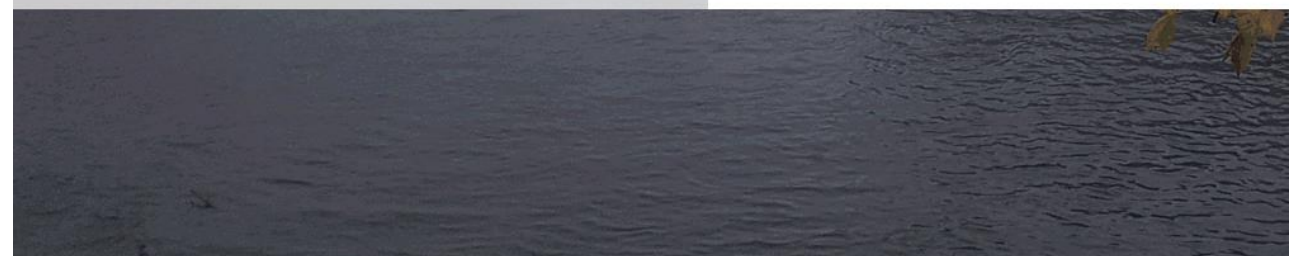




DWMS Annual Report 2020

June 2021





Contents

Executive Summary	1
Glossary	2
1. Introduction	3
2. Supply Scheme	4
3. Scheme Changes.....	5
3.1. Batlow Scheme.....	5
3.2. Brungle Scheme.....	5
3.3. Khancoban Scheme.....	5
3.4. Talbingo Scheme.....	5
3.5. Tumbarumba Scheme.....	5
3.6. Tumut Scheme	6
4. Critical Control Points.....	7
4.1. Batlow	8
4.2. Brungle.....	11
4.3. Khancoban	14
4.4. Talbingo	15
4.5. Tumbarumba.....	17
4.6. Tumut.....	19
5. Reservoir Integrity.....	22
6. Incidents Reported to NSW Health	23
7. Verification Monitoring Performance.....	24
7.1. Reticulation Water Quality Monitoring.....	24
7.2. Sampling Frequency Compliance.....	25
7.3. Water Quality Customer Complaints.....	25
8. Improvement Plan Implementation.....	25
8.1. Status	25
8.2. New Additions	25
9. DWMS Review Outcomes	26
10. DWMS Audit Outcomes.....	26



Tables

Table 1 Snowy Valleys Council's Drinking Water Supply Schemes.....	4
Table 2 Batlow Scheme CCPs	8
Table 3 Batlow CCP Data Analysis	8
Table 4 Brungle Scheme CCPs.....	11
Table 5 Brungle CCP Data Analysis.....	11
Table 6 Khancoban Scheme CCPs	14
Table 7 Khancoban CCPs Data Analysis	14
Table 8 Talbingo Scheme CCPs	15
Table 9 Talbingo CCP Data Analysis	15
Table 10 Tumbarumba Scheme CCPs.....	17
Table 11 Tumbarumba CCP Data Analysis.....	17
Table 12 Tumut Scheme CCPs.....	19
Table 13 Tumut CCP Data Analysis	19
Table 14 Snowy Valleys Council Customer Water Quality Complaints.....	25
Table 15 Batlow Verification Monitoring.....	29
Table 16 Brungle Verification Monitoring.....	30
Table 17 Khancoban Verification Monitoring.....	31
Table 18 Morgans Reserve Verification Monitoring.....	32
Table 19 Talbingo Verification Monitoring.....	33
Table 20 Tumbarumba Verification Monitoring.....	34
Table 21 Tumut Verification Monitoring.....	36
Table 22 Verification Sampling Frequency Compliance	37

