Drinking Water Quality Management Plan (DWQMP) report

2020 - 2021

Etheridge Shire Council

SPID: SP49

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Glossary of terms

ADWG 2004	Australian Drinking Water Guidelines (2004). Published by the National Health and Medical Research Council of Australia
ADWG 2011	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
E. coli	*Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
HACCP	Hazard Analysis and Critical Control Points certification for protecting drinking water quality
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
MPN/100mL	Most probable number per 100 millilitres
CFU/100mL	Colony forming units per 100 millilitres
<	Less than
>	Greater than

1. Introduction

This report documents the performance of Etheridge Shire Council's drinking water service with respect to water quality and performance in implementing the actions detailed in the drinking water quality management plan (DWQMP) as required under the *Water Supply (Safety and Reliability) Act 2008* (the Act).

The report assists the Regulator to determine whether the approved DWQMP and any approval conditions have been complied with and provides a mechanism for providers to report publicly on their performance in managing drinking water quality.

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

2. Overview of Operations

Georgetown's water supply is drawn from the aquifer in the alluvial bed sands of the Etheridge River. Surface water filters through the alluvial sands of the Riverbed to the aquifer where it is drawn from a series of wells. Due to occasional high levels of manganese and iron in Georgetown's water source, a treatment plant was installed in March-May 2015. The treatment comprises of a flocculation tank, 3 sand\carbon media filters and 3 DMI filters. Water is disinfected at the treatment plant and stored in two service reservoirs (1 x 600KL and 1 x 1800KL added in 2017). Water in the reservoirs is monitored and further disinfected (if required) before reticulation via a trim system.

Forsayth's water is sourced from the Big Reef Dam located 6 kilometres from the township. The water supply is treated by a DAF water treatment plant commissioned in 2006. Treated water is fed to a 600 kL service reservoir (installed in 2021) which in turn gravity feeds the township.

The treatment was upgraded in 2018 and comprises of a Pot perm dosing system, a pre aeration system, carbon dosing and a carbon retention tank, flocculation tank, clarifier, dissolved air floatation system and 4 sand media filters. Water is disinfected at the treatment plant and monitored and further disinfected (if needed) via a trim system in the 600kl reservoir.

3. Actions taken to implement the DWQMP

Georgetown and Forsayth

Management conducts regular toolbox meetings to make operational staff aware and familiar with the DWQMP and its implementation. Risk management measures are performed as written in our DWQMP. This includes operational procedures/practices and operational and verification monitoring. We have continued to work through improvements in our Risk management improvement plan.

Operational parameters have been checked and maintained at locations regularly as per our DWQMP. Verification testing has confirmed the operational monitoring programme to be effective.

Progress in implementing the risk management improvement program

We have continued to progress in implementing the risk management improvement program. We have worked towards all actions and completed some of them. For all progress information see Appendix B – Implementation of the Risk Management Improvement Program, Table 5 – Progress against the risk management improvement program in the approved DWQMP

Amendments made to the DWQMP

Our last DWQMP review was due and submitted by 31 March 2020.
Our next review is due to be completed by 31 March 2022.

4. Compliance with water quality criteria for drinking water

See appendix A – Summary of compliance with water quality criteria

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

Forsayth

This financial year there were no new instances at Forsayth where the Regulator required notification under sections 102 or 102A of the Act.

There was two ongoing incidents at Forsayth for the detection of chlorate & bromide, which are parameters with no water quality criteria. There was one ongoing incident for the detection of Bromate over the Health limit of 0.02 mg/L. The bromate incident was closed on the 16-2-2021.

Georgetown

This financial year there was one new instance at Georgetown where the Regulator was notified under sections 102 or 102A of the Act. This was for a E.coli detection.

There was two ongoing incidents at Georgetown for the detection of a parameter with no water quality criteria, which was chlorate and Bromide. There was one ongoing incident for the detection of Bromate over the Health limit of 0.02 mg/L. The bromate incident was closed on the 16-2-2021.

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

Incident Description: **Bromate – Forsayth** - 0.040mg/L of Bromate was detected at the Forsayth library on the 4-9-2018, which is over the health limit of .020mg/L, and incident DWI-7-49-00026 was opened. We have had no further detections over the health limit since then and only one detection of 0.016 mg/L, which was under the limit. We send updates along with detection levels to The Drinking Water regulators and Health Department monthly.

Corrective and Preventative Actions We turn over our chlorine as frequently as possible and keep it out of the sun. We aim to turn our hypo over within 2 to 4 weeks when possible. We have installed an aircon storage room for our chlorine in stock. This incident is ongoing at this stage while we continue to monitor. Detections seem to be rare. We have not had a detection within the last 24 months and have closed this incident.

Incident Description: Chlorate – Forsayth. DWI-7-49-00015. We have an ongoing incident for the detection of Chlorate, which is a parameter with no water quality criteria. We regularly detect chlorate in the treated water. We send updates along with detection levels to The Drinking Water regulators and Health Department monthly.

Corrective and Preventative Actions We turn over our chlorine as frequently as possible and keep it out of the sun. We aim to turn our hypo over within 2 to 4 weeks or less. We regularly clean our chlorine storage containers. We have talked with our chemical supplier about the importance of supplying fresh product and test the strength on arrival. We have talked to our freight company about issues while transporting and storing the hypo. We have upgraded our treatment plant and now dose pot perm instead of hypo before aeration. We dilute the hypo with demineralised water asap after it arrives. We now make our own demineralised water. We have installed an aircon storage room to keep our chlorine stock. We have been working with the health department who has agreed that we can set a chlorate guideline in our DWQMP of .8mg/L. We have only had 1 detections over .8 mg/L in the last 15 months. We have made improvements and are monitoring. We plan to close this incident.

Incident Description: Bromide – Forsayth DWI-7-49-00022. We have an ongoing incident for the detection of bromide, which is a parameter with no water quality criteria. Bromide is almost always detected in the raw water. We send updates along with detection levels to The Drinking Water regulators and Health Department monthly.

Corrective and Preventative Actions Our Treatment Plant often removes bromide and usually only very low detections are found in the treated water. We continue to sample monthly and monitor the results. We are trying to work with the Health Dept. to adopt a guideline and then should be able to close this incident.

Incident Description: E.coli – Georgetown 10CFU/100mL of E.coli was detected on the 12-2-2021 at Greens Park in Georgetown and incident DWI-49-21-08875 was opened.

Corrective and Preventative Actions

We increased chlorine levels and flushed the retic system. A check of the CL2 free level on the day of sampling showed it was .29mg/L which was lower than our target level although should have not been low enough to cause this detection especially as this was the only detection from 5 samples in the retic.

We did issue boiled water alerts and went through the process of providing 2 NATA laboratory reports before lifting the boiled water alerts. It was concluded that this detection was likely due to operator era while sampling. We conducted tool box meetings with operators and issued them with flushing and sampling procedures.

