

Drinking Water Quality Management Plan (DWQMP) Report

2016/2017

Balonne Shire Council

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Glossary of terms

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

Introduction

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

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

1. Actions taken to implement the DWQMP

The adopted aesthetic and health limits for all drinking water schemes managed by the Balonne Shire Council are based on the physical, chemical and microbial limits set out in the ADWG 2011. Testing of physical and chemical parameters are undertaken quarterly. Testing for *E. coli* is undertaken weekly for the St George Water supply and monthly for all other schemes. A full list of the tested parameters can be found in Appendix A.

Progress in implementing the risk management improvement program

Refer to Appendix B for a summary of progress in implementing each of the Improvement Program actions.

Revisions made to the operational monitoring program to assist in maintaining the compliance with water quality criteria¹ in verification monitoring.

No changes have been made to operational monitoring programs in the latest revision of the Balonne Shire Council's DWQPM.

Amendments made to the DWQMP

No amendments were made to the DWQMP in the 2016/17 reporting period. However, a Drinking Water Quality Management Plan Amendment Application had been lodged at the time of this report's preparation. Proposed amendments included updated service and infrastructure details, updated water quality data, a list of Operation and Maintenance procedures, and amended target dates in the risk management improvement program. Recommendations from the May 2017 Audit were also incorporated into the amended Plan.

¹ Refer to *Water Quality and Reporting Guideline for a Drinking Water Service* for the water quality criteria for drinking water.

2. Compliance with water quality criteria for drinking water

The water quality criteria refer to health guideline values in the most current Australian Drinking Water Guidelines, as well as the standards in the Public Health Regulation 2005. A summary of monitoring results and compliance assessment for all Balonne Shire drinking water schemes can be found in Appendix A. All schemes in the shire were found to be compliant for the 2016-17 period.

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

This financial year there were no non-compliance instances where the Regulator needed to be notified under sections 102 or 102A of the Act.

4. Customer complaints related to water quality

Balonne Shire Council is required to report on the number of complaints, general details of complaints, and the responses undertaken. There were no official complaints recorded this financial year.

Very few complaints are received from the schemes supplied by GAB bore water as the water is of a very consistent quality. Complaints for the Dirranbandi and Mungindi water supply schemes are typically directed to the town officer / water treatment plant operator. These complaints are not always recorded.

5. Findings and recommendations of the DWQMP auditor

Viridis Consultants Pty Ltd conducted an audit of Balonne Shire Council's (BSC) approved Drinking Water Quality Management Plan (DWQMP) on 24 and 25 May 2017. The audit included site inspections of the St George, Dirranbandi and Thallon schemes. The scope of the audit was in accordance with the *Drinking Water Quality Management Plan Review and Audit Guidelines 2013*.

The Auditors found that the DWQMP that has been developed is reasonably thorough and has, in the whole, been well implemented.

One (1) major non-compliance was identified in relation to relevance of service description and details of infrastructure - operational control should be improved for the Dirranbandi WTP, the online turbidity instrument should sample filtered water and the WTP should shut down or at least alarm on high turbidity and low or high chlorine. Turbidity should not exceed 0.5 NTU. Schematic inconsistencies and additional risks which require review were also identified in this area.

There were three (3) minor non-compliances identified, in relation to accuracy of monitoring and performance data, implementation of preventive measures and implementation of operational and maintenance procedures.

The overall summary of compliance is shown in Table 1. Eleven (11) requirements were audited within the audit areas.

Table 1 Compliance Summary

| Compliance | Number of Findings |
|---------------------|---------------------------|
| Compliant | 7 |
| Minor Non-Compliant | 3 |
| Major Non-Compliant | 1 |

Recommendations were provided for major and minor non-compliances. Opportunities for improvement were also identified, where relevant.

The recommendations from the audit were as follows:

- Ensure that the entire year's monitoring program is included in the annual reports.
- Ensure that practices and procedures are in place to hygienically repair broken mains and undertake other prescribed reactive and programmed maintenance activities.
- In the unchlorinated system, mains hygiene is of the utmost importance and procedures must be prepared to ensure that crews do not contaminate the water supply when undertaking reactive or planned maintenance.
- Update the scheme description.
- Consider these risks when reviewing the plan:
 - Crews work on sewers and water and there are no hygiene procedures.
 - There is no backflow prevention on tanker filling stations.
 - There is dual reticulation of river water in St George and there is the potential for cross-connections.
 - There may be a cross-connection at the school and it is not certain if there is appropriate backflow device. Although, bore water is metered and the meters have non-returns in them.
 - Growth of opportunistic pathogens, *Naegleria fowleri* and *Legionella*, in the distribution.
- Operational control at the Dirrumbandi WTP needs to be improved. The turbidity online instrument should sample filtered water, whilst the pH and chlorine instruments continue to sample the finish water. The water treatment should shut down or at least alarm on high turbidity and low or high chlorine. Turbidity should not exceed 0.5 NTU.
- Develop a communications protocol with Moree Plains Shire Council (MPSC) for the water supply at Mungindi.

