GLADSTONE
REGIONAL COUNCIL

**ABN: 27 330 979 106**

# *DRINKING WATER QUALITY MANAGEMENT PLAN REPORT*

## *2018-19*

SPID: 483

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# Glossary of terms

| | |
|---|---|
| ADWG 2011 | Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia |
| *E. coli* | *Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk |
| GRC | Gladstone Regional Council |
| GAWB | Gladstone Area Water Board |
| HU | Hazen Units |
| mg/L | Milligrams per litre |
| NTU | Nephelometric Turbidity Units |
| MPN/100mL | Most probable number per 100 millilitres |
| CFU/mL | Colony forming units per millilitre |
| WTP | Water Treatment Plant |
| < | Less than |
| > | Greater than |

# 1. Introduction

This report documents the performance of Gladstone Regional Council's (GRC) drinking water service with respect to water quality, and implementation of the drinking water quality management plan (DWQMP) as required under the *Water Supply (Safety and Reliability) Act 2008* (the Act).

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

# 2. Overview of Operations

The Gladstone Regional Council provides water to its residents through four water schemes:

- **Lake Awoonga Scheme.** Under this scheme the Gladstone Area Water Board (GAWB) collects and treats raw water harvested from the Lake Awoonga Dam. The water is treated through a conventional water treatment plant before being sold to Gladstone Regional Council at a number of reservoir and supply points throughout Gladstone, Boyne Island, Tannum Sands Calliope and Mt Larcom. GRC distributes the water to approximately 22,282 connections.
- **Bororen Scheme.** GRC sources water from two production bores located to the west of Lagoon Creek within the Baffle Creek catchment. The groundwater is treated at the Bororen Water Treatment Plant (WTP) and disinfected before being reticulated to 80 connections within the Bororen Township.
- **Miriam Vale Scheme.** GRC usually sources water from Baffle Creek (~80%) and the Thornes Road bore. The water is mixed and treated through a conventional treatment process and disinfected before being reticulated to approximately 157 connections.
- **Agnes Water/1770 Scheme.** GRC sources water from seawater and groundwater bores along Springs Road. The seawater is treated through a reverse osmosis desalination plant, and the bore water is treated through a conventional filtration plant. Disinfected water is supplied to approximately 1057 connections within the townships of Agnes Water and 1770. The treatment plant is operated and maintained under contract by Trility Pty Ltd.

GRC manages drinking water quality through an approved Drinking Water Quality Management Plan (DWQMP). This ensures that water supplied to its 23,576 total connections, which represents an estimated population of approximately 61,000 people, is safe and public health is maintained.

# 3. Compliance with water quality criteria for drinking water

A summary of water quality performance over the four schemes is summarised in Appendix A.

GRC have produced a consistent and safe water supply that meet the requirements set by the *Public Health Regulation 2018* for drinking water with 100% of the 912 samples tested free of *E. coli*.

The physical and chemical testing program included over 11,500 individual tests. None of these test results exceeded a health guideline value in the Australian Drinking Water Guidelines 2011.

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

There was one (1) instance during 2018-19 where the Regulator was notified under sections 102 or 102A of the Act.

***PRESCRIBED INCIDENTS OR EVENTS AND CORRECTIVE AND PREVENTIVE ACTIONS UNDERTAKEN.***

***DWI-7-483-00020 - Event***

**Incident Description:**
On 22/02/2019 the Miriam Vale WTP operated intermittently for an initially unknown reason. This allowed some untreated water to pass through the plant and into the clear water tanks where it blended with treated water. This mixture was then pumped into the reticulation system.

