## DRINKING WATER QUALITY MANAGEMENT PLAN 2021/2022 REPORT

Service Provider Identification Number	SP485
Name	Gympie Regional Council
Address	2 Caledonian Hill
	Gympie QLD 4570
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Website	www.gympie.qld.gov.au
Local Government Area covered by this plan	Gympie Regional Council
Water Supply Schemes covered by this plan	Amamoor, Cooloola Cove, Goomeri, Gympie, Imbil, Kandanga, Kilkivan and Rainbow Beach







Revision	<b>Revision Date</b>	Details	Authorised
	16/12/2022	Draft	Rhonda Otto
1.0	16/12/2022	Approved	Peter Chandler



## About this report

The Gympie Regional Council 2021/22 Drinking Water Quality Management Plan (DWQMP) Report provides an overview of our operational performance with respect to drinking water quality, and shows how we have been implementing key improvement actions detailed in our approved DWQMP.

This report provides our customers with information about the quality of their drinking water.

This report also informs the regulator on how we complied with our DWQMP and its approval conditions. It also allows us to meet our legislative obligations under the *Water Supply (Safety and Reliability) Act 2008*.

## Audience

This report aims to communicate comprehensive information to satisfy the needs of individuals and groups who are affected by, or have an interest in, our activities, including:

- our customers
- the communities we serve
- current and future employees
- government agencies
- other Local Councils and utilities
- business and industry.

## **Reporting requirements**

Under the *Water Supply (Safety and Reliability) Act 2008*, water service providers must prepare a DWQMP Report each financial year. This report must include:

- the actions taken by Gympie Regional Council to implement its DWQMP
- the outcome of any DWQMP Review undertaken
- a summary of DWQMP audit findings and recommendations
- details of any water quality incidents
- details of Gympie Regional Council's compliance with drinking water quality criteria
- details of any customer complaints related to water quality.



## Tell us what you think

A copy of this DWQMP report is available to view on Council's website and for inspection by the public during office hours on business days. A copy of the report is also available for purchase at a reasonable cost.

If you would like to provide feedback on this report, please contact us via:

## Website

www.gympie.qld.gov.au

## **Head office**

2 Caledonian Hill Gympie QLD 4570 (Monday to Friday 8.30am – 4.30pm)

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## Chapter 1: About us

## What we do

Gympie Regional Council is responsible for delivering drinking water, recycled water and sewerage services to approximately 35,908 customers in the Gympie Region.

Our 6,898km<sup>2</sup> geographical area includes the towns of Amamoor, Cooloola Cove, Tin Can Bay, Goomeri, Gympie, Imbil, Kandanga, Kilkivan and Rainbow Beach.

We provide water services through the management of an extensive network, including:

- 8 water treatment plants
- 19 reservoirs
- 6 pump stations
- 455 kilometres of pipeline.

## Our strategic framework

#### Our purpose

To be a sustainable regional water business, providing reliable and value for money water and sewerage services.



#### **Our Corporate Values**

#### Consistent:

our actions will reflect Council's guidelines and practices at all times.

## Accountable:

we take responsibility for our actions, we will be accessible and fair.

## CORPORATE VALUES

### Appreciative:

we value the opportunities we have, and look for the best in our people, our organisation and our community.

**Respectful:** we treat people with dignity, courtesy and respect. We recognise and support everyone's contributions. **Communicative:** we will keep people informed, consult with the community and will actively listen to and respond to their input.

#### **Key Strategic Themes**

Council's activities aimed toward achieving its vision for the future of the local government area are focused into the following five key strategic themes.

## OUR INFRASTRUCTURE is well planned, integrated and safe.

#### **OUR COMMUNITY**

is active, diverse, creative and engaged.

#### **OUR ECONOMY**

is dynamic, productive and resilient.

## **OUR ENVIRONMENT**

is sustainable, well-managed and accessible.

#### **OUR ORGANISATION**

is accountable, responsive, efficient and innovative.



## Chapter 2: Our service area



## Our network

We supply around 3,860 megalitres of drinking water to approximately 14,728 residential and commercial properties. Drinking water is delivered to our customers via 8 separate network water supply schemes as listed below:

- Amamoor
- Cooloola Cove/Tin Can Bay
- Goomeri
- Gympie
- Imbil
- Kandanga
- Kilkivan
- Rainbow Beach.

The schemes begin at raw water source (surface and groundwater) and include water treatment, water storage, trunk and distribution pipe networks, pumps, chlorination systems and water meters. Gympie is the largest scheme, supplying 65 per cent of the customers.



## Amamoor

Amamoor water supply is sourced from Amamoor Creek. This scheme includes:

- surface water source and infrastructure
- water treatment
- chlorine disinfection
- operation and management
- water distribution.

## Cooloola Cove/Tin Can Bay

Cooloola Cove/Tin Can Bay water supply is sourced from Teewah Creek. This scheme includes:

- surface water source and infrastructure
- water treatment
- chlorine disinfection and fluoridation
- operation and management
- water distribution.

## Goomeri

Goomeri water supply is sourced from a combination of artesian bores and an off stream storage off Kimbombi Creek. This scheme includes:

- bores, surface water source and infrastructure
- water treatment
- chlorine disinfection and ozone treatment
- operation and management
- water distribution.

## Gympie

The Mary River is the sole source of supply for the Gympie scheme, and Gympie Regional Council holds a high priority allocation of 3464ML per annum from this source. Seqwater controls releases from Borumba Dam which feeds into the Mary River via Yabba Creek.



This scheme includes:

- shared bulk water sources and infrastructure
- water treatment
- chlorine disinfection and fluoridation
- operation and management
- water distribution.

## Imbil

Imbil water supply is sourced from Yabba Creek which is fed from Borumba Dam. This scheme includes:

- surface water source and infrastructure
- water treatment
- chlorine disinfection and UV treatment
- operation and management
- water distribution.

## Kandanga

Kandanga water supply is sourced from Kandanga Creek. This scheme includes:

- surface water source and infrastructure
- water treatment
- chlorine disinfection
- operation and management
- water distribution.

## Kilkivan

Kilkivan water supply is sourced from artesian bores. This scheme includes:

- bores and infrastructure
- water treatment
- chlorine disinfection and ozone treatment
- operation and management
- water distribution.



## **Rainbow Beach**

Rainbow Beach water supply is sourced from bores drawing sub artesian water from the Cooloola Sand mass. This scheme includes:

- bores and infrastructure
- water treatment
- chlorine disinfection
- operation and management
- water distribution.



## Chapter 3: Drinking water quality performance

## Legislative requirements

The supply of safe and reliable drinking water in Queensland is regulated by various state legislation, including the *Water Supply (Safety and Reliability) Act 2008* and the *Public Health Act 2005*.

Under the *Water Supply (Safety and Reliability) Act 2008*, a drinking water service provider may only carry out a registered drinking water service in accordance with an approved Drinking Water Quality Management Plan (DWQMP).

Under the *Public Health Act 2005*, Queensland Health has regulated the standards for drinking water quality related to *E. coli* and fluoride. These standards, together with the health guideline levels in the 'Australian Drinking Water Guidelines 2011' – updated March 2021 (ADWG), have been incorporated under the *Water Supply (Safety and Reliability) Act 2008* as water quality criteria for drinking water in Queensland.

## Water quality performance summary

For the 2021/22 reporting period, Gympie Regional Council met the prescribed microbiological standards for all eight drinking water schemes.

Table 1 summarises how our drinking water schemes performed over 1 July 2021 to 30 June 2022, against each category of water quality performance:

Water Quality Performance		
Scheme	Microbiological	Chemical
Amamoor	$\checkmark$	×
Cooloola Cove/Tin Can Bay	$\checkmark$	$\checkmark$
Goomeri	$\checkmark$	$\checkmark$
Gympie	$\checkmark$	$\checkmark$
Imbil	$\checkmark$	×
Kandanga	$\checkmark$	×
Kilkivan	$\checkmark$	$\checkmark$
Rainbow Beach	$\checkmark$	$\checkmark$

Table 1: Drinking water performance summary: 1 July 2021 – 30 June 2022



## Verification monitoring program

To verify that we deliver safe drinking water, Council's Environmental Health Department collects samples from the respective networks and sends the samples to a National Association of Testing Authorities (NATA) accredited laboratory for water analyses. These samples are collected from 31 dedicated sample points across the service region. The water quality data is reviewed and compared against prescribed requirements in the legislation and the ADWG.

As part of our commitment to continuous improvement we are revising the location of the sample points in the network and installing new sample taps with dedicated service lines.

## Microbiological assessment (E. coli)

Over 2021/22 eight drinking water schemes achieved 100 per cent compliance with legislative *E. coli* requirements. The standard for drinking water in Queensland requires no detection of E. coli in 98 per cent of samples collected over a 12 month period. The minimum number of samples required to be taken is detailed in the *Queensland Public Health Regulation 2005 Schedule 3A*.

*E. coli* water quality compliance details are provided in Appendix A, including the month-bymonth performance.

## Health-related chemical assessment

We use a risk management approach to drinking water quality which allows us to identify the substances that may pose a risk to public health. The verification monitoring program analyses these substances which are continuously assessed against ADWG health-related limits and operational control triggers.

Five of the eight water schemes complied with all of the health-related chemical limit values defined in the ADWG. The exceptions were the below levels of trihalomethanes (THMs):

Water supply	Date	THMs (mg/L) range
Amamoor	18 November 2021 – 9 March 2022	260 - 390
Imbil	24 November 2021 – 24 February 2022	260 - 280
Kandanga	28 October 2021 – 15 February 2022	270 - 350

Health assessment water quality compliance details are provided in Appendix B.



## Aesthetic assessment

Our routine verification monitoring program is important for us to verify that we provide safe drinking water to our customers. We take advantage of the program to continuously assess non-health related parameters which contribute to the way our water tastes, smells and appears. We aim to meet the ADWG aesthetic guidelines where possible, however providing safe drinking water is our overriding priority.



## Chapter 4: Notifying the regulator

Under sections 102 and 102A of the *Water Supply (Safety and Reliability) Act 2008*, Gympie Regional Council is required to immediately inform the Regulator if the quality of water supplied from its drinking water service does not comply with the water quality criteria as specified in the ADWG.

In the event that Gympie Regional Council becomes aware of a reportable incident, we notify the Regulator within the required timeframe.

On detection of a water quality issue, Council will:

- initiate further sampling in the affected zone
- undertake a comprehensive investigation to determine the factors that may have attributed to the event, and
- initiate responsive corrective actions e.g. flushing of water mains.

## **Reportable events**

For the 2021/2022 year the reportable events were

- THM exceedances in Amamoor water scheme between 18 November 2021 and 9 March 2022 with range of 260 to 390 μg/L;
- THM exceedance in Imbil water scheme on 24 November 2021 to 24 February 2022 with range of 260 to 280 µg/L;
- THM exceedance in Kandanga water scheme between 28 October 2021 and 15 February 2022 with values ranging from 270 and 350 µg/L;
- 26 February 2022 Power supply to the Gympie Water Treatment Plant was disconnected by Energex as floodwaters were too close to 11kV lines. Power was restored to Treatment Plant on 28 February 2022.
- Fluoride non-operation at Gympie Water Treatment Plant on 3 March 2022
- Flooding from 25 February 2022 prevented access to Kandanga Township and the Water Treatment Plant was not operational due to remote SCADA access issue. Operators accessed the Treatment Plant on 28 February but due to raw water quality it was deemed untreatable and tankering was commenced 1 March 2022.
- 25 February 2022 the Imbil Water Treatment Plant was not operational due to a remote SCADA access issue and flooding of access roads preventing site attendance.
- Raw Water pipeline for Imbil Water Supply ruptured on 25 June 2022 rendering the Water Treatment Plant inoperable.

Drinking Water Quality Management Report 2021/2022



## Chapter 5: Managing water safety

Gympie Regional Council is committed to providing safe, reliable drinking water from source to our customers' tap. We ensure a consistent and reliable supply of high quality and safe drinking water to our customers through a risk management and robust planning approach.

## **Drinking Water Quality Management Plan**

Gympie Regional Council operates with an approved DWQMP that is reviewed every two years.

A scheduled review was carried out in the second half of 2021. This incorporated changes made in the schemes over the previous period and addressed outcomes from the regular audit undertaken earlier in 2021.

A DWQMP amendment was submitted to the Regulator in December 2021. Further information supporting the amendment to address an Information Requirement Notice was submitted in June 2022. The updated DWQMP was approved on 13 September 2022.

The next review is required to be carried out by 4 September 2023.

## Risk management approach

The approved DWQMP follows industry best practice in that all water quality hazards have been identified, risk assessed, and where necessary, improvements have been committed to.

An update on actions included within the risk management improvement plan is given in Chapter 7.

## Drinking Water Quality Management Plan audit

As required by the *Water Supply (Safety and Reliability) Act 2008*, Gympie Regional Council is operating its drinking water service under an approved DWQMP. Northern Water Management Pty Ltd conducted the second regular audit of Gympie Regional Council's approved DWQMP during the last reporting period (February and March 2021).

The scope of the audit was in accordance with DRDMW's *Drinking Water Quality Management Plan Review and Audit Guideline 2019.* 

The audit outcomes were addressed in the 2021 review of the DWQMP.

The next audit is required to be carried out by 30 June 2025.



# Chapter 6: Managing the customer's water quality experience

## **Customer Service Standards**

Gympie Regional Council operates with an approved Customer Services Standards, the latest version was compiled in December 2019, and is reviewed every five years.

## Water Quality Complaints

Gympie Regional Council receives various water quality enquiries throughout the year. When a customer is dissatisfied with the efforts of Gympie Regional Council to address a water quality issue and remedial action is required, these enquiries are classified as 'water quality complaints'.

Water quality complaints are captured, recorded and monitored to help identify any trends and possible areas of improvement in the operation, maintenance and management of the Gympie Regional Council water supply network.

There were no water quality complaints were received during 2021/22.



# Chapter 7: Risk management improvement program update

The risk management improvement program (RMIP) during this reporting period was the version included with the DWQMP approved in 2020.

A review of our risk RMIP was conducted in December 2021. This updated RMIP was incorporated into the DWQMP approved in 2022, subsequent to this reporting year.

The below dot points and Tables 18 to 26 (Appendix C) outline the progress against this RMIP.

Significant projects undertaken within this year include:

- Goomeri WTP a new ultraviolet disinfection system has been installed to give an improved disinfection outcome.
- Scheme control systems (SCADA) program the upgrade of water outstations in Gympie (mainly reservoir sites) to new control systems monitored by the newer SCADA system.
- Scheme control systems (SCADA) program development of design for additional monitoring instrumentation at reservoir sites for re-release to market in 2022/23.

Another significant project carried out during the year which was identified within the updated RMIP is:

• Gympie WTP – replacement of the flocculation paddles within the coagulation tank



## Glossary

<	Less than.
>	Greater than.
ADWG	Australian Drinking Water Guidelines 2011 – updated November 2018 published by the National Health and Medical Research Council of Australia.
Bulk Water	The treated water supplied from the Queensland Bulk Water Authority (Seqwater) to distributor retailers, including Gympie Regional Council.
cfu/100mL	Colony Forming Units per 100 millilitres.
DNRME	Department of Natural Resources Mines and Energy (Queensland Government).
DRDMW	Department of Regional Development Manufacturing and Water (Queensland Government)
Disinfectant	An agent that destroys or inhibits the activity of microorganisms which cause disease. Gympie Regional Council uses chlorine.
DWQMP	Drinking Water Quality Management Plan as required under the <i>Water Supply (Safety and Reliability) Act 2008.</i>
E. coli	<i>Escherichia coli</i> , a bacterium whose presence in water indicates that the water may be contaminated by faecal matter and therefore there is the potential to cause illness when people drink the water.
km	Kilometre, which is 1,000 metres.
Megalitre (ML)	One million litres.
mg/L	Milligrams per litre.
MPN/100mL	Most Probable Number per 100 millilitres.
Network	An arrangement or system of pipes, pumps and reservoirs used for distributing water.
NTU	Nephelometric Turbidity Unit- a measure of turbidity which is the



	cloudiness or haziness of water caused by particles that are generally invisible to the naked eye. The measurement of turbidity is a key test of water quality.
Reservoir	A water tower or tank used for the storage of treated water within the water distribution system.
QFSS	Queensland Forensic and Scientific Services, Health Support Queensland.
Scheme	The system distributing drinking water to customers.
Seqwater	Queensland Bulk Water Supply Authority, trading as Seqwater. The bulk drinking water provider for Gympie Regional Council.
SCADA	Supervisory Control and Data Acquisition, which are computer-based control systems for water facilities including WTPs.
Stakeholder	All those who are either affected by or who can affect the activities of an organisation, namely customers, governments, regulators, the media, non-government organisations, local residents and employees.
The Regulator	The Chief Executive of Department of Regional Development Manufacturing and Water (DRDMW); previously Department of Natural Resources Mines and Energy (DNRME).
THMs	Total Trihalomethanes – a group of disinfection by-products that generally form when chlorine is used to disinfect drinking water.
WTP	Water Treatment Plant.



