Drinking Water Quality Management Plan Report (DWQMP) 2021 – 2022

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Contents

Glossary of terms

ADWG 2011	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
DRDMW	Department of Regional Development Manufacturing and Water
DWQMP	Drinking Water Quality Management Plan
E. coli	*Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
The Regulator	Department of Regional Development Manufacturing and Water
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
MPN/100mL	most probable number per 100 millilitres
CFU/100mL	Colony forming units per 100 millilitres
<	Less than
>	Greater than

1. Introduction

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

The goal of the DWQMP is the protection of public health through the identification and minimisation of any public health related risks associated with drinking water. The DWQMP for Bulloo Shire Council was approved by the Queensland Water Supply Regulator, Department of Regional Development, Manufacturing and Water (QWSR, RDMW) in May 2021.

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

2. Overview of Operations

Bulloo Shire incorporates the towns of Thargomindah and Hungerford, and covers an expanse of 73,807.6km^2. The population within the shire is approximately 377. Thargomindah is the administration centre of the Shire with the adjoining Shires being Barcoo, Quilpie and the Paroo. The Bulloo Shire is approximately 1,004km west of Brisbane and 197km west of Cunnamulla.

The Bulloo Shire Council is a small drinking water service provider as defined under the Act and provides drinking water to a population of approximately 200 people. Reticulated water supply is provided to both Thargomindah and Hungerford, with a potable supply to Thargomindah by artesian supply, Hungerford receives a non-potable supply from a sub-artesian supply.

Thargomindah

- The potable supply delivered to Thargomindah is sourced from the Hooray aquifer. The town water is sourced from a depth of 820 metres in the Great Artesian Basin at a temperature of approximately >70^{o}C.
- The Cooling Plant System cools water supplied by the bore (either directly from the bore or from the bore via the existing cooling ponds). The cooling process is performed via Plate Heat Exchangers. All Bore water (town supply water) is directed through the hot side of the plate heat exchangers in a parallel arrangement.
- Once the water passes through the plate heat exchangers the cooler water is directed either into the tanks outside the shed (these are in a parallel arrangement), OR directly to the town supply manifold where the water is directed to town. The direction of the water at this point is determined by the tanks capacity and the bore water temperature entering the plate heat exchanges at the time. Generally, this scenario will be somewhat seasonal as during the cooler months the bore supply water temp may be significantly lower.
- If the cooled water fills the tanks, the water is stored in these tanks and is the towns water supply when required. There is a main supply pump manifold that maintains town pressure to the town as required.

- In line of the water supplied to town is a UV filter that is enabled if flow is detected. This will treat the water with means of UV lamps with a UV dose of at least 40mJ/cm2.
- The System is connected to the Grid Network and is in parallel with onsite embedded generation which consists of a battery storage inverter and roughly 240kW of ground mount solar. The system is design to have enough stored electrical capacity to run the supply water pumps if the solar is not available and the batteries are not being recharged. Otherwise very little grid power should be required. Cooling of the water is generally provided during the day when the solar is available or at short periods at the end of the day when the battery capacity allows.

Table 1-1. Water Supply System and Infrastructure Details

COMPONENT		**Scheme 1**
Sources	Name	Bore 01
	Type	Artesian Bore
	% of supply	100
	Reliability	Excellent
	Water quality issues	Total Dissolved Solids, Fluoride, Sodium, Temperature
Sourcing Infrastructure	Type (pumped/gravity/equipped bore/ etc.	Free Flowing Bore. Pressure reduction is required prior to entry into Town Reticulation.
	Description	Bore Depth - 820m approx
Sources that do not undergo treatment	Water is sourced from a deep bore and water quality information does not identify any water quality issues that require treatment (aside from UV, see below).	
Sources that do not undergo disinfection	Water is disinfected via UV irradiation. On rare occasions, if the cooling, storage and/or treatment systems are bypassed, water may be supplied directly from the bore.	
Distribution and Reticulation System	Pipe material	PVC
	Age range	17-29 years
	Approx. % of total length	100
	Areas where potential long detention periods could be expected	North-Western end of unnamed street off Frew Street
	Areas where low water pressure (e.g. <12m) could be expected during peak or other demand periods.	No Areas.