**Investigation and Cause:**
The incident was found to be caused not by equipment failure or other unforeseeable malfunction or breakdown but was a consequence of the fundamental operational philosophy of the plant. It was identified that four operational characteristics of the treatment plant resulted in untreated or partially treated water being allowed to mix with treated water in the clear water tanks.
These were:

1. The inhibition of all water treatment process operations including chemical dosing, mixing, aeration, and valve regulation when Baffle Creek raw water flow rate reduces below 3L/second;
2. No inhibition of the raw water pumps at any flow rate;
3. Design of the WTP allows water to flow through the process when raw water pumps are not operating
4. When a backwash trigger was met (filtered water turbidity >0.5NTU for >15 minutes; head loss >30kPa or filter run time >8 hours); the DAFF tank would drain down and flow would continue to enter the Process Tank, which itself overflows into Clear Water Tank 1.

The above factors were not known by Gladstone Regional Council staff at the time of the incident and are ultimately believed to be related to poor asset handover and documentation practices, as well as loss of internal knowledge due to staff turnover.

**Corrective and Preventative Actions:**

- The treatment plant was investigated, and changes made to raw water pumping operations to allow the treatment plant to operate correctly
- Water was tankered from Gladstone during the period of investigations
- Additional interlocks were programmed into the treatment plant PLC
- External party engaged to undertake a Root Cause Analysis
- Staff training
- Risk assessment and Drinking Water Quality Management Plan update.

# 5. Customer complaints related to water quality

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

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

**Table 1 - Complaints Relating to Water Quality**

| Scheme | Suspected Illness | Discoloured water | Taste and Odour | Other | Total |
|---|---|---|---|---|---|
| Lake Awoonga Scheme | 3 | 19 | 7 | 0 | 29 |
| Agnes Water/1770 Scheme | 0 | 0 | 1 | 0 | 1 |
| Miriam Vale Scheme | 0 | 3 | 0 | 0 | 3 |
| Bororen Scheme | 0 | 3 | 0 | 0 | 3 |
| **Total** | **3** | **25** | **8** | **0** | **36** |

### Suspected Illness

Gladstone Regional Council investigates each complaint relating to alleged illness from the water supply, typically by conducting *E. coli* analysis from the source tap and monitoring the levels of free chlorine present in the water.

During 2018-2019, there were no confirmed cases of illness arising from the water supply system.

### Discoloured water

A total of 25 customer complaints were received related to discoloured water. In response to discoloured water complaints, Council staff flush the relevant mains until the water runs clear. Council staff also makes contact with the customer to advise them of the actions taken. Council proactively flushes mains on a routine basis in areas with a history of discoloured water complaints. This has reduced the number of complaints received in the past year.

It is standard practice for Council to flush mains after breaks and in response to abnormal water quality sample results and low residual free chlorine.

### Taste and odour

Gladstone Regional Council investigates taste and odour complaints and devise plans for prompt resolution, which may include flushing the reticulation system. Investigation of each complaint found no public health risks. The taste and odour complaints are possibly due to variations in chlorine concentration throughout the year and or due to operational changes (i.e. setpoint increase).

# 6. Findings and recommendations of the DWQMP auditor

No DWQMP audits were required or undertaken in 2018-19.

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

No DWQMP audits were required or undertaken in 2018-19.

# 8. Actions taken to implement the DWQMP

For the first few months of the 2018-19 financial year, GRC was operating under its old approved DWQMP while the new amended plan was under assessment. The amended DWQMP was approved in November 2018.

Actions taken by GRC to implement the DWQMP in 2018-19 included:

- Finalisation of Incident Management and Reporting Procedure
- Miriam Vale Water Treatment Plant supernatant return turned off
- A Good Practice Guide assessment of Miriam Vale and Bororen Water Treatment Plants was undertaken
- Isolation of the Agnes Water groundwater treatment process due to water quality concerns, pending a treatment upgrade
- Hydrogeological assessments of aquifers – Agnes Water and Bororen
- Implementation of the updated drinking water verification monitoring program
- Emergency water supplies for the Miriam Vale system were investigated

# Appendix A – Summary of compliance with water quality criteria

The results from the verification monitoring program have been compared against the water quality criteria specified by the Regulator in the *DWQMP Amended Information Notice for the Decision (November 2018)*

