and in house E.Coli testing commenced.

3.3 Amendments made to the DWQMP

Following completion of CHRC’s DWQMP review in January 2020, an application for approval to amend the DWQMP was made in February 2020.

In May 2020, an Information Requirement Notice was given under section 96 pursuant to sub-section 100(3) of the Water Supply (Safety and Reliability) Act 2008. The notice required CHRC to provide additional information about the DWQMP, which was necessary for the Regulator to properly consider our amendment application.

The additional information was provided to the regulator in June 2020. A notice of decision was received on 10 August 2020, advising CHRC’s application for amendment had been approved.

4 Verification Monitoring - Water Quality Information and Summary

Appendix A provides an overview of the results from the water quality monitoring program for the reporting period of 1 July 2019 to 30 June 2020. The water quality monitoring program was generally carried out as per Section 12 of the approved Central Highlands Regional Council overarching volume of the DWQMP. A small number of missed samples are attributed to the Queensland Government Forensic and Scientific Services laboratory closing during the Christmas / New Year break.

This year the internal database and results in Appendix A are considered complete in so much as all the sample results have been recorded and included. This continues the maturing of our data management as previously identified and completed in the risk management improvement program.

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 former *Public Health Regulation 2005 and the current Public Health Regulation 2018*. Appendix A (Tables 4.1 to 4.14) contain a summary of the results of the water quality monitoring program for all of council's water supply schemes. Most physicochemical drinking water quality results from the standard monitoring program met the recommended values in the ADWG. An exception was the total Trihalomethanes (THM) value in the surface water sourced scheme of Tieri. Details of this are discussed in the next section of this report, along with a boil water alert due to zero chlorine level in the reticulation network in Dingo.

Other aesthetic exceedances like pH, sodium and dissolved solids in Springsure and Rolleston, total hardness in Anakie, Sapphire and Rubyvale and Turbidity in Bauhinia were recorded with actions and projects implemented or being considered to make improvements in those areas.

Conversion to an alternative raw water supply was made in the town of Comet in May 2020. A number of indicators were well outside the aesthetic guidelines including total hardness, total dissolved solids, sodium, sulphate and chloride. As such, conversion back to our primary raw supply source was made and the issue was resolved.

Appendix B (Tables 5.1 to 5.12) contain a summary of the results of the reticulation *E. coli* verification monitoring program for all council water supply schemes. While all samples taken tested negative for *E. coli*, a number of schemes did have recorded result/s for coliforms. We observe, monitor, resample and investigate as required positive coliform occurrences.

R. raciborskii levels were seasonally monitored in surface water schemes with a recognised risk. The DWQMP trigger level for cylindrospermopsin toxin testing was reached for the Capella and Rolleston schemes. While levels of the toxin varied in the raw water no detection of cylindrospermopsin was made in the treated water throughout the blue green algae bloom.

5 Incidents Reported to the Regulator

This financial year there were two instances where the regulator was notified under sections 102 or 102A of the Act. These notifications did not involve 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.

As shown in table 2 the notifications were a non-compliance with the water quality criteria related to total Trihalomethanes (THM) in Tieri and zero chlorine level in the reticulation network in Dingo.

The Dingo incident required council to issue a 'boil water alert' to the public. Subsequent sampling and retesting results indicated the water quality was back in compliance, thus the boil water alert was then cancelled.

5.1 Non-compliances with the water quality criteria and corrective and preventive actions undertaken

Table 2 – Non-compliance reported to the regulator

Incident date	Scheme	Parameter	Level reported µg/L	Health Value* µg/L	Corrective and Preventive actions
17/01/2020	Dingo	Chlorine	0	0.2	A replacement chlorine dosing pump was installed. Continuous sampling and testing of water quality occurred from 17/01/2020 through until cancellation of the Boil Water alert on 20/01/2020. No subsequent occurrences have been recorded in the scheme monitoring to date.
11/02/2020	Tieri	THM	260	250	Chlorine dosing and organic load at the Water Treatment Plant were investigated. Small changes to chlorine dosing and regular testing were performed to gradually reduce THMs, while not compromising effective disinfection. No subsequent exceedances have been recorded in the scheme monitoring to date.

* Health Value is from the ADWG.

5.2 Prescribed incidents or events reported to the regulator and corrective and preventive actions undertaken

No prescribed incidents or events were required to be reported to the regulator during this reporting period

6 Customer Complaints

The council is required to report on the number of complaints, general details of complaints, and the responses undertaken. Table 3 provides an overview of the customer complaints relating to drinking water quality during this period plus adds some context by including the complaints per 1000 customers.

Table 3 – Customer complaints about water quality (including per 1000 customers)

Scheme	Health Concern	Dirty water	Taste and Odour	Other	Total
Anakie					0
Bauhinia		1 (40)			1 (40)
Blackwater/Bluff		1 (0.2)			1 (0.2)
Capella					0
Comet			4 (27)		4 (27)
Dingo		1 (6.9)			1 (6.9)
Duaringa					0
Emerald		8 (0.6)	4 (0.3)	1 (0.07)	13 (0.9)
Rolleston					0
Sapphire/Rubyvale		1 (0.9)	1 (0.9)		2 (1.7)
Springsure		1 (1.2)			1 (1.2)
Tieri		2 (2)			2 (2)
Total	0	15 (0.6)	9 (0.4)	1 (0.04)	25 (1)

* Complaints with multiple categories or multiple complaints for a same event in the system have all been counted as individual complaints for this report. Within the system there are 25 applicable records that total the 25 complaints.

The two graphs overleaf show the breakdown of customer complaints by month in Figure 1 and by scheme in Figure 2. Other than the Emerald and Tieri events discussed in the dirty water section and the Comet event discussed in the taste and odour section, there is a general spread of water quality complaints through the whole reporting period. As expected, there is a higher frequency of complaints for the schemes that service larger communities.