Figures

Figure 1: Batlow CCP1: Turbidity.....	10
Figure 2: Batlow CCP2: Turbidity.....	10
Figure 3: Batlow CCP2: pH to Town.....	10
Figure 4: Batlow CCP2: Free Chlorine	10
Figure 5: Batlow CCP3: Fluoride.....	11
Figure 6: Brungle CCP1: Turbidity	13
Figure 7: Brungle CCP2: Turbidity	13
Figure 8: Brungle CCP2: pH to Town.....	13
Figure 9: Brungle CCP2: Free Chlorine Residual.....	13
Figure 10: Khancoban Balance Tank Free Chlorine Residual.....	14
Figure 11: Talbingo CCP1: Turbidity	16
Figure 12: Talbingo CCP2: Turbidity	16
Figure 13: Talbingo CCP2: pH to Town.....	16
Figure 14: Talbingo CCP2: Free Chlorine Residual.....	16
Figure 15: Tumbarumba CCP1: Filter Turbidity	18
Figure 16: Tumbarumba CCP2: Free Chlorine Residual.....	18
Figure 17: Tumbarumba CCP3: Fluoride	18
Figure 18: Tumut CCP2: Average Filtered Turbidity.....	20
Figure 19: Tumut CCP3: Turbidity.....	20
Figure 20: Tumut CCP3: pH	20
Figure 21: Tumut CCP3: Free Chlorine Residual	20
Figure 22: Tumut CCP4: Fluoride.....	21



Appendices

A. Verification Monitoring



EXECUTIVE SUMMARY

Water suppliers in New South Wales (NSW) are required to establish and adhere to a 'quality assurance program', referred to as a Drinking Water Management System (DWMS). An annual review of the DWMS is recommended to ensure that it is valid and being implemented effectively. Furthermore, an annual report is required to be prepared and submitted to the local Public Health Unit (PHU), NSW Health.

Viridis Consultants P/L (Viridis) was engaged by Snowy Valleys Council (SVC) to prepare the DWMS Annual Report for the 2020 reporting period from 1 January 2020 to 31 December 2020.

SVC is responsible for treating and distributing water to:

- Batlow Township
- Brungle Township
- Khancoban Township
- Talbingo Township
- Tumbarumba Township
- Tumut Township
- Morgans Reserve- Cloverdale
- Adelong Township.

Verification monitoring for all schemes was 100% compliant with the Australian Drinking Water Guidelines (ADWG) health-based guidelines.

At the start of 2020 severe bushfires impacted the region and emergency measures were required to supply water to fight fires. This was managed under the drinking water quality Incident and Emergency Response Plan (IERP)- Drinking Water Quality Management System (DWQMS), which was effectively implemented for the prevailing circumstances.

There were occasional critical limit breaches which were discussed in the 2020 Implementation Review. CCPs were reviewed and in future all critical limit breaches will be managed as per the DWMS.

SVC maintained overall good customer satisfaction, with only eleven water quality customer complaints across all schemes.



GLOSSARY

Word	Description
ADWG	Australian Drinking Water Guidelines
CCP	Critical Control Point
CRM	Customer Relations Management software
Disinfection	The process designed to kill most microorganisms in water, including essentially all pathogenic (disease-causing) bacteria. There are several ways to disinfect, with chlorine being most frequently used in water treatment.
DWMS	Drinking Water Management System
kL	Kilo litres
mg/L	Milligram per litre
ML	Mega litres
NSW	New South Wales
NTU	Nephelometric Turbidity Units
pH	An expression of the intensity of the basic or acid condition of a liquid. Natural waters usually have a pH between 6.5 and 8.5
PHU	Public Health Unit
PIRMP	Pollution incident response management plan
RPZ	Reduced pressure zone
SCADA	Supervisory control and data acquisition
SOP	Standard operating procedure
Turbidity	The cloudiness of water caused by the presence of fine suspended matter.
SVC	Snowy Valleys Council
WTP	Water Treatment Plant



1. INTRODUCTION

Water suppliers in New South Wales (NSW) are required to establish and adhere to a 'quality assurance program', referred to as a Drinking Water Management System (DWMS). The DWMS is a risk-based approach to managing drinking water quality.

An annual review of the DWMS is recommended to ensure that it is valid and is being implemented effectively. In addition, an Annual Report is required to be prepared and submitted to the local Public Health Unit (PHU), NSW Health.

Snowy Valleys Council (SVC) has engaged Viridis Consultants P/L (Viridis) to prepare the DWMS Annual Report for 2020. This DWMS Report covers a 12-month reporting period from 1 January 2020 to 31 December 2020. It summarises SVC's drinking water quality performance for the reporting period and progress on the implementation of the improvement plan.



2. SUPPLY SCHEME

SVC operates and manages the following drinking water supply schemes, as outlined in Table 1 below.