**Verification monitoring results - Lake Awoonga Scheme - Reticulation System**

| Parameter | Unit of Measure | Sample Results | Minimum | Average | Maximum | Non-compliances* |
|---|---|---|---|---|---|---|
| Alkalinity | mg/L as CaCO3 | 55 | 62 | 69 | 79 | 0 |
| Aluminium | mg/L | 55 | 0.02 | 0.04 | 0.1 | 0 |
| Antimony | mg/L | 10 | < | < | < | 0 |
| Arsenic | mg/L | 10 | < | < | < | 0 |
| Barium | mg/L | 10 | 0.008 | 0.011 | 0.013 | 0 |
| Boron | mg/L | 10 | < | 0.002 | 0.017 | 0 |
| Bromate | mg/L | 53 | < | < | < | 0 |
| Bromide | mg/L | 53 | < | 0.018 | 0.091 | 0 |
| Bromodichloromethane | mg/L | 63 | 0.008 | 0.021 | 0.034 | 0 |
| Cadmium | mg/L | 10 | < | < | 0.0003 | 0 |
| Chlorate | mg/L | 64 | 0.06 | 0.30 | 0.91 | 2^ |
| Chloride | mg/L | 53 | 20 | 25 | 32 | 0 |
| Chromium | mg/L | 10 | < | < | 0.002 | 0 |
| Copper | mg/L | 10 | < | 0.014 | 0.096 | 0 |
| Dibromochloromethane | mg/L | 65 | 0.007 | 0.017 | 0.17 | 0 |
| E. coli | mpn/100mL | 690 | <1 | <1 | <1 | 0 |
| Electrical Conductivity | µS/cm | 697 | 232 | 282 | 333 | 0 |
| Fluoride | mg/L | 53 | < | < | 0.1 | 0 |
| Free Chlorine | mg/L | 699 | < | 1.0 | 2.7 | 0 |
| HPC | cfu/mL | 350 | < | 8 | 300 | 0 |
| Iron | mg/L | 55 | < | < | 0.05 | 0 |
| Lead | mg/L | 10 | < | < | 0.001 | 0 |
| Mercury | mg/L | 10 | < | < | < | 0 |
| Molybdenum | mg/L | 10 | < | < | < | 0 |
| Nickel | mg/L | 10 | < | < | < | 0 |
| Nitrate | mg/L | 53 | 0.07 | 0.12 | 0.16 | 0 |
| Nitrite | mg/L | 53 | < | < | < | 0 |
| pH | | 698 | 7.0 | 7.5 | 8.8 | 0 |
| Phosphate | mg/L | 53 | < | < | 0.02 | 0 |
| Selenium | mg/L | 10 | < | < | < | 0 |
| Soluble Manganese | mg/L | 55 | < | < | < | 0 |
| Sulfate | mg/L | 53 | 24 | 27 | 29 | 0 |
| Temperature | °C | 698 | 19.2 | 26.2 | 33.8 | 0 |
| Total (Insoluble) Manganese | mg/L | 55 | < | < | 0.003 | 0 |
| Total Coliforms | mpn/100mL | 691 | <1 | 4 | 2419 | 0 |
| Total Hardness | mg/L | 55 | 20 | 75 | 89 | 0 |
| Total Trihalomethanes | mg/L | 65 | 0.021 | 0.067 | 0.118 | 0 |
| Tribromomethane | mg/L | 65 | < | < | 0.005 | 0 |
| Trichloromethane | mg/L | 63 | 0.006 | 0.034 | 0.067 | 0 |
| True Colour | HU | 698 | < | <1 | 22 | 0 |
| Turbidity | NTU | 699 | < | 0.12 | 2.4 | 0 |
| Zinc | mg/L | 10 | < | 0.008 | 0.017 | 0 |

*Non-compliances refers to non-compliances with the regulatory water quality criteria

^although there is no ADWG guideline value for chlorate, Gladstone Regional Council has implemented a reporting limit of 0.8mg/L which was approved by Queensland Health and DNRME

< symbol denotes that the number is below the limit of reporting for the test. In all cases, the limits of reporting are below the ADWG health (and aesthetic) guideline values.