Figure 1 – Monthly complaints about water quality

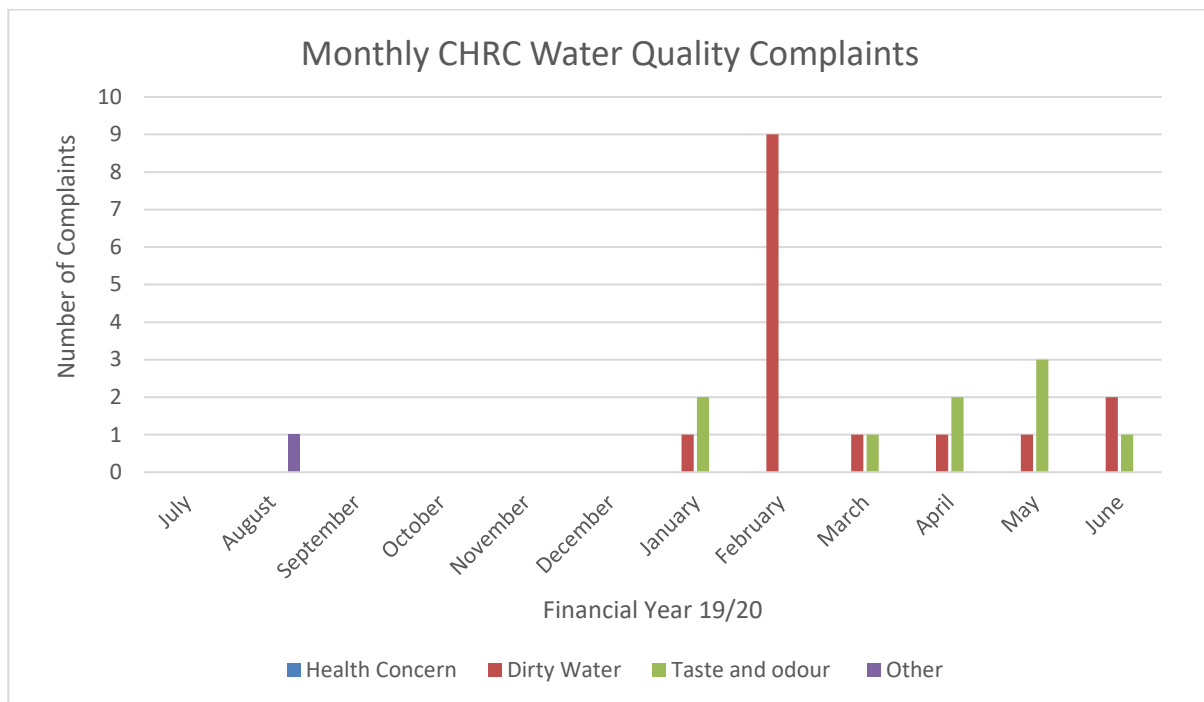
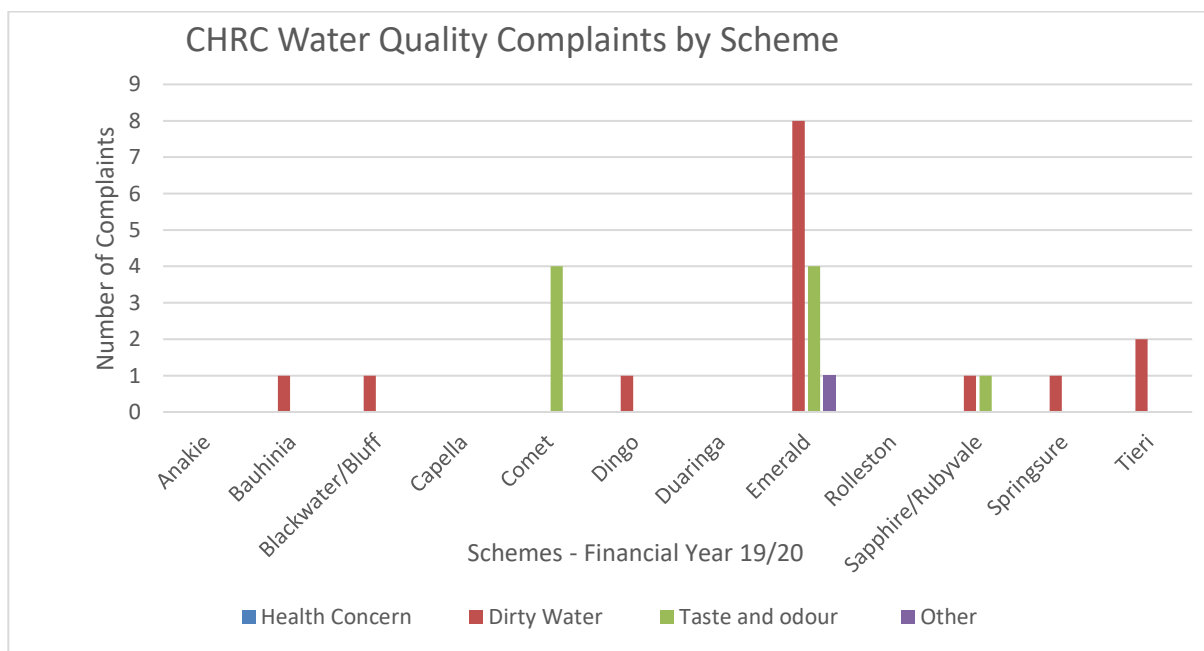


Figure 2 – Complaints about water quality by scheme



6.1 Health Concern

Complaints or enquiries are sometimes received from customers who suspect their water may be associated with an illness they are experiencing. Council investigates each complaint relating to alleged illness from its water quality, typically by testing the customer's tap and other sampling points close by for general water quality indicators and/or for the presence of *E. coli*. and a standard water analysis as required.

During the 2019-2020 financial year council is not aware of any confirmed cases of illness arising from the water supply system. Zero complaints were received between July 2019 and June 2020 regarding illness.

6.2 Dirty Water

A total of 15 customer complaints associated with dirty water were received between July 2019 and June 2020.

The town of Emerald reported nine of these complaints during one week in February 2020. Council investigated the situation and found high levels of manganese in the water was causing discolouration. The network was flushed and grab samples from complainant households were tested. Whilst the water was aesthetically unpleasant testing results showed both compliance with the ADWG and no sign of poor quality.

A further two complaints came from the community of Tieri in June 2020. Council investigated the situation and found a valve and hydrant replacement project was the cause. The contractor engaged by Council had not flushed the lines resulting in dirty water within the network. The network was flushed, and the issue was promptly resolved.

Each complaint relating to discoloured water or unusual water appearance is investigated by Council. Testing the water quality, typically by testing the customer's tap and other sampling points close by for turbidity, chlorine levels and/or getting a standard water analysis as required. Many of the complaints received are associated with a water main break, presence of air in the water or sedentary water at the extremities of the supply zone. When dealing with water main breaks staff conduct the repairs while ensuring the water quality is maintained, as well as managing storage levels in the affected reservoirs to ensure no one is without water. The area is then flushed to remove the dirty water and to achieve detectable chlorine residual results. The flushing targets specific areas such as dead-end mains, where it is anticipated the dirty water would not be flushed through normal use. Customers that report a complaint in this context are advised of the reasons for the dirty or unusual water appearance and are requested to allow the main a short period of time to settle.

6.3 Taste and Odour

The community of Comet reported four of these complaints during May 2020. Council investigated the situation and found poor raw water aesthetic quality to be the cause. Due to exceeding the water allocation of our primary raw water supply source in Comet, conversion to an alternative raw water supply was made. Standard water analysis testing results showed a number of indicators well outside the aesthetic guidelines including total hardness, total dissolved solids, sodium, sulphate and chloride. As such, conversion back to our primary raw supply source was made and the issue was resolved.

Of the four complaints received for the year from Emerald, one was found to be the result of an internal plumbing issue within the customer's house. The other three were all isolated, unrelated incidents, and no conclusions were made as to the sources of the issues. Testing results at the time indicated no parameters exceeded the ADWG guidelines.

6.4 Other

During the 2019-2020 financial year council received one complaint about 'other' water quality issues from a customer querying quality of town water supply used at their vineyard. The complaint was investigated, and no parameters were recorded as exceeding the ADWG guidelines.

7 DWQMP Review Outcomes

The first regular review of CHRC's DWQMP was completed in January 2020, with the assistance of Viridis Consultants Pty Ltd. The process consisted of:

- desktop review of the approved DWQMP and associated documents
- water quality data analysis from approximately November 2014 to July 2018
- meetings and review discussions with relevant staff
- preparation of the final review report

As a result of the review, a number of amendments were made to our DWQMP (as noted in Section 3.3 above) including:

- Schematics for each location were updated including chemicals, dosing and monitoring points.
- Risk Registers were reviewed and updated with new risks applicable to each scheme.
- Chemical usage, dosage and critical limits were reviewed and updated accordingly.
- The RMIP was updated, completed items removed and new items added as a result of the risk register review.
- Additional verification monitoring has been added, frequency updated and in house E.Coli testing commenced.
- Operational monitoring parameters have been expanded in most locations since the initial development of DWQMP.

(Note: a full outline of all review findings and recommendations were included in the 2018-2019 DWQMP Annual Report).

8 DWQMP Audit Findings

No audit was conducted during the reporting period of 01/07/2019 to 30/06/2020.