Table 1 Snowy Valleys Council's Drinking Water Supply Schemes

Scheme Name	Primary Source	Treatment Processes	Serviced Areas
Batlow	Kunama Dam (via Little Gilmore Creek)	<ul style="list-style-type: none"> Flocculation Ultrafiltration Disinfection (chlorine gas) Fluoridation (sodium fluoride) Storage (Batlow Reservoir) 	Batlow Township
Brungle	Nimbo Creek	<ul style="list-style-type: none"> Limestone Contact Tank (optional) Microfiltration Disinfection (sodium hypochlorite) Storage (Brungle Reservoir) 	Brungle Township
Khancoban	Khancoban Creek	<ul style="list-style-type: none"> Course filtration (offline) Disinfection (chlorine gas) Storage 	Khancoban Township
Talbingo	Jounama Creek	<ul style="list-style-type: none"> Flocculation Sand Filtration Disinfection (chlorine gas) Storage (high level and low level reservoir) 	Talbingo Township
Tumbarumba	Tumbarumba Creek Burra Creek McKeenin Street and Common Bore	<ul style="list-style-type: none"> Flocculation Sand Filtration Fluoridation (sodium fluoride) Disinfection (chlorine gas) 	Tumbarumba Township
Tumut	Tumut River	<ul style="list-style-type: none"> Powdered activated carbon (optional) Flocculation Fluoridation (sodium fluoride) Sand Filtration Disinfection (chlorine gas) Adelong Rechlorination (chlorine gas) 	<ul style="list-style-type: none"> Tumut Township Morgans Reserve-Cloverdale Adelong Township



3. SCHEME CHANGES

The scheme changes are discussed in this section.

3.1. Batlow Scheme

Temporary changes:

The townships of Batlow and Tumbarumba were supplied with Raw Water (directly from dam which is gravity feed) from 3rd to 9 January 2020 for the following reasons:

1. there was high water demand of >100 L/s for fire fighting duties. The plant could not meet the demand for long periods of time as the situation was worsening and the community required access to high volumes of water to fight fires.
2. fire risk to infrastructure (lines and the plants themselves) meant that power supply could easily be cut. Water supply would have ceased if the power supply failed the community would not have access to any water for fire fighting or hygiene.

Boil water notifications were made to the community. During the fire, 25 drive-by water meters were burnt and required replacement.

There were no significant permanent changes to the scheme, including catchment characteristics, treatment processes, chemicals used and the distribution network.

3.2. Brungle Scheme

There were no significant permanent changes to the scheme, including catchment characteristics, treatment processes, chemicals used and the distribution network.

3.3. Khancoban Scheme

Khancoban Creek at Khancoban was impacted by severe bushfires. Khancoban supplies were managed by filling up the reservoirs prior to storm to avoid the first flush.

There were no significant permanent changes to the scheme, including catchment characteristics, treatment processes, chemicals used and the distribution network.

3.4. Talbingo Scheme

Junama Creek at Talbingo was impacted by severe bushfires and was considered unsuitable as a source for drinking water. SVC installed a temporary pump to utilise the alternative source in Juanama Poundage for the Talbingo water supply from 17 to 26 January 2020.

There were no significant permanent changes to the scheme, including catchment characteristics, treatment processes, chemicals used and the distribution network.

3.5. Tumbarumba Scheme

Temporary changes:

The townships of Batlow and Tumbarumba were supplied with Raw Water (directly from dam which is gravity feed) from 3rd to 9 January 2020 for the following reasons:



3. there was high water demand of >100 L/s for fire fighting duties. The plant could not meet the demand for long periods of time as the situation was worsening and the community required access to high volumes of water to fight fires.
4. fire risk to infrastructure (lines and the plants themselves) meant that power supply could easily be cut. Water supply would have ceased if the power supply failed the community would not have access to any water for fire fighting or hygiene.

There were no significant permanent changes to the scheme, including catchment characteristics, treatment processes, chemicals used and the distribution network.

3.6. Tumut Scheme

There were no significant permanent changes to the scheme, including catchment characteristics, treatment processes, chemicals used and the distribution network.



