



DIAMANTINA SHIRE COUNCIL
DWQMP ANNUAL REPORT
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Drinking Water Service Provider ID - 42

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LIST OF ACRONYMS (Glossary of Terms)

AWDG	Australian Drinking Water Guidelines (2011) – Published by the National Health and Medical Research Council of Australia
DSC	Diamantina Shire Council
CEO	Chief Executive Officer
DWS	Director of Works and Services
DWQMP	Drinking Water Quality Management Plan
DWSP	Drinking Water Service Provider
OWSR	Office of the Water Safety Regulator
SPID	Service Provider Identification
<i>E. coli</i>	Escherichia coli, a bacterium which is considered to indicate the presence of faecal contamination and therefore a potential health risk
CFU/100ml	Colony Forming Units per 100 millilitres

1.0 INTRODUCTION

This is the Drinking Water Quality Management Plan (DWQMP) Annual Report for Diamantina Shire Council (DSC) for the 2021-22 financial year. This annual report will assist the Regulator to determine whether the approved DWQMP and any approval conditions have been complied with. It further provides a mechanism for service providers to report publicly on their performance in managing drinking water quality.

DSC is a registered Service Provider with Identification (SPID) number 42. DSC is operating under an approved DWQMP to ensure consistent supply of safe quality drinking water in order to protect public health. This is done through proactive identification and minimisation of public health related risks associated with drinking water.

This annual report includes the following:

- Activities undertaken over the financial year in operating Council's drinking water service
- Drinking water quality summary
- A summary of Council's performance in implementing the approved DWQMP
- Incidents reported to the Regulator
- Customer complaints
- Review outcomes and audit findings.

This report will be made available publicly to Council customers through the website or upon request at the Council offices.

2.0 SUMMARY OF THE SCHEMES OPERATED

DSC is a small Drinking Water Service Provider, as defined in the Water Supply (Safety and Reliability) Act of 2008. Diamantina Shire covers an area of 95,000km² with an overall population of approximately 350 people which swells significantly during the cooler months due to travelling tourists. There are two operational water schemes within the Shire, in the towns of Bedourie and Birdsville. The Shire's administration centre is located in Bedourie. Both systems are characterised by deep artesian bores bringing hot water to the surface under pressure, where the only treatment is cooling. Bedourie's water is sourced from a bore approximately 400m deep and surfaces at approximately 45°C. Birdsville's bore water is sourced from 1200m below ground level and surfaces at a temperature of approximately 98°C. Birdsville has a dual reticulation system where non-potable water is sourced from the Diamantina River when water is available.

Table 1: Summary of Schemes.

Scheme	Water Source	Treatment	Pop. Served	No. Conns	Demand
Bedourie	Artesian Bore Water	Cooling	122	70	281 KL/d
Birdsville	Artesian Bore Water	Cooling	140	70	394 KL/d

3.0 ACTIONS TAKEN TO IMPLEMENT THE DWQMP

The implementation of DSC's DWQMP has provided Council with an operational framework to manage the water supply systems of Bedourie and Birdsville. To ensure greater surety for the supply of safe drinking water for the supply schemes within the Shire. The risk management components of the DWQMP have been a priority for DSC for providing a safe and reliable water source for the local population and visitors.

Finally, it should be noted that Diamantina's DWQMP was submitted for Amendment in February of 2022 and was approved by the Regulator in March. Subsequently, this annual report encompasses the 2020 and 2022 Amendments which were both in operation throughout the reporting period.

Table 2: Diamantina Shire Council Risk Management Improvement Program Implementation Status.

Scheme	Component	Improvement Actions	Target Date	Actions Taken To Date	Status/Revised Target Date	Responsible Officer	Amendment Version
Bedourie	Source Water Infrastructure	Construction of new Bedourie town bore to increase the town's water security.	Feb 21	New bore was drilled in 2019.	Completed	Director of Works	2020
Birdsville	Cooling Pond	Clean cooling pond of vegetation.	Jun 18	Actioned.	Completed	Director of Works	2020
Birdsville	Cooling Pond Infrastructure	Insulate the pipe between the cooling pond and ground level reservoir.	Dec 18	Completion date was revised with the 2022 Amendment.	Ongoing December 2022	Director of Works	2020/2022
Birdsville	Source Water	Provide public information on the potential health risks associated with elevated levels of fluoride in the drinking water.	Jun 14	Fluoride fact-sheet has been distributed to residents, this item has been carried over to the 2022 Amendment.	Ongoing	Director of Works	2020/2022
Bedourie/Birdsville	Source Water	Radiological Activity (Gross Alpha and Gross Beta) and Uranium verification monitoring of source water.	Dec 23	Verification monitoring programme has been updated to include these parameters. Results will be monitored to assess if the parameters are present above ADWG values.	Ongoing	Director of Works	2022

