



sunwater

Drinking Water Quality Management Plan Report

Dumaresq-Barwon Border Rivers Commission (BRC)

SPID: 370

Financial Year: 2020 - 2021

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LGA covered by this plan: Southern Downs Regional Council

Water Supply Schemes covered by this plan:

- Glenlyon Dam Drinking Water Scheme

This report has been prepared in accordance with the Drinking Water Quality Management Plan Report Guidance Note.

Sunwater Limited

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Document history and status

Revision	Date	Description	Developed By	Review	Approved
A	3/11/2021	Draft prepared by Jacobs for Sunwater and BRC review	Cilna van Wijk (Jacobs)	Kenny Liew (Jacobs)	Nicholas Stanton (Jacobs)
0	15/12/2021	Reviewed and approved by Sunwater and BRC for submission to Regulator	Cilna van Wijk (Jacobs)	Neil McCabe John Kelly Chris Delamont (Sunwater)	Donna Hodgson (BRC)

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1 Introduction

This report documents the performance of the Border River Commission's Glenlyon Dam 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 is for the period 1 July 2020 – 30 June 2021.

Dumaresq-Barwon Border Rivers Commission (BRC) is a registered service provider with identification (SPID) number 370. BRC is operating under an approved DWQMP to ensure the consistent supply of safe quality drinking water to protect public health.

Sunwater is contracted for the asset management, operation and maintenance of the dam, the associated water treatment facilities and mains reticulation system for the provision of drinking water services. Jacobs is engaged by Sunwater to provide specialist technical services to assist with the operation and management of drinking water plants including the preparation of this report.

The report assists the Regulator with determining 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 Summary of Scheme Operated

The Glenlyon Dam drinking water scheme sources water from Glenlyon Dam. The dam is jointly owned by the State of QLD and the State of NSW, and is managed by the Border Rivers Commission.

Sunwater is contracted for the asset management, operation and maintenance of the dam, the associated water treatment facilities and mains reticulation system for the provision of drinking water services to four houses, a small caravan park and day visitor / recreational areas together with associated toileting services (i.e. picnic area toilets).

The water treatment process comprises of a multi-barrier three step process of;

- (i) Primary media filtration and storage
- (ii) Secondary filtration with organics removal through activated carbon media; and
- (iii) Disinfection by sodium hypochlorite.

The water treatment process, plant and equipment are essentially manually controlled by operations staff during day-light hours, with the exception of the automation of the sodium hypochlorite pump. This automatic chlorine dosing system maintains free chlorine residual levels above 0.5 mg/L in the clear water tanks as part of the water treatment process.

The treated drinking water is stored in above ground tanks for later use on a two or three day production cycle, depending on demand for drinking water at the caravan park and picnic facilities at Glenlyon Dam. Water is disinfected before reticulation.

The daily drinking water demand is very seasonal, typically ranging from 10 to 40 kL/day, with minimum and maximum demand values of 18 and 300 kL/week respectively.

A summary of this scheme is presented in Table 1 below.

Table 1 – Summary of schemes

Scheme	Water Source	Treatment processes	Treatment capacity	Towns supplied
Glenlyon Dam WTP	Glenlyon Dam	Primary filtration, secondary filtration and disinfection with dosing by sodium hypochlorite.	0.043 ML/d	Four houses, small caravan park and day visitor / recreational areas together with associated toileting services (i.e. picnic area toilets).

3 DWQMP Implementation

The actions undertaken to implement the DWQMP are summarised below.

Sunwater has implemented the DWQMP by setting operational limits and investigation into non-compliances, as defined in the DWQMP operational and verification monitoring programmes, and site specific work instructions.

Progress in implementing the risk management improvement program

Appendix C of the approved DWQMP outlines the Improvement Plan Actions. A brief status report of the progress of these actions is included in Table 2.