Incident Description: Bromate – Georgetown .072mg/L of Bromate which has an ADWG Health limit of 0.02mg/L was detected on the 11-7-2018 at the Georgetown Rec Grounds and incident DWI-7-49-00024 was opened.

Corrective and Preventative Actions We turn over chlorine as frequently as possible and store it out of the sun. We aim to turn our hypo over within 2 to 4 weeks or less. We have talked with our chemical supplier about the importance of supplying fresh product. We have talked to our freight company about issues while transporting and storing the hypo. We have installed an aircon storage room to store our chlorine. We continue to sample monthly and monitor the results. Detections seem to be rare. Since then we have had 0 detections over the health limit and closed then incident on the 16-2-2021.

Incident Description: Chlorate – Georgetown DWI-7-49-00014. We have an ongoing incident for detection of Chlorate - a parameter with no water quality criteria. We regularly detect low levels of chlorates in our treated water. We send updates along with detection levels to The Drinking Water regulators and Health Department monthly.

Corrective and Preventative Actions We turn over chlorine as frequently as possible and store it out of the sun. We regular clean our chlorine storage containers. We aim to turn it over within 2 to 4 weeks or less. We have talked with our chemical supplier about the importance of supplying fresh product and test the strength on arrival. We have talked to our freight company about issues while transporting and storing the hypo. We dilute the hypo with demineralised water asap after it arrives. We now make our own demineralised water. We have installed an aircon room to store our chlorine stock. We have been working with the health department and set a chlorate guideline in our DWQMP of .8mg/L. Detections over .8mg/L are rare. We plan to close this incident. We have made improvements and are monitoring.

Incident Description: Bromide – Georgetown DWI-7-49-00023. We have an ongoing incident for the detection of bromide, which is a parameter with no water quality criteria. Bromide is usually detected in the raw water. We send updates along with detection levels to The Drinking Water regulators and Health Department monthly.

Corrective and Preventative Actions Our Treatment Plant often removes bromide and usually only very low detections are found in the treated water. We continue to sample monthly and monitor the results. We are working with the Health Dept. to adopt a guideline and then will be able to close this incident.

6. Customer complaints related to water quality

Etheridge Shire Council is required to report on the number of complaints, general details of complaints, and the responses undertaken.

Throughout the year the following complaints about water quality were received:

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

	Suspected Illness	Discoloured water	Taste and odour	Total
Georgetown	0	0	0	0
Forsayth	0	0	0	0
Total	0	0	0	0

Suspected Illness

Complaints are sometimes received from customers who suspect their water may be associated with an illness they are experiencing. Etheridge Shire Council investigates each complaint relating to alleged illness from our water quality, typically by testing the customers tap and closest reticulation sampling point for the presence of *E. coli*.

During 2020/2021, there were zero confirmed cases of illness arising from the water supply system.

7. Findings and recommendations of the DWQMP auditor

Water Futures reported that Etheridge Shire Council (ESC) has demonstrated full compliance with the regular audit imposed by the *Water Supply (Safety and Reliability) Act 2008* during the audit period.
The audit found that ESC had provided accurate data to the Regulator and is operating its drinking water services in accordance with the approved Drinking Water Quality Management Plan (DWQMP) and the conditions of the approval notice. ESC is implementing preventive measures in accordance with the DWQMP and has established processes to support the implementation of the DWQMP.
There were no non-compliances identified and the audit found that ESC is implementing its DWQMP effectively and managing risks to drinking water quality and public health.
Opportunities for improvements were identified.

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

We have been working through the opportunity for improvement items. The following table shows progress.

Opportunities For improvement		
Topic area	**Opportunity for improvement recommendations**	**Progress**
Implementation of all preventive measures for managing hazards and hazardous events including those applied in the distribution/reticulation network)	Enhancing protection of the WTP bypass, e.g. using a double block and bleed system or removable spool piece.	This area is going to change within upgrades to treatment plant.
	Noting that the 0.6 ML treated water storage reservoir roof has a box gutter which, whilst not blocked, has the potential to block, and as such ESC should proactively maintain the box gutter to prevent its blockage. The discharge point for drainage from the roof should be clarified	The gutter has never blocked in the past as there are no trees around this area. This is checked within our reservoir inspections. We have it programed to check the discharge point.
	Noting that the 0.6 ML treated water storage reservoir roof is corroding and risks becoming non-compliant and needs to be rectified	The corroded sheet of iron has been replaced.
	Requiring relevant customers to meet the requirements of the plumbing code with respect to backflow prevention.	All water meters have backflow. This is under consideration
	Storing all drinking water parts and fittings such that they are protected from sunlight and from potential contamination	Budgeting for extra storage.
Implementation of operational and maintenance procedures (including instrument calibration), including availability and currency of the procedures	Sourcing standards and reagents with longer shelf lives and/or forming a formal position on marking or discarding expired standards and reagents and/or extending the shelf lives for standards and reagents. The focus should be on standards and reagents used to measure, verify or calibrate parameters with critical limits (e.g. chlorine and turbidity) or for verification of final water quality (e.g. E. coli testing).	This is under consideration and in process of sourcing reagents with longer shelf lives. Out of date reagents have been removed.

Appendix A – Summary of compliance with water quality criteria

The results from the verification-monitoring program have been compared against the levels of the water quality criteria specified by the Regulator in the *Water Quality and Reporting Guideline for a Drinking Water Service*.

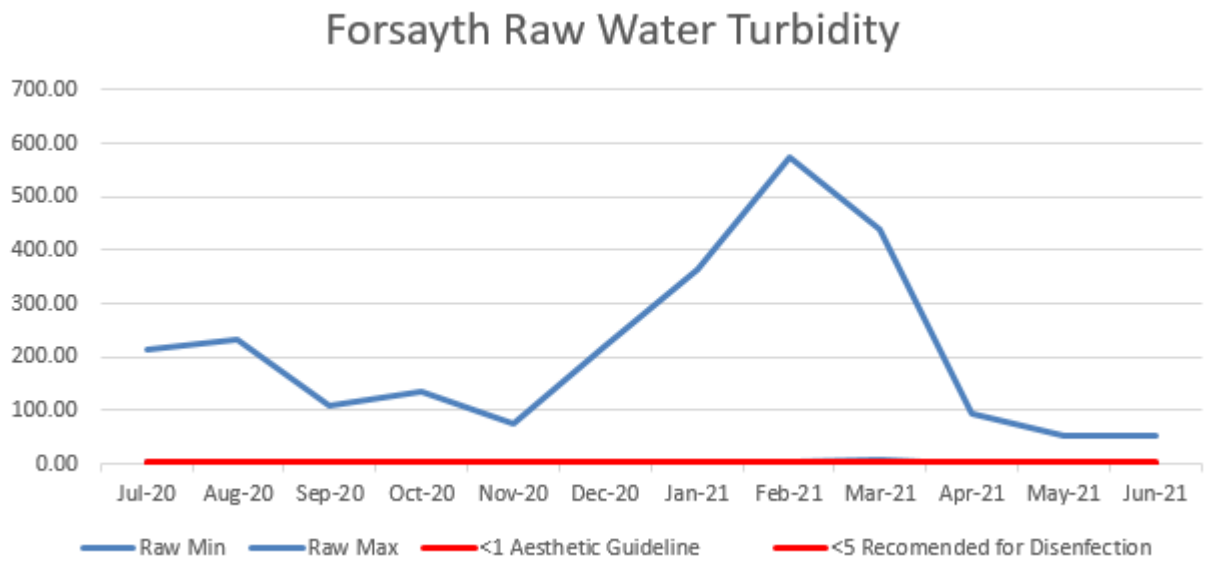
The reported statistics do not include results derived from repeat samples, or from emergency or investigative samples undertaken in response to an elevated result.