## Appendices



## Appendix A: Water quality compliance – E. coli

Overall						
Scheme	Number of samples required	Actual number of samples	Number of samples <i>E.coli</i> detected	Required performance %	Actual performance %	<i>E. coli</i> Compliant
Amamoor	12	24	0	98	100	✓
Cooloola Cove/Tin Can Bay	60	109	0	98	100	✓
Goomeri	12	24	0	98	100	√
Gympie	96	129	0	98	100	√
Imbil	12	24	0	98	100	✓
Kandanga	12	24	0	98	100	✓
Kilkivan	12	24	0	98	100	✓
Rainbow Beach	60	97	0	98	100	✓

The *Public Health Regulation 2005* (the regulation) requires that 98 per cent of samples taken in a 12-month period should contain no *E. Coli*. This requirement is referred to as the 'annual value' in Schedule 3A of the regulation.



Driffking water scheme.	Amame											
Year	2021-2022											
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
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	24	24	24	24	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

#### **Drinking water scheme:** Amamoor



		-										
Year	2021-2022											
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	9	9	8	9	9	9	9	9	10	9	10	9
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	106	106	105	106	106	106	105	107	108	108	109	109
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

## **Drinking water scheme:** Cooloola Cove/Tin Can Bay



Brinking water scheme.	doome											
Year	2021-2022											
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
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	24	24	24	24	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

## Drinking water scheme: Goomeri



Year		2021-2022										
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	11	10	10	11	10	10	11	10	14	10	12	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	122	121	121	123	122	122	122	124	128	127	129	129
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

## **Drinking water scheme:** Gympie



Year						2021-	2022					
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
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	24	24	24	24	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											

## Drinking water scheme: Imbil



Drinking water scheme:	Kanuang	Ja										
Year						2021-	-2022					
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
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	24	24	24	24	24	24	24	24	24	24	24	24
No. of failures for previous 12												
month period	1	1	1	1	1	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

## Drinking water scheme: Kandanga



Year						202	1-22					
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
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	24	24	24	24	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											

## Drinking water scheme: Kilkivan



## Drinking water scheme: Rainbow Beach

Year						2010-	-2022					
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
No. of samples collected	8	8	8	8	8	8	8	8	9	8	9	7
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	92	92	92	92	92	94	94	96	97	97	98	97
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											



Appendix B: Water quality compliance – Health Assessment



#### Table 1 - Amamoor Water Analysis

Parameter	Scheme	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated		D	352	352	0	1.00	4.90	2.80	0.01	WTP
	Reticulation		М	24	24	0	0.10	2.36	1.07		QFSS
Total	Raw	ug/L	-	-	-	-	-	-	-	-	-
Trihalomethanes	Treated		-	-	-	-	-	-	-	-	-
	Reticulation		М	79	79	14	84	390	170		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated		-	-	-	-	-	-	-	-	-
	Reticulation		М	24	24	0	0	0	0		QFSS
рН	Raw		HY	2	2	0	6.89	7.47	7.18		QFSS
	Treated		W	37	37	0	7.20	7.80	7.50		WTP
	Reticulation		HY	2	2	0	7.12	7.57	7.35		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	2	2	0	70	83	77		QFSS
	Treated		М	23	23	0	90	192	170	1	WTP
	Reticulation		HY	2	2	0	77	99	88		QFSS
Temporary	Raw	mgCaCO₃/L	HY	2	2	0	67	73	70		QFSS
Hardness	Treated		HY	2	2	0	71	75	73		QFSS
	Reticulation		HY	2	2	0	73	89	81		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	2	2	0	67	73	70		QFSS
	Treated		HY	2	2	0	71	75	73		QFSS
	Reticulation		HY	2	2	0	73	89	81		QFSS
Residual Alkalinity	Raw	meq/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Silica	Raw	mg/L	HY	2	2	0	25	28	27		QFSS
	Treated		HY	2	2	0	24	25	25		QFSS
	Reticulation		HY	2	2	0	25	26	26		QFSS
Total Dissolved Ions	Raw	mg/L	HY	2	2	0	141	157	149		QFSS
	Treated		HY	2	2	0	168	181	175		QFSS
	Reticulation		HY	2	2	0	176	210	193		QFSS
Total Dissolved	Raw	mg/L	HY	2	2	0	130	140	135		QFSS
Solids	Treated		HY	2	2	0	150	160	155		QFSS



	Reticulation		HY	2	2	0	160	180	170		QFSS
True Colour	Raw	Hazen	HY	2	2	0	75	96	86		QFSS
	Treated		W	63	63	0	1	10	1	1	WTP
	Reticulation		HY	2	2	0	<8	<8	<8		QFSS
Turbidity	Raw	NTU	HY	2	2	0	21	83	52		QFSS
	Treated		W	64	64	0	0.01	0.27	0.04	0.001	WTP
	Reticulation		HY	2	2	0	<1	<1	<1		QFSS
pH Saturation	Raw		HY	2	2	0	8.7	8.7	8.7		QFSS
	Treated		HY	2	2	0	8.7	8.7	8.7		QFSS
	Reticulation		HY	2	2	0	8.5	8.6	8.6		QFSS
Saturation Index	Raw		HY	2	2	0	-1.8	-1.2	-1.5		QFSS
	Treated		HY	2	2	0	-1.7	-1.3	-1.5		QFSS
	Reticulation		HY	2	2	0	-1.5	-0.9	-1.2		QFSS
Mole Ratio	Raw		HY	2	2	0	2.4	3.0	2.7		QFSS
	Treated		HY	2	2	0	2.7	3.1	2.9		QFSS
	Reticulation		HY	2	2	0	2.5	2.9	2.7		QFSS
Sodium	Raw	mg/L	HY	2	2	0	12	14	13		QFSS
	Treated		HY	2	2	0	21	23	22		QFSS
	Reticulation		HY	2	2	0	22	25	24		QFSS
Potassium	Raw	mg/L	HY	2	2	0	1.2	1.3	1.3		QFSS
	Treated		HY	2	2	0	1.1	1.4	1.3		QFSS
	Reticulation		HY	2	2	0	1.2	1.3	1.3		QFSS
Calcium	Raw	mg/L	HY	2	2	0	8	8	8		QFSS
	Treated		HY	2	2	0	8	9	9		QFSS
	Reticulation		HY	2	2	0	9	11	10		QFSS
Magnesium	Raw	mg/L	HY	2	2	0	12	15	14		QFSS
	Treated		HY	2	2	0	13	15	14		QFSS
	Reticulation		HY	2	2	0	13	17	15		QFSS
Hydrogen	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Bicarbonate	Raw	mg/L	HY	2	2	0	81	89	85		QFSS
	Treated		HY	2	2	0	86	91	89		QFSS
	Reticulation		HY	2	2	0	89	108	99		QFSS
Carbonate	Raw	mg/L	HY	2	2	0	0.0	0.1	0.1		QFSS
	Treated		HY	2	2	0	0.0	0.1	0.1		QFSS
	Reticulation		HY	2	2	0	0.1	0.2	0.2		QFSS
Hydroxide	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS



	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Chloride	Raw	mg/L	HY	2	2	0	19	22	21		QFSS
	Treated		HY	2	2	0	31	34	33		QFSS
	Reticulation		HY	2	2	0	33	40	37		QFSS
Fluoride	Raw	mg/L	HY	2	2	0	0.05	0.05	0.05		QFSS
	Treated		HY	2	2	0	0.05	0.05	0.05		QFSS
	Reticulation		HY	2	2	0	0.06	0.06	0.06		QFSS
Nitrate	Raw	mg/L	HY	2	2	0	0.34	1.00	0.67		QFSS
	Treated		HY	2	2	0	0.30	0.92	0.61		QFSS
	Reticulation		HY	2	2	0	0.23	1.20	0.72		QFSS
Sulphate	Raw	mg/L	HY	2	2	0	6.1	6.8	6.5		QFSS
	Treated		HY	2	2	0	6.6	7.0	6.8		QFSS
	Reticulation		HY	2	2	0	7.1	7.3	7.2		QFSS
Iron	Raw	mg/L	HY	2	2	0	0.31	0.61	0.46		QFSS
	Treated		М	23	23	0	0.001	0.031	0.002	0.001	WTP
	Reticulation		HY	2	2	0	<0.01	< 0.01	<0.01		QFSS
Manganese	Raw	mg/L	HY	2	2	0	0.004	0.005	0.005		QFSS
	Treated		М	23	23	0	0.010	0.200	0.100	0.001	WTP
	Reticulation		HY	2	2	0	0.001	0.002	0.002		QFSS
Zinc	Raw	mg/L	HY	2	2	0	<0.06	< 0.06	< 0.06		QFSS
	Treated		HY	2	2	0	<0.06	< 0.06	<0.06		QFSS
	Reticulation		HY	2	2	0	<0.06	< 0.06	<0.06		QFSS
Aluminium	Raw	mg/L	HY	2	2	0	0.29	0.78	0.54		QFSS
	Treated		М	23	23	0	0.001	0.077	0.007	0.001	WTP
	Reticulation		HY	2	2	0	< 0.03	< 0.03	< 0.03		QFSS
Boron	Raw	mg/L	HY	2	2	0	0.03	0.04	0.04		QFSS
	Treated		HY	2	2	0	0.03	0.04	0.04		QFSS
	Reticulation		HY	2	2	0	0.03	0.04	0.04		QFSS
Copper	Raw	mg/L	HY	2	2	0	0.003	0.004	0.004		QFSS
	Treated		HY	2	2	0	0.013	0.077	0.045		QFSS
	Reticulation		HY	2	2	0	0.010	0.029	0.020		QFSS
Annual Aluminium	Raw	mg/L	Y	1	1	0	1.1	1.1	1.1		QFSS
Metals	Treated		Y	1	1	0	0.17	0.17	0.17		QFSS
	Reticulation		Y	1	1	0	0.64	0.64	0.64		QFSS
Annual Arsenic	Raw	mg/L	Y	1	1	0	0.0017	0.0017	0.0017		QFSS
Metals	Treated		Y	1	1	0	0.0006	0.0006	0.0006		QFSS
	Reticulation		Y	1	1	0	0.0005	0.0005	0.0005		QFSS



en al displacement											
Annual Cadmium	Raw	mg/L	Y	1	1	0	<0.0001	<0.0001	<0.0001	Q	<b></b> ¥FSS
Metals	Treated		Y	1	1	0	<0.0001	<0.0001	<0.0001	Q	<b></b> ↓FSS
	Reticulation		Y	1	1	0	<0.0001	<0.0001	<0.0001	Q	<b></b> ĮFSS
Annual Chromium	Raw	mg/L	Y	1	1	0	0.0069	0.0069	0.0069	Q	<b></b> ↓FSS
Metals	Treated		Y	1	1	0	0.001	0.001	0.001	Q	<b></b> ↓FSS
	Reticulation		Y	1	1	0	0.0007	0.0007	0.0007	Q	<b></b> ↓FSS
Annual Copper	Raw	mg/L	Y	1	1	0	0.006	0.006	0.006	Q	<b></b> ĮFSS
Metals	Treated		Y	1	1	0	0.082	0.082	0.082	Q	<b></b> ↓FSS
	Reticulation		Y	1	1	0	0.011	0.011	0.011	Q	<b></b> ĮFSS
Annual Iron Metals	Raw	mg/L	Y	1	1	0	1.7	1.7	1.7	Q	<b></b> ↓FSS
	Treated		Y	1	1	0	0.075	0.075	0.075	Q	<b></b> ĮFSS
	Reticulation		Y	1	1	0	0.025	0.025	0.025	Q	<b></b> ↓FSS
Annual Lead Metals	Raw	mg/L	Y	1	1	0	0.0016	0.0016	0.0016	Q	<b></b> ĮFSS
	Treated		Y	1	1	0	0.0009	0.00009	0.0009	Q	<b></b> ĮFSS
	Reticulation		Y	1	1	0	0.0006	0.0006	0.0006	Q	<b></b> ↓FSS
Annual Manganese	Raw	mg/L	Y	1	1	0	0.24	0.24	0.24	Q	<b></b> ĮFSS
Metals	Treated		Y	1	1	0	0.0038	0.0038	0.0038	Q	<b></b> ↓FSS
	Reticulation		Y	1	1	0	0.0036	0.0036	0.0036	Q	<b></b> ↓FSS
Annual Nickel	Raw	mg/L	Y	1	1	0	0.03	0.03	0.03	Q	<b></b> ĮFSS
Metals	Treated		Y	1	1	0	0.0039	0.0039	0.0039	Q	<b></b> ↓FSS
	Reticulation		Y	1	1	0	0.0014	0.0014	0.0014	Q	<b></b> ĮFSS
Annual Zinc Metals	Raw	mg/L	Y	1	1	0	0.01	0.01	0.01	Q	<b></b> ĮFSS
	Treated		Y	1	1	0	0.02	0.02	0.02	Q	<b></b> ¥FSS
	Reticulation		Y	1	1	0	0.008	0.008	0.008	Q	<b>⊋FSS</b>

NOTE: QFSS Limit of Reporting not provided to Gympie Regional Council.



### Table 2 – Cooloola Cove/Tin Can Bay Water Analysis

Parameter	Scheme	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated	-	D	365	365	0	1.88	3.48	2.88	0.01	WTP
	Reticulation	-	W	97	97	0	0.08	2.05	1.47		QFSS
Total	Raw	ug/L	-	-	-	-	-	-	-	-	-
Trihalomethanes	Treated	-	-	-	-	-	-	-	-	-	-
	Reticulation	-	М	22	22	0	0.84	97	58		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated		М	12	12	0	0	0	0		QFSS
	Reticulation		W	97	97	0	0	0	0		QFSS
рН	Raw		HY	2	2	0	4.54	4.71	4.63		QFSS
	Treated		D	365	365	0	6.90	7.40	7.10	1	WTP
	Reticulation		HY	4	4	0	6.92	7.17	7.12		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	2	2	0	5	8	6		QFSS
	Treated		М	12	12	0	6	30	8	1	WTP
	Reticulation		HY	4	4	0	7	12	10		QFSS
Temporary	Raw	mgCaCO₃/L	HY	2	2	0	0	1	1		QFSS
Hardness	Treated		HY	2	2	0	5	8	6		QFSS
	Reticulation		HY	4	4	0	7	12	10		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	2	2	0	<1	1	1		QFSS
	Treated		М	12	12	0	28	54	36	1	WTP
	Reticulation		HY	4	4	0	28	42	34		QFSS
Residual Alkalinity	Raw	meq/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.40	0.80	0.60		QFSS
	Reticulation		HY	4	4	0	0.30	0.70	0.50		QFSS
Silica	Raw	mg/L	HY	2	2	0	3	5	4		QFSS
	Treated		HY	2	2	0	3	5	4		QFSS
	Reticulation		HY	4	4	0	3	6	5		QFSS
Total Dissolved Ions	Raw	mg/L	HY	2	2	0	23	42	33		QFSS
	Treated		HY	2	2	0	194	246	220		QFSS
	Reticulation		HY	4	4	0	163	229	199		QFSS
Total Dissolved	Raw	mg/L	HY	2	2	0	25	46	36		QFSS