Please refer to summary below regarding the four improvement actions:

- Action No. 1 has been actioned. A turbidity treatment assessment was completed in FY2020/2021 and a final assessment report issued in June 2021. This action is ongoing, whereby a condition assessment of existing equipment is to be undertaken and technical specification to be completed to allow installation of a new coagulant dosing system in FY2021/2022.
- Action No. 2 has been actioned. Total Petroleum Hydrocarbon (TPH) and Polycyclic Aromatic Hydrocarbon (PAH) testing was completed in FY2020/2021. This action is ongoing, as TPH and PAH are to be tested again in FY2021/2022, in addition to Benzene, Toluene and Ethylbenzene.
- Action No. 3 has been completed. Trihalomethane (THM) testing was completed in FY2020/2021. THM testing to continue in accordance with DWQMP.
- Action No. 4 has been completed. A review was undertaken by the Sunwater Information & Communication Technology (ICT) and Operational Technology (OT) teams with input sought from cyber security specialists at Jacobs. In addition, actions from this review were implemented as described in Table 2.

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

No changes were made to the operational monitoring program during this reporting period.

Drinking water quality is tested in accordance with ADWG limits on a number of key parameters and monitored on three levels to test for water quality and microbiological characteristics to ensure safe drinking water for consumers. The drinking water quality tests involve weekly testing at the WTP for water chemistry (aesthetics) and residual chlorine, monthly testing of microbiology and annual testing of heavy metals, and Trihalomethanes (THMs) at a NATA accredited Laboratory.

Three water quality sampling locations (test points) within the distribution system are utilised to provide high levels of overall confidence, guarantee and surety in the provision of safe drinking water quality to consumers.

The sampling points were selected based on providing the highest probability of finding non-compliant drinking water to prevent a worst-case scenario for a public health incident. The water quality sampling

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

points are located at the Water Treatment Plant (Clear Water Tanks - Tank 1 and Tank 2) and at the end of the reticulation mains at the Caravan Park (Office) and Haigh Cottage (kitchen tap).

Amendments made to the DWQMP

The DWQMP was not updated in the reporting period.

An amendment to the BRC DWQMP was submitted to the Director-General of the Department of Regional Development, Manufacturing and Water (the Regulator) on 24 September 2020 to address the DWQMP review outcomes (Refer section 7). Subsequently, comments were received by the Regulator for further amendments and provision of additional information on the 22 February 2021. These comments were addressed and a revised DWQMP amendment re-submitted on the 8 April 2021. Additional comments were received by the Regulator for further amendments and provision of additional information following the 2020/2021 reporting period. These additional comments were addressed and a revised DWQMP submitted to the Regulator during the 2021/2022 reporting period. Therefore, the amendments are not applicable to this reporting period.

Table 2 – Risk management improvement program implementation status

RMIP Action No.	Component	Hazard/Event	Improvement actions	Target date	Actions taken to date	Status and revised target date	Responsible Officer / Position
1	Source Water	Chemical & physical hazards due to climatic and seasonal variations in raw water quality, due to heavy rainfall and drought conditions.	Investigation on feasibility of a new treatment process or chemical dosing system for additional treatment during higher raw water turbidity/colour events.	FY2019/2020	Turbidity treatment assessment completed in FY2020/2021. Final assessment report issued in June 2021. Condition assessment of existing equipment to be undertaken and technical specification to be completed to allow installation of a new coagulant dosing system in FY2021/2022.	Ongoing FY2021/2022	General Manager South
2	Source Water	Hydrocarbon contamination due to accidental large-scale fuel / petrol spillages from (capsized or sinking) fishing or ski boats.	Complete base-line hydrocarbon testing of dam storage during a period of heavy recreational use and add hydrocarbon testing to annual heavy metals test regime.	FY2018/2019	Total Petroleum Hydrocarbon (TPH) and Polycyclic Aromatic Hydrocarbon (PAH) testing completed for FY2020/2021. Annual TPH and PAH testing in addition to Benzene, Toluene and Ethylbenzene testing to be undertaken in FY2021/2022 to obtain additional dataset to assess ongoing testing requirement.	Ongoing FY2021/2022	Storage Supervisor
3	Water Treatment Plant	High Total chlorine from overdosing chlorine and presence of THM's from failure to remove organic matter.	Commence annual THM testing. If levels are of concern more regular testing to be investigated and established as required.	FY2018/2019	Annual THM testing completed for FY2020/2021. Annual THM testing to be continued annually and increased to quarterly testing (pending results of initial monthly monitoring for first 3 months) following approval of revised DBBRC DWQMP. THM testing has been scheduled in Sunwater Asset Management System for completion to ensure completion in accordance to monitoring program.	Completed. THM testing to be continued in accordance with DWQMP.	Storage Supervisor
4	Water Treatment Plant	Cyber intrusion or interference disrupting chlorine dosing	Investigation into the current configuration of the cellular unit and chlorine controller, and ownership/setup of the	FY2020/2021	A review was undertaken by Sunwater Information & Communication Technology (ICT) and Operational Technology (OT) teams regarding the connectivity of the WTP. Input was also sought from cyber security specialists at Jacobs. The	Completed	General Manager South