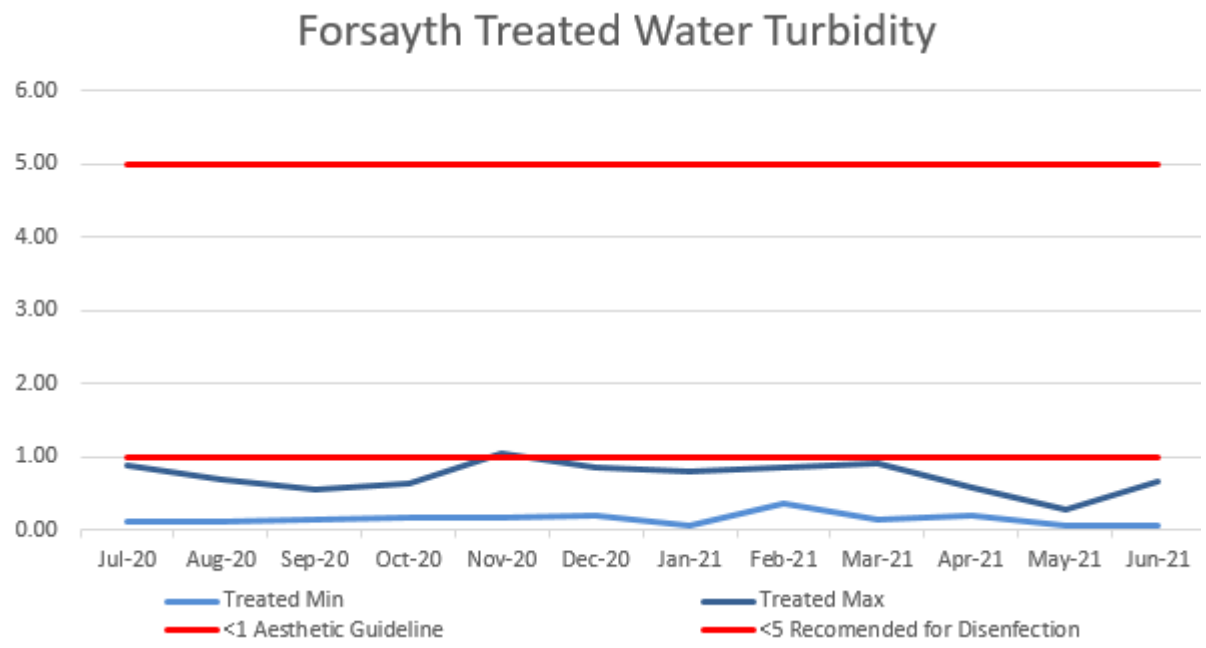
Other verification monitoring was carried out as per our DWQMP.

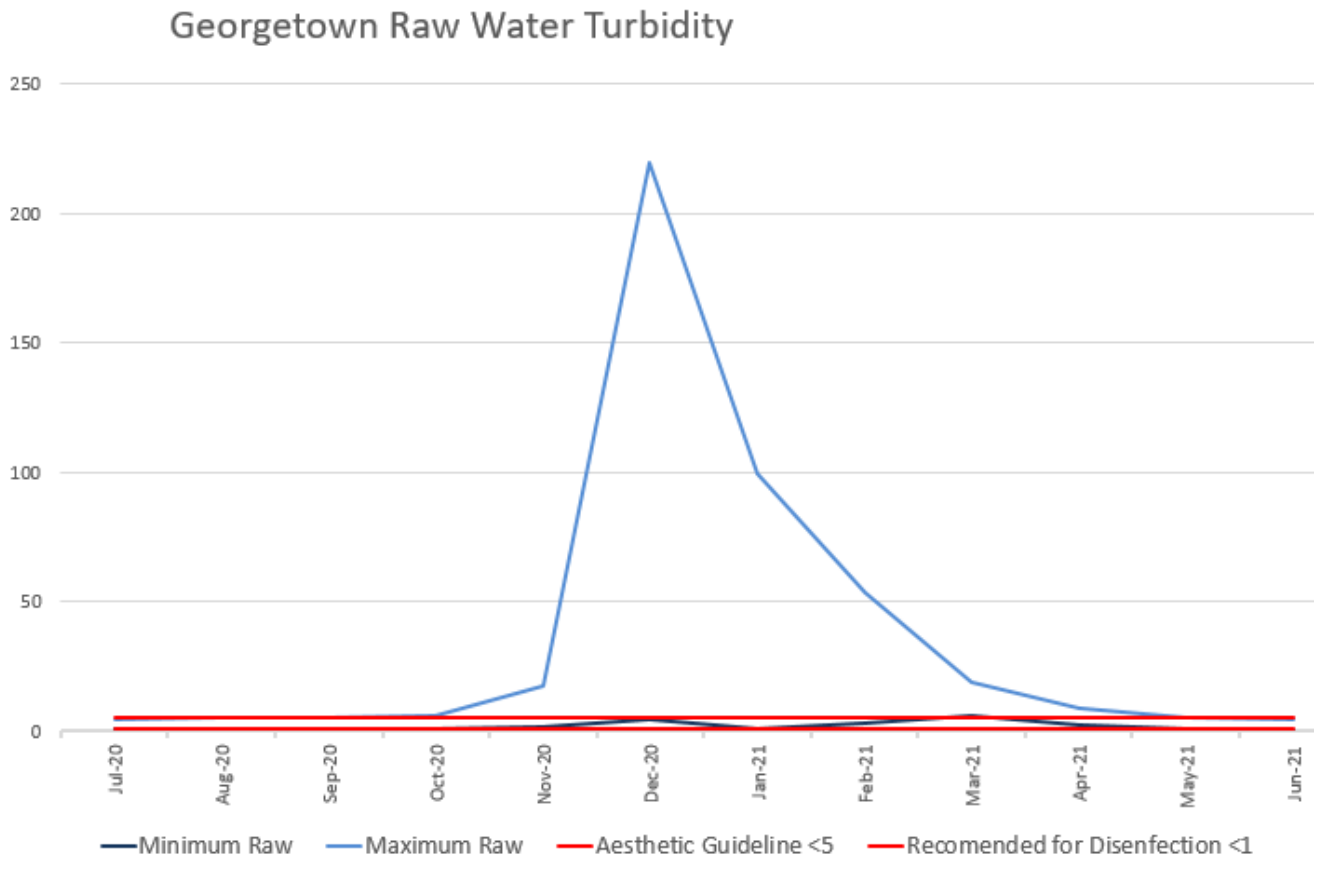
The presence of potentially toxic Blue/green algae in the raw water at Forsayth is detected on occasions and is treated and removed from the retic water. High levels of turbidity, colour, iron and manganese are also detected in the raw water at Forsayth and is treated and removed in the water treatment plant. Our verification monitoring covers all aspects. It shows any operational faults which can be rectified fast and confirms our operational monitoring is working and remains appropriate.