Appendix A – Summary of Compliance with Water Quality Criteria

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 former *Public Health Regulation 2005 and the current Public Health Regulation 2018*. While all samples taken tested negative for *E. coli*, a number of schemes did have recorded result/s for coliforms. Most physicochemical drinking water quality results from the standard monitoring program met the recommended health value ranges in the ADWG. The exception was the total Trihalomethanes (THM) value in one scheme sourced from surface water namely Tieri. In addition, Rolleston had two THM exceedances, however these were recorded as updates to previous events as opposed to new occurrences.

Other aesthetic exceedances like pH, sodium and dissolved solids in Springsure and Rolleston, total hardness in Anakie, Sapphire and Rubyvale and Turbidity in Bauhinia were recorded with actions and projects implemented or being considered to make improvements in those areas.

As noted in section 6.3, conversion to an alternative raw water supply was made in the town of Comet in May 2020. A number of indicators were well outside the aesthetic guidelines including total hardness, total dissolved solids, sodium, sulphate and chloride. As such, conversion back to our primary raw supply source was made and the issue was resolved.

Table 4.1 to 4.14 – Verification monitoring results

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Anakie	Reticulation	Chlorine (Free)	mg/L	Monthly	12	0	0.06	1.2	0.63	0.01
		Ecoli	CFU/100mL	Monthly	12	0	0	0	0	0
		Coliforms	CFU/100mL	Monthly	12	0	0	0	0	0
		Conductivity	µs/cm	Monthly	12	No value	689	718	699	1
		pH	at 22°C	Monthly	12	0	7.02	7.97	7.23	0.01
		Total Hardness	mg CaCO ₃ /L	Monthly	12	12	227	232	229	1
		Alkalinity	mg CaCO ₃ /L	Monthly	12	No value	277	288	284	1
		Silica	mg/L	Monthly	12	0	47	49	48	1
		Dissolved Solids	mg/L	Monthly	12	0	422	432	426	1
		True Colour	hazen	Monthly	12	0	<1	3	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	0	64	67	65	1
		Potassium	mg/L	Monthly	12	No value	1.2	1.3	1.28	0.1
		Calcium	mg/L	Monthly	12	No value	40	41	40.5	0.1
		Magnesium	mg/L	Monthly	12	No value	31	32	31.08	0.1
		Chloride	mg/L	Monthly	12	0	48	53	49	1
		Fluoride	mg/L	Monthly	12	0	0.22	0.23	0.23	0.01
		Nitrate	mg/L	Monthly	12	0	<0.05	<0.5	<0.22	0.5
		Sulphate	mg/L	Monthly	12	0	19	21	20.8	0.1
		Iron	mg/L	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.01	0.004	0.01
		Zinc	mg/L	Monthly	12	0	0.06	1.4	0.29	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.04	0.065	0.05	0.01
		Copper	mg/L	Monthly	12	0	0.007	1.7	0.37	0.03

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Bauhinia	Reticulation	Chlorine (Free)	mg/L	Monthly	12	0	0.04	2.2	0.59	0.01
		Coliforms	CFU/100mL	Monthly	12	0	0	0	0	0
		Ecoli	CFU/100mL	Monthly	12	0	0	0	0	0
		Conductivity	us/cm	Monthly	12	No value	451	464	458	1
		pH	mg/L	Monthly	12	0	7.79	8.3	7.99	0.01
		Total Hardness	mg CaCO ₃ /L	Monthly	12	0	53	63	57	1
		Alkalinity	mg CaCO ₃ /L	Monthly	12	No value	148	163	157	1
		Silica	mg/L	Monthly	12	0	18	18	18	1
		Dissolved Solids	mg/L	Monthly	12	0	260	270	266	1
		True Colour	hazen	Monthly	12	0	<1	5	2	1
		Turbidity	NTU	Monthly	12	2	<1	12	3	1
		Sodium	mg/L	Monthly	12	0	59	68	65	1
		Potassium	mg/L	Monthly	12	No value	20	23	21.2	0.1
		Calcium	mg/L	Monthly	12	No value	9.8	12	11	0.1
		Magnesium	mg/L	Monthly	12	No value	6.9	8	7.3	0.1
		Chloride	mg/L	Monthly	12	0	46	51	49	1
		Fluoride	mg/L	Monthly	12	0	0.16	0.17	0.17	0.01
		Nitrate	mg/L	Monthly	12	0	<0.1	0.5	0.3	0.5
		Sulphate	mg/L	Monthly	12	0	0.3	1.0	0.6	0.1
		Iron	mg/l	Monthly	12	0	<0.01	0.22	0.06	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.03	0.04	0.04	0.01
		Copper	mg/L	Monthly	12	0	0.003	0.080	0.02	0.03

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Blackwater	Reticulation	Chlorine (Free)	mg/L	Weekly	51	0	0.03	1.03	0.60	0.01
		Coliforms	CFU/100mL	Weekly	51	1	0	1	0	0
		Ecoli	CFU/100mL	Weekly	51	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonal/Event	5	0	85	180	125	1
		Conductivity	us/cm	Monthly	12	No value	223	429	297	1
		pH	mg/L	Monthly	12	0	7.04	7.81	7.37	0.01
		Total Hardness	mg CaCO ₃ /L	Monthly	12	0	61	111	82	1
		Alkalinity	mg CaCO ₃ /L	Monthly	12	No value	57	96	73	1
		Silica	mg/L	Monthly	12	0	9	14	12	1
		Dissolved Solids	mg/L	Monthly	12	0	130	228	165	1
		True Colour	hazen	Monthly	12	0	<1	2	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	0	16	41	24	1
		Potassium	mg/L	Monthly	12	No value	4.2	5	4.6	0.1
		Calcium	mg/L	Monthly	12	No value	16	26	19.8	0.1
		Magnesium	mg/L	Monthly	12	No value	5.6	12	8.1	0.1
		Chloride	mg/L	Monthly	12	0	22	67	38	1
		Fluoride	mg/L	Monthly	12	0	0.28	0.71	0.59	0.01
		Nitrate	mg/L	Monthly	12	0	<0.1	1.8	0.7	0.5
		Sulphate	mg/L	Monthly	12	0	11	15	13.5	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.02	0.04	0.03	0.01
		Copper	mg/L	Monthly	12	0	0.003	0.042	0.015	0.03
	Raw Water	Atrazine	µg/L	Seasonally	1	NA	0.05	0.05	0.05	0.01
		Atrazine, 2-hydroxy	µg/L	Seasonally	1	NA	0.03	0.03	0.03	0.01
		Tebuthiuron	µg/L	Seasonally	1	NA	0.26	0.26	0.26	0.01
		Metsulfuron	µg/L	Seasonally	1	NA	0.03	0.03	0.03	0.01

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Bluff	Reticulation	Chlorine (Free)	mg/L	Monthly	12	0	0.29	1.06	0.72	0.01
		Coliforms	CFU/100mL	Monthly	12	0	0	0	0	0
		Ecoli	CFU/100mL	Monthly	12	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonal/Event	6	0	95	210	152	1