<table-container>          Intend         Intend         Int         Int</table-container>												
<table-container>          Image         <t< td=""><td>Solids</td><td>Treated</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>180</td><td>220</td><td>200</td><td></td><td>QFSS</td></t<></table-container>	Solids	Treated		HY	2	2	0	180	220	200		QFSS
<table-container>          Impercise         Ray         Ray         Happen         P         2         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         1         1         1         1         0        0    &lt;</table-container>		Reticulation		HY	4	4	0	150	210	180		QFSS
<table-container>          Interior         Interior</table-container>	True Colour	Raw	Hazen	HY	2	2	0	240	280	260		QFSS
<table-container>          Return         Return         Return         Return         M</table-container>		Treated		D	365	365	0	1	1	1	1	WTP
<table-container>          Turbidity Tratical of Refutation         Rav (P)         NTU (P)         Rav (P)         &lt;</table-container>		Reticulation		HY	4	4	0	<8	<8	<8		QFSS
<table-container>          Trand Return         Trans         D         360         360         0.001         0.360         0.0350         0.001         VTP           PH Saturation         Raw         HY         4         4         0         &lt;1</table-container>	Turbidity	Raw	NTU	HY	2	2	0	1	4	3		QFSS
ReticulationReticulationHY440<1<1<1<1QFSSPB SturationRawHW2201114111411140QFSSReticulationReticulationHW2201100101010110QFSSSaturation IndeTreatedHW2206.686.676.680QFSSMole RatioTreatedHW2206.647.006.630QFSSMole RatioTreatedHW2206.647.006.670QFSSMole RatioTreatedHY2206.647.006.670QFSSMole RatioTreatedHY2206.647.006.70QFSSMole RatioRawmg/LHY2207.7129QFSSQFSSSociumRawmg/LHY2206.17.87.00QFSSQFSSSociumRawmg/LHY2200.147.000.01QFSSSociumRawmg/LHY2200.147.000.01QFSSSociumRawmg/LHY2200.111.00.03QFSSSociumRawmg/LHY2200.111.00.0 </td <td></td> <td>Treated</td> <td></td> <td>D</td> <td>365</td> <td>365</td> <td>0</td> <td>0.001</td> <td>0.360</td> <td>0.035</td> <td>0.001</td> <td>WTP</td>		Treated		D	365	365	0	0.001	0.360	0.035	0.001	WTP
<table-container>          PH Saturation Tracked intervalue         Raw intervalue         Image intervalue         <thimage intervalue         Image intervalue         Ima</thimage </table-container>		Reticulation		HY	4	4	0	<1	<1	<1		QFSS
<table-container>          Treated Reliculation         Image of the state of</table-container>	pH Saturation	Raw		HY	2	2	0	11.4	11.4	11.4		QFSS
Reticulation         Reticulation<		Treated		HY	2	2	0	10.0	10.2	10.1		QFSS
Saturation Index Treated (internal condition)         Raw (internal condition)         IMY         2         2         0         -6.8         -6.7         -6.8         (IPC)         QFSS           Mole Ratio (internal condition)         Raw (internal condition)         Raw (internal condition)         Imternal condition		Reticulation		HY	4	4	0	9.3	9.8	8.6		QFSS
<table-container>          Image         <t< td=""><td>Saturation Index</td><td>Raw</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>-6.8</td><td>-6.7</td><td>-6.8</td><td></td><td>QFSS</td></t<></table-container>	Saturation Index	Raw		HY	2	2	0	-6.8	-6.7	-6.8		QFSS
<table-container>          Reticulation         Reticulation         HY         44         40         -2.7         -2.3         -2.5         -2.5         QFSS           Mole Ratio Reticulation         Raw         HY         2         2         0         6.4         7.0         6.7         QFSS           Reticulation         HY         2         2         0         2.9         3.2         3.2         QFSS           Reticulation         HY         2         2         0         7.7         12         9         QFSS           Solium         Raw         MY         2         2         0         61         7.80         7.0         QFSS           Reticulation         HY         2         2         0         61         7.80         7.0         QFSS           Reticulation         HY         2         2         0         0.37         0.38         0.38         0.39         QFSS           Reticulation         Reticulation         HY         2         2         0         0.37         0.41         0.39         QFSS           Reticulation         Reticulation         HY         2         2         0         1         1         1</table-container>		Treated		HY	2	2	0	-3.2	-3.0	-3.1		QFSS
<table-container>          Mole Rain Teated (inclusion)         Raw (inclusion)         HW (inclusion)         I (inclusion)         HW (inclusion)         I (inclusion)         I (inclusion)</table-container>		Reticulation		HY	4	4	0	-2.7	-2.3	-2.5		QFSS
<table-container>          Image         <t< td=""><td>Mole Ratio</td><td>Raw</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>6.4</td><td>7.0</td><td>6.7</td><td></td><td>QFSS</td></t<></table-container>	Mole Ratio	Raw		HY	2	2	0	6.4	7.0	6.7		QFSS
ReticulationReticulationHY4402.93.23.23.20.20.5SodiumRawPreatedHY220712900.55ReticulationHY2200.61787000.75PotassiumRawmg/LHY2200.370.380.380.380.55PotassiumRawmg/LHY2200.370.410.3900.755TreatedHY2200.400.490.440.7550.550.55Rawmg/LHY220111110.755TreatedHY220111400.455RawRawmg/LHY220111100.555TreatedRawMg/L1440111400.5550.555MagnesiumRawmg/LHY220111200.5550.555MagnesiumRawMg/LHY2201111100.555MagnesiumRawMg/LHY2200.000.000.000.5550.5550.5550.555MagnesiumRawHY2200.000.000.000.000.555<		Treated		HY	2	2	0	2.9	3.4	3.2		QFSS
<table-container>          Sodium Treated         Raw Treated         mg/L HY         L         2         2         0         7         12         9         (mode)         QFSS           Reticulation         Reticulation         HY         2         2         0         610         778         70         0         QFSS           Potassium Reticulation         Raw Treated         mg/L HY         2         2         0         0.37         0.38         0.38         0.38         QFSS           Reticulation         HY         2         2         0         0.37         0.41         0.39         QFSS           Acticulation         HY         2         2         0         0.37         0.41         0.39         QFSS           Acticulation         HY         2         2         0         0.41         0.49         0.44         QFSS           Acticulation         HY         2         2         0         1         1         0         QFSS           Acticulation         HY         2         2         0         1         1         0         QFSS           Magnesium         Raw         Mg/L         4         4         0         1</table-container>		Reticulation		HY	4	4	0	2.9	3.2	3.2		QFSS
Treated Ref(u)Treated Ref(u)IPV <td>Sodium</td> <td>Raw</td> <td>mg/L</td> <td>HY</td> <td>2</td> <td>2</td> <td>0</td> <td>7</td> <td>12</td> <td>9</td> <td></td> <td>QFSS</td>	Sodium	Raw	mg/L	HY	2	2	0	7	12	9		QFSS
ReticulationReticulationHY44440497161(0)QFSSPotassiumRawMg/LMg/L2.20.00.370.380.380.38QFSSTreatedHY4.22.20.00.370.410.39QFSSQFSSReticulationHY4.24.20.00.470.440.39QFSSCalciumRawMg/LHY2.20.00.10.490.440.0QFSSTeatedMg/LHY2.22.20.01.11.11.0QFSSMagnesiumRawMg/LHY2.22.01.11.11.0QFSSMagnesiumRawMg/LHY2.22.01.11.11.0QFSSMagnesiumRawMg/LHY2.22.01.11.11.0QFSSMagnesiumRawMg/LHY2.22.01.11.11.0QFSSMagnesiumHRMg/L1.44.40.01.11.11.0QFSSMagnesiumRawMg/LHY2.22.20.01.00.00.0QFSSMagnesiumRawMg/LHY2.22.20.00.00.00.0QFSSMagnesiumMg/LHY2.22.20.00.00.00.0QFSSMagnesiumMg/LHY2.22.2 <td< td=""><td></td><td>Treated</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>61</td><td>78</td><td>70</td><td></td><td>QFSS</td></td<>		Treated		HY	2	2	0	61	78	70		QFSS
Potassium Treated ReticulationMg/L TreatedHY 2200.370.380.380.08QFSSReticulationHY2200.370.410.390.4500Raw TreatedRaw ReticulationMg/L HY4400.400.490.4400.490.4400.490.4400.490.4400.45S000		Reticulation		HY	4	4	0	49	71	61		QFSS
Image ReticulationImage HYImage QQQ0.0370.0410.039QQFSSReticulationMmy/LHYQQ0.0400.0490.0400.04550.055	Potassium	Raw	mg/L	HY	2	2	0	0.37	0.38	0.38		QFSS
ReticulationHY44400.400.490.440.4400.49CalciumRawMg/LMg/LMY220111000TreatedHY22011110000MagnesiumRawMg/LHY220142000 <t< td=""><td></td><td>Treated</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>0.37</td><td>0.41</td><td>0.39</td><td></td><td>QFSS</td></t<>		Treated		HY	2	2	0	0.37	0.41	0.39		QFSS
Calcium TreatedRaw Treatedmg/L HYHY201110QFSSReticulationReticulationHY2001110QFSSMagnesium EncodedRaw Treatedmg/L HYHY200142000Magnesium ReticulationRaw Treatedmg/L HYHY2001200 <td></td> <td>Reticulation</td> <td></td> <td>HY</td> <td>4</td> <td>4</td> <td>0</td> <td>0.40</td> <td>0.49</td> <td>0.44</td> <td></td> <td>QFSS</td>		Reticulation		HY	4	4	0	0.40	0.49	0.44		QFSS
$ \begin{array}{ c c c c } \hline \begin{tabular}{ c c } \hline \end{tabular}{ c c } \hline \e$	Calcium	Raw	mg/L	HY	2	2	0	1	1	1		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	1	1	1		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Reticulation		HY	4	4	0	1	4	2		QFSS
$ \begin{array}{ c c c c c c } \hline \end{bmatrix} \hline bma$	Magnesium	Raw	mg/L	HY	2	2	0	1	2	1		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	1	2	1		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Reticulation		HY	4	4	0	1	1	1		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Hydrogen	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0	-	QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Reticulation		HY	4	4	0	0.0	0.0	0.0		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Bicarbonate	Raw	mg/L	HY	2	2	0	2	3	3		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	35	56	46		QFSS
Carbonate         Raw         mg/L         HY         2         2         0         0.0         0.0         0.0         QFSS           Treated         HY         2         2         0         0.0         0.0         0.0         QFSS           Reticulation         HY         4         4         0         0.0         0.0         0.0         QFSS		Reticulation		HY	4	4	0	34	51	42		QFSS
Treated         HY         2         2         0         0.0         0.0         0.0         QFSS           Reticulation         HY         4         4         0         0.0         0.0         0.0         QFSS	Carbonate	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS
Reticulation         HY         4         4         0         0.0         0.0         0.0         QFSS		Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
		Reticulation		HY	4	4	0	0.0	0.0	0.0		QFSS



Hydroxide	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	4	4	0	0.0	0.0	0.0		QFSS
	Raw		HY	2	2	0	11	22	17		QFSS
Chloride	Treated	mg/L	HY	2	2	0	15	25	20		QFSS
	Reticulation		HY	4	4	0	15	25	21		QFSS
Fluoride	Raw	mg/L	HY	2	2	0	<0.02	<0.02	<0.02		QFSS
	Treated		D	365	365	0	0.05	0.9	0.82	1	WTP
	Reticulation		М	11	11	0	0.71	0.88	0.79		QFSS
Nitrate	Raw	mg/L	HY	2	2	0	< 0.05	0.07	0.06		QFSS
	Treated		HY	2	2	0	< 0.05	0.05	0.05		QFSS
	Reticulation		HY	4	4	0	< 0.05	0.10	0.07		QFSS
Sulphate	Raw	mg/L	HY	2	2	0	0.70	1.70	1.20		QFSS
	Treated		HY	2	2	0	70	95	83		QFSS
	Reticulation		HY	4	4	0	51	88	71		QFSS
Iron	Raw	mg/L	HY	2	2	0	0.27	0.33	0.30		QFSS
	Treated		М	12	12	0	0.01	0.09	0.04	0.01	WTP
	Reticulation		HY	4	4	0	<0.01	<0.01	<0.01		QFSS
Manganese	Raw	mg/L	HY	2	2	0	0.002	0.004	0.003		QFSS
	Treated		М	12	12	0	< 0.05	<0.20	< 0.05	0.01	WTP
	Reticulation		HY	4	4	0	< 0.001	<0.001	< 0.001		QFSS
Zinc	Raw	mg/L	HY	2	2	0	<0.06	<0.06	<0.06		QFSS
	Treated		HY	2	2	0	<0.06	<0.06	<0.06		QFSS
	Reticulation		HY	4	4	0	< 0.03	<0.06	<0.06		QFSS
Aluminium	Raw	mg/L	HY	2	2	0	0.32	0.41	0.37		QFSS
	Treated		М	12	12	0	0.005	0.106	0.007	0.1	WTP
	Reticulation		HY	4	4	0	< 0.03	0.04	0.03		QFSS
Boron	Raw	mg/L	HY	2	2	0	<0.02	<0.02	<0.02		QFSS
	Treated		HY	2	2	0	<0.02	<0.02	<0.02		QFSS
	Reticulation		HY	4	4	0	<0.02	<0.02	<0.02		QFSS
Copper	Raw	mg/L	HY	2	2	0	0.029	0.033	0.031		QFSS
	Treated		HY	2	2	0	< 0.003	< 0.003	< 0.003		QFSS
	Reticulation		HY	4	4	0	< 0.003	0.003	< 0.003		QFSS
Annual Aluminium	Raw	mg/L	Y	1	1	0	0.39	0.39	0.39		QFSS
Metals	Treated		Y	1	1	0	0.022	0.022	0.022		QFSS
	Reticulation		Y	2	2	0	0.022	0.022	0.022		QFSS
Annual Arsenic	Raw	mg/L	Y	1	1	0	0.0001	0.0001	0.0001		QFSS
Metals	Treated		Y	1	1	0	<0.0001	< 0.0001	< 0.0001		QFSS



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	Reticulation		Y	2	2	0	<0.0001	< 0.0001	< 0.0001	QFSS
Annual Cadmium	Raw	mg/L	Y	1	1	0	<0.0001	< 0.0001	< 0.0001	QFSS
Metals	Treated		Y	1	1	0	<0.0001	< 0.0001	<0.0001	QFSS
	Reticulation		Y	2	2	0	<0.0001	< 0.0001	< 0.0001	QFSS
Annual Chromium	Raw	mg/L	Y	1	1	0	0.0004	0.0004	0.0004	QFSS
Metals	Treated		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
	Reticulation		Y	2	2	0	0.0001	0.0002	0.0002	QFSS
Annual Copper	Raw	mg/L	Y	1	1	0	0.035	0.035	0.035	QFSS
Metals	Treated		Y	1	1	0	<0.0010	<0.0010	<0.0010	QFSS
	Reticulation		Y	2	2	0	0.002	0.008	0.005	QFSS
Annual Iron Metals	Raw	mg/L	Y	1	1	0	0.48	0.48	0.48	QFSS
	Treated		Y	1	1	0	0.009	0.009	0.009	QFSS
	Reticulation		Y	2	2	0	0.007	0.020	0.013	QFSS
Annual Lead Metals	Raw	mg/L	Y	1	1	0	0.0019	0.0019	0.0019	QFSS
	Treated		Y	1	1	0	<0.0001	< 0.0001	<0.0001	QFSS
	Reticulation		Y	2	2	0	0.0001	0.0002	0.0002	QFSS
Annual Manganese	Raw	mg/L	Y	1	1	0	0.0032	0.0032	0.0032	QFSS
Metals	Treated		Y	1	1	0	0.0046	0.0046	0.0046	QFSS
	Reticulation		Y	2	2	0	0.0008	0.0009	0.0009	QFSS
Annual Nickel	Raw	mg/L	Y	1	1	0	0.0003	0.0003	0.0003	QFSS
Metals	Treated		Y	1	1	0	0.0005	0.0005	0.0005	QFSS
	Reticulation		Y	2	2	0	0.0001	0.0002	0.0002	QFSS
Annual Zinc Metals	Raw	mg/L	Y	1	1	0	0.037	0.037	0.037	QFSS
	Treated		Y	1	1	0	0.011	0.011	0.011	QFSS
	Reticulation		Y	2	2	0	0.005	0.021	0.013	 QFSS