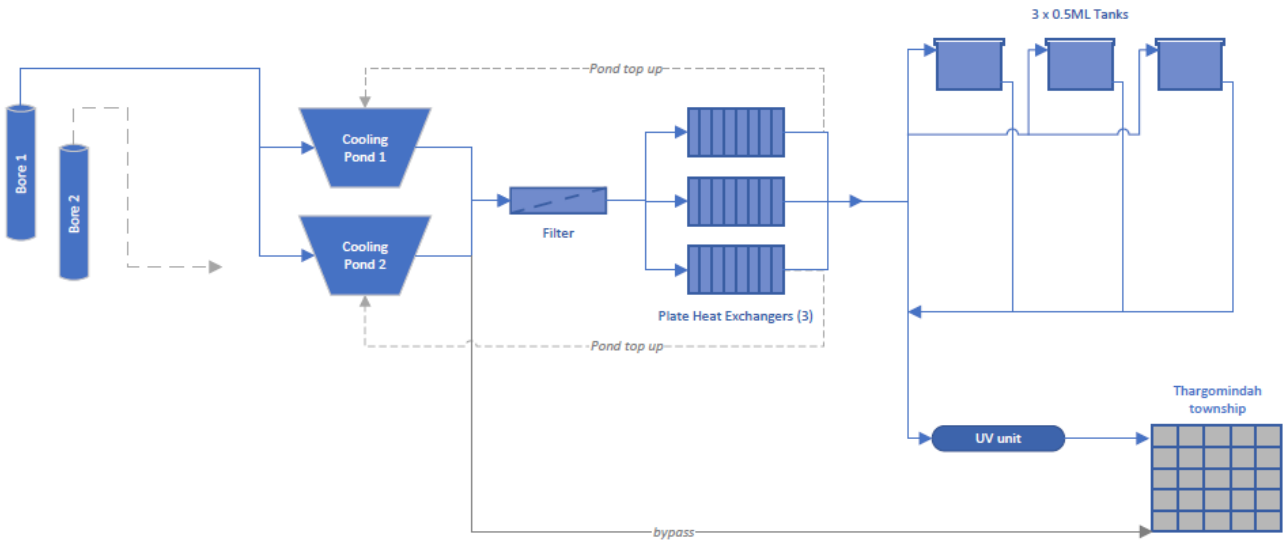

Figure 1 Thargomindah drinking water network schematic

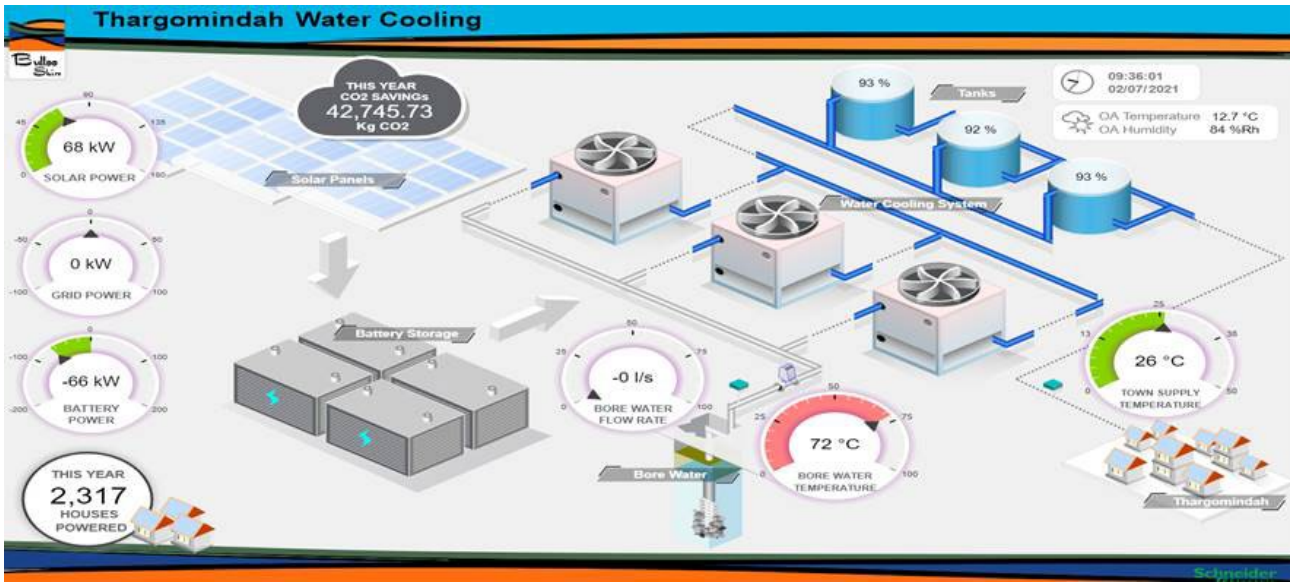

Figure 2 Thargomindah Cooling Plant Web Overview

Hungerford

Hungerford is a non-potable water scheme. The information provided in this report is not a regulatory requirement however is provided for the benefit of the community.