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Capella	Reticulation	Chlorine (Free)	mg/L	Monthly	51	0	0.03	1.39	0.54	0.01
		Coliforms	CFU/100mL	Monthly	51	0	0	0	0	0
		Ecoli	CFU/100mL	Monthly	51	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonal/Event	5	0	85	130	102	1
		Conductivity	us/cm	Monthly	12	No value	340	552	450	1
		pH	mg/L	Monthly	12	0	7.06	7.84	7.49	0.01
		Total Hardness	mg CaCO ₃ /L	Monthly	12	0	81	129	100	1
		Alkalinity	mg CaCO ₃ /L	Monthly	12	No value	86	137	112	1
		Silica	mg/L	Monthly	12	0	11	14	12	1
		Dissolved Solids	mg/L	Monthly	12	0	209	315	262	1
		True Colour	hazen	Monthly	12	0	<1	<1	<1	1
		Turbidity	NTU	Monthly	12	0	<1	3	<1	1
		Sodium	mg/L	Monthly	12	0	36	68	55	1
		Potassium	mg/L	Monthly	12	No value	2.4	4	3.1	0.1
		Calcium	mg/L	Monthly	12	No value	19	25	21.8	0.1
		Magnesium	mg/L	Monthly	12	No value	8.5	16	11.1	0.1
		Chloride	mg/L	Monthly	12	0	21	57	38	1
		Fluoride	mg/L	Monthly	12	0	0.12	0.22	0.16	0.01
		Nitrate	mg/L	Monthly	12	0	0.1	1.3	0.5	0.5
		Sulphate	mg/L	Monthly	12	0	44	66	53.8	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.07	0.05	0.05
		Boron	mg/L	Monthly	12	0	0.08	0.15	0.11	0.01
		Copper	mg/L	Monthly	12	0	0.013	0.030	0.023	0.03
		Algae (pot. toxic)	Cells/mL	Seasonally	7	No value	1008	14250	5812	1
		Toxin (cylindro)	µg/L	Seasonally	2	No value	0.2	0.2	0.2	0.2

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Comet	Reticulation	Chlorine (Free)	mg/L	Monthly	13	0	0.33	1.28	0.76	0.01
		Coliforms	CFU/100mL	Monthly	13	0	0	0	0	0
		Ecoli	CFU/100mL	Monthly	13	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonal/Event	3	0	160	250	200	1
		Conductivity	us/cm	Monthly	13	No value	184	5020	840	1
		pH	mg/L	Monthly	13	0	7.3	8.33	7.96	0.01
		Total Hardness	mg CaCO3/L	Monthly	13	2	48	1290	299	1
		Alkalinity	mg CaCO3/L	Monthly	13	No value	46	284	127	1
		Silica	mg/L	Monthly	13	0	13	24	17	1
		Dissolved Solids	mg/L	Monthly	13	2	110	2730	458	1
		True Colour	hazen	Monthly	13	0	<1	3	<1	1
		Turbidity	NTU	Monthly	13	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	13	2	14	540	81	1
		Potassium	mg/L	Monthly	13	No value	4.6	8.4	6.3	0.1
		Calcium	mg/L	Monthly	13	No value	10	230	44.3	0.1
		Magnesium	mg/L	Monthly	13	No value	5.2	180	29.2	0.1
		Chloride	mg/L	Monthly	13	2	17	1400	184	1
		Fluoride	mg/L	Monthly	13	0	0.11	0.23	0.15	0.01
		Nitrate	mg/L	Monthly	13	0	<0.1	9.5	1.6	0.5
		Sulphate	mg/L	Monthly	13	1	1.4	577	58.1	0.1
		Iron	mg/l	Monthly	13	0	<0.01	0.02	<0.01	0.01
		Manganese	mg/L	Monthly	13	0	0.001	0.010	0.004	0.01
		Zinc	mg/L	Monthly	13	0	0.010	0.120	0.049	0.01
		Aluminium	mg/L	Monthly	13	0	0.03	0.06	0.04	0.05
		Boron	mg/L	Monthly	13	0	0.02	0.07	0.04	0.01
		Copper	mg/L	Monthly	13	0	0.005	0.062	0.017	0.03
	Raw Water	Desethyl Atrazine	µg/L	Seasonally	2	NA	0.01	0.01	0.01	0.01
		Hexazinone	µg/L	Seasonally	2	NA	0.01	0.01	0.01	0.01
		Atrazine, 2-hydroxy	µg/L	Seasonally	2	NA	0.04	0.09	0.07	0.01
		Tebuthiuron	µg/L	Seasonally	2	NA	0.12	0.46	0.29	0.01
		Metolachlor	µg/L	Seasonally	2	NA	0.02	0.02	0.02	0.01

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Dingo	Reticulation	Chlorine (Free)	mg/L	Monthly	12	0	0.21	1.18	0.75	0.01
		Coliforms	CFU/100mL	Monthly	12	1	0	5	0	0
		Ecoli	CFU/100mL	Monthly	12	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonally	6	0	140	180	167	1
		Conductivity	us/cm	Monthly	12	No value	146	164	152	1
		pH	mg/L	Monthly	12	0	6.8	7.72	7.16	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	0	26	31	28	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	38	46	41	1
		Silica	mg/L	Monthly	12	0	11	13	12	1
		Dissolved Solids	mg/L	Monthly	12	0	85	96	90	1
		True Colour	hazen	Monthly	12	0	<1	2	<1	1
		Turbidity	NTU	Monthly	12	0	<1	2	<1	1
		Sodium	mg/L	Monthly	12	0	16	20	18	1
		Potassium	mg/L	Monthly	12	No value	3.9	4.8	4.2	0.1
		Calcium	mg/L	Monthly	12	No value	4.5	6.1	5.4	0.1
		Magnesium	mg/L	Monthly	12	No value	3	3.8	3.5	0.1
		Chloride	mg/L	Monthly	12	0	18	23	20	1
		Fluoride	mg/L	Monthly	12	0	0.13	0.15	0.14	0.01
		Nitrate	mg/L	Monthly	12	0	<0.1	0.5	0.3	0.5
		Sulphate	mg/L	Monthly	12	0	1.0	2.2	1.7	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.05	0.07	0.06	0.01
		Copper	mg/L	Monthly	12	0	0.003	0.049	0.016	0.03
	Raw Water	Atrazine	µg/L	Seasonally	1	0	0.0	0.0	0.0	0.01
		Desethyl Atrazine	µg/L	Seasonally	1	No value	0.0	0.0	0.0	0.01
		Simazine	µg/L	Seasonally	1	0	0.0	0.0	0.0	0.01
		Tebuthiuron	µg/L	Seasonally	1	No value	0.66	0.66	0.66	0.01
		Metolachlor	µg/L	Seasonally	1	0	0.0	0.0	0.0	0.01

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Duaringa	Reticulation	Chlorine (Free)	mg/L	Monthly	12	0	0.19	1.43	0.69	0.01
		Coliforms	CFU/100mL	Monthly	12	1	0	0	0	0
		Ecoli	CFU/100mL	Monthly	12	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonally	6	0	76	150	124	1
		Conductivity	us/cm	Monthly	12	No value	229	457	330	1
		pH	mg/L	Monthly	12	0	7.01	8.30	7.80	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	0	53	98	76	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	69	116	90	1
		Silica	mg/L	Monthly	12	0	2	18	8	1
		Dissolved Solids	mg/L	Monthly	12	0	133	236	178	1
		True Colour	hazen	Monthly	12	0	<1	2	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	0	21	50	34	1
		Potassium	mg/L	Monthly	12	No value	5.8	8.7	7.4	0.1
		Calcium	mg/L	Monthly	12	No value	11	20	16.8	0.1
		Magnesium	mg/L	Monthly	12	No value	5	12	8.3	0.1
		Chloride	mg/L	Monthly	12	0	20	68	44	1
		Fluoride	mg/L	Monthly	12	0	0.13	0.23	0.17	0.01
		Nitrate	mg/L	Monthly	12	0	<0.1	2	0.8	0.5
		Sulphate	mg/L	Monthly	12	0	4.0	7.1	5.6	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.06	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.04	0.08	0.05	0.01
		Copper	mg/L	Monthly	12	0	0.004	0.042	0.018	0.03
	Raw Water	Atrazine	µg/L	Seasonally	1	NA	0.04	0.04	0.04	0.01
		Desethyl Atrazine	µg/L	Seasonally	1	NA	0.30	0.30	0.30	0.01
		Hexazinone	µg/L	Seasonally	1	NA	0.03	0.03	0.03	0.01
		Tebuthiuron	µg/L	Seasonally	1	NA	0.50	0.50	0.50	0.01
		Propazin-2-hydroxy	µg/L	Seasonally	1	NA	0.02	0.02	0.02	0.01
		Metachlor	µg/L	Seasonally	1	NA	0.06	0.06	0.06	0.01
		Metolachlor-OXA	µg/L	Seasonally	1	NA	0.08	0.08	0.08	0.01
		Algae (pot. toxic)	Cells/mL	Seasonally	2	No value	45	285	165	1