Upgrades to the Water treatment Plant at Forsayth in 2018 was a have succeeded to greatly improve turbidity levels in the reticulation.

Our verification monitoring results in the following table shows verification results for treated retic water. They also show operational results from the raw water to help compare and show the achievement of the treatment plants.




Forsayth Treated Water Turbidity
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Treated Min
Treated Max
<1 Aesthetic Guideline
<5 Recomended for Disenfection


Georgetown Raw Water Turbidity
250
200
150
100
50
0
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Minimum Raw
Maximum Raw
Aesthetic Guideline <5
Recomended for Disenfection <1

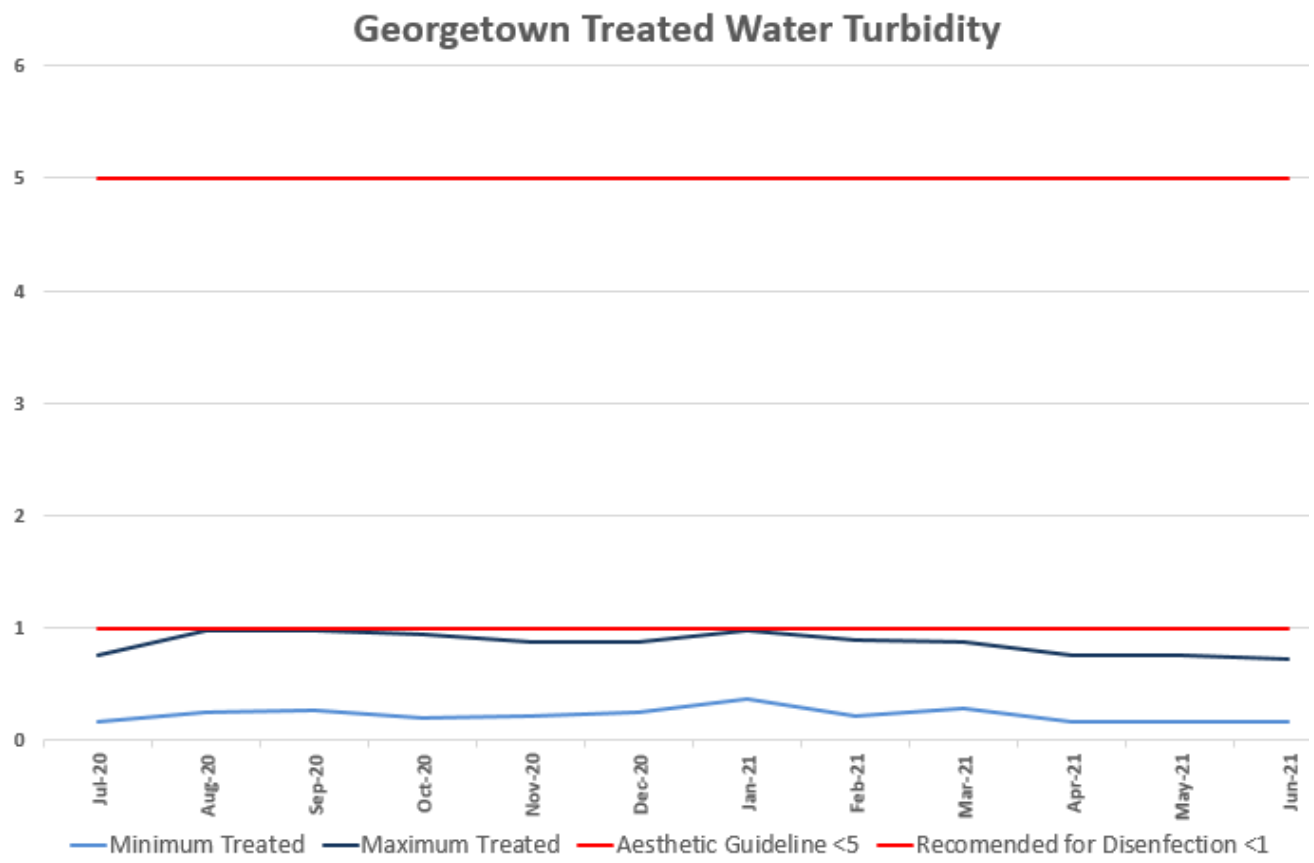

Georgetown Treated Water Turbidity
6
5
4
3
2
1
0
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Minimum Treated
Maximum Treated
Aesthetic Guideline <5
Recomended for Disenfection <1