RMIP Action No.	Component	Hazard/Event	Improvement actions	Target date	Actions taken to date	Status and revised target date	Responsible Officer / Position
			<p>SIM card with the contractor that installed it.</p> <p>If found to be exposed to the internet, this will either be disabled or secured. There will be a password protection in front of the device regardless of finding.</p>		<p>following actions were completed following this review:</p> <ul style="list-style-type: none"> • The cellular unit is used only for delivery of SMS alarms to the operators. The SMS alarms are still active and confirmed working with the operators. The password was also changed on the cellular unit. • The chlorine dosing unit controller is only able to be adjusted locally from the console by the operators onsite. • The sim was removed and replaced with a Sunwater owned service. • The service has no internet access. 		

4 Verification Monitoring – Water Quality Information and Summary

Under the *Water Supply (Safety and Reliability) Act 2008*, the Dumaresq-Barwon Border Rivers Commission (BRC) (the entity responsible for Glenlyon Dam) is defined as a large water service provider.

The drinking water quality control parameters were developed from recommendations outlined in ADWG (2011). Key parameters for operator testing and water quality acceptance are identified in Table 3 (a): Drinking Water Quality Control Parameters. These parameters are tested at the WTP at the three different water quality sampling points (WTP (Clear Water Tanks – Tank 1 and Tank 2), Haigh Cottage and Caravan Park).

Table 3 (a) – Drinking Water Quality Control Parameters

Parameter	Monitoring Frequency	Acceptable Limits
Residual chlorine (free) (Note 1)	Every 3 – 4 days	> 0.5 mg/L after 30 mins
Total chlorine	Every 3 – 4 days	< 5 mg/L
Raw Water pH	Every 3 – 4 days	N/A
Raw Water Turbidity	Every 3 – 4 days	N/A
Treated Water pH	Every 3 – 4 days	6.5 – 8.5
Treated Water Turbidity (Note 2)	Every 3 – 4 days	< 1 NTU

Note 1: The minimum acceptable residual chlorine (free) limit of 0.5 mg/L is not a specific requirement of the ADWG and has been applied by Sunwater as an internal operational check for disinfection performance. Although residual chlorine (free) is outlined in the DWQMP as a drinking water quality control parameter to monitor operational performance, verification of the treatment process and particularly disinfection is by the monthly micro bacteriological sampling.

Note 2: The acceptable limit of < 1 NTU for turbidity is based on effective chlorination as described in the ADWG and has been applied by Sunwater as an internal critical limit to verify the treatment performance and check disinfection.

Microbiological control testing is also required to ensure compliance with ADWG and the standards in the Public Health Regulation 2005. The parameters and frequency of the monitoring is shown in Table 3 (b): Microbiological control.

Table 3 (b) – Microbiological Control

Parameter	Monitoring Frequency	Acceptable Limits
E.Coli	Monthly	<1 CFU
Total Coliforms	Monthly	N/A – significant changes will be investigated
Total Plate Count	Monthly	N/A – significant changes will be investigated

Trihalomethanes and heavy metals are also tested annually to ensure compliance with ADWG and the standards in the Public Health Regulation 2005. The parameters and frequency of the monitoring is shown below in Table 3 I: Trihalomethanes and Heavy Metal Testing.