4. CRITICAL CONTROL POINTS

Critical control points (CCP) are selected as points that control hazards that represent a significant risk and require elimination or reduction to assure supply of safe drinking water. These points are applied to important treatment processes and must have a timely measurable parameter and corrective actions that are able to be applied in response to a deviation. Alert and critical limits applied to the parameter are used to assess process performance rather than final water quality (which is discussed in the Verification Monitoring Performance section). A critical limit exceedance may indicate that a treatment process is no longer operating properly whereas an ADWG non-compliance indicates that water delivered to customers did not meet required specifications. Both should be managed in accordance with the IERP, and CCP procedures where applicable.

A review of the CCPs was undertaken during 2020 as part of the Risk Assessment Review. This will result in some changes to Critical Control Point limit values and treatment processes moving forward into 2021, including:

- A review of and update of CCP procedures and limits for the Talbingo, Brungle and Tumut schemes to ensure filtered water turbidity is reflective of protozoan removal requirements (i.e. critical limit of 0.5 NTU). New limit values were established:
 - Target of 0.2 NTU (down from 0.3 NTU),
 - Adjustment Limit of 0.3 NTU (down from 0.4 NTU), and
 - Critical Limit of 0.5 NTU (down from 1.0 NTU).
- The Brungle critical limit for disinfection is 0.3 mg/L of free Chlorine. The chlorination strategy recommended an increase to 0.5 mg/L to ensure *C.t.* is achieved.
- Filters at Batlow are over 12 years old and 'Pressure Decay' testing is not detailed in the CCP procedures. An action has been listed (but not yet implemented) to update CCP procedures for Batlow and Brungle to include a trigger for pressure decay testing in response to exceedance of the adjustment limit.



4.1. Batlow

The current CCPs for the Batlow scheme are presented in Table 2.

Table 2 Batlow Scheme CCPs

Critical Control Point	Parameter	Operational Target	Adjustment Limit	Critical Limit
Batlow CCP 1: Filtration	Turbidity	<0.2 NTU	>0.2 NTU	>0.5 NTU
	TMP	TMP -60 to -30 kPa	-30 ≤ TMP < -25 kPa	TMP ≥ -25 kPa
Batlow CCP 2: Primary Disinfection	pH	pH 7.5 - 7.8	pH <7.5 or >7.8 for >24 hours	pH >8.2 (instantaneous)
	Turbidity	Turbidity <0.3 NTU	Turbidity >0.5 NTU (instantaneous)	Turbidity >1.0 NTU (instantaneous)
	Chlorine residual	Free Chlorine 0.7 - 1.0 mg/L	Free chlorine <0.7 mg/L or >1 mg/L (instantaneous)	Free chlorine <0.3 mg/L or >1.5 mg/L (instantaneous)
Batlow CCP 3: Fluoridation	Fluoride	0.9 - 1.1 mg/L	<0.9 mg/L or >1.1 mg/L (instantaneous)	<0.9 mg/L for greater than 72 hours or >1.5 mg/L (instantaneous)*
Batlow CCP 4: Distribution Reservoirs	Reservoir integrity	Vermin proof	Evidence of integrity breach	Integrity breach not rectified
		Secure and leak proof	Evidence of security breach	Security breach not rectified

Table 3 Batlow CCP Data Analysis

Parameter	Min	5th %ile	Mean	95th %ile	Max	Count
Filtered Turbidity (NTU)	0.05	0.06	0.076	0.10	0.18	252
Turbidity (NTU)	0.07	0.07	0.229	0.48	3.93	356
Fluoride Reading (mg/l)	0.58	0.81	0.981	1.07	1.11	361
pH To Town	6.30	7.10	7.540	8.00	8.70	362
Free Residual Chlorine (mg/l)	0.29	0.62	1.047	1.39	1.64	362

In early January, severe bushfires affected the region around Batlow. During the fires, electrical power supply was cut and it was not safe for staff to attend site to start a generator. During this time, the town was supplied with raw water. In addition, 25 Itron drive by water meters were burnt and required replacement.

Filter performance was good, with no breaches for turbidity. There were two breaches for “before backpulse” TMP pressure, on 1st January and again on 28th January, and a further 25 alert level readings.