Scheme	Component	Improvement Actions	Target Date	Actions Taken To Date	Status/Revised Target Date	Responsible Officer	Amendment Version
Birdsville	Dual Reticulation System	Ingress of contamination from the cross-connection to the untreated river water.	Dec 23	Monthly turbidity monitoring has been implemented into the operational monitoring programme. Results are to be monitored to determine if cross-contamination from the river water is present within the drinking water reticulation.	Ongoing	Director of Works	2022
Birdsville	Distribution System	<i>E.coli</i> and Total Coliform operational monitoring of ground level and elevated reservoirs (new sampling point)	Dec 22	New sampling point has been added to the operational testing programme, to be tested on a monthly basis. To date, results are being monitored and a reservoir cleaning procedure is being developed.	Ongoing	Director of Works	2022

4.0 WATER QUALITY MONITORING – COMPLIANCE WITH QUALITY CRITERIA

Council undertake monthly operational testing in Bedourie and Birdsville, in addition to weekly visual inspections of all drinking water infrastructure (bores, reservoirs, cooling ponds etc.). Council also send out water samples to external laboratories twice a year as part of their verification monitoring programme. All of Council's water samples are taken from within the distribution system of the two towns. In the past, road closures between Bedourie and Birdsville due to flooding has prevented some operational water testing from being conducted, however, this was not the case for the 2021-22 financial year.

Sections 4.1 and 4.2 below summarises all operational and verification monitoring for the Bedourie and Birdsville schemes undertaken during the reporting period, while Section 4.3. outlines any potential water quality issues encountered by Council.

4.1. Bedourie Drinking Water Quality Summary 2021- 2022

Table 3: Bedourie Verification Monitoring Results.

Bedourie Distribution Water	Start Date: 01/07/2021- 30/06/2022						Guideline Value			
Parameters	Units	Testing Frequency	No. of Samples Tested	Summary of Results			Health	Exceedances	Aesthetic	Exceedances
				Max Value	Average Value	Min Value				
<i>E.coli</i>	CFU/100mL	Biannual	2	0	0	0	1	0		
Total Coliforms	CFU/100mL	Biannual	2	0	0	0				
Conductivity	µS/cm	Biannual	2	880	443.5	7				
Dissolved Organic Carbon	mg/L	Biannual	2	1	0.6	0.2				
Dissolved Oxygen	mg/L	Biannual	2	10	8.85	7.7				
pH	mg/L	Biannual	2	8.4	8.25	8.1			≥6.5 & ≤ 8.5	0
Total Dissolved Solids	mg/L	Biannual	2	530	520	510			660	0
Turbidity	NTU	Biannual	1	0.5	0.5	0.5			5	0
Aluminium	mg/L	Biannual	2	0.02	0.0115	0.003			0.2	0
Chloride	mg/L	Biannual	2	90	88	86			250	0
Fluoride	mg/L	Biannual	2	0.8	0.45	0.1	1.5	0		
Selenium	mg/L	Biannual	2	0.002	0.0015	0.001	0.01	0		
Sodium	mg/L	Biannual	2	200	170	140			180	1
Total Iron	mg/L	Biannual	2	0.11	0.1	0.09			0.3	
Soluble Iron	mg/L	Biannual	2	0.11	0.095	0.08				

Bedourie Distribution Water	Start Date: 01/07/2021- 30/06/2022						Guideline Value			
Parameters	Units	Testing Frequency	No. of Samples Tested	Summary of Results			Health	Exceedances	Aesthetic	Exceedances
				Max Value	Average Value	Min Value				
Total Manganese	mg/L	Biannual	2	0.015	0.0145	0.014	0.5	0		
Soluble Manganese	mg/L	Biannual	2	0.014	0.014	0.014				
Uranium	mg/L	Biannual	1	0.001	0.001	0.001	0.017	0		
Gross Alpha	Bq/L	Biannual	1	0.081 ±0.034	0.081 ±0.034	0.081 ±0.034			0.5	0
Gross Beta	Bq/L	Biannual	1	0.033 ±0.039	0.033 ±0.039	0.033 ±0.039			0.5	0
Aesthetic Guideline Exceedance										
Health Guideline Exceedance										

Table 4: Bedourie Operational Monitoring Source Water and Distribution.