Table 3 (c) – Trihalomethanes and Heavy Metal Testing

Parameter	Monitoring Frequency	Acceptable Limits
Trihalomethanes (THM)	Annually	< 0.25 mg/L
Zinc (Zn)	Annually	< 3 mg/L (Note 1)
Arsenic (As)	Annually	< 0.01 mg/L
Cadmium (Cd)	Annually	< 0.002 mg/L
Chromium (Cr)	Annually	< 0.05 mg/L
Copper (Cu)	Annually	< 2 mg/L
Nickel (Ni)	Annually	< 0.02 mg/L
Lead (Pb)	Annually	< 0.01 mg/L

Note 1: The acceptable limit of <3 mg/L for zinc is not a specific requirement of the ADWG and has been applied by Sunwater as an internal operational check for WTP performance.

A summary of compliance with water quality criteria is displayed in Table 4 and Table 5. This includes the following information:

- parameter
- unit of measure
- total number of samples collected
- number of samples that did not meet the water quality criteria
- maximum concentration or count

The water quality results for the 2020/2021 financial year have achieved the recommended health limits in the ADWG.

There were however two (2) events where the treated water turbidity exceeded the Sunwater acceptable limit of 1 NTU, across 37 separate samples at the WTP, 36 separate samples at the Haigh Cottage, and 42 separate samples at the Caravan Park. The events are as follows:

- 7 samples at the Glenlyon WTP exceeded the acceptable limit in the period 8/12/2020 to 16/12/2020 (with 8 samples at the Haigh Cottage and 9 samples at the Caravan Park (Office) exceeding the limit in this period). The maximum turbidity recorded in this period was 1.27 NTU, 1.33 NTU, and 2.5 NTU at the WTP, Haigh Cottage and Caravan Park respectively. This event was not notified to the Regulator as it was determined that there was no risk to public health and the event was under operational control.
- 30 samples at the Glenlyon WTP exceeded the acceptable limit in the period 12/02/2021 to the end of the reporting period of 30/06/2021 (with 28 samples at the Haigh Cottage and 33 samples at the Caravan Park (Office) exceeding the limit in this period). The maximum turbidity recorded in this period was 14.9 NTU, 14.9 NTU, and 15 NTU at the WTP, Haigh Cottage and Caravan Park respectively. This event was not initially notified to the regulator as it was determined that there was no risk to public health and the event was under operational control. Additional testing of manganese and iron levels on the 01/03/2021

indicated manganese levels above ADWG aesthetic limits due to oxidation in the treated water tank. Increase in Manganese suspected to have been caused by low dam levels. This event was notified to the Regulator on the 13/03/201 due to manganese levels above the aesthetic limit resulting in a discolouration of the water and attributing to increased turbidity levels. The elevated manganese levels eventually subsided however increasing turbidity levels persisted due to higher raw water turbidity levels due to subsequent inflows into Glenlyon Dam. Overall, elevated turbidity levels occurred throughout February – June 2021 and into the 2021/2022 reporting period. Refer to Section 5 for event details.

Table 4 – Drinking water quality performance for Glenlyon Dam Scheme - verification monitoring