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

A regular review of the DWQMP was completed on 29 September 2017. The purpose of the review was to ensure that the DWQMP remains relevant, having regard to the operation of the drinking water service. The review was conducted by:

- *Author – Peter Willey – Balonne Shire Council - Project Engineer*
- *Verifier – Ross Drabble - Balonne Shire Council – Director of Infrastructure Services*

As a result of the review the following amendments have been made to the DWQMP and lodged for approval:

- Amendments to the population/connection totals.
- Amendments to pipe material and age range for each scheme
- Water Quality monitoring results have been updated.
- The Risk Management Measures for Mungindi were updated as per Audit.
- Operation and Maintenance Procedures list added
- Risk management improvement plan target dates updated
- Issues identified in the audit that were not directly actioned were also included.

Appendix A – Summary of compliance with water quality criteria

The results from the verification monitoring program for each of the schemes have been compared against the levels of the water quality criteria specified by the Regulator in the *Water Quality and Reporting Guideline for a Drinking Water Service*. The annual results demonstrate that the water monitoring program has been effective for measuring and controlling water quality for all the schemes in the shire.

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

Table 1 – St. George – 2016/17 Verification monitoring results and Reticulation *E. coli* verification monitoring.

| Summary Page | | | | | | | | | | | |
|------------------------|--|------------------------|------------|--------|-------------|--------------------|---------------|---------------|---------------|--------|---|
| Scheme | St George | | | | | | | | | | |
| Sampling Location | BSC Administration Building | | | | | | | | | | |
| Laboratory Used | Queensland Health Forensic and Scientific Services | | | | | | | | | | |
| Parameter | Units | Frequency of Reporting | ADWG Limit | | No. Samples | Summary of Results | | | No. Exceeding | | Comment |
| | | | Aesthetic | Health | | Maximum Value | Average Value | Minimum Value | Aesthetic | Health | |
| PH | | Quarterly | 6.5-8.5 | | 4 | 8.47 | 8.46 | 8.42 | 0 | 0 | ADWG Compliant |
| Total Hardness | mg/L | Quarterly | 200.00 | | 4 | 7.8 | 7.75 | 7.6 | 0 | 0 | ADWG Compliant |
| Alkalinity | mg/L | Quarterly | | | 4 | 287 | 281.50 | 275 | 0 | 0 | ADWG Compliant |
| Total Dissolved Ions | mg/L | Quarterly | | | 4 | 692 | 687.00 | 680 | 0 | 0 | ADWG Compliant |
| Total Dissolved Solids | mg/L | Quarterly | 500.00 | | 4 | 558 | 552.75 | 549 | 4 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Colour | PCU | Quarterly | 15.00 | | 4 | 1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Turbidity | NTU | Quarterly | 5.00 | | 4 | <1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Sodium | mg/L | Quarterly | 180.00 | | 4 | 210 | 209.50 | 208 | 4 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Potassium | mg/L | Quarterly | | | 4 | 2.2 | 2.18 | 2.1 | 0 | 0 | ADWG Compliant |
| Calcium | mg/L | Quarterly | | | 4 | 3.1 | 3.08 | 3 | 0 | 0 | ADWG Compliant |
| Magnesium | mg/L | Quarterly | | | 4 | 0 | 0.00 | 0 | 0 | 0 | ADWG Compliant |
| Chloride | mg/L | Quarterly | 250.00 | | 4 | 89 | 87.75 | 86 | 0 | 0 | ADWG Compliant |
| Fluoride | mg/L | Quarterly | | 1.50 | 4 | 0.36 | 0.33 | 0.26 | 0 | 0 | ADWG Compliant |
| Nitrate | mg/L | Quarterly | | 50.00 | 4 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Sulphate | mg/L | Quarterly | 250.00 | 500.00 | 4 | 49 | 47.75 | 46 | 0 | 0 | ADWG Compliant |
| Iron | mg/L | Quarterly | 0.30 | | 4 | 0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Manganese | mg/L | Quarterly | 0.10 | 0.50 | 4 | 0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Zinc | mg/L | Quarterly | 3.00 | | 4 | 0.09 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Aluminium | mg/L | Quarterly | 0.20 | | 4 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Copper | mg/L | Quarterly | 1.00 | 2.00 | 4 | <0.03 | N/A | <0.03 | 0 | 0 | ADWG Compliant |
| E. Coli | CFU/100mL | Weekly | | 0.00 | 51 | | | | | 0 | ADWG Compliant |