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Emerald	Reticulation	Chlorine (Free)	mg/L	Weekly	102	0	0.31	1.85	1.11	0.01
		Coliforms	CFU/100mL	Weekly	102	1	0	2	0	0
		Ecoli	CFU/100mL	Weekly	102	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonally	8	0	85	130	103	1
		Conductivity	us/cm	Monthly	25	No value	248	436	339	1
		pH	mg/L	Monthly	25	0	6.95	8.02	7.60	0.01
		Total Hardness	mg CaCO3/L	Monthly	25	0	67	123	100	1
		Alkalinity	mg CaCO3/L	Monthly	25	No value	56	145	112	1
		Silica	mg/L	Monthly	25	0	2	11	7.8	1
		Dissolved Solids	mg/L	Monthly	25	0	131	232	186	1
		True Colour	hazen	Monthly	25	0	<1	<1	<1	1
		Turbidity	NTU	Monthly	25	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	25	0	17	37	25	1
		Potassium	mg/L	Monthly	25	No value	6.2	11	8.8	0.1
		Calcium	mg/L	Monthly	25	No value	16	29	24	0.1
		Magnesium	mg/L	Monthly	25	No value	6.7	12	10	0.1
		Chloride	mg/L	Monthly	25	0	25	42	31	1
		Fluoride	mg/L	Monthly	25	0	0.23	0.92	0.60	0.01
		Nitrate	mg/L	Monthly	25	0	0.31	3.10	1.60	0.5
		Sulphate	mg/L	Monthly	25	0	5.2	67	11	0.1
		Iron	mg/l	Monthly	25	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	25	0	0.001	0.01	0.005	0.01
		Zinc	mg/L	Monthly	25	0	0.01	0.06	0.04	0.01
		Aluminium	mg/L	Monthly	25	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	25	0	0.05	0.08	0.06	0.01
		Copper	mg/L	Monthly	25	0	0.005	0.030	0.019	0.03
		Atrazine, 2-hydroxy	µg/L	Seasonally	2	NA	0.03	0.03	0.03	0.01
		2,4-D	µg/L	Seasonally	2	NA	0.3	0.3	0.3	0.01
		Tebuthiuron	µg/L	Seasonally	2	NA	0.03	0.34	0.18	0.01
		Dalapon (2,2-DPA)	µg/L	Seasonally	2	NA	1.3	1.9	1.6	0.01
		Simazine	µg/L	Seasonally	2	NA	0.02	0.02	0.02	0.01
	Raw Water	Atrazine, 2-hydroxy	µg/L	Seasonally	2	NA	0.04	0.04	0.04	0.01
		2,4-D	µg/L	Seasonally	2	NA	0.5	0.8	0.65	0.01
		Diuron	µg/L	Seasonally	2	NA	0.03	0.04	0.035	0.01
		Tebuthiuron	µg/L	Seasonally	2	NA	0.31	0.31	0.31	0.01
		Fluroxypyr	µg/L	Seasonally	2	NA	0.07	0.09	0.08	0.01
		Simazine	µg/L	Seasonally	2	NA	0.02	0.02	0.02	0.01

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Rolleston	Reticulation	Chlorine (Free)	mg/L	Weekly	12	0	0.69	1.90	1.16	0.01
		Coliforms	CFU/100mL	Weekly	12	0	0	0	0	0
		Ecoli	CFU/100mL	Weekly	12	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonal/Event	8	2	65	310	193	1
		Conductivity	us/cm	Monthly	12	No value	244	1250	435	1
		pH	mg/L	Monthly	12	5	7.51	9.06	8.39	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	0	21	90	72	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	88	283	135	1
		Silica	mg/L	Monthly	12	0	10	18	13	1
		Dissolved Solids	mg/L	Monthly	12	1	138	683	244	1
		True Colour	hazen	Monthly	12	0	<1	<1	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	1	18	260	63	1
		Potassium	mg/L	Monthly	12	No value	1.4	7.9	5.9	0.1
		Calcium	mg/L	Monthly	12	No value	6.3	18	14.9	0.1
		Magnesium	mg/L	Monthly	12	No value	1.3	12	8.4	0.1
		Chloride	mg/L	Monthly	12	0	16	210	52	1
		Fluoride	mg/L	Monthly	12	0	0.18	0.25	0.20	0.01
		Nitrate	mg/L	Monthly	12	0	<0.1	0.5	0.4	0.5
		Sulphate	mg/L	Monthly	12	0	1.7	16	5.7	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.04	0.07	0.05	0.01
		Copper	mg/L	Monthly	12	0	0.003	0.035	0.015	0.03
	Raw Water	Atrazine	µg/L	Seasonally	1	NA	0.10	0.10	0.10	0.01
		N-Butylbenzenesulfonamide	µg/L	Seasonally	1	NA	0.20	0.20	0.20	0.01
		Simazine	µg/L	Seasonally	1	NA	0.10	0.10	0.10	0.01
		Tebuthiuron	µg/L	Seasonally	1	NA	1.40	1.40	1.40	0.01
		Metolachlor-OXA	µg/L	Seasonally	1	NA	0.07	0.07	0.07	0.01
		Tris(chloropropyl) phosphate	µg/L	Seasonally	1	NA	0.20	0.20	0.20	0.01
		Algae (pot. toxic)	Cells/mL	Seasonally	5	No value	90	57000	12480	1
		Toxin (cylindro)	µg/L	Seasonally	1	No value	3.2	3.2	3.2	0.2

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Rubyvale	Reticulation	Chlorine (Free)	mg/L	Weekly	51	0	0.19	1.18	0.67	0.01
		Coliforms	CFU/100mL	Weekly	51	1	0	1	0	0
		Ecoli	CFU/100mL	Weekly	51	0	0	0	0	0
		Conductivity	us/cm	Monthly	12	No value	583	694	633	1
		pH	mg/L	Monthly	12	0	7.46	7.91	7.68	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	5	181	220	198	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	166	188	177	1
		Silica	mg/L	Monthly	12	0	33	35	34	1
		Dissolved Solids	mg/L	Monthly	12	0	347	400	371	1
		True Colour	hazen	Monthly	12	0	<1	<1	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	0	50	58	54	1
		Potassium	mg/L	Monthly	12	No value	1.6	1.8	1.7	0.1
		Calcium	mg/L	Monthly	12	No value	45	55	49	0.1
		Magnesium	mg/L	Monthly	12	No value	17	20	18	0.1
		Chloride	mg/L	Monthly	12	0	64	87	73	1
		Fluoride	mg/L	Monthly	12	0	0.38	0.83	0.65	0.01
		Nitrate	mg/L	Monthly	12	0	2.1	6.0	3.3	0.5
		Sulphate	mg/L	Monthly	12	0	29	34	32	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.03	0.04	0.03	0.01
		Copper	mg/L	Monthly	12	0	0.06	0.12	0.096	0.03