### Table 3 - Goomeri Water Analysis

Parameter	Scheme	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated		D	363	363	0	0.30	4.16	1.43	0.01	WTP
	Reticulation		М	24	24	0	0.38	1.39	0.96		QFSS
Total	Raw	ug/L	-	-	-	-	-	-	-	-	-
Trihalomethanes	Treated	-	-	-	-	-	-	-	-	-	-
	Reticulation	-	М	11	11	0	100	210	160		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated		-	-	-	-	-	-	-	-	-
	Reticulation		М	24	24	0	0	0	0		QFSS
рН	Raw		HY	10	10	0	7.48	8.43	7.58		QFSS
	Treated		D	363	363	0	7.10	7.84	7.48	1	WTP
	Reticulation		HY	2	2	0	7.72	7.93	7.83		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	10	10	0	120	762	528		QFSS
	Treated		М	24	24	0	150	198	180	1	WTP
	Reticulation		HY	2	2	0	166	202	184		QFSS
Temporary Hardness	Raw	mgCaCO₃/L	HY	10	10	0	119	447	347		QFSS
	Treated	_	HY	2	2	0	155	175	165		QFSS
	Reticulation		HY	2	2	0	159	180	170		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	10	10	0	120	450	350		QFSS
	Treated	_	М	24	24	0	110	174	144	1	WTP
	Reticulation		HY	2	2	0	160	180	170		QFSS
Residual Alkalinity	Raw	meq/L	HY	10	10	0	0.0	0.2	0.0		QFSS
	Treated	_	HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Silica	Raw	mg/L	HY	10	10	0	7	55	46		QFSS
	Treated	_	HY	2	2	0	12	18	15		QFSS
	Reticulation		HY	2	2	0	12	18	15		QFSS
Total Dissolved Ions	Raw	mg/L	HY	10	10	0	243	1280	945		QFSS
	Treated	_	HY	2	2	0	350	397	374		QFSS
	Reticulation		HY	2	2	0	354	406	380		QFSS
Total Dissolved	Raw	mg/L	HY	10	10	0	100	1000	755		QFSS
Solids	Treated		HY	2	2	0	270	310	290		QFSS



	Reticulation		HY	2	2	0	270	310	290		QFSS
True Colour	Raw	Hazen	HY	10	10	0	<8	20	<8	8	QFSS
	Treated		W	363	363	0	0	0	0	1	WTP
	Reticulation		HY	2	2	0	<8	<8	<8		QFSS
Turbidity	Raw	NTU	HY	10	10	0	1	14	2		QFSS
	Treated		W	363	363	0	0.04	3.48	0.19	0.001	WTP
	Reticulation		HY	2	2	0	<1	<1	<1		QFSS
pH Saturation	Raw		HY	10	10	0	6.8	8.0	6.9		QFSS
	Treated		HY	2	2	0	7.6	7.7	7.7		QFSS
	Reticulation		HY	2	2	0	7.5	7.7	7.6		QFSS
Saturation Index	Raw		HY	10	10	0	-0.3	0.9	0.7		QFSS
	Treated		HY	2	2	0	0.0	0.2	0.1		QFSS
	Reticulation		HY	2	2	0	0.1	0.4	0.3		QFSS
Mole Ratio	Raw		HY	10	10	0	1.3	2.8	2.5		QFSS
	Treated		HY	2	2	0	2.2	2.2	2.2		QFSS
	Reticulation		HY	2	2	0	2.0	2.2	2.1		QFSS
Sodium	Raw	mg/L	HY	10	10	0	19	100	84		QFSS
	Treated		HY	2	2	0	35	35	35		QFSS
	Reticulation		HY	2	2	0	35	36	36		QFSS
Potassium	Raw	mg/L	HY	10	10	0	0.35	5.50	0.98		QFSS
	Treated		HY	2	2	0	4.7	5.1	4.9		QFSS
	Reticulation		HY	2	2	0	4.7	5.2	5.0		QFSS
Calcium	Raw	mg/L	HY	10	10	0	28	170	125		QFSS
	Treated		HY	2	2	0	41	49	45		QFSS
	Reticulation		HY	2	2	0	41	50	46		QFSS
Magnesium	Raw	mg/L	HY	10	10	0	12	80	52		QFSS
	Treated		HY	2	2	0	16	19	18		QFSS
	Reticulation		HY	2	2	0	16	19	18		QFSS
Hydrogen	Raw	mg/L	HY	10	10	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Bicarbonate	Raw	mg/L	HY	10	10	0	140	543	421		QFSS
	Treated		HY	2	2	0	187	212	200		QFSS
	Reticulation		HY	2	2	0	192	218	205		QFSS
Carbonate	Raw	mg/L	HY	10	10	0	0.4	2.8	1.2		QFSS
	Treated		HY	2	2	0	0.6	0.7	0.7		QFSS
	Reticulation		HY	2	2	0	0.6	1.1	0.9		QFSS
Hydroxide	Raw	mg/L	HY	10	10	0	0.0	0.0	0.0		QFSS



	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Chloride	Raw	mg/L	HY	10	10	0	32	350	215		QFSS
	Treated		HY	2	2	0	59	69	64		QFSS
	Reticulation		HY	2	2	058	69	64			QFSS
Fluoride	Raw	mg/L	HY	10	10	0	0.17	0.21	0.19		QFSS
	Treated		HY	2	2	0	0.19	0.22	0.21		QFSS
	Reticulation		HY	2	2	0	0.19	0.25	0.22		QFSS
Nitrate	Raw	mg/L	HY	10	10	0	1.8	14	3.6		QFSS
	Treated		HY	2	2	0	1.6	2.5	2.1		QFSS
	Reticulation		HY	2	2	0	1.5	2.5	2.0		QFSS
Sulphate	Raw	mg/L	HY	10	10	0	1.3	47	36		QFSS
	Treated		HY	2	2	0	4.8	5.7	5.3		QFSS
	Reticulation		HY	2	2	3	4.8	5.7	5.3		QFSS
Iron	Raw	mg/L	HY	10	10	0	< 0.01	0.02	0.01		QFSS
	Treated		М	26	26	0	0.0	0.013	0.0	0.001	WTP
	Reticulation		HY	2	2	0	<0.01	<0.01	< 0.01		QFSS
Manganese	Raw	mg/L	HY	10	10	0	0.001	0.100	0.004		QFSS
	Treated		М	26	26	0	0.05	0.44	0.20	0.001	WTP
	Reticulation		HY	2	2	0	< 0.001	0.002	0.001		QFSS
Zinc	Raw	mg/L	HY	10	10	0	< 0.06	< 0.06	< 0.06		QFSS
	Treated		HY	2	2	0	< 0.06	< 0.06	< 0.06		QFSS
	Reticulation		HY	2	2	0	< 0.06	< 0.06	< 0.06		QFSS
Aluminium	Raw	mg/L	HY	10	10	0	< 0.03	< 0.03	< 0.03		QFSS
	Treated		М	26	26	0	0.0	0.027	0.0	0.001	WTP
	Reticulation		HY	2	2	0	< 0.03	< 0.03	< 0.03		QFSS
Boron	Raw	mg/L	HY	10	10	0	0.03	0.04	0.03		QFSS
	Treated		HY	2	2	0	0.03	0.04	0.04		QFSS
	Reticulation		HY	2	2	0	0.03	0.04	0.04		QFSS
Copper	Raw	mg/L	HY	10	10	0	< 0.003	< 0.003	<0.003		QFSS
	Treated		HY	2	2	0	0.014	0.026	0.020		QFSS
	Reticulation		HY	2	2	0	0.006	0.009	0.008		QFSS
Annual Aluminium	Raw	mg/L	Y	4	4	0	0.003	0.68	0.009		QFSS
Metals	Treated		Y	1	1	0	0.01	0.01	0.01		QFSS
	Reticulation		Y	1	1	0	0.01	0.01	0.01		QFSS
Annual Arsenic	Raw	mg/L	Y	4	4	0	0.0007	0.0015	0.0011		QFSS
Metals	Treated		Y	1	1	0	0.0056	0.0056	0.0056		QFSS
	Reticulation		Y	1	1	0	0.0053	0.0053	0.0053		QFSS



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Annual Cadmium	Raw	mg/L	Y	4	4	0	< 0.0001	< 0.0001	< 0.0001	QFSS
Metals	Treated		Y	1	1	0	< 0.0001	< 0.0001	< 0.0001	QFSS
	Reticulation		Y	1	1	0	< 0.0001	<0.0001	< 0.0001	QFSS
Annual Chromium	Raw	mg/L	Y	4	4	0	0.0004	0.0019	0.0016	QFSS
Metals	Treated		Y	1	1	0	< 0.0001	<0.0001	< 0.0001	QFSS
	Reticulation		Y	1	1	0	< 0.0001	< 0.0001	< 0.0001	QFSS
Annual Copper	Raw	mg/L	Y	4	4	0	<0.001	0.003	0.002	QFSS
Metals	Treated		Y	1	1	0	0.026	0.026	0.026	QFSS
	Reticulation		Y	1	1	0	0.010	0.010	0.010	QFSS
Annual Iron Metals	Raw	mg/L	Y	4	4	0	0.05	0.77	0.435	QFSS
	Treated		Y	1	1	0	0.006	0.006	0.006	QFSS
	Reticulation		Y	1	1	0	0.009	0.009	0.009	QFSS
Annual Lead Metals	Raw	mg/L	Y	4	4	0	< 0.0001	0.0042	0.0005	QFSS
	Treated		Y	1	1	0	0.0003	0.0003	0.0003	QFSS
	Reticulation		Y	1	1	0	0.0007	0.0007	0.0007	QFSS
Annual Manganese	Raw	mg/L	Y	4	4	0	0.039	0.0810	0.0355	QFSS
Metals	Treated		Y	1	1	0	0.005	0.005	0.005	QFSS
	Reticulation		Y	1	1	0	0.004	0.004	0.004	QFSS
Annual Nickel	Raw	mg/L	Y	4	4	0	0.0003	0.014	0.0052	QFSS
Metals	Treated		Y	1	1	0	0.0006	0.0006	0.0006	QFSS
	Reticulation		Y	1	1	0	0.0004	0.0004	0.0004	QFSS
Annual Zinc Metals	Raw	mg/L	Y	4	4	0	0.001	0.062	0.012	QFSS
	Treated		Y	1	1	0	0.009	0.009	0.009	QFSS
	Reticulation		Y	1	1	0	0.01	0.01	0.01	QFSS



### Table 4 - Gympie Water Analysis

Parameter	Scheme	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated		D							0.01	WTP
	Reticulation		W	118	118	0	0.04	2.59	1.16		QFSS
Total	Raw	ug/L	-	-	-	-	-	-	-	-	-
Trihalomethanes	Treated	-	-	-	-	-	-	-	-	-	-
	Reticulation		М	14	14	0	0	130	66		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated		М	12	12	0	0	0	0		QFSS
	Reticulation		W	117	117	0	0	0	0		QFSS
рН	Raw		HY	2	2	0	6.70	7.57	7.14		QFSS
	Treated		D	364	364	0	6.64	8.00	7.10	1	WTP
	Reticulation		HY	4	4	0	6.62	7.25	6.98		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	2	2	0	45	80	63		QFSS
	Treated		М	24	24	0	36	116	82	1	WTP
	Reticulation		HY	4	4	0	38	84	61		QFSS
Temporary	Raw	mgCaCO₃/L	HY	2	2	0	45	71	58		QFSS
Hardness	Treated		HY	2	2	0	41	43	42		QFSS
	Reticulation		HY	4	4	0	30	57	46		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	2	2	0	45	71	58		QFSS
	Treated		HY	2	2	0	41	43	42		QFSS
	Reticulation		HY	4	4	0	30	57	46		QFSS
Residual Alkalinity	Raw	meq/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	4	4	0	0.0	0.0	0.0		QFSS
Silica	Raw	mg/L	HY	2	2	0	17	21	19		QFSS
	Treated		HY	2	2	0	14	17	16		QFSS
	Reticulation		HY	4	4	0	12	16	15		QFSS
Total Dissolved Ions	Raw	mg/L	HY	2	2	0	114	213	164		QFSS
	Treated		HY	2	2	0	132	231	182		QFSS
	Reticulation	ļ	HY	4	4	0	127	236	170		QFSS
Total Dissolved	Raw	mg/L	HY	2	2	0	110	190	150		QFSS
Solids	Treated		HY	2	2	0	120	220	170		QFSS



	Reticulation		HY	4	4	0	120	210	155		QFSS
True Colour	Raw	Hazen	HY	2	2	0	41	58	50		QFSS
	Treated		D	364	364	0	0	3	1	1	WTP
	Reticulation		HY	4	4	0	<8	<8	<8		QFSS
Turbidity	Raw	NTU	D	364	364	0	2.30	530.00	17.00	0.001	WTP
	Treated		D	364	364	0	0.06	0.24	0.10	0.001	WTP
	Reticulation		HY	4	4	0	<1	<1	<1		QFSS
pH Saturation	Raw		HY	2	2	0	8.5	8.9	8.7		QFSS
	Treated		HY	2	2	0	8.8	9.0	8.9		QFSS
	Reticulation		HY	4	4	0	8.6	9.2	8.9		QFSS
Saturation Index	Raw		HY	2	2	0	-2.2	-1.0	-1.6		QFSS
	Treated		HY	2	2	0	-2.1	-1.9	-2.0		QFSS
	Reticulation		HY	4	4	0	-2.5	-1.3	-1.9		QFSS
Mole Ratio	Raw		HY	2	2	0	2.7	3.4	3.1		QFSS
	Treated		HY	2	2	0	3.4	3.6	3.5		QFSS
	Reticulation		HY	4	4	0	3.1	3.7	3.4		QFSS
Sodium	Raw	mg/L	HY	2	2	0	15	35	25		QFSS
	Treated		HY	2	2	0	22	44	33		QFSS
	Reticulation		HY	4	4	0	23	42	30		QFSS
Potassium	Raw	mg/L	HY	2	2	0	1.7	2.5	2.1		QFSS
	Treated		HY	2	2	0	1.6	2.7	2.2		QFSS
	Reticulation		HY	4	4	0	1.7	2.9	2.2		QFSS
Calcium	Raw	mg/L	HY	2	2	0	7	12	10		QFSS
	Treated		HY	2	2	0	7	12	9		QFSS
	Reticulation		HY	4	4	0	6	14	10		QFSS
Magnesium	Raw	mg/L	HY	2	2	0	7	12	9		QFSS
	Treated		HY	2	2	0	7	12	9		QFSS
	Reticulation		HY	4	4	0	5	12	9		QFSS
Hydrogen	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	4	4	0	0.0	0.0	0.0		QFSS
Bicarbonate	Raw	mg/L	HY	2	2	0	55	86	71		QFSS
	Treated		HY	2	2	0	50	52	51		QFSS
	Reticulation		HY	4	4	0	37	70	55		QFSS
Carbonate	Raw	mg/L	HY	2	2	0	0.0	0.2	0.1		QFSS
	Treated	]	HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation	]	HY	4	4	0	0.0	0.1	0.0		QFSS
Hydroxide	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS



	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	4	4	0	0.0	0.0	0.0		QFSS
Chloride	Raw	mg/L	HY	2	2	0	21	56	39		QFSS
	Treated		HY	2	2	0	28	64	46		QFSS
	Reticulation		HY	4	4	0	24	58	39		QFSS
Fluoride	Raw	mg/L	HY	2	2	0	0.06	0.08	0.07		QFSS
	Treated		D	306	306	0	0.016	0.94	0.79	0.01	WTP
	Reticulation		М	10	10	0	0.33	0.83	0.71		QFSS
Nitrate	Raw	mg/L	HY	2	2	0	0.21	1.90	1.06		QFSS
	Treated		HY	2	2	0	0.23	1.80	1.02		QFSS
	Reticulation		HY	4	4	0	0.43	1.70	0.89		QFSS
Sulphate	Raw	mg/L	HY	2	2	0	5.6	8.1	6.9		QFSS
	Treated		HY	2	2	0	14	43	29		QFSS
	Reticulation		HY	4	4	0	16	37	30		QFSS
Iron	Raw	mg/L	HY	2	2	0	0.28	0.50	0.39		QFSS
	Treated		М	24	24	0	0.001	0.027	0.006	0.001	WTP
	Reticulation		HY	4	4	0	<0.01	< 0.01	<0.01		QFSS
Manganese	Raw	mg/L	HY	2	2	0	0.002	0.004	0.003		QFSS
	Treated		М	24	24	0	0.050	0.200	0.200	0.001	WTP
	Reticulation		HY	4	4	0	<0.001	0.004	0.002		QFSS
Zinc	Raw	mg/L	HY	2	2	0	<0.06	< 0.06	<0.06		QFSS
	Treated		HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
	Reticulation		HY	4	4	0	<0.06	< 0.06	<0.06		QFSS
Aluminium	Raw	mg/L	HY	2	2	0	0.09	0.59	0.34		QFSS
	Treated		М	24	24	0	0.001	0.027	0.006	0.001	WTP
	Reticulation		HY	4	4	0	<0.03	< 0.03	< 0.03		QFSS
Boron	Raw	mg/L	HY	2	2	0	0.03	0.03	0.03		QFSS
	Treated		HY	2	2	0	0.03	0.03	0.03		QFSS
	Reticulation		HY	4	4	0	0.02	0.03	0.03		QFSS
Copper	Raw	mg/L	HY	2	2	0	0.006	0.007	0.007		QFSS
	Treated		HY	2	2	0	< 0.003	0.003	0.003		QFSS
	Reticulation		HY	4	4	0	0.0060	0.030	0.013		QFSS
Annual Aluminium	Raw	mg/L	Y	1	1	0	2.2	2.2	2.2		QFSS
Metals	Treated		Y	1	1	0	0.008	0.008	0.008		QFSS
	Reticulation		Y	2	2	0	0.011	0.017	0.014		QFSS
Annual Arsenic	Raw	mg/L	Y	1	1	0	0.0011	0.0011	0.0011		QFSS
Metals	Treated	_	Y	1	1	0	0.0002	0.0002	0.0002		QFSS
	Reticulation		Y	2	2	0	0.0002	0.0002	0.0002		QFSS



Annual Cadmium	Raw	mg/L	Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
Metals	Treated		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
	Reticulation		Y	2	2	0	<0.0001	<0.0001	<0.0001	QFSS
Annual Chromium	Raw	mg/L	Y	1	1	0	0.0069	0.0069	0.0069	QFSS
Metals	Treated		Y	1	1	0	0.0002	0.0002	0.0002	QFSS
	Reticulation		Y	2	2	0	0.0001	0.0002	0.0002	QFSS
Annual Copper	Raw	mg/L	Y	1	1	0	0.019	0.019	0.019	QFSS
Metals	Treated		Y	1	1	0	0.003	0.003	0.003	QFSS
	Reticulation		Y	2	2	0	0.005	0.070	0.038	QFSS
Annual Iron Metals	Raw	mg/L	Y	1	1	0	4.1	4.1	4.1	QFSS
	Treated		Y	1	1	0	<0.0050	<0.0050	< 0.0050	QFSS
	Reticulation		Y	2	2	0	0.005	0.007	0.006	QFSS
Annual Lead Metals	Raw	mg/L	Y	1	1	0	0.0024	0.0024	0.0024	QFSS
	Treated		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
	Reticulation		Y	2	2	0	0.0002	0.0003	0.0003	QFSS
Annual Manganese	Raw	mg/L	Y	1	1	0	0.34	0.34	0.34	QFSS
Metals	Treated		Y	1	1	0	0.013	0.013	0.013	QFSS
	Reticulation		Y	2	2	0	0.0066	0.0290	0.0178	QFSS
Annual Nickel	Raw	mg/L	Y	1	1	0	0.014	0.014	0.014	QFSS
Metals	Treated		Y	1	1	0	0.0011	0.0011	0.0011	QFSS
	Reticulation		Y	2	2	0	0.0007	0.0011	0.0009	QFSS
Annual Zinc Metals	Raw	mg/L	Y	1	1	0	0.017	0.017	0.017	QFSS
	Treated		Y	1	1	0	0.007	0.007	0.007	QFSS
	Reticulation		Y	2	2	0	0.004	0.006	0.005	QFSS



### Table 5 - Imbil Water Analysis

Parameter	Scheme	Units	Frequency of sampling Required	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated	1 -	D	348	348	0	2.0	5.8	3.5	0.01	WTP
	Reticulation		М	24	24	0	0.08	1.9	0.49		QFSS
Total	Raw	ug/L	-	-	-	-	-	-	-	-	-
Trihalomethanes	Treated		-							-	QFSS
	Reticulation	-	М	80	80	9	86	300	195		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated	]	-	-	-	-	-	-	-	-	-
	Reticulation	]	М	24	24	0	0	0	0		QFSS
pН	Raw		HY	2	2	0	6.74	7.15	6.95		QFSS
	Treated		W	37	37	0	7.00	7.70	7.40	1	WTP
	Reticulation		HY	2	2	0	6.95	7.48	7.22		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	2	2	0	47	95	71		QFSS
	Treated		М	23	23	0	44	162	100	1	WTP
	Reticulation		HY	2	2	0	54	117	86		QFSS
Temporary	Raw	mgCaCO₃/L	HY	2	2	0	47	78	63		QFSS
Hardness	Treated		HY	2	2	0	47	80	64		QFSS
	Reticulation		HY	2	2	0	54	89	72		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	2	2	0	48	78	63		QFSS
	Treated		HY	2	2	0	48	80	64		QFSS
	Reticulation		HY	2	2	0	55	89	72		QFSS
Residual Alkalinity	Raw	meq/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Silica	Raw	mg/L	HY	2	2	0	21	24	23		QFSS
	Treated		HY	2	2	0	19	23	21		QFSS
	Reticulation		HY	2	2	0	19	21	20		QFSS
Total Dissolved Ions	Raw	mg/L	HY	2	2	0	111	204	158		QFSS
	Treated		HY	2	2	0	129	231	180		QFSS
	Reticulation		HY	2	2	0	140	268	204		QFSS
Total Dissolved	Raw	mg/L	HY	2	2	0	100	180	140		QFSS
Solids	Treated		HY	2	2	0	120	200	160		QFSS



	Reticulation		HY	2	2	0	130	230	180		QFSS
True Colour	Raw	Hazen	HY	2	2	0	55	96	76		QFSS
	Treated		W	65	65	0	0	13	1	1	WTP
	Reticulation		HY	2	2	0	<8	<8	<8		QFSS
Turbidity	Raw	NTU	HY	2	2	0	18	48	33		QFSS
	Treated		М	37	37	0	0.01	1.09	0.09	0.001	WTP
	Reticulation		HY	2	2	0	<1	12	7		QFSS
pH Saturation	Raw		HY	2	2	0	8.4	8.9	8.7		QFSS
	Treated		HY	2	2	0	8.4	8.9	8.7		QFSS
	Reticulation		HY	2	2	0	8.2	8.8	8.5		QFSS
Saturation Index	Raw		HY	2	2	0	-2.1	-1.3	-1.7		QFSS
	Treated		HY	2	2	0	-2.1	-1.1	-1.6		QFSS
	Reticulation		HY	2	2	0	-1.8	-0.8	-1.3		QFSS
Mole Ratio	Raw		HY	2	2	0	3.0	3.2	3.1		QFSS
	Treated		HY	2	2	0	3.0	3.4	3.2		QFSS
	Reticulation		HY	2	2	0	2.8	3.2	3.0		QFSS
Sodium	Raw	mg/L	HY	2	2	0	13	25	19		QFSS
	Treated		HY	2	2	0	20	34	27		QFSS
	Reticulation		HY	2	2	0	20	38	29		QFSS
Potassium	Raw	mg/L	HY	2	2	0	1.5	2.2	1.9		QFSS
	Treated		HY	2	2	0	1.4	2.4	1.9		QFSS
	Reticulation		HY	2	2	0	1.4	2.9	2.2		QFSS
Calcium	Raw	mg/L	HY	2	2	0	8	14	11		QFSS
	Treated		HY	2	2	0	8	15	11		QFSS
	Reticulation		HY	2	2	0	9	19	14		QFSS
Magnesium	Raw	mg/L	HY	2	2	0	7	14	10		QFSS
	Treated		HY	2	2	0	7	14	10		QFSS
	Reticulation		HY	2	2	0	8	17	12		QFSS
Hydrogen	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Bicarbonate	Raw	mg/L	HY	2	2	0	58	95	77		QFSS
	Treated		HY	2	2	0	58	98	78		QFSS
	Reticulation		HY	2	2	0	67	109	88		QFSS
Carbonate	Raw	mg/L	HY	2	2	0	0.0	0.1	0.1		QFSS
	Treated		HY	2	2	0	0.0	0.1	0.1		QFSS
	Reticulation		HY	2	2	0	0.0	0.2	0.1		QFSS
Hydroxide	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS



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	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
	Raw		HY	2	2	0	18	42	30		QFSS
Chloride	Treated	mg/L	HY	2	2	0	29	56	43		QFSS
	Reticulation		HY	2	2	0	30	71	51		QFSS
Fluoride	Raw	mg/L	HY	2	2	0	0.06	0.08	0.07		QFSS
	Treated		HY	2	2	0	0.06	0.09	0.08		QFSS
	Reticulation		HY	2	2	0	0.06	0.08	0.07		QFSS
Nitrate	Raw	mg/L	HY	2	2	0	1.2	1.8	1.5		QFSS
	Treated		HY	2	2	0	1.0	1.9	1.5		QFSS
	Reticulation		HY	2	2	0	0.78	1.00	0.89		QFSS
	Raw		HY	2	2	0	4.1	9.3	6.7		QFSS
Sulphate	Treated	mg/L	HY	2	2	0	4.1	9.3	6.7		QFSS
	Reticulation		HY	2	2	0	4.3	10.0	7.2		QFSS
	Raw		HY	2	2	0	0.31	0.44	0.38		QFSS
Iron	Treated	mg/L	М	23	23	0	0.001	0.078	0.009	0.001	WTP
	Reticulation		HY	2	2	0	<0.01	< 0.01	<0.01		QFSS
	Raw		HY	2	2	0	0.004	0.005	0.005		QFSS
Manganese	Treated	mg/L	М	23	23	0	0.010	0.200	0.100	0.001	WTP
	Reticulation		HY	2	2	0	<0.001	< 0.001	<0.001		QFSS
	Raw		HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
Zinc	Treated	mg/L	HY	2	2	0	<0.06	< 0.06	<0.06		QFSS
	Reticulation		HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
	Raw		HY	2	2	0	0.35	0.57	0.46		QFSS
Aluminium	Treated	mg/L	М	23	23	0	0.001	0.034	0.006	0.001	WTP
	Reticulation		HY	2	2	0	< 0.03	< 0.03	< 0.03		QFSS
	Raw		HY	2	2	0	0.03	0.04	0.04		QFSS
Boron	Treated	mg/L	HY	2	2	0	0.03	0.04	0.04		QFSS
	Reticulation		HY	2	2	0	0.03	0.04	0.04		QFSS
	Raw		HY	2	2	0	0.006	0.009	0.008		QFSS
Copper	Treated	mg/L	HY	2	2	0	0.009	0.022	0.016		QFSS
	Reticulation		HY	2	2	0	0.006	0.011	0.009		QFSS
	Raw		Y	1	1	0	0.77	0.77	0.77		QFSS
Annual Aluminium	Treated	mg/L	Y	1	1	0	0.08	0.08	0.08		QFSS
ivietais	Reticulation		Y	1	1	0	0.79	0.79	0.79		QFSS
	Raw		Y	1	1	0	0.0008	0.0008	0.0008		QFSS
Annual Arsenic Motals	Treated	mg/L	Y	1	1	0	0.0005	0.0005	0.0005		QFSS
IVIELAIS	Reticulation		Y	1	1	0	0.001	0.001	0.001		QFSS



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	Raw		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
Annual Cadmium	Treated	mg/L	Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
IVIELAIS	Reticulation		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
	Raw		Y	1	1	0	0.0021	0.0021	0.0021	QFSS
Annual Chromium	Treated	mg/L	Y	1	1	0	0.0004	0.0004	0.0004	QFSS
IVIELAIS	Reticulation		Y	1	1	0	0.0011	0.0011	0.0011	QFSS
Annual Common	Raw		Y	1	1	0	0.014	0.014	0.014	QFSS
Annual Copper Motols	Treated	mg/L	Y	1	1	0	0.011	0.011	0.011	QFSS
Ivietais	Reticulation		Y	1	1	0	0.018	0.018	0.018	QFSS
	Raw		Y	1	1	0	1.0	1.0	1.0	QFSS
Annual Iron Metals	Treated	mg/L	Y	1	1	0	0.039	0.039	0.039	QFSS
	Reticulation		Y	1	1	0	0.33	0.33	0.33	QFSS
	Raw		Y	1	1	0	0.0012	0.0012	0.0012	QFSS
Annual Lead Metals	Treated	mg/L	Y	1	1	0	0.0003	0.0003	0.0003	QFSS
	Reticulation		Y	1	1	0	0.0011	0.0011	0.0011	QFSS
	Raw		Y	1	1	0	0.079	0.079	0.079	QFSS
Annual Manganese	Treated	mg/L	Y	1	1	0	0.0005	0.0005	0.0005	QFSS
Wetais	Reticulation		Y	1	1	0	0.042	0.042	0.042	QFSS
	Raw		Y	1	1	0	0.0049	0.0049	0.0049	QFSS
Annual Nickel	Treated	mg/L	Y	1	1	0	0.0011	0.0011	0.0011	QFSS
INICIAIS	Reticulation		Y	1	1	0	0.002	0.002	0.002	QFSS
	Raw		Y	1	1	0	0.01	0.01	0.01	QFSS
Annual Zinc Metals	Treated	mg/L	Y	1	1	0	0.005	0.005	0.005	QFSS
	Reticulation		Y	1	1	0	0.017	0.017	0.017	 QFSS



### Table 6- Kandanga Water Analysis

Parameter	Scheme	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated		D	350	350	0	1.3	7.4	3.0	0.01	WTP
	Reticulation		М	24	24	0	00.07	2.82	0.55		QFSS
Total	Raw	ug/L	-	-	-	-	-	-	-	-	-
Trihalomethanes	Treated	-	-	-	-	-	-	-	-	-	QFSS
	Reticulation		М	81	81	32	96	350	220		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated		-	-	-	-	-	-	-		-
	Reticulation		М	24	24	0	0	0	0		QFSS
рН	Raw		HY	2	2	0	7.09	7.37	7.23		QFSS
	Treated		М	35	35	0	7.00	7.80	7.50	1	WTP
	Reticulation		HY	2	2	0	7.67	7.72	7.70		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	2	2	0	86	89	88		QFSS
	Treated	-	М	23	23	0	44	214	156	1	WTP
	Reticulation		HY	2	2	0	113	122	118		QFSS
Temporary	Raw	mgCaCO₃/L	HY	2	2	0	78	84	81		QFSS
Hardness	Treated	-	HY	2	2	0	67	82	75		QFSS
	Reticulation		HY	2	2	0	106	110	108		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	2	2	0	78	84	81		QFSS
	Treated	-	HY	2	2	0	67	82	75		QFSS
	Reticulation		HY	2	2	0	110	110	110		QFSS
Residual Alkalinity	Raw	meq/L	HY	2	2	0	0.0	0.0	0.0		QFSS
	Treated	-	HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Silica	Raw	mg/L	HY	2	2	0	24	28	26		QFSS
	Treated	_	HY	2	2	0	22	26	24		QFSS
	Reticulation		HY	2	2	0	23	26	25		QFSS
Total Dissolved Ions	Raw	mg/L	HY	2	2	0	175	185	180		QFSS
	Treated	_	HY	2	2	0	175	195	185		QFSS
	Reticulation		HY	2	2	0	238	282	260		QFSS
Total Dissolved	Raw	mg/L	HY	2	2	0	150	160	155		QFSS
Solids	Treated		HY	2	2	0	160	170	165		QFSS