- Note:**
1. Sampling was undertaken in accordance with the DWQMP.
 2. TDS & Sodium consistently exceeded the ADWG Aesthetic limit.
 3. All Chloride and E.Coli samples were compliant with the ADWG.

Table 2 – Dirranbandi – 2016/17 Verification monitoring results and Reticulation E. coli verification monitoring

| Summary Page | | | | | | | | | | | |
|------------------------|-----------|--|------------|--------|-------------|--------------------|---------------|---------------|---------------|--------|---|
| Scheme | | Dirranbandi | | | | | | | | | |
| Sampling Location | | Dirranbandi Works Depot | | | | | | | | | |
| Laboratory Used | | Queensland Health Forensic and Scientific Services | | | | | | | | | |
| Parameter | Units | Frequency of Reporting | ADWG Limit | | No. Samples | Summary of Results | | | No. Exceeding | | Comment |
| | | | Aesthetic | Health | | Maximum Value | Average Value | Minimum Value | Aesthetic | Health | |
| PH | | Quarterly | 6.5-8.5 | | 4 | 8.24 | 8.04 | 7.78 | 3 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Total Hardness | mg/L | Quarterly | 200.00 | | 3 | 30 | 27.00 | 25 | 0 | 0 | ADWG Compliant |
| Alkalinity | mg/L | Quarterly | | | 3 | 175 | 164.67 | 147 | 0 | 0 | ADWG Compliant |
| Total Dissolved Ions | mg/L | Quarterly | | | 3 | 383 | 373.67 | 365 | 0 | 0 | ADWG Compliant |
| Total Dissolved Solids | mg/L | Quarterly | 500.00 | | 3 | 307 | 291.00 | 279 | 0 | 0 | ADWG Compliant |
| Colour | PCU | Quarterly | 15.00 | | 3 | 1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Turbidity | NTU | Quarterly | 5.00 | | 3 | 5 | N/A | 2 | 0 | 0 | ADWG Compliant |
| Sodium | mg/L | Quarterly | 180.00 | | 3 | 102 | 99.00 | 97 | 0 | 0 | ADWG Compliant |
| Potassium | mg/L | Quarterly | | | 3 | 4.4 | 3.97 | 3.7 | 0 | 0 | ADWG Compliant |
| Calcium | mg/L | Quarterly | | | 3 | 7.6 | 6.87 | 6.2 | 0 | 0 | ADWG Compliant |
| Magnesium | mg/L | Quarterly | | | 3 | 2.7 | 2.47 | 2.3 | 0 | 0 | ADWG Compliant |
| Chloride | mg/L | Quarterly | 250.00 | | 3 | 47 | 42.67 | 38 | 0 | 0 | ADWG Compliant |
| Fluoride | mg/L | Quarterly | | 1.50 | 3 | 0.38 | 0.29 | 0.24 | 0 | 0 | ADWG Compliant |
| Nitrate | mg/L | Quarterly | | 50.00 | 3 | 1.2 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Sulphate | mg/L | Quarterly | 250.00 | 500.00 | 3 | 50 | 19.00 | 3 | 0 | 0 | ADWG Compliant |
| Iron | mg/L | Quarterly | 0.30 | | 3 | <0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Manganese | mg/L | Quarterly | 0.10 | 0.50 | 3 | 0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Zinc | mg/L | Quarterly | 3.00 | | 3 | 0.07 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Aluminium | mg/L | Quarterly | 0.20 | | 3 | 0.06 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Copper | mg/L | Quarterly | 1.00 | 2.00 | 3 | <0.03 | N/A | <0.03 | 0 | 0 | ADWG Compliant |
| E. Coli | CFU/100mL | Weekly | | 0.00 | 50 | | | | | 0 | ADWG Compliant |

- Note:**
1. Sampling was undertaken in accordance with the DWQMP. No sample was taken for the final quarter due to staff shortages at the time.
 2. Turbidity exceeded the ADWG Aesthetic limit on two occasions.
 3. All Chloride levels were compliant with the ADWG
 4. Two E.Coli samples were non-compliant with the ADWG.