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Sapphire	Reticulation	Chlorine (Free)	mg/L	Weekly	51	0	0.25	1.27	0.80	0.01
		Coliforms	CFU/100mL	Weekly	51	1	0	1	0	0
		Ecoli	CFU/100mL	Weekly	51	0	0	0	0	0
		Conductivity	us/cm	Monthly	12	No value	567	709	637	1
		pH	mg/L	Monthly	12	0	7.33	7.83	7.59	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	5	175	224	199	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	166	188	177	1
		Silica	mg/L	Monthly	12	0	33	34	33	1
		Dissolved Solids	mg/L	Monthly	12	0	340	407	373	1
		True Colour	hazen	Monthly	12	0	<1	<1	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	0	50	58	54	1
		Potassium	mg/L	Monthly	12	No value	1.5	1.8	1.6	0.1
		Calcium	mg/L	Monthly	12	No value	44	56	50	0.1
		Magnesium	mg/L	Monthly	12	No value	16	21	18	0.1
		Chloride	mg/L	Monthly	12	0	58	89	74	1
		Fluoride	mg/L	Monthly	12	0	0.38	0.85	0.69	0.01
		Nitrate	mg/L	Monthly	12	0	1.9	5.8	3.2	0.5
		Sulphate	mg/L	Monthly	12	0	28	35	32	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.040	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.02	0.04	0.03	0.01
		Copper	mg/L	Monthly	12	0	0.030	0.074	0.057	0.03

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Tier1	Reticulation	Chlorine (Free)	mg/L	Weekly	51	0	0.20	1.44	0.90	0.01
		Coliforms	CFU/100mL	Weekly	51	0	0	0	0	0
		Ecoli	CFU/100mL	Weekly	51	0	0	0	0	0
		Trihalomethanes	µg/L	Seasonal/ Event	7	1	100	260	179	1
		Conductivity	us/cm	Monthly	12	No value	377	796	498	1
		pH	mg/L	Monthly	12	0	7.28	7.83	7.62	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	0	65	153	93	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	84	154	119	1
		Silica	mg/L	Monthly	12	0	9	14	12	1
		Dissolved Solids	mg/L	Monthly	12	0	229	438	288	1
		True Colour	hazen	Monthly	12	0	<1	<1	<1	1
		Turbidity	NTU	Monthly	12	0	<1	4	<1	1
		Sodium	mg/L	Monthly	12	0	50	100	67	1
		Potassium	mg/L	Monthly	12	No value	4.3	6.4	5.0	0.1
		Calcium	mg/L	Monthly	12	No value	16	32	21	0.1
		Magnesium	mg/L	Monthly	12	No value	5.9	18	9.6	0.1
		Chloride	mg/L	Monthly	12	0	16	120	47	1
		Fluoride	mg/L	Monthly	12	0	0.27	0.69	0.50	0.01
		Nitrate	mg/L	Monthly	12	0	<0.1	1.4	0.6	0.5
		Sulphate	mg/L	Monthly	12	0	48	59	54	0.1
		Iron	mg/l	Monthly	12	0	<0.01	<0.01	<0.01	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.09	0.06	0.05
		Boron	mg/L	Monthly	12	0	0.03	0.06	0.04	0.01
		Copper	mg/L	Monthly	12	0	0.003	0.030	0.014	0.03

Scheme name	Scheme component	Parameter	Units	Minimum frequency of sampling	Total No. samples collected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	LOR
Springsure	Upper Reticulation Zone	Chlorine (Free)	mg/L	Monthly	12	0	0.48	2.2	1.37	0.01
		Coliforms	CFU/100mL	Monthly	12	1	0	1	0	0
		Ecoli	CFU/100mL	Monthly	12	0	0	0	0	0
		Conductivity	us/cm	Monthly	12	No value	878	966	944	1
		pH	mg/L	Monthly	12	1	8.33	8.57	8.42	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	0	15	46	22	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	435	495	475	1
		Silica	mg/L	Monthly	12	0	21	35	24	1
		Dissolved Solids	mg/L	Monthly	12	0	546	600	580	1
		True Colour	hazen	Monthly	12	0	<1	2	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	12	200	240	227	1
		Potassium	mg/L	Monthly	12	No value	3.9	5.3	4.3	0.1
		Calcium	mg/L	Monthly	12	No value	3.8	11	5.3	0.1
		Magnesium	mg/L	Monthly	12	No value	1.3	4.8	2.1	0.1
		Chloride	mg/L	Monthly	12	0	32	34	33	1
		Fluoride	mg/L	Monthly	12	0	0.32	0.50	0.43	0.01
		Nitrate	mg/L	Monthly	12	0	0.3	0.5	0.4	0.5
		Sulphate	mg/L	Monthly	12	0	0.3	1.2	0.6	0.1
		Iron	mg/l	Monthly	12	0	<0.01	0.09	0.04	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.12	0.17	0.15	0.01
		Copper	mg/L	Monthly	12	0	0.003	0.110	0.022	0.03
	Lower Reticulation Zone	Chlorine (Free)	mg/L	Monthly	12	0	1.11	2.2	1.52	0.01
		Coliforms	CFU/100mL	Monthly	12	0	0	0	0	0
		Ecoli	CFU/100mL	Monthly	12	0	0	0	0	0
		Conductivity	us/cm	Monthly	12	No value	1130	1170	1144	1
		pH	mg/L	Monthly	12	9	8.33	8.56	8.44	0.01
		Total Hardness	mg CaCO3/L	Monthly	12	0	25	39	35	1
		Alkalinity	mg CaCO3/L	Monthly	12	No value	528	585	571	1
		Silica	mg/L	Monthly	12	0	19	22	21	1
		Dissolved Solids	mg/L	Monthly	12	12	682	715	696	1
		True Colour	hazen	Monthly	12	0	<1	2	<1	1
		Turbidity	NTU	Monthly	12	0	<1	<1	<1	1
		Sodium	mg/L	Monthly	12	12	260	290	271	1
		Potassium	mg/L	Monthly	12	No value	1	4.3	3.9	0.1
		Calcium	mg/L	Monthly	12	No value	5.5	7.9	7.2	0.1
		Magnesium	mg/L	Monthly	12	No value	2.8	4.8	4.2	0.1
		Chloride	mg/L	Monthly	12	0	38	63	44	1
		Fluoride	mg/L	Monthly	12	0	0.33	0.41	0.35	0.01
		Nitrate	mg/L	Monthly	12	0	0.2	0.5	0.3	0.5
		Sulphate	mg/L	Monthly	12	0	1	3	1.4	0.1
		Iron	mg/l	Monthly	12	0	<0.01	0.04	0.02	0.01
		Manganese	mg/L	Monthly	12	0	0.001	0.010	0.005	0.01
		Zinc	mg/L	Monthly	12	0	0.010	0.060	0.039	0.01
		Aluminium	mg/L	Monthly	12	0	0.03	0.05	0.04	0.05
		Boron	mg/L	Monthly	12	0	0.23	0.32	0.26	0.01
		Copper	mg/L	Monthly	12	0	0.003	0.100	0.020	0.03

Appendix B – Reticulation *E. coli* verification monitoring

All samples taken tested negative for *E. coli* and below are summaries of the results of the reticulation *E. coli* verification monitoring program for all council water supply schemes.