The Village of Hungerford has a twin supply to the Village. One supply is from a sub-artesian bore and the second is stored river water:

- The main supply is from a bore located approximately 6km from Hungerford on the Thargomindah/Hungerford Road
  - The water is pumped from the bore by use of a solar bore pump into an onsite storage tank.
  - The water is pumped into Hungerford by the use of a transfer pump where it is collected into one Poly Tank with a storage capacity of approximately 50,500 litres.
  - Water is transferred to the reticulated supply for the residents of Hungerford by dual pumps.
- The second reticulated supply is from two storage dams that receive water during high river flows.
  - The stored river water is pumped to Hungerford and stored in a 40,000 litre Poly tank where it is pumped into an elevated Tank;
  - The elevated tank is the supply to the secondary reticulation and is used by the residents for watering their yards and gardens.

3 Actions taken to implement the DWQMP

Generally, the DWQMP was implemented through the 2021-22 financial year, other than as noted under section 6 External Audit. Progress with RMIP actions is summarised in section 7.

4 Compliance with water quality criteria for drinking water

In 2021-2022, Bulloo Shire Council complied with all the water quality criteria as detailed in this report, with the exception of fluoride which is naturally occurring and is regularly above the ADWG health guideline. These results are reported to the Regulator. Council continues to maintain community awareness via website messaging supported by Queensland Health.

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

This financial year there four notifications reported to the Regulator under section 102 and 102A of the Act.

- October 2021 – failure to test water samples in accordance with the DWQMP
- October 2021 – failure to test water samples in accordance with the DWQMP (faulty equipment)
- November 2021 – detection of a parameter with no guideline value (*Pseudomonas aeruginosa*) in the water supply
- May 2022 – ongoing detections of a parameter with no guideline value (*Pseudomonas aeruginosa*) in the water supply

6 External Audit

An external audit was conducted in the 2021-2022 financial year by Viridis Consultants.

The auditor found 3 major non-conformances and 4 minor non-conformances as follows:

Major

- the data reported in the annual report was not complete and there were instances where data was not reliable.
- the DWQMP identifies operational monitoring processes that are not fully implemented including the in-house verification monitoring
- the risk assessment does not consider risks associated with undisinfected water held in storage tanks

Minor

- Annual Report (2019-2020) did not contain all required information
- Preventive measures were not implemented as stated in the DWQMP (e.g. flushing, separate tools for different job types)
- Procedures could not be located
- the DWQMP is no longer relevant to the water supply system circumstances as there have been recent major upgrades to the system in early 2021 that need to be documented and incorporated into the DWQMP.

The auditor made a range of recommendations to address the non-conformances. Most of these have been addressed in the recent DWQMP review and/or through ensuring existing processes are properly implemented.

7 Risk Management Improvement Program

Fluoride:

A factsheet is readily available to the public at the Thargomindah Health Clinic and is distributed periodically through local publications.

Temperature:

A heat exchange unit was commissioned in April 2021 as a secondary cooling system which now cools the Thargomindah town water supply to below 35°C, with all water passing through a UV filtration system before entering the town reticulation system. Flushing of the water mains continues to happen periodically.

Microbial or chemical cross contamination of water supply due to backflow:

The process has commenced and is ongoing to establish a backflow prevention device register and maintenance schedule which identifies all backflow prevention devices and their current conditions.

Loss of staff:

The Manager Infrastructure position has been modified and filled temporarily by an internal resource and will be advertised soon.

8 Customer complaints related to water quality

Bulloo Shire Council did not receive any formal water quality complaints from its customers for the period.

Although there is a general acceptance of the quality of the supplied water within the township of Thargomindah, there is always a concern on the temperature supplied to the community during the summer months relating to the high temperature the water is being supplied to the residents during this period of time (in excess of 50^{o}C).

APPENDICES

Appendix A: Summary of compliance with water quality criteria.

The Bulloo Shire Council Amended Drinking Water Quality Management Plan (DWQMP) was approved by the Regulator on 14 May 2021.

The results from the verification monitoring program have been compared against levels of the Reporting Guidelines for a Drinking Water Service.

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

The Bulloo Shire Council has adopted a new record keeping system for all water and sewerage data which replaces all previous record keeping systems. This system is the SWIMLocal system created by **qldwater** – The Queensland Water Directorate. All data from previous years has been entered ensuring no loss of data will occur.

Appendix B: Details of Compliance with water quality criteria

The following results were obtained from samples submitted for analysis.