**Verification monitoring results - Bororen Scheme – Treated water / reticulation System**

| Parameter | Unit of Measure | Sample Results | Minimum | Average | Maximum | Non-compliances* |
|---|---|---|---|---|---|---|
| Alkalinity | mg/L as CaCO3 | 21 | 209 | 226 | 252 | 0 |
| Aluminium | mg/L | 21 | < | 0.04 | 0.21 | 0 |
| Antimony | mg/L | 1 | < | < | < | 0 |
| Arsenic | mg/L | 1 | < | < | < | 0 |
| Barium | mg/L | 1 | 0.017 | 0.017 | 0.017 | 0 |
| Boron | mg/L | 1 | < | < | < | 0 |
| Bromate | mg/L | 3 | < | < | < | 0 |
| Bromide | mg/L | 3 | 0.153 | 0.175 | 0.202 | 0 |
| Bromodichloromethane | mg/L | 6 | < | 0.005 | 0.009 | 0 |
| Cadmium | mg/L | 1 | 0.0001 | 0.0001 | 0.0001 | 0 |
| Chlorate | mg/L | 6 | 0.19 | 0.28 | 0.43 | 0 |
| Chloride | mg/L | 3 | 130 | 136 | 140 | 0 |
| Chromium | mg/L | 1 | < | < | < | 0 |
| Copper | mg/L | 1 | 0.001 | 0.001 | 0.001 | 0 |
| Dibromochloromethane | mg/L | 6 | 0.008 | 0.016 | 0.025 | 0 |
| E. coli | mpn/100mL | 38 | < | < | < | 0 |
| Electrical Conductivity | µS/cm | 24 | 546 | 838 | 890 | 0 |
| Fluoride | mg/L | 3 | 0.1 | 0.1 | 0.1 | 0 |
| Free Chlorine | mg/L | 24 | 0.71 | 1.3 | 1.8 | 0 |
| Iron | mg/L | 21 | < | 0.008 | 0.07 | 0 |
| Lead | mg/L | 1 | < | < | < | 0 |
| Mercury | mg/L | 1 | < | < | < | 0 |
| Molybdenum | mg/L | 1 | < | < | < | 0 |
| Nickel | mg/L | 1 | < | < | < | 0 |
| Nitrate | mg/L | 3 | < | 0.01 | 0.03 | 0 |
| Nitrite | mg/L | 3 | < | < | < | 0 |
| pH | | 24 | 7.4 | 7.6 | 8.3 | 0 |
| Phosphate | mg/L | 3 | < | < | < | 0 |
| Selenium | mg/L | 1 | < | < | < | 0 |
| Soluble Manganese | mg/L | 21 | < | < | 0.003 | 0 |
| Sulfate | mg/L | 2 | 3 | 3 | 3 | 0 |
| Temperature | °C | 24 | 19.8 | 26.3 | 34.7 | 0 |
| Total (Insoluble) Manganese | mg/L | 21 | 0.001 | 0.004 | 0.021 | 0 |
| Total Coliforms | mpn/100mL | 38 | < | < | 1 | 0 |
| Total Hardness | mg/L | 21 | 281 | 300 | 322 | 0 |
| Total Trihalomethanes | mg/L | 6 | 0.015 | 0.037 | 0.06 | 0 |
| Tribromomethane | mg/L | 6 | 0.007 | 0.016 | 0.026 | 0 |
| Trichloromethane | mg/L | 6 | < | < | < | 0 |
| True Colour | HU | 24 | < | < | 6 | 0 |
| Turbidity | NTU | 24 | < | 0.13 | 0.38 | 0 |
| Zinc | mg/L | 1 | < | < | < | 0 |

*Non-compliances refers to non-compliances with the regulatory water quality criteria

< symbol denotes that the number is below the limit of reporting for the test. In all cases, the limits of reporting are below the ADWG health (and aesthetic) guideline values.