Start Date: 1/07/2021- 30/06/2022										
Parameters	Units	No. of Samples to be Tested as per DWQMP	No. of Samples Tested	Summary of Results			Guideline Value			
				Maximum Value	Average Value	Minimum Value	Health	Exceedances	Aesthetic	Exceedances
<i>E.coli</i>	CFU/100mL	Monthly	36	0	0	0	1	0		
Total Coliforms	CFU/100mL	Monthly	36	0	0	0				
Turbidity	NTU	Monthly	36	0.6	0.18	0.02			5	0
Aesthetic Guideline Exceedance										
Health Guideline Exceedance										

Table 5: Bedourie *E.coli* Annual Value Compliance Table.

Year	1/07/2021- 30/06/2022											
	July	August	September	October	November	December	January	February	March	April	May	June
No. of samples collected	3	3	3	3	3	3	3	3	3	3	3	3
No. of samples collected in which <i>E.coli</i> is detected	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	36	36	36	36	36	36	36	36	36	36	36	36
No. failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

4.2. Birdsville Drinking Water Quality Summary 2021- 2022

Table 6: Birdsville Verification Monitoring Results.

Birdsville Distribution Water	Start Date: 01/07/2021- 30/06/2022						Guideline Value			
Parameters	Units	Testing Frequency	No. of Samples Tested	Summary of Results			Health	Exceedances	Aesthetic	Exceedances
				Max Value	Average Value	Min Value				
<i>E.coli</i>	CFU/100mL	Biannual	2	0	0	0	1	0		
Total Coliforms	CFU/100mL	Biannual	2	0	0	0				
Conductivity	µS/cm	Biannual	2	928	867	806				
Dissolved Organic Carbon	mg/L	Biannual	2	1	1	1				
Dissolved Oxygen	mg/L	Biannual	2	11	8.9	6.8				
pH	mg/L	Biannual	2	8.5	8.35	8.2			≥6.5 & ≤ 8.5	0
Total Dissolved Solids	mg/L	Biannual	2	560	550	540			660	0
Turbidity	NTU	Biannual	1	0.5	0.5	0.5			5	0
Aluminium	mg/L	Biannual	2	0.041	0.0365	0.032			0.2	0
Chloride	mg/L	Biannual	2	55	53	51			250	0
Fluoride	mg/L	Biannual	2	1.8	1.75	1.7	1.5	2		
Selenium	mg/L	Biannual	2	0.001	0.001	0.001	0.01	0		
Sodium	mg/L	Biannual	2	210	200	190			180	2
Total Iron	mg/L	Biannual	2	0.016	0.0125	0.009			0.3	0
Soluble Iron	mg/L	Biannual	2	0.013	0.0105	0.008				

Birdsville Distribution Water	Start Date: 01/07/2021- 30/06/2022						Guideline Value			
Parameters	Units	Testing Frequency	No. of Samples Tested	Summary of Results			Health	Exceedances	Aesthetic	Exceedances
				Max Value	Average Value	Min Value				
Total Manganese	mg/L	Biannual	2	0.016	0.0083	0.0006	0.5	0		
Soluble Manganese	mg/L	Biannual	2	0.015	0.0078	0.0005				
Uranium	mg/L	Biannual	1	0.001	0.001	0.001	0.017	0		
Gross Alpha	Bq/L	Biannual	1	0.079 ±0.033	0.079	0.079			0.5	0
Gross Beta	Bq/L	Biannual	1	0.065 ±0.04	0.065	0.065			0.5	0
Aesthetic Guideline Exceedance										
Health Guideline Exceedance										

Table 7: Birdsville Operational Monitoring Source Water and Distribution.

Start Date: 1/07/2021- 30/06/2022										
Parameters	Units	No. of Samples to be Tested as per DWQMP	No. of Samples Tested	Summary of Results			Guideline Value			
				Maximum Value	Average Value	Minimum Value	Health	Exceedances	Aesthetic	Exceedances
<i>E.coli</i>	CFU/100mL	Monthly	36	0	0	0	1	0		
Total Coliforms	CFU/100mL	Monthly	36	0	0	0				
Turbidity	NTU	Monthly	36	0.9	0.27	0.03			5	0
Aesthetic Guideline Exceedance										
Health Guideline Exceedance										

Table 8: Birdsville *E.coli* Annual Value Compliance Table.