Table 3 – Thallon – 2016/17 Verification monitoring results and Reticulation E. coli verification monitoring

| Summary Page | | | | | | | | | | | | |
|------------------------|-----------|--|------------|--------|-------------|--------------------|---------------|---------------|---------------|--------|---|--|
| Scheme | | Thallon | | | | | | | | | | |
| Sampling Location | | Thallon Park | | | | | | | | | | |
| Laboratory Used | | Queensland Health Forensic and Scientific Services | | | | | | | | | | |
| Parameter | Units | Frequency of Reporting | ADWG Limit | | No. Samples | Summary of Results | | | No. Exceeding | | Comment | |
| | | | Aesthetic | Health | | Maximum Value | Average Value | Minimum Value | Aesthetic | Health | | |
| PH | | Quarterly | 6.5-8.5 | | 4 | 8.5 | 8.42 | 8.29 | 0 | 0 | ADWG Compliant | |
| Total Hardness | mg/L | Quarterly | 200.00 | | 4 | 6 | 5.70 | 5.5 | 0 | 0 | ADWG Compliant | |
| Alkalinity | mg/L | Quarterly | | | 4 | 535 | 500.75 | 483 | 0 | 0 | ADWG Compliant | |
| Total Dissolved Ions | mg/L | Quarterly | | | 4 | 987 | 936.00 | 905 | 0 | 0 | ADWG Compliant | |
| Total Dissolved Solids | mg/L | Quarterly | 500.00 | | 4 | 699 | 668.50 | 648 | 4 | 0 | Some Non-Compliances - ADWG Aesthetic Limit | |
| Colour | PCU | Quarterly | 15.00 | | 4 | 2 | N/A | <1 | 0 | 0 | ADWG Compliant | |
| Turbidity | NTU | Quarterly | 5.00 | | 4 | <1 | N/A | <1 | 0 | 0 | ADWG Compliant | |
| Sodium | mg/L | Quarterly | 180.00 | | 4 | 280 | 270.00 | 260 | 4 | 0 | Some Non-Compliances - ADWG Aesthetic Limit | |
| Potassium | mg/L | Quarterly | | | 4 | 2.5 | 2.43 | 2.4 | 0 | 0 | ADWG Compliant | |
| Calcium | mg/L | Quarterly | | | 4 | 2.3 | 2.23 | 2.2 | 0 | 0 | ADWG Compliant | |
| Magnesium | mg/L | Quarterly | | | 4 | 0 | 0.00 | 0 | 0 | 0 | ADWG Compliant | |
| Chloride | mg/L | Quarterly | 250.00 | | 4 | 61 | 59.25 | 58 | 0 | 0 | ADWG Compliant | |
| Fluoride | mg/L | Quarterly | | 1.50 | 4 | 0.72 | 0.66 | 0.56 | 0 | 0 | ADWG Compliant | |
| Nitrate | mg/L | Quarterly | | 50.00 | 4 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant | |
| Sulphate | mg/L | Quarterly | 250.00 | 500.00 | 4 | 2.2 | 2.05 | 2 | 0 | 0 | ADWG Compliant | |
| Iron | mg/L | Quarterly | 0.30 | | 4 | 0.12 | N/A | <0.01 | 0 | 0 | ADWG Compliant | |
| Manganese | mg/L | Quarterly | 0.10 | 0.50 | 4 | 0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant | |
| Zinc | mg/L | Quarterly | 3.00 | | 4 | 0.09 | N/A | <0.01 | 0 | 0 | ADWG Compliant | |
| Aluminium | mg/L | Quarterly | 0.20 | | 4 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant | |
| Copper | mg/L | Quarterly | 1.00 | 2.00 | 4 | <0.03 | N/A | <0.03 | 0 | 0 | ADWG Compliant | |
| E. Coli | CFU/100mL | Monthly | | 0.00 | 12 | | | | | 1 | Some Non-Compliances - ADWG Health Limit | |

Note:

1. Sampling was undertaken in accordance with the DWQMP. No sample was taken for the final quarter due to staff shortages at the time.
2. TDS & Sodium consistently exceeded the ADWG Aesthetic limit; the aesthetic limit for Iron was exceeded on one occasion.
3. All Chloride and E.Coli samples were compliant with the ADWG.