**Verification monitoring results - Miriam Vale Scheme – Treated water / reticulation System**

| Parameter | Unit of Measure | Sample Results | Minimum | Average | Maximum | Non-compliances* |
|---|---|---|---|---|---|---|
| Alkalinity | mg/L as CaCO3 | 33 | 57 | 87 | 105 | 0 |
| Aluminium | mg/L | 33 | < | 0.07 | 0.22 | 0 |
| Antimony | mg/L | 1 | < | < | < | 0 |
| Arsenic | mg/L | 1 | < | < | < | 0 |
| Barium | mg/L | 1 | 0.047 | 0.047 | 0.047 | 0 |
| Boron | mg/L | 1 | < | < | < | 0 |
| Bromate | mg/L | 7 | < | < | < | 0 |
| Bromide | mg/L | 7 | 0.058 | 0.10 | 0.17 | 0 |
| Bromodichloromethane | mg/L | 14 | 0.007 | 0.017 | 0.030 | 0 |
| Cadmium | mg/L | 1 | < | < | < | 0 |
| Chlorate | mg/L | 14 | 0.28 | 0.40 | 0.53 | 0 |
| Chloride | mg/L | 7 | 85 | 116 | 169 | 0 |
| Chromium | mg/L | 1 | < | < | < | 0 |
| Copper | mg/L | 1 | < | < | < | 0 |
| Dibromochloromethane | mg/L | 14 | 0.013 | 0.030 | 0.056 | 0 |
| E. coli | mpn/100mL | 74 | < | < | < | 0 |
| Electrical Conductivity | µS/cm | 62 | 422 | 558 | 727 | 0 |
| Fluoride | mg/L | 7 | < | < | < | 0 |
| Free Chlorine | mg/L | 62 | 0.02 | 1.0 | 1.9 | 0 |
| HPC | cfu/mL | 24 | < | < | < | 0 |
| Iron | mg/L | 33 | < | 0.02 | 0.11 | 0 |
| Lead | mg/L | 1 | < | < | < | 0 |
| Mercury | mg/L | 1 | < | < | < | 0 |
| Molybdenum | mg/L | 1 | < | < | < | 0 |
| Nickel | mg/L | 1 | < | < | < | 0 |
| Nitrate | mg/L | 7 | 0.08 | 0.15 | 0.19 | 0 |
| Nitrite | mg/L | 7 | < | < | < | 0 |
| pH | | 62 | 6.9 | 7.3 | 7.6 | 0 |
| Phosphate | mg/L | 7 | < | < | < | 0 |
| Selenium | mg/L | 1 | < | < | < | 0 |
| Soluble Manganese | mg/L | 33 | < | < | 0.018 | 0 |
| Sulfate | mg/L | 7 | 2 | 2 | 3 | 0 |
| Temperature | °C | 62 | 10.9 | 24.9 | 32.3 | 0 |
| Total (Insoluble) Manganese | mg/L | 33 | < | 0.005 | 0.026 | 0 |
| Total Coliforms | mpn/100mL | 74 | < | < | < | 0 |
| Total Hardness | mg/L | 33 | 75 | 99 | 143 | 0 |
| Total Trihalomethanes | mg/L | 14 | 0.025 | 0.067 | 0.124 | 0 |
| Tribromomethane | mg/L | 14 | 0.005 | 0.015 | 0.038 | 0 |
| Trichloromethane | mg/L | 14 | < | 0.005 | 0.018 | 0 |
| True Colour | HU | 62 | < | < | 4 | 0 |
| Turbidity | NTU | 62 | < | 0.22 | 0.87 | 0 |
| Zinc | mg/L | 1 | < | < | < | 0 |

*Non-compliances refers to non-compliances with the regulatory water quality criteria

< symbol denotes that the number is below the limit of reporting for the test. In all cases, the limits of reporting are below the ADWG health (and aesthetic) guideline values.