Table 1 - Verification monitoring results 2020/2021

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Georgetown	Reticulation	Turbidity	Ntu	Daily	362	362	NA	0.16	.98	.50		In House
Georgetown	Reticulation	True colour	Pt/Co	Twice a week	160	160	NA	0.00	4.00	0.04		In House
Georgetown	Reticulation	PH		Daily	359	359	NA	6.1	7.9	7.1		In House
Georgetown	Reticulation	Temperature	C	Daily	359	359	NA	16.8	37.6	28.6		In House
Georgetown	Reticulation	Chlorine Free	Ppm	Daily	539	539	NA	0.28	1.06	.57		In House
Georgetown	Reticulation	Chlorine Total	Ppm	Daily	358	358	NA	.22	1.55	.67		In House
Georgetown	Reticulation	Aluminium	Mg/L	Monthly	24	24	NA	0.021	0.269	0.065	<0.005	Cairns Regional Council
Georgetown	Reticulation	Silicon	Mg/L	Quarterly	4	4	NA	16	22	18.7	<0.10	Cairns Regional Council
Georgetown	Reticulation	Mercury	ug/L	Quarterly	4	0	0	<0.06	<0.06	<0.06	<0.06	Cairns Regional Council
Georgetown	Reticulation	Arsenic	Mg/L	Quarterly	4	0	0	<0.0002	<0.0002	0	<0.0002	Cairns Regional Council
Georgetown	Reticulation	Cadmium	Mg/L	Quarterly	4	0	0	<0.0001	<0.0001	0	<0.0001	Cairns Regional Council
Georgetown	Reticulation	Chromium	Mg/L	Quarterly	4	1	0	<0.0005	0.0014	0.0004	<0.0005	Cairns Regional Council
Georgetown	Reticulation	Copper	Mg/L	Quarterly	4	4	0	0.003	0.008	0.004	<0.001	Cairns Regional Council
Georgetown	Reticulation	Iron	Mg/L	Monthly	24	6	NA	<0.015	0.070	0.00	<0.015	Cairns Regional Council
Georgetown	Reticulation	Lead	Mg/L	Quarterly	4	0	0	<0.0005	<0.0005	0.0000	<0.0005	Cairns Regional Council
Georgetown	Reticulation	Manganese	Mg/L	Monthly	24	24	0	0.0002	0.0031	0.0009	<0.0002	Cairns Regional Council
Georgetown	Reticulation	Nickel	Mg/L	Quarterly	4	0	0	<0.0005	<0.0005	<0.0005	<0.0005	Cairns Regional Council
Georgetown	Reticulation	Zinc	Mg/L	Quarterly	4	1	NA	<0.008	0.015	0.004	<0.008	Cairns Regional Council
Georgetown	Reticulation	Calcium	Mg/L	Quarterly	4	4	NA	6.5	8.2	7.3	<0.20	Cairns Regional Council
Georgetown	Reticulation	Magnesium	Mg/L	Quarterly	4	4	NA	1.2	2.4	1.9	<0.10	Cairns Regional Council
Georgetown	Reticulation	Potassium	Mg/L	Quarterly	4	4	NA	2.0	2.6	2.3	<0.10	Cairns Regional Council
Georgetown	Reticulation	Sodium	Mg/L	Quarterly	4	4	NA	13	16	14.2	<1	Cairns Regional Council
Georgetown	Reticulation	Total Hardness	MgCaC03/L	Quarterly	4	4	NA	21	30	26.2	<1	Cairns Regional Council
Georgetown	Reticulation	Salinity	Psu	Quarterly	4	4	NA	.0595	.0732	.0634		Cairns Regional Council
Georgetown	Reticulation	Total Dissolved Solids	Mg/L	Quarterly	4	4	NA	80	100	86	<1	Cairns Regional Council
Georgetown	Reticulation	Electrical Conductance	Us/cm	Quarterly	4	4	NA	120	150	130	<1	Cairns Regional Council
Georgetown	Reticulation	Total alkalinity	MgCaCO3/L	Quarterly	4	4	NA	25	52	38	<0.1	Cairns Regional Council
Georgetown	Reticulation	Fluoride	Mg/L	Quarterly	4	4	0	.06	.14	.09	<0.02	Cairns Regional Council
Georgetown	Reticulation	Sulphate	Mg/L	Quarterly	4	4	0	8.6	21	13.9	<0.01	Cairns Regional Council
Georgetown	Reticulation	Chloride	Mg/L	Quarterly	4	4	NA	7.9	11	8.9	<0.1	Cairns Regional Council
Georgetown	Reticulation	Chlorate	Mg/L	Monthly	12	12	0	0.110	.499	0.255	<0.005	Cairns Regional Council

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Georgetown	Reticulation	Chlorite	Mg/L	Monthly	12	2	0	<0.005	0.006	0.001	<0.005	Cairns Regional Council
Georgetown	Reticulation	Bromate	Mg/L	Monthly	12	1	0	<0.005	0.009	.000	<0.005	Cairns Regional Council
Georgetown	Reticulation	Bromide	Mg/L	Monthly	12	3	NA	<0.005	0.006	0.002	<0.005	Cairns Regional Council
Georgetown	Reticulation	Giardia, protozoa	Mg/L	Annually	1	0	0	0	0	0		Cairns Regional Council
Georgetown	Reticulation	Organochlorine Pesticides	Ug/L	Annually	1	0	0	0	0	0		Cairns Regional Council
Georgetown	Reticulation	Chloroform	Ug/L	Annually	4	4	0	7	23	15		Cairns Regional Council
Georgetown	Reticulation	Bromodichloromethane	Ug/L	Annually	4	2	0	<5	8	3.3		Cairns Regional Council
Georgetown	Reticulation	Dibomochloromethane	Ug/L	Annually	4	0	0	<5	<5	<5		Cairns Regional Council
Georgetown	Reticulation	Bromoform	Ug/L	Annually	4	0	0	<5	<5	<5		Cairns Regional Council
Georgetown	Reticulation	Total Trihalomethanes	Ug/L	Annually	4	4	0	8	31	15.8		Cairns Regional Council
Georgetown	Reticulation	E.coli	Cells/ML	Monthly	60	1	1	<1	10	.1		Cairns Regional Council
Georgetown	Reticulation	Total Coliforms	Cells/ML	Monthly	60	3	NA	<1	>100			Cairns Regional Council
Georgetown	Reticulation	HPC	Cells/ML	Monthly	60	3	NA	<10	>20000			Cairns Regional Council
Georgetown	Reticulation	TOC	Cells/ML		8	8	N/A	1	2.1	1.5		Cairns Regional Council
Georgetown	Raw	Turbidity	Ntu	Daily	560	560	NA	0.38	220.00	6.69		In House
Georgetown	Raw	True colour	Pt/Co	Twice a week	169	169	NA	0.00	390.00	33.94		In House
Georgetown	Raw	PH		Daily	360	360	NA	4.5	7.4	6.5		In House
Georgetown	Raw	Temperature	C	Daily	359	359	NA	16.8	37.6	28.6		In House
Georgetown	Raw	Aluminium	Mg/L	Monthly	12	12	NA	0.019	0.688	0.221	<0.015	Cairns Regional Council
Georgetown	Raw	Silicon	Mg/L	Quarterly	4	4	NA	19	25	21.2	<0.10	Cairns Regional Council
Georgetown	Raw	Mercury	Ug/L	Quarterly	4	0	NA	<0.06	<0.06	<0.06	<0.06	Cairns Regional Council
Georgetown	Raw	Arsenic	Mg/L	Quarterly	4	4	NA	0.0003	0.0007	0.0005	<0.0001	Cairns Regional Council
Georgetown	Raw	Cadmium	Mg/L	Quarterly	4	3	NA	<0.0001	0.0001	0.0001	0.0001	Cairns Regional Council
Georgetown	Raw	Chromium	Mg/L	Quarterly	4	3	NA	<0.0005	0.0013	0.0006	<0.0005	Cairns Regional Council
Georgetown	Raw	Copper	Mg/L	Quarterly	4	4	NA	0.001	0.005	0.002	<0.001	Cairns Regional Council
Georgetown	Raw	Iron	Mg/L	Monthly	12	12	NA	0.050	.688	0.236	<0.015	Cairns Regional Council
Georgetown	Raw	Lead	Mg/L	Quarterly	4	3	NA	<0.0005	0.0021	0.0011	<0.005	Cairns Regional Council
Georgetown	Raw	Manganese	Mg/L	Monthly	12	12	NA	0.0075	0.0904	0.0416	<0.001	Cairns Regional Council
Georgetown	Raw	Nickel	Mg/L	Quarterly	4	2	NA	<0.0005	0.0006	0.0003	<0.0001	Cairns Regional Council
Georgetown	Raw	Zinc	Mg/L	Quarterly	4	2	NA	<0.008	0.025	0.009	<0.008	Cairns Regional Council
Georgetown	Raw	Calcium	Mg/L	Quarterly	4	4	NA	4.0	9.1	6.0	<0.20	Cairns Regional Council
Georgetown	Raw	Magnesium	Mg/L	Quarterly	4	4	NA	1.5	3.1	2.1	<0.10	Cairns Regional Council