Table 4 – Mungindi – 2016/17 Verification monitoring results and Reticulation E. coli verification monitoring

| Summary Page | | | | | | | | | | | |
|------------------------|-----------|--|------------|--------|-------------|--------------------|---------------|---------------|---------------|--------|---|
| Scheme | | Mungindi | | | | | | | | | |
| Sampling Location | | Mungindi - River Park | | | | | | | | | |
| Laboratory Used | | Queensland Health Forensic and Scientific Services | | | | | | | | | |
| Parameter | Units | Frequency of Reporting | ADWG Limit | | No. Samples | Summary of Results | | | No. Exceeding | | Comment |
| | | | Aesthetic | Health | | Maximum Value | Average Value | Minimum Value | Aesthetic | Health | |
| PH | | Quarterly | 6.5-8.5 | | 3 | 8.08 | 8.02 | 7.91 | 3 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Total Hardness | mg/L | Quarterly | 200.00 | | 3 | 74 | 68.00 | 58 | 0 | 0 | ADWG Compliant |
| Alkalinity | mg/L | Quarterly | | | 3 | 106 | 84.67 | 67 | 0 | 0 | ADWG Compliant |
| Total Dissolved Ions | mg/L | Quarterly | | | 3 | 242 | 204.33 | 173 | 0 | 0 | ADWG Compliant |
| Total Dissolved Solids | mg/L | Quarterly | 500.00 | | 3 | 192 | 168.67 | 153 | 0 | 0 | ADWG Compliant |
| Colour | PCU | Quarterly | 15.00 | | 3 | 1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Turbidity | NTU | Quarterly | 5.00 | | 3 | <1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Sodium | mg/L | Quarterly | 180.00 | | 3 | 41 | 33.67 | 30 | 0 | 0 | ADWG Compliant |
| Potassium | mg/L | Quarterly | | | 3 | 3.7 | 3.30 | 3 | 0 | 0 | ADWG Compliant |
| Calcium | mg/L | Quarterly | | | 3 | 14 | 13.00 | 12 | 0 | 0 | ADWG Compliant |
| Magnesium | mg/L | Quarterly | | | 3 | 9.4 | 8.53 | 6.9 | 0 | 0 | ADWG Compliant |
| Chloride | mg/L | Quarterly | 250.00 | | 3 | 38 | 34.33 | 32 | 0 | 0 | ADWG Compliant |
| Fluoride | mg/L | Quarterly | | 1.50 | 3 | 1 | 0.99 | 0.96 | 0 | 0 | ADWG Compliant |
| Nitrate | mg/L | Quarterly | | 50.00 | 3 | 1.9 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Sulphate | mg/L | Quarterly | 250.00 | 500.00 | 3 | 8.2 | 7.07 | 6 | 0 | 0 | ADWG Compliant |
| Iron | mg/L | Quarterly | 0.30 | | 3 | <0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Manganese | mg/L | Quarterly | 0.10 | 0.50 | 3 | <0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Zinc | mg/L | Quarterly | 3.00 | | 3 | 0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Aluminium | mg/L | Quarterly | 0.20 | | 3 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Copper | mg/L | Quarterly | 1.00 | 2.00 | 3 | <0.03 | N/A | <0.03 | 0 | 0 | ADWG Compliant |
| E. Coli | CFU/100mL | Monthly | | 0.00 | 12 | | | | 1 | 0 | Some Non-Compliances - ADWG Health Limit |

- Note:**
1. Sampling was undertaken in accordance with the DWQMP. No sample was taken for the final quarter due to staff shortages at the time.
 2. Turbidity exceeded the ADWG Aesthetic limit on one occasion.
 3. All Chloride and E.Coli samples were compliant with the ADWG.

Table 5 – Hebel – 2016/17 Verification monitoring results and Reticulation E. coli verification monitoring