ReticulationFixedHY2205302402600755True deReticulationHY2205378660755ReticulationHY202000.09.01.01.0MYTurbidityRawHY2200.84848480.055TurbidityRawHY2200.10.340.060.0010.075ReticulationHY2200.11.11.10.0550.055PF Saturation IdeRawHY2208.68.68.60.0010.0010.001TrastedHY2200.151.121.140.0550.7550												
Tue Colour         Raw         Hzen         Hz         H         2         2         0         53         78         66         0         0753           Hericulation         W         800         800         00         0.00         9.0         1.0         1         WTP           Hericulation         HY         2         2         0         23         37         30         0         0.055           Treated         M         35         35         0         0.001         0.34         0.06         0.001         0.075           PH Saturation         Rescluation         HY         2         2         0         6.6         8.6         8.6         0.001		Reticulation		HY	2	2	0	200	240	220		QFSS
	True Colour	Raw	Hazen	HY	2	2	0	53	78	66		QFSS
ReticulationHY220-8.8-8.8-8.8-8.8-8.8-8.8-8.8-8.8-8.8-9.8-9.8TurbidityReticulationHY220-2.83.73.000.755PH SaturationReticulationHY2200.0110.3.40.0.60.0010.744.1-10.955PH SaturationReticulationHY2206.68.68.60.0070.9340.0650.0010.9340.0650.0010.7550.1550.15 <t< td=""><td></td><td>Treated</td><td></td><td>W</td><td>80</td><td>80</td><td>0</td><td>0.0</td><td>9.0</td><td>1.0</td><td>1</td><td>WTP</td></t<>		Treated		W	80	80	0	0.0	9.0	1.0	1	WTP
Turbidity         Raw         NTU         HY         2         2         0         23         37         30         QFS           Reticulation         Reticulation         MY         2         2         0         0.1         0.1         0.01         WTS           pH Saturation         Raw         HY         2         2         0         6.6         8.7         8.7         0         QFSS           Reticulation         Raw         HY         2         2         0         8.6         8.7         8.7         QFSS           Saturation Index         Reticulation         HY         2         2         0         1.15         1.15         1.14         QFSS           Saturation Index         Reticulation         HY         2         2         0         1.15         1.15         1.15         QFSS           Mole Ratio         Reticulation         HY         2         2         0         2.2         Q         QFSS         QFSS           Solium         Raw         mg/L         HY         2         2         0         2.3         2.5         2.4         QFSS           Solium         Raw         mg/L         HY		Reticulation		HY	2	2	0	<8	<8	<8		QFSS
<table-container>InstanceM353500.0010.340.060.001MVPReticulationHY220&lt;1</table-container>	Turbidity	Raw	NTU	HY	2	2	0	23	37	30		QFSS
PeriodReticulationHYLLQ0-(1)-(1)-(1)-(1)-(1)OPFSPH AurationTreatedHY2208.68.68.60.670.75Saturation IndeReticulationHY2208.88.48.40.750.75Saturation IndeTreatedHY2201.151.121.140.755ReticulationHY2201.151.151.150.7550.755Mole RatioRawHY2202.662.772.770.7550.755Mole RatioRawHY2202.662.772.770.7550.755SodiumRawMg/LHY2202.662.772.770.7550.755SodiumRawMg/LHY2201.662.140.7550.7550.755SodiumRawMg/LHY2201.662.140.7550.7550.755ReticulationHY2201.652.662.110.75550.7550.7550.755<		Treated		М	35	35	0	0.001	0.34	0.06	0.001	WTP
PH SaturationRaw TreatedHYLLUU<		Reticulation		HY	2	2	0	<1	<1	<1		QFSS
<table-container>          Instant         Introduct         <th< td=""><td>pH Saturation</td><td>Raw</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>8.6</td><td>8.6</td><td>8.6</td><td></td><td>QFSS</td></th<></table-container>	pH Saturation	Raw		HY	2	2	0	8.6	8.6	8.6		QFSS
Reticulation		Treated		HY	2	2	0	8.6	8.7	8.7		QFSS
Saturation Index         Raw         HY         2         2         0         -1.5         -1.2         -1.4         QFSS           Meticulation         HY         2         2         0         -1.5         -1.5         .1.5         QFSS           Mole Ratio         Raw         HY         2         2         0         0.07         0.6         0.7         QFSS           Mole Ratio         Raw         HY         2         2         0         2.6         2.7         2.7         QFSS           Treated         HY         2         2         0         2.3         2.5         2.4         QFSS           Sodium         Raw         mg/L         HY         2         2         0         2.5         2.5         QFSS         QFSS           Frated         HY         2         2         0         1.6         2.6         Q.1         QFSS         QFSS           Potassium         Raw         mg/L         HY         2         2         0         1.6         2.6         2.1         QFSS           Reticulation         HY         2         Q         0         1.6         2.6         2.1         QFSS<		Reticulation		HY	2	2	0	8.3	8.4	8.4		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Saturation Index	Raw		HY	2	2	0	-1.5	-1.2	-1.4		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	-1.5	-1.5	-1.5		QFSS
Mole Ratio         Raw         HY         2         2         0         2.6         2.7         2.7         QFSS           Riculation         HY         2         2         0         2.9         3.0         3.0         QFSS           Sodium         Raw         mg/L         HY         2         2         0         2.9         3.0         3.0         QFSS           Feeded         Raw         mg/L         HY         2         2         0         16         21         19         QFSS           Treated         HY         2         2         0         25         25         25         QFSS           Reicolation         HY         2         2         0         1.7         2.4         2.1         QFSS           Reicolation         HY         2         2         0         1.6         2.6         2.1         QFSS           Calcium         Raw         mg/L         HY         2         2         0         1.6         2.6         2.1         QFSS           Calcium         Raw         mg/L         HY         2         2         0         1.6         2.6         2.1         2.5		Reticulation		HY	2	2	0	-0.7	-0.6	-0.7		QFSS
Image         Image <t< td=""><td>Mole Ratio</td><td>Raw</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>2.6</td><td>2.7</td><td>2.7</td><td></td><td>QFSS</td></t<>	Mole Ratio	Raw		HY	2	2	0	2.6	2.7	2.7		QFSS
ReticulationHYPP <t< td=""><td></td><td>Treated</td><td></td><td>HY</td><td>2</td><td>2</td><td>0</td><td>2.9</td><td>3.0</td><td>3.0</td><td></td><td>QFSS</td></t<>		Treated		HY	2	2	0	2.9	3.0	3.0		QFSS
Sodium         Raw         mg/L         HY         2         2         0         16         21         19         QFSS           Treated         HY         2         2         0         25         25         25         QFSS           Potasium         Raw         mg/L         HY         2         2         0         25         40         33         QFSS           Potasium         Raw         mg/L         HY         2         2         0         1.7         2.4         2.1         QFSS           Treated         HY         2         2         0         1.6         2.6         2.1         QFSS           Calcium         Raw         mg/L         HY         2         2         0         1.6         2.6         2.1         QFSS           Treated         HY         2         2         0         1.6         2.6         2.1         QFSS           Magnesium         Raw         mg/L         HY         2         2         0         1.5         1.6         1.6         0.0         0.5         QFSS           Magnesium         Raw         mg/L         HY         2         2		Reticulation		HY	2	2	0	2.3	2.5	2.4		QFSS
Treated         HY         2         2         0         25         25         25         25         QFSS           Potassim         Raw         mg/L         HY         2         2         0         25         40         33         QFSS           Potassim         Raw         mg/L         HY         2         2         0         1.7         2.4         2.1         QFSS           Reticulation         Treated         HY         2         2         0         1.6         2.6         2.1         QFSS           Calcium         Raw         mg/L         HY         2         2         0         1.6         2.6         2.1         QFSS           Magnesium         Raw         mg/L         HY         2         2         0         1.6         2.6         2.1         QFSS           Magnesium         Raw         mg/L         HY         2         2         0         12         14         13         QFSS           Magnesium         Raw         mg/L         HY         2         2         0         13         15         14         QFSS           Magnesium         Raw         mg/L	Sodium	Raw	mg/L	HY	2	2	0	16	21	19		QFSS
Reticulation         HY $2$ $2$ $0$ $25$ $40$ $33$ $(Prs)$ Potassium         Raw $mg/L$ HY $2$ $2$ $0$ $1.7$ $2.4$ $2.1$ $0$ $0$ Treated         HY $2$ $2$ $0$ $1.6$ $2.6$ $2.1$ $0$ $0$ $0$ Reticulation         HY $2$ $2$ $0$ $1.6$ $2.6$ $2.1$ $0$		Treated		HY	2	2	0	25	25	25		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Reticulation		HY	2	2	0	25	40	33		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Potassium	Raw	mg/L	HY	2	2	0	1.7	2.4	2.1		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	1.6	2.6	2.1		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Reticulation		HY	2	2	0	1.6	2.6	2.1		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Calcium	Raw	mg/L	HY	2	2	0	9	10	9		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	8	9	9		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Reticulation		HY	2	2	0	12	14	13		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Magnesium	Raw	mg/L	HY	2	2	0	15	16	16		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	13	15	14		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Reticulation		HY	2	2	0	20	21	21		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Hydrogen	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Bicarbonate	Raw	mg/L	HY	2	2	0	95	102	99		QFSS
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Treated		HY	2	2	0	82	100	91		QFSS
Carbonate         Raw         mg/L         HY         2         2         0         0.1         0.1         0.1         QFSS           Treated         HY         2         2         0         0.1         0.1         0.1         QFSS           Reticulation         HY         2         2         0         0.1         0.1         0.1         QFSS           Hydroxide         Raw         mg/L         HY         2         2         0         0.4         0.4         0.4         QFSS		Reticulation		HY	2	2	0	128	134	131		QFSS
Treated         HY         2         2         0         0.1         0.1         QFSS           Reticulation         HY         2         2         0         0.4         0.4         0.4         QFSS           Hydroxide         Raw         mg/L         HY         2         2         0         0.0         0.0         0.0         QFSS	Carbonate	Raw	mg/L	HY	2	2	0	0.1	0.1	0.1		QFSS
Reticulation         HY         2         2         0         0.4         0.4         QFSS           Hydroxide         Raw         mg/L         HY         2         2         0         0.0         0.0         0.0         QFSS		Treated		HY	2	2	0	0.1	0.1	0.1		QFSS
Hydroxide         Raw         mg/L         HY         2         2         0         0.0         0.0         0.0         QFSS		Reticulation		HY	2	2	0	0.4	0.4	0.4		QFSS
	Hydroxide	Raw	mg/L	HY	2	2	0	0.0	0.0	0.0		QFSS



	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Chloride	Raw	mg/L	HY	2	2	0	22	33	28		QFSS
	Treated		HY	2	2	0	36	38	37		QFSS
	Reticulation		HY	2	2	0	37	68	53		QFSS
Fluoride	Raw	mg/L	HY	2	2	0	0.06	0.06	0.06		QFSS
	Treated		HY	2	2	0	0.05	0.06	0.05		QFSS
	Reticulation		HY	2	2	0	0.06	0.07	0.07		QFSS
Nitrate	Raw	mg/L	HY	2	2	0	1.30	1.6	1.3		QFSS
	Treated		HY	2	2	0	0.99	1.50	1.25		QFSS
	Reticulation		HY	2	2	0	0.61	1.40	1.01		QFSS
Sulphate	Raw	mg/L	HY	2	2	0	6.7	8.0	7.4		QFSS
	Treated		HY	2	2	0	6.3	6.7	6.5		QFSS
	Reticulation		HY	2	2	0	6.8	6.9	6.9		QFSS
Iron	Raw	mg/L	HY	2	2	0	0.33	0.41	0.57		QFSS
	Treated		М	23	23	0	0.001	0.099	0.004	0.001	WTP
	Reticulation		HY	2	2	0	0.01	0.01	0.01		QFSS
Manganese	Raw	mg/L	HY	2	2	0	0.004	0.005	0.005		QFSS
	Treated		HY	2	2	0	0.001	0.004	0.003		QFSS
	Reticulation		HY	2	2	0	0.001	0.004	0.003		QFSS
Zinc	Raw	mg/L	HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
	Treated		HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
	Reticulation		HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
Aluminium	Raw	mg/L	HY	2	2	0	0.30	0.53	0.42		QFSS
	Treated		М	23	23	0	0.001	0.015	0.006	0.001	WTP
	Reticulation		HY	2	2	0	< 0.03	< 0.03	< 0.3		QFSS
Boron	Raw	mg/L	HY	2	2	0	0.03	0.04	0.04		QFSS
	Treated		HY	2	2	0	0.03	0.04	0.04		QFSS
	Reticulation		HY	2	2	0	0.03	0.03	0.03		QFSS
Copper	Raw	mg/L	HY	2	2	0	< 0.003	< 0.003	< 0.003		QFSS
	Treated		HY	2	2	0	< 0.003	< 0.003	< 0.003		QFSS
	Reticulation		HY	2	2	0	0.004	0.013	0.009		QFSS
Annual Aluminium	Raw	mg/L	Y	1	1	0	0.51	0.51	0.51		QFSS
Metals	Treated		Y	1	1	0	0.14	0.14	0.14		QFSS
	Reticulation		Y	1	1	0	0.032	0.032	0.032		QFSS
Annual Arsenic	Raw	mg/L	Y	1	1	0	0.0016	0.0016	0.0016		QFSS
Metals	Treated		Y	1	1	0	0.0008	0.0008	0.0008		QFSS
	Reticulation		Y	1	1	0	0.0013	0.0013	0.0013		QFSS



en al displacement										The second second second second second
Annual Cadmium	Raw	mg/L	Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
Metals	Treated		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
	Reticulation		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
Annual Chromium	Raw	mg/L	Y	1	1	0	0.0029	0.0029	0.0029	QFSS
Metals	Treated		Y	1	1	0	0.0009	0.0009	0.0009	QFSS
	Reticulation		Y	1	1	0	0.0008	0.0008	0.0008	QFSS
Annual Copper	Raw	mg/L	Y	1	1	2	0.002	0.002	0.002	QFSS
Metals	Treated		Y	1	1	0	0.014	0.014	0.014	QFSS
	Reticulation		Y	1	1	0	0.008	0.008	0.008	QFSS
Annual Iron Metals	Raw	mg/L	Y	1	1	0	0.71	0.71	0.71	QFSS
	Treated		Y	1	1	0	0.029	0.029	0.029	QFSS
	Reticulation		Y	1	1	0	0.014	0.014	0.014	QFSS
Annual Lead Metals	Raw	mg/L	Y	1	1	0	0.0006	0.0006	0.0006	QFSS
	Treated		Y	1	1	0	0.0017	0.0017	0.0017	QFSS
	Reticulation		Y	1	1	0	0.0005	0.0005	0.0005	QFSS
Annual Manganese	Raw	mg/L	Y	1	1	0	0.12	0.12	0.12	QFSS
Metals	Treated		Y	1	1	0	0.35	0.35	0.35	QFSS
	Reticulation		Y	1	1	0	0.0007	0.0007	0.0007	QFSS
Annual Nickel	Raw	mg/L	Y	1	1	0	0.01	0.01	0.01	QFSS
Metals	Treated		Y	1	1	0	0.0089	0.0089	0.0089	QFSS
	Reticulation		Y	1	1	0	0.0009	0.0009	0.0009	QFSS
Annual Zinc Metals	Raw	mg/L	Y	1	1	0	0.003	0.003	0.003	QFSS
	Treated		Y	1	1	0	0.025	0.025	0.025	QFSS
	Reticulation		Y	1	1	0	0.006	0.006	0.006	QFSS



### Table 7 - Kilkivan Water Analysis

Parameter	Scheme	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated	1	D	362	362	0	1.01	1.95	1.30	0.01	WTP
	Reticulation		W	24	24	0	0.45	1.15	0.82		QFSS
Total	Raw	mg/L	-	-	-	-	-	-	-	-	-
Trihalomethanes	Treated		-	-	-	-	-	-	-	-	-
	Reticulation	1	М	10	10	0	23	94	31		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated		-	-	-	-	-	-	-	-	-
	Reticulation		М	24	24	0	0	0	0		QFSS
рН	Raw		HY	6	6	0	7.54	8.11	7.71		QFSS
	Treated		D	362	362	0	7.06	7.90	7.55	1	WTP
	Reticulation		HY	2	2	0	7.92	8.05	7.99		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	6	6	0	254	511	403		QFSS
	Treated		М	26	26	0	92	232	195	1	WTP
	Reticulation		HY	2	2	0	199	199	199		QFSS
Temporary	Raw	mgCaCO₃/L	HY	6	6	0	234	385	346		QFSS
Hardness	Treated		HY	2	2	0	171	222	197		QFSS
	Reticulation		HY	2	2	0	199	199	199		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	6	6	0	230	390	350		QFSS
	Treated		М	26	26	0	120	260	190	1	WTP
	Reticulation		HY	2	2	0	220	220	220		QFSS
Residual Alkalinity	Raw	meq/L	HY	6	6	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.4	0.6	0.5		QFSS
	Reticulation		HY	2	2	0	0.4	0.5	0.5		QFSS
Silica	Raw	mg/L	HY	6	6	0	24	34	29		QFSS
	Treated		HY	2	2	0	19	21	20		QFSS
	Reticulation		HY	2	2	0	20	20	20		QFSS
Total Dissolved lons	Raw	mg/L	HY	6	6	0	518	1010	803		QFSS
	Treated		HY	2	2	0	447	572	510		QFSS
	Reticulation		HY	2	2	0	502	516	509		QFSS
Total Dissolved	Raw	mg/L	HY	6	6	0	410	800	620		QFSS
Solids	Treated		HY	2	2	0	340	440	390		QFSS