Year	1/07/2021- 30/06/2022											
Month	July	August	September	October	November	December	January	February	March	April	May	June
No. of samples collected	3	3	3	3	3	3	3	3	3	3	3	3
No. of samples collected in which <i>E.coli</i> is detected	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	36	36	36	36	36	36	36	36	36	36	36	36
No. failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

4.3. Summary of Bedourie and Birdsville Verification and Operational Monitoring

Bedourie Operational and Verification Monitoring:

The following ADWG aesthetic exceedances were reported in Bedourie's distribution system:

- Sodium (1 exceedance from 2 samples)

There were no ADWG health exceedances reported within the Bedourie scheme.

Birdsville Operational and Verification Monitoring:

The following ADWG aesthetic exceedances were reported within Birdsville's distribution system:

- Sodium (2 exceedances from 2 samples)

The following ADWG health exceedances were reported within Birdsville's distribution system:

- Fluoride* (2 exceedances from 2 samples)

***Note: Elevated Fluoride levels detected in Birdsville's drinking water has been identified as a hazard in Council's DWQMP, this is further discussed in Section 5 below.**

The Bedourie and Birdsville bore water is of a relatively high quality, generally meeting the aesthetic and health ADWG values. In regards to the elevated levels of sodium found in both Bedourie and Birdsville's water, no ADWG health target has been set for sodium as elevated levels are generally only associated with taste issues and therefore do not pose any adverse threats to public health. Birdsville's elevated Fluoride levels are discussed further in Section 5.

E.coli Verification and Operational Monitoring:

Bacteriological sampling within the Bedourie and Birdsville drinking water schemes recorded no positive *E.coli* results for the reporting period. Therefore, both Bedourie and Birdsville have been compliant with the 98% *E.coli* value for the 2021-22 financial year.

Missed Verification and Operational Monitoring:

There was no missed verification or operational monitoring within the Bedourie or Birdsville schemes for the 2021-22 Financial Year. However, the following parameters were not tested for at the frequencies stipulated in Council's DWQMP:

- Turbidity
- Uranium
- Gross Alpha
- Gross Beta

Uranium, Gross Alpha and Gross Beta verification monitoring were only added to the verification monitoring programme in the 2022 Amendment which was approved in March. Therefore, Council was only able to undertake one round of testing within the financial year for those parameters. In regards to Turbidity, it was identified within the last annual report that Turbidity verification monitoring was not being undertaken as per the DWQMP. Council addressed this issue following the submittal of the previous Annual Report, however it still resulted in one round of missed verification monitoring.

Finally, no samples were taken from the new operational monitoring sampling point downstream of the Birdsville reservoirs during the reporting period. This can be attributed to the fact that the sampling point was only added to the DWQMP in March and new staff in Birdsville who were not as familiar with the DWQMP requirements. Council will ensure this new sampling point is included in the operational monitoring programme moving forward.

5.0 INCIDENTS REPORTED TO THE REGULATOR

Table 9: Water quality incidents reported to the Regulator for the 2021-22 financial year.

Incident Date	Scheme	Issue	Preventative Actions
5/11/2021	Birdsville	Fluoride in exceedance of ADWG health guideline value	Public notification and ongoing verification monitoring to ensure values are stable and only slightly above the ADWG health limit.
10/05/2021	Birdsville	Fluoride in exceedance of ADWG health guideline value	

DSC has one ongoing incident for the naturally elevated levels of fluoride within Birdsville’s drinking water. The elevated fluoride levels are associated with the natural geology of the area and averages around 1.7mg/L. Treatment to reduce fluoride levels in the drinking water is not financially feasible, considering that the concentration is only 12% above the ADWG health value of 1.5mg/L. The main issues associated with elevated fluoride levels in Birdsville is dental fluorosis primarily affecting children under the age of 6. Despite the frequent exceedance of fluoride levels, biannual verification monitoring has been deemed as suitable for the Birdsville scheme as historical data has identified fluoride concentrations to be within a consistent range. At this stage, Council’s primary management strategy is to provide public notification to Birdsville residents in the form of a fluoride fact-sheet to help the community understand the potential impacts of elevated fluoride in the drinking water.

6.0 CUSTOMER COMPLAINTS REGARDING WATER QUALITY

There were no customer complaints made to Council during the 2021-22 Financial Year.