| Summary Page | | | | | | | | | | | |
|------------------------|-----------|--|------------|--------|-------------|--------------------|---------------|---------------|---------------|--------|---|
| Scheme | | Hebel | | | | | | | | | |
| Sampling Location | | Hebel Park | | | | | | | | | |
| Laboratory Used | | Queensland Health Forensic and Scientific Services | | | | | | | | | |
| Parameter | Units | Frequency of Reporting | ADWG Limit | | No. Samples | Summary of Results | | | No. Exceeding | | Comment |
| | | | Aesthetic | Health | | Maximum Value | Average Value | Minimum Value | Aesthetic | Health | |
| PH | | Quarterly | 6.5-8.5 | | 4 | 8.71 | 8.65 | 8.58 | 3 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Total Hardness | mg/L | Quarterly | 200.00 | | 3 | 5.2 | 4.80 | 4.5 | 0 | 0 | ADWG Compliant |
| Alkalinity | mg/L | Quarterly | | | 3 | 382 | 379.33 | 375 | 0 | 0 | ADWG Compliant |
| Total Dissolved Ions | mg/L | Quarterly | | | 3 | 747 | 740.33 | 736 | 0 | 0 | ADWG Compliant |
| Total Dissolved Solids | mg/L | Quarterly | 500.00 | | 3 | 550 | 545.00 | 541 | 3 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Colour | PCU | Quarterly | 15.00 | | 3 | 1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Turbidity | NTU | Quarterly | 5.00 | | 3 | <1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Sodium | mg/L | Quarterly | 180.00 | | 3 | 220 | 219.67 | 219 | 3 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Potassium | mg/L | Quarterly | | | 3 | 1.4 | 1.37 | 1.3 | 0 | 0 | ADWG Compliant |
| Calcium | mg/L | Quarterly | | | 3 | 2 | 1.90 | 1.8 | 0 | 0 | ADWG Compliant |
| Magnesium | mg/L | Quarterly | | | 3 | 0 | 0.00 | 0 | 0 | 0 | ADWG Compliant |
| Chloride | mg/L | Quarterly | 250.00 | | 3 | 68 | 66.67 | 65 | 0 | 0 | ADWG Compliant |
| Fluoride | mg/L | Quarterly | | 1.50 | 3 | 0.48 | 0.43 | 0.36 | 0 | 0 | ADWG Compliant |
| Nitrate | mg/L | Quarterly | | 50.00 | 3 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Sulphate | mg/L | Quarterly | 250.00 | 500.00 | 3 | 2 | 1.40 | 1 | 0 | 0 | ADWG Compliant |
| Iron | mg/L | Quarterly | 0.30 | | 3 | 0.02 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Manganese | mg/L | Quarterly | 0.10 | 0.50 | 3 | 0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Zinc | mg/L | Quarterly | 3.00 | | 3 | 0.11 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Aluminium | mg/L | Quarterly | 0.20 | | 3 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Copper | mg/L | Quarterly | 1.00 | 2.00 | 3 | <0.03 | N/A | <0.03 | 0 | 0 | ADWG Compliant |
| E. Coli | CFU/100mL | Monthly | | 0.00 | 12 | | | | | 0 | ADWG Compliant |

- Note:**
1. Sampling was undertaken in accordance with the DWQMP. No sample was taken for the second quarter due to staff shortages at the time.
 2. TDS & Sodium consistently exceeded the ADWG Aesthetic limit. The aesthetic limit for pH was exceeded on one occasion.
 3. All Chloride and E.Coli samples were compliant with the ADWG.

Table 6 – Bollon – 2016/17 Verification monitoring results and Reticulation E. coli verification monitoring