	Reticulation		HY	2	2	0	390	400	395		QFSS
True Colour	Raw	Hazen	HY	6	6	0	<8	<8	<8		QFSS
	Treated		D	362	362	0	0	0	0	1	WTP
	Reticulation		HY	2	2	0	<8	<8	<8		QFSS
Turbidity	Raw	NTU	HY	6	6	0	<1	<1	<1		QFSS
	Treated		D	362	362	0	0.01	0.50	0.09	0.001	WTP
	Reticulation		HY	2	2	0	<1	<1	<1		QFSS
pH Saturation	Raw		HY	6	6	0	7.0	7.7	7.2		QFSS
	Treated		HY	2	2	0	7.6	7.8	7.7		QFSS
	Reticulation		HY	2	2	0	7.7	7.7	7.7		QFSS
Saturation Index	Raw		HY	6	6	0	-0.2	0.9	0.7		QFSS
	Treated		HY	2	2	0	0.0	0.3	0.2		QFSS
	Reticulation		HY	2	2	0	0.2	0.4	0.3		QFSS
Mole Ratio	Raw		HY	6	6	0	1.9	2.4	2.3		QFSS
	Treated		HY	2	2	0	2.1	2.2	2.2		QFSS
	Reticulation		HY	2	2	0	1.9	2.1	2.0		QFSS
Sodium	Raw	mg/L	HY	6	6	0	53	120	85		QFSS
	Treated		HY	2	2	0	68	89	79		QFSS
	Reticulation		HY	2	2	0	75	79	77		QFSS
Potassium	Raw	mg/L	HY	6	6	0	1.7	2.4	2.1		QFSS
	Treated		HY	2	2	0	1.3	1.5	1.4		QFSS
	Reticulation		HY	2	2	0	1.4	1.4	1.4		QFSS
Calcium	Raw	mg/L	HY	6	6	0	26	82	61		QFSS
	Treated		HY	2	2	0	23	32	28		QFSS
	Reticulation		HY	2	2	0	28	29	29		QFSS
Magnesium	Raw	mg/L	HY	6	6	0	46	74	61		QFSS
	Treated		HY	2	2	0	28	35	32		QFSS
	Reticulation		HY	2	2	0	31	31	31		QFSS
Hydrogen	Raw	mg/L	HY	6	6	0	0.0	0.0	0.0		QFSS
	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Bicarbonate	Raw	mg/L	HY	6	6	0	284	467	417		QFSS
	Treated		HY	2	2	0	243	291	267		QFSS
	Reticulation		HY	2	2	0	264	268	266		QFSS
Carbonate	Raw	mg/L	HY	6	6	0	0.7	3.2	1.7		QFSS
	Treated		HY	2	2	0	0.9	1.3	1.1		QFSS
	Reticulation		HY	2	2	0	1.4	1.9	1.7		QFSS
Hydroxide	Raw	mg/L	HY	6	6	0	0.0	0.0	0.0		QFSS



	Treated		HY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Chloride	Raw	mg/L	HY	6	6	0	84	260	170		QFSS
	Treated		HY	2	2	0	77	120	99		QFSS
	Reticulation		HY	2	2	0	96	100	98		QFSS
Fluoride	Raw	mg/L	HY	6	6	0	0.10	0.21	0.18		QFSS
	Treated		HY	2	2	0	0.9	0.11	0.10		QFSS
	Reticulation		HY	2	2	0	0.1	0.1	0.1		QFSS
Nitrate	Raw	mg/L	HY	6	6	0	0.06	2.90	0.09		QFSS
	Treated		HY	2	2	0	0.21	1.10	0.66		QFSS
	Reticulation		HY	2	2	0	0.34	0.91	0.63		QFSS
Sulphate	Raw	mg/L	HY	6	6	0	2.10	18.0	7.2		QFSS
	Treated		HY	2	2	0	3.3	4.5	3.9		QFSS
	Reticulation		HY	2	2	0	4.2	4.4	4.3		QFSS
Iron	Raw	mg/L	HY	6	6	0	<0.01	<0.01	<0.01		QFSS
	Treated		М	26	26	0	0.00	0.01	0.00	0.01	WTP
	Reticulation		HY	2	2	0	<0.01	<0.01	<0.01		QFSS
Manganese	Raw	mg/L	HY	6	6	0	0.002	0.670	0.317		QFSS
	Treated		М	16	16	0	0.22	0.59	0.32	0.01	WTP
	Reticulation		HY	2	2	0	< 0.001	< 0.001	< 0.001		QFSS
Zinc	Raw	mg/L	HY	6	6	0	< 0.06	< 0.06	<0.06		QFSS
	Treated		HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
	Reticulation		HY	2	2	0	< 0.06	< 0.06	<0.06		QFSS
Aluminium	Raw	mg/L	HY	6	6	0	< 0.03	< 0.03	<0.03		QFSS
	Treated		М	26	26	0	0.00	0.01	0.00	0.1	WTP
	Reticulation		HY	2	2	0	< 0.03	< 0.03	<0.03		QFSS
	Raw		HY	6	6	0	0.04	0.07	0.06		QFSS
Boron	Treated	mg/L	HY	2	2	0	0.06	0.06	0.06		QFSS
	Reticulation		HY	2	2	0	0.06	0.06	0.06		QFSS
	Raw		HY	6	6	0	< 0.003	0.011	0.004		QFSS
Copper	Treated	mg/L	HY	2	2	0	< 0.003	0.003	0.003		QFSS
	Reticulation		HY	2	2	0	0.061	0.080	0.071		QFSS
	Raw		Y	3	3	0	0.003	0.005	0.004		QFSS
Annual Aluminium	Treated	mg/L	Y	1	1	0	<0.0030	< 0.0030	<0.0030		QFSS
ivietais	Reticulation	_	Y	1	1	0	<0.0030	< 0.0030	< 0.0030		QFSS
Americal According	Raw		Y	3	3	0	0.0011	0.0051	0.0021		QFSS
Annual Arsenic Motals	Treated	mg/L	Y	1	1	0	0.0012	0.0012	0.0012		QFSS
IVIELAIS	Reticulation		Y	1	1	0	0.001	0.001	0.001		QFSS



	Raw		Y	3	3	0	<0.0001	<0.0001	<0.0001	QFSS
Annual Cadmium	Treated	mg/L	Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
IVIELAIS	Reticulation		Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
	Raw		Y	3	3	0	<0.0001	0.0004	0.0001	QFSS
Annual Chromium	Treated	mg/L	Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
Wetais	Reticulation		Y	1	1	0	0.0001	0.0001	0.0001	QFSS
Annual Common	Raw		Y	3	3	0	<0.001	0.006	0.004	QFSS
Annual Copper Motols	Treated	mg/L	Y	1	1	0	0.002	0.002	0.002	QFSS
IVIELAIS	Reticulation		Y	1	1	0	0.084	0.084	0.084	QFSS
	Raw		Y	3	3	0	0.01	3.00	0.08	QFSS
Annual Iron Metals	Treated	mg/L	Y	1	1	0	<0.0050	<0.0050	<0.0050	QFSS
	Reticulation	<u> </u>	Y	1	1	0	0.006	0.006	0.006	QFSS
	Raw		Y	3	3	0	<0.0001	0.0003	0.0002	QFSS
Annual Lead Metals	Treated	mg/L	Y	1	1	0	<0.0001	<0.0001	<0.0001	QFSS
	Reticulation		Y	1	1	0	0.0011	0.0011	0.0011	QFSS
	Raw		Y	3	3	0	0.0037	0.66	0.57	QFSS
Annual Manganese	Treated	mg/L	Y	1	1	0	0.0002	0.0002	0.0002	QFSS
Wetais	Reticulation		Y	1	1	0	0.0002	0.0002	0.0002	QFSS
	Raw		Y	3	3	0	0.0011	0.0029	0.0014	QFSS
Annual Nickel	Treated	mg/L	Y	1	1	0	0.0002	0.0002	0.0002	QFSS
Wetais	Reticulation		Y	1	1	0	0.0002	0.0002	0.0002	QFSS
	Raw		Y	3	3	0	0.002	0.011	0.005	QFSS
Annual Zinc Metals	Treated	mg/L	Y	1	1	0	0.002	0.002	0.002	QFSS
	Reticulation		Y	1	1	0	0.021	0.021	0.021	QFSS



### Table 8 - Rainbow Beach Water Analysis

Parameter	Scheme	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
Chlorine Residual	Raw	mg/L	-	-	-	-	-	-	-	-	-
	Treated		D	315	315	0	0.73	1.37	0.94	0.01	WTP
	Reticulation	1	W	85	85	0	0.18	0.98	0.72		QFSS
Total	Raw	ug/L	-	-	-	-	_	-	-	-	-
Trihalomethanes	Treated		-	-	-	-	-	-	-	-	-
	Reticulation	1	М	11	11	0	6	28	11		QFSS
E. Coli	Raw	mpn/100mL	-	-	-	-	-	-	-	-	-
	Treated	]	М	12	12	0	0	0	0		QFSS
	Reticulation		W	85	85	0	0	0	0		QFSS
рН	Raw		HY	8	8	0	4.95	7.33	5.36		QFSS
	Treated		D	315	315	0	6.6	7.3	7.1	1	WTP
	Reticulation		HY	2	2	0	4.92	7.40	6.16		QFSS
Total Hardness	Raw	mgCaCO₃/L	HY	8	8	0	7	9	8		QFSS
	Treated		М	12	12	0	8	10	10	1	WTP
	Reticulation		HY	2	2	0	8	12	10		QFSS
Temporary	Raw	mgCaCO₃/L	HY	8	8	0	2	9	3		QFSS
Hardness	Treated		HY	2	2	0	8	8	8		QFSS
	Reticulation		HY	2	2	0	2	12	7		QFSS
Alkalinity	Raw	mgCaCO₃/L	HY	8	8	0	2	99	3		QFSS
	Treated		М	12	12	0	3	138	125	1	WTP
	Reticulation		HY	2	2	0	2	110	56		QFSS
Residual Alkalinity	Raw	meq/L	HY	8	8	0	0.0	1.8	0.0		QFSS
	Treated		HY	2	2	0	1.8	2.1	2.0		QFSS
	Reticulation		HY	2	2	0	0.0	1.9	1.0		QFSS
Silica	Raw	mg/L	HY	8	8	0	9	10	9		QFSS
	Treated		HY	2	2	0	9	9	9		QFSS
	Reticulation		HY	2	2	0	9	10	10		QFSS
Total Dissolved Ions	Raw	mg/L	HY	8	8	0	43	214	48		QFSS
	Treated		HY	2	2	0	214	237	226		QFSS
	Reticulation		HY	2	2	0	54	223	139		QFSS
Total Dissolved	Raw	mg/L	HY	8	8	0	50	160	56		QFSS
Solids	Treated		HY	2	2	0	160	180	170		QFSS



Reticulation         HY         2         2         0         61         170         116           True Colour         Raw         Hazen         HY         8         8         0         <8         <8         <8           Treated         W         315         315         0         1         1         1	QFSS QFSS
True Colour         Raw         Hazen         HY         8         8         0         <8         <8           Treated         W         315         315         0         1         1         1	QFSS
Treated         W         315         315         0         1         1         1	
	WTP
Reticulation         HY         2         2         0         <8         <8         <8	QFSS
Turbidity         Raw         NTU         HY         8         8         0         <1         2         <1	QFSS
Treated         W         315         315         0         2.66         0.237         0.001	WTP
Reticulation         HY         2         2         0         <1         <1	QFSS
pH Saturation Raw HY 8 8 0 9.3 11.4 11.2	QFSS
Treated HY 2 2 0 9.5 9.6 9.6	QFSS
Reticulation         HY         2         2         0         9.0         11.3         10.2	QFSS
Saturation Index         Raw         HY         8         8         0         -6.4         -2.0         -5.8	QFSS
Treated HY 2 2 0 -2.6 -2.4 -2.5	QFSS
Reticulation HY 2 2 0 -6.4 -1.6 -4.0	QFSS
Mole Ratio         Raw         HY         8         8         0         2.5         6.5         6.0	QFSS
Treated HY 2 2 0 2.6 2.9 2.8	QFSS
Reticulation         HY         2         2         0         2.4         6.5         4.5	QFSS
Sodium Raw mg/L HY 8 8 0 12 62 14	QFSS
Treated HY 2 2 0 65 68 65	QFSS
Reticulation HY 2 2 0 16 62 39	QFSS
Potassium Raw mg/L HY 8 8 0 0.39 0.65 0.53	QFSS
Treated HY 2 2 0 0.53 0.53	QFSS
Reticulation         HY         2         2         0         0.49         0.54         0.52	QFSS
Calcium Raw mg/L HY 8 8 0 0 1 1	QFSS
Treated         HY         2         2         0         1         1         1	QFSS
Reticulation         HY         2         2         0         1         3         2	QFSS
Magnesium Raw mg/L HY 8 8 0 1 2 2	QFSS
Treated         HY         2         2         0         2         2         2	QFSS
Reticulation         HY         2         2         0         1         2         2	QFSS
Hydrogen Raw mg/L HY 8 8 0 0.0 0.0 0.0	QFSS
Treated HY 2 2 0 0.0 0.0 0.0	QFSS
Reticulation         HY         2         2         0         0.0         0.0         0.0	QFSS
Bicarbonate Raw mg/L HY 8 8 0 3 121 4	QFSS
Treated         HY         2         2         0         121         138         130	QFSS
Reticulation HY 2 2 0 3 128 66	QFSS
Carbonate Raw mg/L HY 8 8 0 0.0 0.1 0.0	QFSS
Treated         HY         2         2         0         0.1         0.1	QFSS
Reticulation         HY         2         2         0         0.0         0.2         0.1	QFSS
Hydroxide Raw mg/L HY 8 8 0 0.0 0.0 0.0	QFSS



	Treated		ΗY	2	2	0	0.0	0.0	0.0		QFSS
	Reticulation		HY	2	2	0	0.0	0.0	0.0		QFSS
Chloride	Raw	mg/L	HY	8	8	0	22	27	24		QFSS
	Treated		HY	2	2	0	25	25	25		QFSS
	Reticulation		HY	2	2	0	25	28	27		QFSS
Fluoride	Raw	mg/L	HY	8	8	0	< 0.02	< 0.02	< 0.02		QFSS
	Treated		HY	2	2	0	<0.02	< 0.02	< 0.02		QFSS
	Reticulation		HY	2	2	0	< 0.02	< 0.02	< 0.02		QFSS
Nitrate	Raw	mg/L	HY	8	8	0	0.13	1.00	0.31		QFSS
	Treated		HY	2	2	0	0.39	0.39	0.39		QFSS
	Reticulation		HY	2	2	0	0.12	0.39	0.26		QFSS
Sulphate	Raw	mg/L	HY	8	8	0	2.8	3.7	3.0		QFSS
	Treated		HY	2	2	0	3.0	3.1	3.1		QFSS
	Reticulation		HY	2	2	0	3.1	3.8	3.5		QFSS
Iron	Raw	mg/L	HY	8	8	0	<0.01	0.02	0.01		QFSS
	Treated		М	12	12	0	1.03	0.09	0.05	0.01	WTP
	Reticulation		HY	2	2	0	<0.01	0.02	0.01		QFSS
Manganese	Raw	mg/L	ΗY	8	8	0	<0.001	0.004	0.003		QFSS
	Treated		М	12	12	0	0.05	0.200	0.050	0.01	WTP
	Reticulation		HY	2	2	0	<0.001	0.002	0.001		QFSS
Zinc	Raw	mg/L	HY	8	8	0	<0.06	< 0.06	< 0.06		QFSS
	Treated		HY	2	2	0	<0.06	<0.06	< 0.06		QFSS
	Reticulation		HY	2	2	0	<0.06	< 0.06	< 0.06		QFSS
Aluminium	Raw	mg/L	HY	8	8	0	<0.03	0.03	< 0.03		QFSS
	Treated		М	12	12	0	0.003	0.108	0.021	0.1	WTP
	Reticulation		HY	2	2	0	< 0.03	< 0.03	< 0.03		QFSS
Boron	Raw	mg/L	HY	8	8	0	< 0.02	0.02	< 0.02		QFSS
	Treated		HY	2	2	0	< 0.02	< 0.02	< 0.02		QFSS
	Reticulation		HY	2	2	0	< 0.02	0.02	0.02		QFSS
Copper	Raw	mg/L	HY	8	8	0	< 0.003	0.017	0.009		QFSS
	Treated		HY	2	2	0	0.026	0.029	0.028		QFSS
	Reticulation		HY	2	2	0	< 0.003	0.010	0.007		QFSS
Annual Aluminium	Raw	mg/L	Y	4	4	0	0.026	0.26	0.140		QFSS
Metals	Treated		Y	1	1	0	0.029	0.029	0.029		QFSS
	Reticulation		Y	1	1	0	0.026	0.026	0.026		QFSS
Annual Arsenic	Raw	mg/L	Y	4	4	0	< 0.0001	0.0003	0.0002		QFSS
Metals	Treated		Y	1	1	0	< 0.0001	<0.0001	<0.0001		QFSS
	Reticulation		Y	1	1	0	< 0.0001	<0.0001	< 0.0001		QFSS