7.0 DWQMP REVIEW OUTCOMES

The last DWQMP Review was conducted in December 2021. The Review found the current DWQMP to be out of date. Council applied for an Amendment to the DWQMP in February 2022 to incorporate the Review findings. The Amendment was approved in March 2022. The next review is scheduled for December 2023.

8.0 DWQMP AUDIT FINDINGS AND RECOMMENDATIONS

An audit of the Bedourie and Birdsville drinking water schemes was conducted in March 2022. The major findings of the audit are summarised in Table 10 below. While the audit identified some non-conformances and improvement actions, all of these were relatively minor and most were in relation to the previous 2020 Amendment which has since been superseded (to include the recommendations from the audit). Therefore, further Amendments to the DWQMP are not required.

Table 10: DWQMP 2022 Audit Outcomes.

Item	Non-conformance	Action	Status of actions	Responsible Officer
Is there evidence the preventative measure is effectively implemented?	The Birdsville reservoirs are not easily accessible. The elevated reservoir has multiple vertical ladders that require harnesses and there are radio frequency hazards on the reservoir that require a permit to access. It is not feasible to inspect the reservoirs weekly due to staffing requirements and the need to shut off communications networks while doing it.	6-monthly reservoir inspections using a drone has been implemented into the Birdsville operational monitoring programme.	Implemented, first inspection was undertaken in July 2022.	Director of Works
Document all procedures and compile into an operation manual.	The DWQMP lists the DWQMP Operating plan as the procedure to manage several risks. No one interviewed during the audit was aware of its existence.	Council are currently undertaking a review of their operation and maintenance procedures.	Ongoing.	Director of Works
Does the monitoring undertaken during the audit period match the monitoring plan?	Operational monitoring (bore pressure, temperature monitoring, reservoir inspections) is not undertaken in accordance with the plan as they are not documented. In the case of Birdsville, visual inspections are conducted which are adequate as it does not increase the risk to the service. The inspection of reservoir integrity presents the main risk to be solved.	The DWQMP will be updated in the next Amendment to include visual inspections of water infrastructure which do not require documentation.	Ongoing.	Director of Works

Item	Non-conformance	Action	Status of actions	Responsible Officer
Was the verification monitoring programme implemented as stated?	Verification monitoring was not undertaken as stated in the plan. There was a 6-month sample missing for Bedourie from July 2021, as this was a 6-monthly sample, the auditor viewed that a catch-up sample could have been taken.	This missed sampling was a result of water samples being lost during transportation to the lab, Council will ensure any further missed sampling is re-sampled for within the required timeframe.	Not applicable.	Director of Works
Ensure that the plan is communicated and that improvements are monitored for effectiveness.	As there were no unacceptable risks identified, these RMIP actions are best practice and not actually required to be documented under the Act and Guidelines. However, as part of the approved DWQMP they are subject to the audit. There are dates for improvement actions that have not been met by a significant period of time. This was identified in the 2021 review and the 2022 DWQMP Amendment addressed these issues.	All RMIP items were updated in the 2022 Amendment.	Completed	Director of Works
Were all high priority actions undertaken in the timeframes committed?	Actions that were determined to be high priority were not completed within years of the stated dates.	All RMIP items were updated in the 2022 Amendment.	Completed	Director of Works

Item	Improvement Action	Action	Status of actions	Responsible Officer
Ensure that equipment performs adequately and provides sufficient flexibility and process control.	The heat exchanger sometimes faults out and relies on customers to inform if there is an issue. The heat exchanger may be undersized and consideration should be given to a larger unit.	Council have purchased a larger heat exchanger which is waiting to be installed.	Ongoing.	Director of Works
Establish a programme for regular inspection and maintenance of all equipment, including monitoring equipment.	There is an asset management strategy and there is knowledge of the actions that are required but there are no specific tasks identified (e.g. there is no documented timeline for cleaning the heat exchanger).	Council are currently undertaking a review of their operation and maintenance procedures.	Ongoing.	Director of Works
Identify training needs and ensure resources are available to support training programmes.	The town foreman in Birdsville is relatively new and is not fully aware of how the drinking water system operates. This is mitigated by the fact that the plumber travels from Bedourie for most works. However, it is advisable that training is provided to the foreman.	Council are currently undertaking a review of their operation and maintenance procedures to better assist new staff members.	Ongoing.	Director of Works
Document information pertinent to all aspects of drinking water quality management.	The operation of the Birdsville scheme in particular should be better documented to support the town foreman.	Council are currently undertaking a review of their operation and maintenance procedures.	Ongoing.	Director of Works