**Verification monitoring results - Agnes Water/1770 - Reticulation System**

| Parameter | Unit of Measure | Sample Results | Minimum | Average | Maximum | Non-compliances* |
|---|---|---|---|---|---|---|
| Alkalinity | mg/L as CaCO3 | 16 | 39 | 46 | 71 | 0 |
| Aluminium | mg/L | 16 | 0.03 | 0.08 | 0.12 | 0 |
| Antimony | mg/L | 4 | < | < | < | 0 |
| Arsenic | mg/L | 4 | < | < | < | 0 |
| Barium | mg/L | 4 | 0.008 | 0.008 | 0.008 | 0 |
| Boron | mg/L | 4 | 1.0 | 1.1 | 1.2 | 0 |
| Bromate | mg/L | 16 | < | < | 0.024 | 0^ |
| Bromide | mg/L | 16 | 0.41 | 0.61 | 0.76 | 0 |
| Bromodichloromethane | mg/L | 16 | < | < | < | 0 |
| Cadmium | mg/L | 4 | < | < | < | 0 |
| Chlorate | mg/L | 16 | 0.06 | 0.10 | 0.13 | 0 |
| Chloride | mg/L | 16 | 124 | 176 | 213 | 0 |
| Chromium | mg/L | 4 | < | < | < | 0 |
| Copper | mg/L | 4 | 0.002 | 0.003 | 0.006 | 0 |
| Dibromochloromethane | mg/L | 15 | < | < | 0.007 | 0 |
| E. coli | mpn/100mL | 110 | < | < | < | 0 |
| Electrical Conductivity | µS/cm | 111 | 406 | 637 | 805 | 0 |
| Fluoride | mg/L | 16 | < | < | 0.1 | 0 |
| Free Chlorine | mg/L | 111 | 0.52 | 0.89 | 1.2 | 0 |
| HPC | cfu/mL | 52 | < | 1 | 30 | 0 |
| Iron | mg/L | 16 | < | 0.02 | 0.13 | 0 |
| Lead | mg/L | 4 | < | < | < | 0 |
| Mercury | mg/L | 4 | < | < | < | 0 |
| Molybdenum | mg/L | 4 | < | < | < | 0 |
| Nickel | mg/L | 4 | < | < | < | 0 |
| Nitrate | mg/L | 16 | < | < | 0.1 | 0 |
| Nitrite | mg/L | 16 | < | < | < | 0 |
| pH | | 111 | 7.6 | 8.2 | 8.5 | 0 |
| Phosphate | mg/L | 16 | < | < | < | 0 |
| Selenium | mg/L | 4 | < | < | < | 0 |
| Soluble Manganese | mg/L | 16 | < | < | < | 0 |
| Sulfate | mg/L | 16 | 2 | 3 | 5 | 0 |
| Temperature | °C | 111 | 20.5 | 26.6 | 33.3 | 0 |
| Total (Insoluble) Manganese | mg/L | 16 | < | 0.005 | 0.03 | 0 |
| Total Coliforms | mpn/100mL | 110 | < | < | < | 0 |
| Total Hardness | mg/L | 16 | 39 | 43 | 46 | 0 |
| Total Trihalomethanes | mg/L | 16 | < | 0.022 | 0.108 | 0 |
| Tribromomethane | mg/L | 16 | < | 0.016 | 0.053 | 0 |
| Trichloromethane | mg/L | 16 | < | < | < | 0 |
| True Colour | HU | 111 | < | < | 6 | 0 |
| Turbidity | NTU | 111 | < | 0.19 | 1.3 | 0 |
| Zinc | mg/L | 4 | < | 0.013 | 0.044 | 0 |

*Non-compliances refers to non-compliances with the regulatory water quality criteria

^although the guideline is 0.02mg/L, the rounding rules stated in the ADWG mean that the result of 0.024mg/L is not considered an exceedance

< symbol denotes that the number is below the limit of reporting for the test. In all cases, the limits of reporting are below the ADWG health (and aesthetic) guideline values.