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Georgetown	Raw	Potassium	Mg/L	Quarterly	4	4	NA	2.0	2.6	2.2	<0.10	Cairns Regional Council
Georgetown	Raw	Sodium	Mg/L	Quarterly	4	4	NA	8.5	13	11.1	<1	Cairns Regional Council
Georgetown	Raw	Total Hardness	MgCaC03/L	Quarterly	4	4	NA	16	35	23.2	<1	Cairns Regional Council
Georgetown	Raw	Salinity	Psu	Quarterly	4	4	NA	0.0418	0.0664	0.0521		Cairns Regional Council
Georgetown	Raw	Total Dissolved solids	Mg/L	Quarterly	4	4	NA	71	90	82	<1	Cairns Regional Council
Georgetown	Raw	Electrical conductance	Us/cm	Quarterly	4	4	NA	78	130	101		Cairns Regional Council
Georgetown	Raw	Total Alkalinity	MgCaCO3/L	Quarterly	4	4	NA	34	84	55	<0.1	Cairns Regional Council
Georgetown	Raw	Fluoride	Mg/L	Quarterly	4	4	NA	.08	.16	.11	<0.02	Cairns Regional Council
Georgetown	Raw	Sulphate	Mg/L	Quarterly	4	4	NA	2.3	5.0	3.1	<0.1	Cairns Regional Council
Georgetown	Raw	Chloride	Mg/L	Quarterly	4	4	NA	3.2	6.1	5.1	<0.1	Cairns Regional Council
Georgetown	Raw	Chlorate	Mg/L	Monthly	12	2	NA	<0.005	0.028	0.002	<0.005	Cairns Regional Council
Georgetown	Raw	Chlorite	Mg/L	Monthly	12	2	NA	<0.005	0.009	0.001	<0.005	Cairns Regional Council
Georgetown	Raw	Bromate	Mg/L	Monthly	12	0	NA	<0.005	<0.014	<0.005	<0.005	Cairns Regional Council
Georgetown	Raw	Bromide	Mg/L	Monthly	12	12	NA	0.014	0.037	0.029	<0.005	Cairns Regional Council
Georgetown	Raw	E.coli	Cells/ML	Monthly	12	4	NA	<.1	170	20	<0.1	Cairns Regional Council
Georgetown	Raw	Total Coliforms	Cells/ML	Monthly	12	11	NA	<1	670	158	<10	Cairns Regional Council
Georgetown	Raw	HPC	Cells/ML	Monthly	12	11	NA	<10	460	73	<10	Cairns Regional Council
Forsayth	Reticulation	Turbidity	Ntu	Daily	360	360	NA	0.05	1.05	0.39		In House
Forsayth	Reticulation	True colour	Pt/Co	Twice a week	172	172	NA	0.00	12.00	.84		In House
Forsayth	Reticulation	PH	PH units	Daily	362	362	NA	6.1	7.6	7.0		In House
Forsayth	Reticulation	Temperature	C	Daily	361	361	NA	20.6	38.9	27.5		In House
Forsayth	Reticulation	Chlorine Free	Ppm	Daily	478	478	NA	0.09	1.30	.49		In House
Forsayth	Reticulation	Chlorine Total	Ppm	Daily	358	358	NA	0.18	1.58	.66		In House
Forsayth	Reticulation	Aluminium	Mg/L	Monthly	24	19	NA	<0.015	0.223	0.049	<0.005	Cairns Regional Council
Forsayth	Reticulation	Silicon	Mg/L	Quarterly	4	4	NA	2.6	12.0	5.8	<0.10	Cairns Regional Council
Forsayth	Reticulation	Mercury	Ug/L	Quarterly	4	0	0	<0.06	<0.06	<0.06	<0.06	Cairns Regional Council
Forsayth	Reticulation	Arsenic	Mg/L	Quarterly	4	2	0	<0.0002	0.0004	0.0003	<0.0001	Cairns Regional Council
Forsayth	Reticulation	Cadmium	Mg/L	Quarterly	4	0	0	<0.0001	<0.0001	<0.0001	<0.0001	Cairns Regional Council
Forsayth	Reticulation	Chromium	Mg/L	Quarterly	4	0	0	<0.0002	<0.0005	<0.0002	<0.0002	Cairns Regional Council
Forsayth	Reticulation	Copper	Mg/L	Quarterly	4	4	0	0.008	0.016	0.003	<0.001	Cairns Regional Council
Forsayth	Reticulation	Iron	Mg/l	Monthly	24	8	NA	<0.008	0.696	0.004	<0.01	Cairns Regional Council
Forsayth	Reticulation	Lead	Mg/L	Quarterly	4	2	0	<0.0005	0.0006	0.0001	<0.0005	Cairns Regional Council
Forsayth	Reticulation	Manganese	Mg/L	Monthly	24	24	0	0.007	0.262	0.061	<0.0002	Cairns Regional