Table 5.1 to 5.12 – Reticulation *E. coli* verification monitoring

Drinking water scheme: Anakie scheme

Year	2019 to 2020											
Month	July	Aug	Sept	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 <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	12	12	12	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Bauhinia Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	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 <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	12	12	12	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Blackwater & Bluff Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	6	5	5	6	5	4	5	5	6	5	5	6
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	61	61	61	61	61	61	60	61	62	62	62	63
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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Capella Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	5	4	4	5	4	3	4	4	5	4	4	5
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	41	44	47	51	51	51	50	50	51	50	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Comet Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	1	1	1	1	1	1	1	1	1	1	1	2
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	12	12	12	12	12	12	12	12	12	12	12	13
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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Dingo Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	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 <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	12	12	12	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Duaringa Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	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 <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	12	12	12	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Emerald Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	10	8	8	10	8	6	8	8	10	8	8	10
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	100	100	100	100	100	100	98	98	100	100	100	102
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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Rolleston Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	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 <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	12	12	12	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Sapphire and Rubyvale Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	10	8	8	10	8	6	8	8	10	8	8	10
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	100	100	100	100	100	100	98	98	100	100	100	102
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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Springsure Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	2	2	2	2	2	2	2	2	2	2	2	2
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	26	26	26	26	24	24	24	24	24	24	24	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Drinking water scheme: Tieri Scheme

Year	2019 to 2020											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	5	4	4	5	4	3	4	4	5	4	4	5
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	51	51	51	51	51	51	50	50	51	50	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	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 2018* (the regulation) 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 should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

Appendix C – Implementation of the DWQMP Risk Management Improvement Program

Table 6.1 to 6.14 – Progress against the RMIP program in the approved DWQMP

Legend: Complete Changes

RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	CHRC WIDE					
CHR 1	Procedures		Procedures required for bore inspection, reservoir inspection, disinfection, coagulation, PAC, filtration, mains breaks, pH correction, transfer procedure.		Disinfection, Filtration & Coagulation procedures completed. Remaining procedures listed to be drafted by end of 2020/2021 FY. Reservoir inspection to be removed as requires external contractor to complete.	Treatment Engineer
CHR 2	Catchment Management - PFAS	Add to verification monitoring (5 years)			Initial PFAS testing on all surface drinking water schemes has commenced.	Planning Engineer
CHR 3, CHR 4	Catchment Management - microplastics	Ensure mains replacement/repair procedure adequately addresses risk of microplastics.	Investigate testing options.		Mains replacement/repair procedure under development. Add to monitoring schedule in all surface schemes.	Network Engineer/Planning Engineer
CHR 5, CHR 6	Network Management - Legionella	See bacteria RMIP items.		-	Consultant engaged for preliminary design of cooling system for Springsure. Existing cooling systems isolated/bypassed.	Treatment Engineer
CHR 5, CHR 6	Network Management - Naegleria	See bacteria RMIP items.	Consider Raw Water awareness alert on CHRC website			Planning Engineer
CHR 7	SCADA Lockout	Investigate alarm level and lockout to operators			Reviewed in greatest order of risk. Ongoing monitoring required.	Treatment Engineer
CHR 8, CHR 9, CHR 10	Treated water storage / Reservoirs	Formalise inspection checklist	Investigate how vermin proof is storage.	Implement appropriate action	Inspections completed 2019. Limited CAPEX budget to undertake priority repairs - vermin proof reservoirs.	Manager WU
CHR 11	Reticulation		need to develop routine flushing program		Plan to have designated crew undertaking routine flushing.	Network Supervisor
CHR 12, CHR 13, CHR 14	Training / operator knowledge	Implement training plans / Ensure other staff are confident to operate scheme	More operators to have a minimum Cert III in Water Operations or equivalent.		Continual training required due to ongoing staff turnover.	Treatment Supervisor
CHR 15, CHR16	Recruitment / staff retention	Fill vacancies	Corporate people plan and plan for upskilling		Recruitment is ongoing due to continual staff turnover. Operator rotations to continue. More Emerald based operators to know other plants i.e. Anakie, Sapphire, Springsure, Rolleston, Comet. Blackwater based operators to know Bluff, Dingo, Duaringa, Bauhinia.	Treatment Supervisor
CHR 17, CHR 18	Maintenance/Key Consultants		develop internal skills to reduce reliance on external support / critical spares to be identified	Preventive maintenance of blowers, air compressors, centrifuges, spare retic pumps fixed, dam switchboards, fluoride plant maintenance, chlorine replacement work, generator plugs.	Consultant engaged to prepare mechanical maintenance contract for all schemes.	Treatment Supervisor
CHR 19, CHR 20	Cyber Security	Investigate governance structure. See site security RMIP items.	Investigate cyber security detection process. Investigate current response and recovery plans, add cyber security focused section if necessary.		Engage consultant to assist with review current plans and identify gaps specific to water utilities.	Manager WU
CHR 21, CHR 22, CHR 23	Site Security	Implement non-capital Audit recommendations. Investigate reducing temptation of site access for robbery.	Conduct Site Security Assessment	Implement capital Audit and Assessment recommendations.	Received proposal from consultant to undertake security audit. Opal St security gate replacement tender awarded. Continuing to implement non-capital audit recommendations.	Manager WU
CHR 24, CHR 25	Sole Operators	Investigate practicality of corporate SOP and self-audit current compliance	Implement actions of investigation		Cross training and operator rotations to continue. More Emerald based operators to know other plants i.e. Anakie, Sapphire, Springsure, Rolleston, Comet. Blackwater based operators to know Bluff, Dingo, Duaringa, Bauhinia.	Treatment Supervisor
CHR 26, CHR 27	Standpipe & Hydrant access	Notify standpipe and hydrant users of risks and the use of an air gap	Install RPZ		Three Metered Standpipes replaced with backflow prevention - Emerald, Blackwater, Sapphire.	Manager WU
CHR 28	Health Based Targets	Assessment of current barrier and catchment	Investigate options to implement	Implement capital recommendations	Raw Water catchment sampling commenced.	Manager WU
CHR 29	Water Quality Data		Add water quality data to site based DWQMPS.		To be included at next DWQMP review.	Planning Engineer

RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	ANAKIE					
ANA 1	Raw water storage	design/install new tank			Capex project has commenced design and land acquisition for replacement of tanks. Installation expected to occur 2021-2022 FY.	Manager WU
ANA 2	Disinfection	Trend and response analysis	Action outcomes of analysis		Awaiting resource prioritisation.	Treatment Engineer
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	BAUHINIA					
BAU 2, BAU 3	Disinfection	Trend and response analysis	Action outcomes of analysis / chlorine dosing upgrade		Assessing operational structure and investigating upgrade of chlorine dosing system and monitoring.	Treatment Engineer / Supervisor
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	BLACKWATER					
BLK 1	Raw Water Abstraction		Investigate new raw water pumps		Construction project currently in 2020/21 Capex budget.	Manager WU
BLK 2	Filtration		investigate ripen to waste for filters 5 and 6		Preliminary design completed. Documents prepared to retender for installation of filter to waste bypass on filters 5 & 6.	Project Team
BLK 3, BLK 4	Disinfection		data collection for options analysis	Investigate options / Chlorine gas/ dual storage	Awaiting prioritisation in CAPEX budget.	Manager WU
BLK 5	Reticulation		Investigate standby generator (reservoirs)		Awaiting prioritisation in CAPEX budget.	Manager WU
BLK 6	Redosing (Bluff Reservoir)			replace generator on site	Awaiting prioritisation in CAPEX budget	Manager WU
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	CAPELLA					
CAP 1, CAP 2	Catchment		online monitoring	Media Replacement	Media replacement due to be completed late 2020.	Project Team
CAP 3, CAP 4	pH correction	data collection for procedure target ranges	Procedure / investigate alarm		ACH upgrade decommission pH adjustment dosing.	
CAP 5, CAP 6	Coagulation	clarifier Turbidity monitoring	investigate online monitoring		Turbidity meter installed, awaiting commissioning.	Treatment Engineer
CAP 7, CAP 8	Filtration		auto backwash, shutdowns, to be investigated.	Investigate replace filter media	Auto backwash - awaiting CAPEX prioritisation. Shutdowns completed.	Manager WU
CAP 9, CAP 10		Data collection on turbidity spikes	Investigate ripening to waste		Awaiting prioritisation within CAPEX budget.	Manager WU
CAP 11, CAP 12	Disinfection	Investigate ACH option and collect data	Investigate pH correction options		ACH system installation to be completed early 2021.	Project Team
CAP 13, CAP 14	Transfer from Tieri to Capella	Data collection of chlorine levels	Develop transfer procedure		Auto dosing of chlorine when pipeline is running.	Treatment Engineer
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	COMET					
COM 1	Raw Water Abstraction		Reinstate duty standby pumps		Construction to commence 20/21 FY.	Project Team
COM 2, COM 3	pH correction	data collection for procedure target ranges. Online pH monitoring needs to be replaced.	procedure / investigate alarm		Awaiting resource prioritisation.	Treatment Supervisor
COM 4, COM 5	Coagulation	clarifier Turbidity monitoring	online monitoring		Awaiting installation of turbidity instrumentation.	Treatment Supervisor
COM 6, COM 7	Filtration	Data collection on turbidity spikes	Investigate ripening to waste		Valves have been installed and commissioned. Have currently been configured into the backwash sequence to lower filter level prior to backwash. Outstanding action to add filter to waste at end of backwash sequence and at plant start-up.	Treatment Engineer
COM 8, COM 9	Disinfection		data collection for options analysis	Investigate options / dual storage	Awaiting prioritisation within CAPEX budget	Manager WU
COM 10, COM 11	Reticulation		Investigate UPS and generator for transfer pumps	Implement appropriate action	Awaiting prioritisation within CAPEX budget and Tower UPS to be included.	Manager WU

RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	DINGO					
DIN 1, DIN 2, DIN 3	Catchment		online monitoring	Media Replacement/Filter replacement	Construction to commence 20/21 FY.	Project Team
DIN 4			Investigate need and use of PAC		Awaiting prioritisation within CAPEX budget.	Manager WU
DIN 5				Relocate pumps	Awaiting prioritisation within CAPEX budget.	Manager WU
DIN 6, DIN 7	Coagulation	clarifier Turbidity monitoring	Turbidity meter online monitoring		Construction to commence 20/21 FY.	Project Team
DIN 8, DIN 9, DIN 3	Filtration	Filtered Turbidity monitoring	Turbidity meter online monitoring	Filter replacement	Construction to commence 20/21 FY.	Project Team
DIN 10, DIN 11, DIN 3		Collect data	Investigate ripen to waste option	Filter replacement to include ripen to waste.	Construction to commence 20/21 FY.	Project Team
DIN 12, DIN 3	Disinfection	Filtered Turbidity monitoring	online monitoring and alarms	Filter replacement	Construction to commence 20/21 FY.	Project Team
DIN 13, DIN 14			data collection for options analysis	Investigate options / dual storage	Awaiting prioritisation within CAPEX budget.	Manager WU
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	DUARINGA					
DUA 1, DUA 2, DUA 3	Catchment		online monitoring	Media Replacement/Filter replacement	Construction to commence 20/21 FY.	Project Team
DUA 4	Coagulation			flow switch	Needs to be added as variation to this project. Construction to commence 20/21 FY.	Project Team
DUA 5, DUA 6		clarifier Turbidity monitoring	Turbidity meter online monitoring		Construction to commence 20/21 FY.	Project Team
DUA 7, DUA 8, DUA 3	Filtration	Filtered Turbidity monitoring	Turbidity meter online monitoring	Filter replacement	Construction to commence 20/21 FY.	Project Team
DUA 9, DUA 10	Disinfection		data collection for options analysis	Investigate options / dual storage	Awaiting prioritisation within CAPEX budget.	Manager WU
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	EMERALD EAST NOGOA					
EMEN 1, EMEN 2	pH correction	data collection for procedure target ranges	Procedure / investigate alarm			Treatment Supervisor
EMEN 3, EMEN 4, EMEN 5	Coagulation	develop operational rules and document procedure	investigate control of supernatant return	Design and implement solution	Investigating capital work upgrades required for the installation of new tanks. Awaiting prioritisation within CAPEX budget.	Manager WU
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	EMERALD OPAL ST					
EMOS 1, EMOS 2, EMOS 3	Coagulation - recycle stream / blanket destabilised	develop operational rules and document procedure	turbidity meter as control of supernatant return	dewatering upgrade	Commenced options analysis on dewatering system.	Manager WU
EMOS 4, EMOS 5	Filtration		auto backwash to be investigated.	Investigate need to replace filter media	Media replacement and new backwash pump design occurring 20-21 FY.	Manager WU
EMOS 6			investigate new backwash pumps instead of backflow prevention valve		New backwash pump design to occur 20-21 FY.	Manager WU
EMOS 7			investigate blanking off valve		Awaiting prioritisation within CAPEX budget.	Manager WU
EMOS 8, EMOS 9	Reticulation		Investigate UPS or other options	Implement appropriate action	Clearwater switchboard replacement within 20-21 FY budget.	Project Team

RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	ROLLESTON					
ROL 1, ROL 2	Coagulation	manual turbidity testing at clarifier	turbidity meter		Clearwater switchboard replacement out to tender.	Project Team
ROL 5, ROL 6	Disinfection		calculation of CT, probably OK, but need to check.	pH adjustment to be considered.	Concept design for pH undertaken and waiting for CAPEX prioritisation.	Manager WU
ROL 7			Check chlorate levels		Consider options to reduce chlorate levels in chemical dosing relocation project.	Treatment Engineer
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	SAPPHIRE/RUBYVALE					
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	SPRINGSURE					
SPR 1, SPR 2	Network Management - Legionella / Naegleria	Assess water cooling options with respect to this risk i.e. Keep current cooling systems offline.	Consider Raw Water awareness alert on CHRC website		Consultant engaged for preliminary design of cooling system for Springsure. Existing cooling systems isolated/bypassed.	
SPR 3	Disinfection		Need to upgrade to auto dosing		Awaiting prioritisation within CAPEX budget.	Manager WU
SPR 4, SPR 5	Cooling systems	Check integrity and sealing	Seal if this is an issue		As a result of consultant review, taken offline.	Manager WU
RMIP Reference	Process Step	Risk Management Improvements			Status as at 30/06/2020	Responsible Position
		Short term	Medium term	Long term		
	TIERI					
TIE 1, TIE 2	Catchment		online monitoring	Media Replacement	Media replacement due to be completed late 2020.	Project Team
TIE 1, TIE 2			online monitoring	Media Replacement	Media replacement due to be completed late 2020.	Project Team
TIE 3, TIE 4	Raw Water Abstraction	develop operational rules and document procedure	investigate turbidity meter as control of supernatant return		Turbidity meter installed, awaiting commissioning.	Treatment Engineer
TIE 5, TIE 6	pH correction	data collection for procedure target ranges	Procedure / investigate alarm			Treatment Supervisor
TIE 7, TIE 8	Coagulation	clarifier Turbidity monitoring	online monitoring		Turbidity meter installed.	Treatment Engineer
TIE 9, TIE 10		document recycle procedure	Investigate recycle control. Requires flow meter/pump upgrade.		Awaiting prioritisation within CAPEX budget.	Manager WU
TIE 12, TIE 13		Data collection on turbidity spikes	Investigate ripening to waste		Awaiting prioritisation within CAPEX budget.	Manager WU
TIE 14, TIE 15		Investigate lockout		Investigate blanking off	To be completed 20/21 FY.	Treatment Supervisor
TIE 16, TIE 17	Disinfection	Investigate ACH option and collect data	Investigate pH correction options		Awaiting prioritisation within CAPEX budget.	Manager WU