Physical/Chemical Results Summary

Parameter	Scheme Component	Laboratory Name	Unit of measure	Limit of reporting (LOR)	Number of samples	Number of samples exceeding health guideline value	Minimum	Maximum	Average
Arsenic (Total)	Bore	Symbio	mg/L	0.0005	7	0	<LOR	<LOR	<LOR
Bicarbonate Alkalinity	Bore	Toowoomba	mg/L as $CaCO_3$	1	7	0	455	458	457
Cadmium (Total)	Bore	Symbio	mg/L	0.0001	7	0	<LOR	<LOR	<LOR
Calcium	Bore	Toowoomba	mg/L	0.03	7	0	3	3.5	3.5
Carbonate Alkalinity	Bore	Toowoomba	mg/L as $CaCO_3$	2	7	0	<LOR	<LOR	<LOR
Chloride	Bore	Toowoomba	mg/L	0.5	7	0	62	63	63
Chromium (Total)	Bore	Symbio	mg/L	0.0005	7	0	<LOR	<LOR	<LOR
Conductivity	Bore	Toowoomba	µs/cm	1	7	0	1,010	1030	1013
Copper (Total)	Bore	Symbio	mg/L	0.001	7	0	<LOR	0.032	0.013
Figure of Merit	Bore	Toowoomba		0.1	7	0	<LOR	<LOR	<LOR
Fluoride	Bore	Toowoomba	mg/L	0.1	14	0	1.7	1.8	1.7
Free Carbon Dioxide	Bore	Toowoomba	mg/L	0.1	7	0	5	9.1	5.7
Hydroxide Alkalinity	Bore	Toowoomba	mg/L as $CaCO_3$	2	7	0	<LOR	<LOR	<LOR
Iron	Bore	Toowoomba	mg/L	0.005	7	0	<LOR	0.026	0.010
Lead (Total)	Bore	Symbio	mg/L	0.0001	7	0	<LOR	0.00033	0.0002
Magnesium	Bore	Toowoomba	mg/L	0.002	7	0	0	0.058	0.046
Manganese	Bore	Toowoomba	mg/L	0.002	7	0	0	0.016	0.015

Parameter	Scheme Component	Laboratory Name	Unit of measure	Limit of reporting (LOR)	Number of samples	Number of samples exceeding health guideline value	Minimum	Maximum	Average
Mercury (Total)	Bore	Symbio	mg/L	0.0001	7	0	<LOR	<LOR	<LOR
Molybdate Reactive Silica	Bore	Toowoomba	mg/L	1	7	0	40	41	40
Nickel (Total)	Bore	Symbio	mg/L	0.0005	7	0	<LOR	<LOR	<LOR
Nitrate	Bore	Toowoomba	mg/L as NO_3	0.5	7	0	<LOR	0.8	0.5
pH	Bore	Toowoomba			7	0	8	8.3	8.2
Phosphate	Bore	Toowoomba	mg/L as PO_4	0.02	7	0	0.03	0.04	0.03
Potassium	Bore	Toowoomba	mg/L	0.03	7	0	4	4.4	4.3
Residual Alkalinity	Bore	Toowoomba	mq/L as $CaCO_3$		7	0	9.0	9.0	9.0
Saturation Index	Bore	Toowoomba			7	0	-0.39	-0.09	-0.18
Sodium	Bore	Toowoomba	mg/L	0.5	7	0	246	256	249
Sodium Adsorption Ratio	Bore	Toowoomba		0.1	7	0	35.8	37.2	36.4
Sulphate	Bore	Toowoomba	mg/L as SO_4	2.5	7	0	<LOR	<LOR	<LOR
Temporary Hardness	Bore	Toowoomba	mq/L as $CaCO_3$	1	7	0	9.0	9.0	9.0
Total Alkalinity	Bore	Toowoomba	mq/L as $CaCO_3$	2	7	0	455	458	457
Total Dissolved Ions	Bore	Toowoomba	mq/L	1	7	0	871	881	877
Total Hardness	Bore	Toowoomba	mq/L as $CaCO_3$	1	7	0	9	9	9
Total Dissolved Solids	Bore	Toowoomba	mq/L	1	7	0	630	639	634
Zinc (Total)	Bore	Symbio	mq/L	0.005	7	0	<LOR	0.0063	0.003

Compliance with *Public Health Regulation 2018* for Escherichia coli (*E. coli*) monitoring in the reticulation system

As detailed in the Thargomindah Drinking Water Quality Management Plan, Council currently uses the "Colilert" field test kits which allow "in-house" testing for *E.Coli*. Appropriate validation of the field tests through duplicate samples is undertaken, as well as by sending samples externally to Toowoomba Regional Council laboratory.

E.coli Field Test Kit Results (Colilert)

Month of Year	In-house samples (number)	In-house results	External verification samples (number)	External verification results
July 2021	0		0	
August 2021	0		6	No detections
September 2021	0		0	
October 2021	3	No detections	0	
November 2021	7	No detections	14	No detections
December 2021	14	No detections	15	No detections
January 2022	14	No detections	7	No detections
February 2022	21	No detections	0	
March 2022	21	No detections	0	
April 2022	14	No detections	10	No detections
May 2022	14	No detections	2	No detections
June 2022	7	No detections	16	No detections
Total	115	No detections	70	No detections

Other microbiological verification monitoring

Factor	Pseudomonas aeruginosa (mpn/100mL)	HPC (cfu/mL)	Enterococci (cfu/100mL)
Count	98	98	98
Detects	18	84	0
Average	51	1265	0
Median	0	180	0
Max	2400	16000	0