Annual Cadmium	Raw	mg/L	Y	4	4	0	< 0.0001	< 0.0001	< 0.0001	(	QFSS
Metals	Treated		Y	1	1	0	< 0.0001	< 0.0001	< 0.0001	(	QFSS
	Reticulation		Y	1	1	0	< 0.0001	< 0.0001	< 0.0001	(	QFSS
Annual Chromium	Raw	mg/L	Y	4	4		0.0003	0.0006	0.0004	(	QFSS
Metals	Treated		Y	1	1	0	0.0002	0.0002	0.0002	(	QFSS
	Reticulation		Y	1	1	0	0.0003	0.0003	0.0003	(	QFSS
Annual Copper	Raw	mg/L	Y	4	4	0	0.002	0.028	0.011	(	QFSS
Metals	Treated		Y	1	1	0	0.027	0.027	0.027	(	QFSS
	Reticulation		Y	1	1	0	0.009	0.009	0.009	(	QFSS
Annual Iron Metals	Raw	mg/L	Y	4	4	0	0.041	0.490	0.091	(	QFSS
	Treated		Y	1	1	0	0.025	0.025	0.025	(	QFSS
	Reticulation		Y	1	1	0	0.026	0.026	0.026	(	QFSS
Annual Lead Metals	Raw	mg/L	Y	4	4	0	< 0.0001	0.012	0.0022	(	QFSS
	Treated		Y	1	1	0	0.0004	0.0004	0.0004	(	QFSS
	Reticulation		Y	1	1	0	0.0009	0.0009	0.0009	(	QFSS
Annual Manganese	Raw	mg/L	Y	4	4	0	0.0010	0.0055	0.0030	(	QFSS
Metals	Treated		Y	1	1	0	0.0016	0.0016	0.0016	(	QFSS
	Reticulation		Y	1	1	0	0.0006	0.0006	0.0006	(	QFSS
Annual Nickel	Raw	mg/L	Y	4	4	0	0.0002	0.0008	0.0004	(	QFSS
Metals	Treated		Y	1	1	0	0.0002	0.0002	0.0002	(	QFSS
	Reticulation		Y	1	1	0	0.0002	0.0002	0.0002	(	QFSS
Annual Zinc Metals	Raw	mg/L	Y	4	4	0	0.005	0.200	0.011	(	QFSS
	Treated		Y	1	1	0	0.006	0.006	0.006	(	QFSS
	Reticulation		Y	1	1	0	0.007	0.007	0.007	(	QFSS

# Appendix C: Risk management improvement plan - progress

					RMIP				
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
	Bacteria/ Virus (Reticulation)		Reservoir ingress	Reservoir integrity	Preventive maintenance programs (5 yearly cleaning unless required sooner, and external inspection); Draft Reservoir Inspection Procedure Disinfectant Residual	Finalise Reservoir Inspection Procedure	Investigate use of drones to inspect reservoir roofs	Program of reservoir hatch and ladder enclosure replacements (10 year capital program - ongoing)	Dates revised in the new RMIP
	Protozoa (Crypto/ Giardia) (Retic)		Flood	Pressurised network	Repair as soon as possible, disaster management plan, leakage management software		Install flow/pressure monitoring (for confirmation of network integrity)		Commenced investigation for conversion to SCADA
	Bacteria/ Virus (Reticulation)		Backflow	Disinfection residual	Plumbing regulations, regular audits/inspections				Council to check STP backflow prevention measures
	Loss of Supply		PLC failure/ lightning strike/ rough power	Reservoir storage	Incident management plan; Disaster management plan		Review control systems at WTPs and consider additional backup/ protections		
Whole of System	All hazards		Human Error (either due to knowledge/training, resourcing or fatigue)	Staff training, fortnightly head operator/ reticulation meetings	All staff trained to Cert 3, CCPs, ongoing training, other procedures and work instructions; Water hygiene training	-	Roll out Aquacard training; Review all operational procedures listed in the DWQMP	Develop succession plan for operators; Install new verification monitoring locations (focus on reservoir outlets)	
	Chlorate		Breakdown of sodium hypochlorite (not relevant for the gas chlorine schemes)	Various (refer to scheme risk assessments)	Less stock on hand at smaller schemes (some issues when chlorine usage drops)	Review/implement inventory control and testing of hypo quality at time of purchase	Investigative monitoring for chlorate to determine need/frequency for inclusion in verification monitoring		Chlorate investigation to be included in 2023 DWQMP review
	All hazards		Operation of a bypass valve allowing untreated water into the reticulation	Various (refer to scheme risk assessments)		Cap and clearly mark all bypass valves	Alter bypass pipework to include air gaps		Some have been capped, marked and/or removed, but not all
	Bacteria/ Virus (Reticulation)	Taste and odour	Offline reservoir returned into service, supply of stagnant or potentially contaminated water to customers (with no chlorine residual barrier)	Dose chlorine, and undertake water quality testing before returning a reservoir to service.			Roll out Aquacard training		
	Bacteria/ Virus (Reticulation)		Cross contamination between sewer and water maintenance & operations	General staff awareness and training	Disinfectant residual; sewerage maintenance tools and equipment stay at the plant	Aquacard training for all Operations staff	Investigate supply options for 4% hypo		

# Table 18 – Whole of System Risk Register including Progress against the risk management improvement program (RMIP) in the approved DWQMP- All Schemes



# Table 19 – Progress against the risk management improvement program in the approved DWQMP- Amamoor

							RMIP		
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
WTP bypass	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)	Turbidity, Manganese, Iron	Accidental or deliberate use of bypass	Bolt installed to prevent operation	Operator training, only use under incident management team	Air gap the bypass			Complete. Plant bypass removed
Supernatant return	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)		Supernatant return - concentration of oocysts	Filtration and UV	Not currently returning but need a long term option for supernatant	Investigate local usage of supernatant or return to creek (if allowable)			New plant design has supernatant return limited by pumped flow.
Pre- chlorination	Disinfection byproducts (surface water)		Reaction with organic matter and chlorine	Chlorination OCP	Control and monitoring of pre-dose to provide Fe and Mn removal without over-dosing				Gathering data for the THM reduction action plans
Chlorine Disinfection	Disinfection byproducts (surface water)		Reaction with organic matter and chlorine	Disinfection OCP	Control and monitoring of pre-dose to provide Fe and Mn removal without over-dosing				
Reservoir	Bacteria/ Virus (Reticulation)		Reservoir ingress	Sealed tank	Disinfectant residual	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	New roof installed Reservoir cleaned
Storage	Protozoa (Crypto/ Giardia) (Retic)		Reservoir ingress	Sealed tank		Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	New roof installed Reservoir cleaned



# Table 20 – Progress against the risk management improvement program in the approved DWQMP- Cooloola Cove/Tin Can Bay

							RMIP		
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
Coagulation/ Flocculation	Protozoa (Crypto/ Giardia) (Teewah Creek)	Colour	Underdose coagulant	Coagulation OCP	Jar testing as required	Turbidity meter connection into ClearSCADA			Complete. Instrumentation connected to SCADA
Sand Filters	Protozoa (Crypto/ Giardia) (Teewah Creek)		Filter breakthrough	Filtration OCP		Online monitoring and automated plant shutdown - filtered water turbidity (Cooloola TCB)	Investigate options for filter to waste		Instrumentation connected to SCADA
Clear Water Storage	Bacteria/ Virus (Reticulation)		Ingress into tank	Sealed storage	Disinfection residual	Refer to Whole of System RMIP (Reservoir ingress); Clean and inspect CWS	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	
	Protozoa (Crypto/ Giardia) (Retic)		Ingress into tank	Sealed storage		Refer to Whole of System RMIP (Reservoir ingress); Clean and inspect CWS	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	



# Table 21 – Progress against the risk management improvement program in the approved DWQMP- Goomeri

							RMIP		
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
Surface Water (Kinbombi Creek, Weir, OS Storages)	Hardness/TDS		Naturally occurring	N/A	lon exchange water softener (but not currently used)	Develop long term water supply & security strategy for Goomeri (incl. treatment processes for the available sources)			Whilst a high risk, this is lower priority as it is not based on a health outcome
Groundwater	Hardness/TDS		Naturally occurring		Ion exchange water softener (but not currently used)	Develop long term water supply & security strategy for Goomeri (incl. treatment processes for the available sources)			Whilst a high risk, this is lower priority as it is not based on a health outcome
Bypass	All hazards		Accidental or deliberate use of bypass	Air gapped	Staff training - Not intentionally used	Investigate potential second bypass at WTP - lockout			
Sand filtration	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)	Protozoa (Crypto/ Giardia) (Western bores); Turbidity	Filter breakthrough	Filtration OCP; Running on bore water only until RMIP action for filter upgrade is complete	Combined filter outlet turbidity monitoring; Ozone system		Filter replacement, install individual online turbidity meters	Investigate feasibility of increasing ozone contact tank to allow increased protozoan deactivation, or alternatively cost out a UV system	New UV system commissioned September 2021
Primary Disinfection (Hypo)	Chlorate		Breakdown of sodium hypochlorite				Refer to Whole of System RMIP (Chlorate)		
Water softener	Hardness/TDS		Naturally occurring	N/A	lon exchange water softener (but not currently used)	Develop long term water supply & security strategy for Goomeri (incl. treatment processes for the available sources)			Whilst a high risk, this is lower priority as it is not based on a health outcome
Secondary disinfection (hypo)	Chlorate		Breakdown of sodium hypochlorite				Refer to Whole of System RMIP (Chlorate)		
	Bacteria/ Virus (Reticulation)	Protozoa (Crypto/ Giardia) (Retic)	Ingress into Reservoir	Sealed storage, vermin proofed	Monitoring point at the reservoir; tank drained, cleaned and inspected in 2018	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Reservoir cleaned 2021
Goomeri Reservoir	Disinfection byproducts (surface water)		Water age, low turnover	Bore water in use until filter refurbishment	Ozone BAC		Investigate options for increasing turnover of reservoir		



# Table 22 – Progress against the risk management improvement program in the approved DWQMP- Gympie

							RMIP	-	
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
Mary River	Loss of Supply		Asset failure - raw water tunnel	Reservoir storage	Disaster Management Plan		Develop contingency plan for raw water tunnel bypass		
Supernatant return	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)		Concentration through waste recycle	Filtration CCP	Online monitoring of filtration	Investigate possibility of ceasing this practice and sending supernatant to sewer (currently being scoped)			Current return is less than 5%
Bypass of filter	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)		Bypass from sedimentation tank into clear water	Filter bypass - dead plate on the valve - capped.	Not used under normal circumstances	Refer to Whole of System RMIP (Bypass)	Refer to Whole of System RMIP (Bypass)		
Clear Water Storage	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)		Failure of backwash procedure allowing dirty water to enter the Clear Water Tank	Operator training and awareness	Backwash Procedure (EWSI1104)		SCADA Lockout to prevent accidental initiation of backwash		
	Bacteria/ Virus (Reticulation)	Protozoa (Crypto/ Giardia) (Retic)	Ingress into reservoirs - Jones Hill in-ground	Residual disinfection	Sealed storages	Refer to Whole of System RMIP (Reservoir ingress); Fill gaps underneath corrugations	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	
	Bacteria/ Virus (Reticulation)		Ingress into reservoirs - Penny Road and Noosa Road WPS	Sealed storages	Residual disinfection	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Currently not in use
Reservoir Storage	Protozoa (Crypto/ Giardia) (Retic)		Ingress into reservoirs - Penny Road and Noosa Road WPS	Sealed storages		Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Currently not in use
	Bacteria/ Virus (Reticulation)		Ingress into reservoirs - other storages	Sealed storages	Residual disinfection	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	
	Protozoa (Crypto/ Giardia) (Retic)		Ingress into reservoirs - other storages	Sealed storages		Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	



# Table 23 – Progress against the risk management improvement program in the approved DWQMP- Imbil

							RMIP		
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
Reservoir	Bacteria/ Virus (Reticulation)		Reservoir ingress	Sealed reservoirs	Disinfectant residual	Refer to Whole of System RMIP (Reservoir ingress); Interim works complete, next on the list for roof renewal	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	New roof installed (completed 2020) Reservoir cleaned 2021
Storage	Protozoa (Crypto/ Giardia) (Retic)		Reservoir ingress	Sealed reservoirs		Refer to Whole of System RMIP (Reservoir ingress); Interim works complete, next on the list for roof renewal	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	New roof installed (completed 2020) Reservoir cleaned 2021



# Table 24 – Progress against the risk management improvement program in the approved DWQMP- Kandanga

							RMIP		
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
WTP bypass	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)	Turbidity, Manganese, Iron	Accidental or deliberate use of bypass	Bolt installed to prevent operation	Operator training, only use under incident management team	Air gap the bypass			There is no bypass for the entire plant
Supernatant return	Protozoa (Crypto/ Giardia) (Gympie, Mary Valley, Kinbombi)		Supernatant return - concentration of oocysts	Filtration and UV	Not currently returning but need a long term option for supernatant	Investigate local usage of supernatant or return to creek (if allowable)			New plant design has supernatant return limited by pumped flow.
Reservoir	Bacteria/ Virus (Reticulation)		Reservoir ingress	Sealed tank	Disinfectant residual; recent remedial works	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	New roof installed (completed 2020) Reservoir cleaned 2021
Storage	Protozoa (Crypto/ Giardia) (Retic)		Reservoir ingress	Sealed tank	Disinfectant residual; recent remedial works	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	New roof installed (completed 2020) Reservoir cleaned 2021



# Table 25 – Progress against the risk management improvement program in the approved DWQMP- Kilkivan

							RMIP		
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
Bypass	All hazards		Accidental or deliberate use of bypass	Marked (blue); signed on GIS	Staff training - Not intentionally used	Refer to Whole of System RMIP (Bypass) Investigate potential additional bypasses in the network	Refer to Whole of System RMIP (Bypass)		
Disinfection (hypo)	Chlorate		Breakdown of sodium hypochlorite				Refer to Whole of System RMIP (Chlorate)		



# Table 26 – Progress against the risk management improvement program in the approved DWQMP- Rainbow Beach

							RMIP		
Process Step	Primary hazard	Other hazards managed by same barriers	Source of Hazard/Event	Primary Preventive Measure	Other Preventative Measures	Immediate (30/06/2020)	Short Term (30/06/2021)	Long Term (30/06/2025)	Updates
Burnin	Bacteria/ Virus (Reticulation)		Ingress into tank	Sealed storages	Residual disinfection	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Rainbow Beach Reservoir No.2 – roof replaced 2021
Keservoirs	Protozoa (Crypto/ Giardia) (Retic)		Ingress into tank	Sealed storages		Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Refer to Whole of System RMIP (Reservoir ingress)	Rainbow Beach Reservoir No.2 – roof replaced 2021