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
												Council
Forsayth	Reticulation	Nickel	Mg/L	Quarterly	4	1	0	<0.0005	0.0009	0.0002	<0.0005	Cairns Regional Council
Forsayth	Reticulation	Zinc	Mg/L	Quarterly	4	2	NA	<0.008	0.031	0.010	<0.008	Cairns Regional Council
Forsayth	Reticulation	Calcium	MG/L	Quarterly	4	4	NA	2.5	4.7	3.7	<0.20	Cairns Regional Council
Forsayth	Reticulation	Magnesium	Mg/L	Quarterly	4	4	NA	1.0	1.7	1.4	<0.10	Cairns Regional Council
Forsayth	Reticulation	Potassium	Mg/L	Quarterly	4	4	NA	2.4	5.6	3.6	<0.10	Cairns Regional Council
Forsayth	Reticulation	Sodium	Mg/L	Quarterly	4	4	NA	29	48	39	<1	Cairns Regional Council
Forsayth	Reticulation	Total Hardness	MgCaC03/L	Quarterly	4	4	NA	10	19	15	<1	Cairns regional Council
Forsayth	Reticulation	Salinity	Psu	Quarterly	4	4	NA	0.0899	0.147	0.116		Cairns Regional Council
Forsayth	Reticulation	Total Dissolved Solids	Mg/L	Quarterly	4	4	NA	110	190	145	<1	Cairns Regional Council
Forsayth	Reticulation	Electrical Conductance	Us/cm	Quarterly	4	4	NA	180	420	307	<1	Cairns Regional Council
Forsayth	Reticulation	Total Alkalinity	MgCaCO3/L	Quarterly	4	4	NA	34	52	41	<1	Cairns Regional Council
Forsayth	Reticulation	Fluoride	Mg/L	Quarterly	4	4	0	0.02	0.08	0.06	<0.02	Cairns Regional Council
Forsayth	Reticulation	Sulphate	Mg/L	Quarterly	4	4	0	42	64	51	<0.1	Cairns Regional Council
Forsayth	Reticulation	Chloride	Mg/L	Quarterly	4	4	NA	6.4	16	10.9	<0.01	Cairns Regional Council
Forsayth	Reticulation	Chlorate	Mg/L	Monthly	12	12	1	0.139	0.946	0.401	<0.005	Cairns Regional Council
Forsayth	Reticulation	Chlorite	Mg/L	Monthly	12	4	0	<0.005	0.022	0.0009	<0.005	Cairns Regional Council
Forsayth	Reticulation	Bromate	Mg/L	Monthly	12	0	0	<0.005	<0.005	<0.005	<0.005	Cairns Regional Council
Forsayth	Reticulation	Bromide	Mg/L	Monthly	12	4	NA	<0.005	0.012	0.003	<0.005	Cairns Regional Council
Forsayth	Reticulation	Giardia, protozoa	Mg/L	Annually	1	0	0	0	0	0		Cairns Regional Council
Forsayth	Reticulation	Organochlorine Pesticides	Ug/L	Annually	1	0	0	0	0	0		Cairns Regional Council
Forsayth	Reticulation	Microcystis aeruginosa	Cells/ML	Monthly	12	0	0	0	0	0		Cairns Regional Council
Forsayth	Reticulation	Cylindrospermopsis raciborskii	Cells/ML	Monthly	12	0	0	0	0	0		Cairns Regional Council
Forsayth	Reticulation	Dolichospermum circinale	Cells/ML	Monthly	12	0	0	0	0	0		Cairns Regional Council
Forsayth	Reticulation	Chrysosporum ovalisporum	Cells/ML	Monthly	12	0	0	0	0	0		Cairns Regional Council
Forsayth	Reticulation	Chloroform	Ug/L	Annually	4	3	0	<5	67	31	<5	Cairns Regional Council
Forsayth	Reticulation	Bromodichloromethane	Ug/L	Annually	4	2	0	<5	16	6	<5	Cairns Regional Council
Forsayth	Reticulation	Dibomochloromethane	Ug/L	Annually	4	0	0	<5	<5	<5	<5	Cairns Regional Council
Forsayth	Reticulation	Bromoform	Ug/L	Annually	4	0	0	<5	<5	<5	<5	Cairns Regional Council
Forsayth	Reticulation	Total Trihalomethanes	Ug/L	Annually	4	3	0	<5	83	37	<5	Cairns Regional Council

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Forsayth	Reticulation	E.coli	Cells/ML	Monthly	36	0	0	<1	<1	<1	<1	Cairns Regional Council
Forsayth	Reticulation	Total Coliforms	Cells/ML	Monthly	36	1	NA	<1	17		<1	Cairns Regional Council
Forsayth	Reticulation	HPC	Cells/ML	Monthly	36	1	NA	<10	20		<10	Cairns Regional Council
Forsayth	Reticulation	TOC	Cells/ML		8	8	N/A	1.5	6.6	3.5		Cairns Regional Council
Forsayth	Raw	Turbidity	Ntu	Daily	538	538	NA	.92	574.02	7.31		In House
Forsayth	Raw	True colour	Pt/Co	Twice a week	171	171	NA	0.82	487.00	120.65		In House
Forsayth	Raw	PH	PH units	Daily	363	363	NA	6.0	8.4	6.7		In House
Forsayth	Raw	Temperature	C	Daily	361	361	NA	19.4	38.4	26.5		In House
Forsayth	Raw	Aluminium	Mg/L	Monthly	12	12	NA	.240	6.77	2.513	<0.005	Cairns Regional Council
Forsayth	Raw	Silicon	Mg/L	Quarterly	4	4	NA	3.5	18.0	8.0	<0.10	Cairns Regional Council
Forsayth	Raw	Mercury	Ug/L	Quarterly	4	0	NA	<0.06	<0.06	<0.06	<0.06	Cairns Regional Council
Forsayth	Raw	Arsenic	Mg/L	Quarterly	4	4	NA	0.0003	0.0008	0.0006	<0.0001	Cairns Regional Council
Forsayth	Raw	Cadmium	Mg/L	Quarterly	4	0	NA	<0.0001	<0.0002	<0.0001	<0.0001	Cairns Regional Council
Forsayth	Raw	Chromium	Mg/L	Quarterly	4	2	NA	<0.0005	0.0011	0.0003	<0.0002	Cairns Regional Council
Forsayth	Raw	Copper	Mg/L	Quarterly	4	4	NA	0.002	0.042	0.006	<0.001	Cairns Regional Council
Forsayth	Raw	Iron	Mg/l	Monthly	12	12	NA	0.473	6.560	1.963	<0.01	Cairns Regional Council
Forsayth	Raw	Lead	Mg/L	Quarterly	4	2	NA	<0.0005	0.0025	0.0005	<0.0005	Cairns Regional Council
Forsayth	Raw	Manganese	Mg/L	Monthly	12	12	NA	0.019	.734	0.344	<0.0005	Cairns Regional Council
Forsayth	Raw	Nickel	Mg/L	Quarterly	4	3	NA	<0.001	0.0012	0.0006	<0.001	Cairns Regional Council
Forsayth	Raw	Zinc	Mg/L	Quarterly	4	2	NA	<0.008	0.046	0.014	<0.008	Cairns Regional Council
Forsayth	Raw	Calcium	MG/L	Quarterly	4	4	NA	1.1	4.8	3.3	<0.20	Cairns Regional Council
Forsayth	Raw	Magnesium	Mg/L	Quarterly	4	4	NA	1.1	1.8	1.5	<0.10	Cairns Regional Council
Forsayth	Raw	Potassium	Mg/L	Quarterly	4	4	NA	1.5	4.2	2.7	<0.10	Cairns Regional Council
Forsayth	Raw	Sodium	Mg/L	Quarterly	4	4	NA	7.6	19	12.3	<1	Cairns Regional Council
Forsayth	Raw	Total Hardness	MgCaC03/L	Quarterly	4	4	NA	12	29	18.5	<1	Cairns Regional Council
Forsayth	Raw	Salinity	Psu	Quarterly	4	4	NA	0.0351	0.0676	0.0489		Cairns Regional Council
Forsayth	Raw	Total Dissolved Solids	Mg/L	Quarterly	4	4	NA	53	110	81	<1	Cairns Regional Council
Forsayth	Raw	Electrical Conductance	Us/cm	Quarterly	4	4	NA	63	140	95	<1	Cairns Regional Council
Forsayth	Raw	Total Alkalinity	MgCaCO3/L	Quarterly	4	4	NA	29	50	37	<0.1	Cairns Regional Council
Forsayth	Raw	Fluoride	Mg/L	Quarterly	4	4	NA	0.11	0.36	0.22	<0.02	Cairns Regional Council
Forsayth	Raw	Sulphate	Mg/L	Quarterly	4	2	NA	<1	0.65	0.40	<1	Cairns Regional Council
Forsayth	Raw	Chloride	Mg/L	Quarterly	4	4	NA	2.8	11	6.3	<0.01	Cairns Regional Council