Parameter	Sampling Points	Units	No. of samples required to be collected (as per the approved DWQMP)	No. of samples actually collected and tested	Water quality criteria (i.e DWQMP or ADWG health guideline value)	Min	Max	Average (Mean)	No. of non compliant samples	Comments
pH	WTP, Haigh Cottage, Caravan Park (Note 1)	-	Every 2-3 days	112 at 3 sampling points (336 Total)	6.5-8.5	6.9	7.7	7.4	0	
Turbidity		NTU		112 at 3 sampling points (336 Total)	<1	0.22	15	1.8	115	December 2020 event: Turbidity levels >1 NTU were not required to be notified to the regulator. February 2021 event: Turbidity levels >1 NTU were not required to be notified to the regulator. March 2021 event: Regulator was notified on the 13/03/2021 regarding the turbidity levels >1 NTU. Refer to Section 5.
Residual Chlorine (Free)		mg/L		112 at 3 sampling points (336 Total)	>0.5 after 30 mins	0.52	2.36	1.0	0	
Total Chlorine				112 at 3 sampling points (336 Total)	<5	0.76	2.74	1.4	0	
E.Coli		Haigh Cottage, Caravan Park (Note 1)		CFU/100ml	Monthly	20 at 2 sampling points (40 Total)	<1	< 1	< 1	< 1
Trihalomethanes (THM)	Haigh Cottage, WTP (Note 1)	µg/L	Annually	1 at each sample point (2 Total)	< 250	190	210	200	0	

Parameter	Sampling Points	Units	No. of samples required to be collected (as per the approved DWQMP)	No. of samples actually collected and tested	Water quality criteria (i.e DWQMP or ADWG health guideline value)	Min	Max	Average (Mean)	No. of non compliant samples	Comments
Arsenic (As)	WTP (Note 2)	mg/L	Annually	1	< 0.01		0.0026		0	
Cadmium (Cd)					< 0.002		<0.0001		0	
Chromium (Cr)					< 0.05		<0.0005		0	
Copper (Cu)					< 2		0.0085		0	
Lead (Pb)					< 0.01		0.00066		0	
Nickel (Ni)					< 0.02		0.0011		0	
Zinc (Zn)					< 3		0.012		0	

Notes:

Note 1 - Samples from different locations at the site were combined for reporting (Refer to water quality parameters including pH, turbidity, residual chlorine (free), total chlorine, E.Coli and Trihalomethanes (THM)).

Note 2 - Heavy metal results are specific to the WTP sampling point. This is an individual sample result and minimum / maximum / average results are not applicable.

Table-5 - E. coli compliance with annual value

Drinking water scheme: Glenlyon Dam Drinking Water Scheme

Year	2020 – 2021											
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	8	2	2	2	2	6	2	4	2	2	6	2
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	50	50	50	50	50	54	54	56	56	50	48	40
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

5 Incidents Reported to the Regulator

One (1) notification to the regulator was made between 1 July 2020 and 30 June 2021. This notification is summarised below:

- 1/03/2021 – Manganese > 0.1 mg/L followed by ongoing Turbidity > 1 NTU throughout February – June 2021 (event)

All microbiological testing undertaken during the financial year revealed that there were no instances where *Escherichia coli* (E. Coli) exceeded the acceptable limit of <1 CFU/100ml.

Non-compliances with the water quality criteria and corrective and preventive actions undertaken

As outlined above, for this reporting period there was one (1) prescribed incident or event reported to the regulator. Incidents / Events reported to the regulator are described in Table 6.