| Summary Page | | | | | | | | | | | |
|------------------------|-----------|--|------------|--------|-------------|--------------------|---------------|---------------|---------------|--------|---|
| Scheme | | Bollon | | | | | | | | | |
| Sampling Location | | Rayner Place Park | | | | | | | | | |
| Laboratory Used | | Queensland Health Forensic and Scientific Services | | | | | | | | | |
| Parameter | Units | Frequency of Reporting | ADWG Limit | | No. Samples | Summary of Results | | | No. Exceeding | | Comment |
| | | | Aesthetic | Health | | Maximum Value | Average Value | Minimum Value | Aesthetic | Health | |
| PH | | Quarterly | 6.5-8.5 | | 4 | 8.57 | 8.54 | 8.49 | 3 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Total Hardness | mg/L | Quarterly | 200.00 | | 4 | 5.2 | 5.15 | 5 | 0 | 0 | ADWG Compliant |
| Alkalinity | mg/L | Quarterly | | | 4 | 359 | 356.75 | 355 | 0 | 0 | ADWG Compliant |
| Total Dissolved Ions | mg/L | Quarterly | | | 4 | 753 | 748.50 | 743 | 0 | 0 | ADWG Compliant |
| Total Dissolved Solids | mg/L | Quarterly | 500.00 | | 4 | 573 | 567.75 | 563 | 4 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Colour | PCU | Quarterly | 15.00 | | 4 | 2 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Turbidity | NTU | Quarterly | 5.00 | | 4 | <1 | N/A | <1 | 0 | 0 | ADWG Compliant |
| Sodium | mg/L | Quarterly | 180.00 | | 4 | 230 | 226.00 | 220 | 4 | 0 | Some Non-Compliances - ADWG Aesthetic Limit |
| Potassium | mg/L | Quarterly | | | 4 | 1.8 | 1.73 | 1.7 | 0 | 0 | ADWG Compliant |
| Calcium | mg/L | Quarterly | | | 4 | 2.1 | 2.03 | 2 | 0 | 0 | ADWG Compliant |
| Magnesium | mg/L | Quarterly | | | 4 | 0 | 0.00 | 0 | 0 | 0 | ADWG Compliant |
| Chloride | mg/L | Quarterly | 250.00 | | 4 | 89 | 87.00 | 85 | 0 | 0 | ADWG Compliant |
| Fluoride | mg/L | Quarterly | | 1.50 | 4 | 0.44 | 0.41 | 0.32 | 0 | 0 | ADWG Compliant |
| Nitrate | mg/L | Quarterly | | 50.00 | 4 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Sulphate | mg/L | Quarterly | 250.00 | 500.00 | 4 | 6 | 5.68 | 5 | 0 | 0 | ADWG Compliant |
| Iron | mg/L | Quarterly | 0.30 | | 4 | 0.04 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Manganese | mg/L | Quarterly | 0.10 | 0.50 | 4 | 0.01 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Zinc | mg/L | Quarterly | 3.00 | | 4 | 0.09 | N/A | <0.01 | 0 | 0 | ADWG Compliant |
| Aluminium | mg/L | Quarterly | 0.20 | | 4 | <0.05 | N/A | <0.05 | 0 | 0 | ADWG Compliant |
| Copper | mg/L | Quarterly | 1.00 | 2.00 | 4 | <0.03 | N/A | <0.03 | 0 | 0 | ADWG Compliant |
| E. Coli | CFU/100mL | Monthly | | 0.00 | 11 | | | | | 0 | ADWG Compliant |

Note:

1. Sampling was undertaken in accordance with the DWQMP. No sample was taken for the second quarter due to staff shortages at the time.
2. TDS & Sodium twice exceeded the ADWG Aesthetic limit. The aesthetic limit for pH was exceeded on one occasion.
3. All Chloride and E.Coli samples were compliant with the ADWG.

Appendix B – Implementation of the DWQMP Risk Management Improvement Program

Table 7 – Progress against the risk management improvement program in the approved DWQMP

| Scheme | Scheme Component / Sub-component | Action(s) | Target date/s | Status as at <<date>> | (If implementing these actions will take longer than anticipated, please provide detail, as it may affect the approved DWQMP) |
|--|--|---|---------------|--|---|
| GOB Bore Water Supplies- St George, Dirranbandi, Bollon, Thallon and Hebel | Reservoirs and Distribution | Interim - Maintain Monitoring to detect presence of bacteria. | Ongoing | In place | . |
| | | Short/Long Term - Implement Annual Mains Flushing with other annual maintenance procedures. | Ongoing | In place | |
| | Whole System | Develop operational and maintenance procedures | June 2017 | Drafts completed with focus on hygiene | . |
| Dirranbandi – Surface Water Supply | Treatment - Coagulant Dosing Irregularities | Interim - Monitor recent upgrades to coagulation process - coagulant change (ACH) & installation of static mixer. Upgrades to low lift pump system. | July 2017 | In progress | Upgrades to low lift pump system to be completed early 2018 |
| | | Short/Long Term - Implement and Monitor coagulant dosing improvements | June 2017 | In place | |
| | Treatment - Disinfection Dosing Irregularities | Interim - Complete investigation and design of disinfection dosing improvements. | June 2017 | In place | |
| | | Short/Long Term - Implement and Monitor disinfection dosing improvements | June 2017 | In place | |
| | Treatment - Coagulant Dosing Equipment Malfunction | Interim - Monitor recent upgrades to coagulation system. | Ongoing | In place | |
| | | Short/Long Term - Monitor effectiveness of coagulant dosing. | Ongoing | In place | . |
| | Treatment - Inadequate Flocculation | Interim - Monitor effectiveness of flocculation in peak demand periods. | Ongoing | In place | |
| | | Short/Long Term - Monitor effectiveness of flocculation in peak demand periods. Consider modifications. | Ongoing | In place | |
| | Treatment - Inadequate Clarification | Interim – Monitor recent upgrade to coagulation system. | Ongoing | In place | |