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Forsayth	Raw	Chlorate	Mg/L	Monthly	12	0	NA	<0.005	<0.005	<0.005	<0.005	Cairns Regional Council
Forsayth	Raw	Chlorite	Mg/L	Monthly	12	2	NA	<0.005	0.007	0.0006	<0.005	Cairns Regional Council
Forsayth	Raw	Bromate	Mg/L	Monthly	12	0	NA	<0.005	<0.005	<0.005	<0.005	Cairns Regional Council
Forsayth	Raw	Bromide	Mg/L	Monthly	12	12	NA	0.010	0.057	0.025	<0.025	Cairns Regional Council
Forsayth	Raw	Microcystis aeruginosa	Cells/ML	Monthly	12	1	NA	0	400	33		Cairns Regional Council
Forsayth	Raw	Cylindrospermopsis raciborskii	Cells/ML	Monthly	12	3	NA	0	9400	1378		Cairns Regional Council
Forsayth	Raw	Dolichospermum circinale	Cells/ML	Monthly	12	0	NA	0	0	0		Cairns Regional Council
Forsayth	Raw	Chrysosporum ovalisporum	Cells/ML	Monthly	12	0	NA	0	0	0		Cairns Regional Council
Forsayth	Raw	E.coli	Cells/ML	Monthly	12	11	NA	<1	70		<1	Cairns Regional Council
Forsayth	Raw	Total Coliforms	Cells/ML	Monthly	12	12	NA	110	>100000			Cairns Regional Council
Forsayth	Raw	HPC	Cells/ML	Monthly	12	12	NA	30	3300			Cairns Regional Council

Table - Reticulation *E. coli* verification monitoring

Georgetown	***2020***											
Month	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***June***	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***
No. of samples collected	5	5	5	5	5	5	5	5	5	5	5	5
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	60	60	60	60	60	60	60	60	60	60	60	60
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

Georgetown	*2021*											
Month	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***June***	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***
No. of samples collected	5	5	5	5	5	5	5	5	5	5	5	5
No. of samples collected in which *E. coli* is detected (i.e. a failure)	0	1	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	60	60	60	60	60	60	60	60	60	60	60	60
No. of failures for previous 12 month period	0	0	1	1	1	1	1	1	1	1	1	1
% of samples that comply	100.0%	98.3%	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

Forsayth	*2020*											
Month	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***June***	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***
No. of samples collected	3	3	3	3	3	3	3	3	3	3	3	
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	
No. of samples collected in previous 12 month period	36	36	36	36	36	36	36	36	36	36	36	
No. of failures for previous 12 month period	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 %	
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	

Forsayth	***2021***											
Month	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***June***	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***
No. of samples collected	5	5	5	5	5	5	5	5	5	5	5	5
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	60	60	60	60	60	60	60	60	60	60	60	60
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

Appendix B – Implementation of the DWQMP Risk Management Improvement Program

Table 2 – Progress against the risk management improvement program in the approved DWQMP

IP item	Action	Priority	Description Describe the deliverable and the scope	Original Target date/s	Progress	Target date/s	Responsibility
Determine & manage Chlorate levels in Georgetown & Forsayth & manage.	*5*	*Med*	*Sample for chlorate more often (at least twice yearly). Monitor and develop options to manage chlorate production.*	*End 2015*	*We have added testing for chlorate to our schedule on a monthly basis.* We *aim to turn hypo stock over within 2 to 4 weeks or less. We have talked with our chemical supplier about the importance of supplying fresh product and test the strength on arrival.* *We mix our hypo with demineralised water on arrival. We make our own demineralised water for this.* *We have built an air-conditioned room to store our chlorine supplies.* *We regularly clean our chlorine storage containers.* *We have talked to our freight company about issues while transporting and storing the hypo.* *We have upgraded the Forsayth Water Treatment Plant and now use pot perm instead of hypo for aeration and have also improved turbidity levels.* *We have engaged consultants to design an upgrade for the Georgetown Water Treatment plant and have applied for a grant to do upgrades* *. We have been working with the health department and have agreed to set a chlorate guideline in our DWQMP of*	*Complete /ongoing*	*Town & Water manager, Water Treatment Supervisor, Council*

IP item	Action	Priority	Description Describe the deliverable and the scope	Original Target date/s	Progress	Target date/s	Responsibility
					.8mg/L. *We have made great improvements over the past few years and are monitoring.*		
Loss of Forsayth water supply from structural failure at Big Reef Dam.	*7*	*Med*	*Investigate water sourcing options or dam repairs/improvements.*	*End 2024*	*We have built a new Dam and expect to be using the new water source within 2022*	*2022*	*Council*
Ongoing siltation & weed management at Big Reef Dam	*8*	*High*	*Investigate resolving ongoing siltation and weed management problems at Big Reef Dam.*	*2020*	*We have built a new Dam and expect to be using the new water source within 2022*	*2022*	*Council*
Loss of water supply through inadequate wet season	*9*	*High*	*Investigate water sourcing options for supply security for Georgetown & Forsayth*	*2020*	*We have built a new Dam and expect to be using the new water source within 2022. Pipelines have been installed to Georgetown & Forsayth.*	*2022*	*Council*
Scada	*12*	*Med*	*Investigate scada computer system specifically chlorine alarms*	*End 2014*	*We now have a system in the Georgetown Reservoirs which circulates the water, senses the chlorine levels and adds chlorine if needed.* *We have started a scada system at Georgetown, which allows us to monitor reservoir levels and activate pumps. We are in the process of upgrades to monitor cl2, ph & turbidity levels entering the reservoirs remotely.* *We have upgraded the computer system within our upgrade at the Forsayth Treatment plant. We can now view this from Georgetown or a tablet. We are in the process of adding to our existing scada and will be able to remotely view reservoir levels, chlorine levels ect.* *We plan to budget to keep updating our scada*	*2023/on going upgrades*	*Town & Water Manager, Water Treatment Supervisor, Council*
Water mains	*13*	*Low*	*Investigate capital works projects to replace 80mm AC with PVC & extend mains with PVC to complete*	*2023*	*We have performed capital works jobs each year and eliminated some dead*	*2025*	*Town & Water Manager, Engineer,*

IP item	Action	Priority	Description Describe the deliverable and the scope	Original Target date/s	Progress	Target date/s	Responsibility
			circuits.		*ends. This is ongoing at this stage.*		*Council*