Table 6 – Incidents / Events reported to the regulator

Incident / Event date	Scheme / location	Parameter / issue	Preventive actions
<p>Event 1 March 2021</p>	<p>Glenlyon Dam Water Treatment Plant</p>	<p>Manganese > 0.1 mg/L (Aesthetic Limit) Turbidity > 1 NTU</p>	<p>Turbidity levels at the WTP exceeded the critical limit of 1 NTU (1.72 NTU on 12/02/2021) but this did not represent a notification to the regulator at the time. Operator collected sample for Iron/Manganese testing on the 1/03/2021. Manganese levels (below the ADWG Health limit, but above the Aesthetic limit) were detected in the treated water from event-based sampling following increased turbidity after the treated water tanks and a discolouration of the water. It was identified that the Manganese was possibly oxidising in the treated water tank when exposed to the sodium hypochlorite resulting in high turbidity results in the treated water. Increase in Manganese in raw water suspected to have been caused by low dam levels. Regulator was notified of this event on the 13/03/2021. A Precautionary Water Quality Notice was issued to residents and customers on the 12/03/2021 to not drink the potable water.</p> <p>The elevated manganese levels eventually subsided however increasing turbidity levels persisted for the remainder of the reporting period due to higher raw water turbidity levels due to subsequent inflows into Glenlyon Dam. Overall, elevated turbidity levels occurred throughout February – June 2021 and into the 2021/2022 reporting period.</p> <p>The drinking advisory remains in place as a precaution. The precautionary water quality notice was updated and issued to customers on the 1/07/2021 regarding the increasing turbidity.</p> <p>The following actions are being taken regarding this event:</p> <ul style="list-style-type: none"> • Precautionary Water Quality Notice still in place for Glenlyon Dam residents. The precautionary water quality notice advises all residents and visitors to not use the tap water for drinking, cooking and brushing teeth following higher than normal levels of turbidity in the water supply. Residents and visitors are urged to bring potable water to the recreation area. Limited bottled water is available for purchase from the Glenlyon Dam Tourist Park Office. • Operator is monitoring turbidity levels, pH levels, Total and Free Chlorine at the Treated Water Storage (WTP), Haigh Cottage and Caravan Park. • Bacteriological testing is undertaken to monitor effectiveness of chlorine disinfection. Total and Free Chlorine residual in treated water still detected above target limit and E.coli results indicate compliance to treated water quality specifications. • Turbidity treatment assessment completed in FY2020/2021. Final assessment report issued in June 2021. Condition assessment of existing equipment to be undertaken and technical specification to be completed to allow installation of a new coagulant dosing system in FY2021/2022. The installation of a new coagulant dosing system is anticipated to rectify the ongoing turbidity issues being experienced at the WTP.

6 Customer Complaints

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

Throughout the 2020/2021 reporting period, no complaints about water quality were received.

During 2020/2021 reporting period, there were no suspected or confirmed cases of illness arising from the water supply system.

7 DWQMP Review Outcomes

A review was conducted by Jacobs and Sunwater and the finalised review was submitted to the regulator on the 13 August 2020. The review considered six categories of the DWQMP and identified areas where the DWQMP requires update to remain relevant for the safe management of the drinking water supply. There were several review outcomes and subsequent actions identified following the completion of this review. A summary of these review outcomes & actions are referenced in Table 7.

Table 7 – Summary of review outcomes and actions

Item No.	Description	DWQMP Reference	Action	Due Date
1	One of the clear water storage tanks listed in the DWQMP has been replaced due to a structural failure	Section 2.1.4, and Table 3, Section 2.2	Update the DWQMP to reflect changes to assets on site.	30/10/2020
2	Raw water quality data is included up to the end of 2018 when the DWQMP was developed.	Section 2.1.2	Update the raw water quality data to include data from 2018-2020	30/10/2020
3	The current DWQMP risk assessment and DWQMP does not incorporate or address cyber security risks to water quality	Appendix B, Risk Assessment Section 5	Undertake an additional risk assessment specific to cyber security risks and include this as an addendum to the current risk assessment. After the cyber security risk assessment, include an explanation of the cyber security risks and implications to managing the drinking water scheme	30/10/2020
4	The current DWQMP does not accurately describe the incident management process undertaken by Sunwater. Additionally, the current incident management process is being updated.	Section 5.3	Update the incident management process (currently underway). Update the DWQMP to include the updated incident management process.	30/10/2020
5	The operational and verification monitoring program has been updated since the DWQMP was approved.	Section 6	Update the DWQMP to include the updated operational and verification monitoring program.	30/10/2020
6	Of the three actions on the RMIP, one is complete and can be removed, one is underway, and one is not complete.	Appendix C, RMIP	Review and close-out Actions 1 and 2. Update the RMIP to include additional actions for continual improvement.	30/10/2020

The DWQMP was updated to address the review outcomes/actions, and an amended DWQMP was submitted to the regulator on the 24 September 2020 (Refer section 3).

8 DWQMP Audit Findings

No audit was conducted during the reporting period 01/07/2020 to 30/06/2021.