| Scheme | Scheme Component / Sub-component | Action(s) | Target date/s | Status as at <<date>> | (If implementing these actions will take longer than anticipated, please provide detail, as it may affect the approved DWQMP) |
|--------|---|--|------------------|-----------------------|---|
| | | <i>Short/Long Term – Connect turbidity monitor to SCADA for real time assessment. Monitor effectiveness of flocculation in peak demand periods.</i> | <i>June 2017</i> | <i>In place</i> | |
| | <i>Treatment - Inadequate Disinfection Contact Time</i> | <i>Interim – Monitor recent upgrades to water processing rates. Target chlorination break point, monitor chlorine levels</i> | <i>Ongoing</i> | <i>In place</i> | |
| | | <i>Short/Long Term – Monitor bore water demand during next peak period. Maintain chlorination breakpoint. Connect chlorination monitor to SCADA. Monitor effectiveness of disinfection dosing.</i> | <i>June 2017</i> | <i>In place</i> | |
| | <i>Reservoirs & Distribution – Sediment Build Up</i> | <i>Interim - Maintain Monitoring to detect presence of bacteria.</i> | <i>Ongoing</i> | <i>In place</i> | |
| | | <i>Short/Long Term - Implement Annual Mains Flushing with other annual maintenance procedures</i> | <i>June 2017</i> | <i>In progress</i> | |
| | <i>Reservoirs & Distribution – Long Detention or Stagnation Zones</i> | <i>Interim - Maintain Monitoring to detect presence of bacteria.</i> | <i>Ongoing</i> | <i>In place</i> | |
| | | <i>Short/Long Term - Investigate network to determine zones of long detention and stagnation.</i> | <i>June 2017</i> | <i>In progress</i> | <i>Target date extended to June 2018 in amended plan</i> |
| | <i>Reservoirs & Distribution – Inadequate Maintenance of Chlorine Residuals</i> | <i>Interim - Maintain Monitoring to detect presence of bacteria.</i> | <i>Ongoing</i> | <i>Ongoing</i> | |
| | | <i>Short/Long Term - Investigate network to determine zones of low chlorine residual. Increase dose rate or consider alternate dosing locations</i> | <i>June 2017</i> | <i>None</i> | <i>Target date extended to June 2018 in amended plan</i> |
| | <i>Reservoirs & Distribution – Reservoir Contamination</i> | <i>Interim – Monitor recent upgrades to water processing rates. Target chlorination break point, Monitor chlorine levels.</i> | <i>Ongoing</i> | <i>In place</i> | |
| | | <i>Short/Long Term - Monitor bore water demand during next peak demand period.</i> | <i>June 2017</i> | <i>In place</i> | |

| Scheme | Scheme Component / Sub-component | Action(s) | Target date/s | Status as at <<date>> | (If implementing these actions will take longer than anticipated, please provide detail, as it may affect the approved DWQMP) |
|---------------------------------|--|--|---------------|---|---|
| | | <i>Maintain chlorination breakpoint. Connect chlorination monitor to SCADA. Monitor effectiveness of disinfection dosing. Consider additional reservoir storage to overcome need for bore water supplementing.</i> | | | |
| | Whole System - All Hazards | <i>Interim - Nil</i> | - | N/A | |
| | | <i>Short/Long Term - Develop operational and maintenance procedures</i> | June 2017 | <i>Drafts completed with focus on hygiene</i> | |
| Mungindi – Surface Water Supply | Reservoirs & Distribution – Sediment Build Up | <i>Interim - Maintain Monitoring to detect presence of bacteria.</i> | Ongoing | In place | |
| | | <i>Short/Long Term - Implement Annual Mains Flushing with other annual maintenance procedures</i> | June 2017 | In progress | |
| | Reservoirs & Distribution – Long Detention or Stagnation Zones | <i>Interim - Maintain Monitoring to detect presence of bacteria.</i> | Ongoing | Ongoing | |
| | | <i>Short/Long Term - Investigate network to determine zones of long detention and stagnation.</i> | June 2017 | None | Target date extended to June 2018 in amended plan |
| | Reservoirs & Distribution – Inadequate Maintenance of Chlorine Residuals | <i>Interim - Maintain Monitoring to detect presence of bacteria.</i> | Ongoing | Ongoing | |
| | | <i>Short/Long Term - Investigate network to determine zones of low chlorine residual. Increase dose rate or consider alternate dosing locations</i> | June 2017 | None | Target date extended to June 2018 in amended plan |
| | Whole System - All Hazards | <i>Interim - Nil</i> | - | N/A | |
| | | <i>Short/Long Term - Develop operational and maintenance procedures</i> | June 2017 | <i>Drafts completed with focus on hygiene</i> | |