Due to the bushfires a boil water advisory was in place from 3rd January to 9th January, during which time raw water was supplied. There was also a power outage at the treatment plant on 24/05/2020.

A period of treated water turbidity alerts in April due to a rain event after fires were managed with corrective actions and the process was brought within limits.

Fluctuations were seen in pH results with three breaches for high pH in 2020. In January the plant was running on a generator which caused one of the breaches.

There were four critical high breaches for free chlorine, three being in the week after the loss of power due to bushfires. The first reading after the bushfires and power outage was critically low and the subsequent two critical high readings were due to a planned increase of the free chlorine residual target to 2 mg/L and flushing activity in the Batlow network. The other high free chlorine CCP breach occurred on 1 June 2020.



Fluoride was typically maintained within limits, with 3 critical low breaches of longer than 72 hours duration in April, October, and December. There were two alert high-level readings, which were managed with corrective actions.

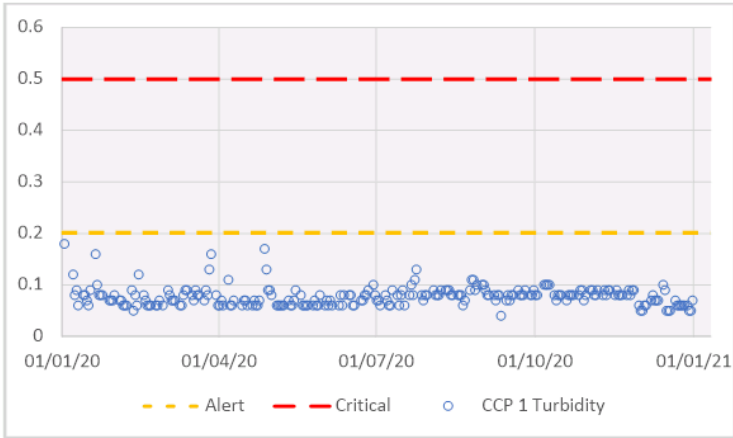


Figure 1: Batlow CCP1: Turbidity

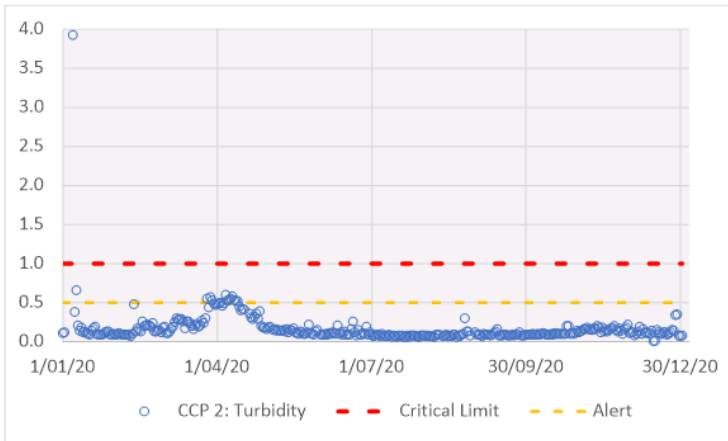


Figure 2: Batlow CCP2: Turbidity

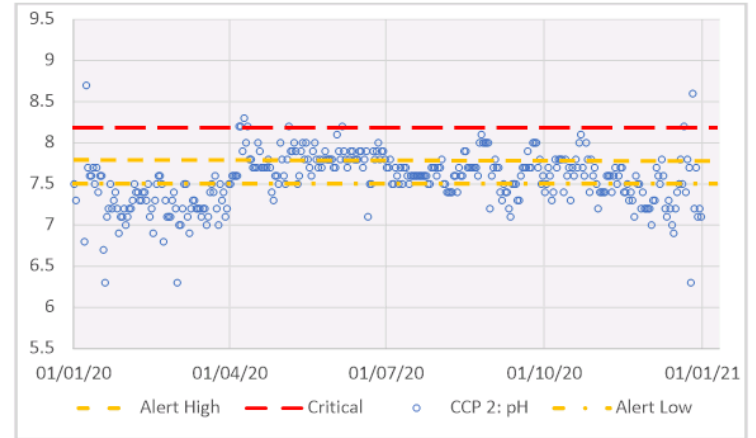


Figure 3: Batlow CCP2: pH to Town

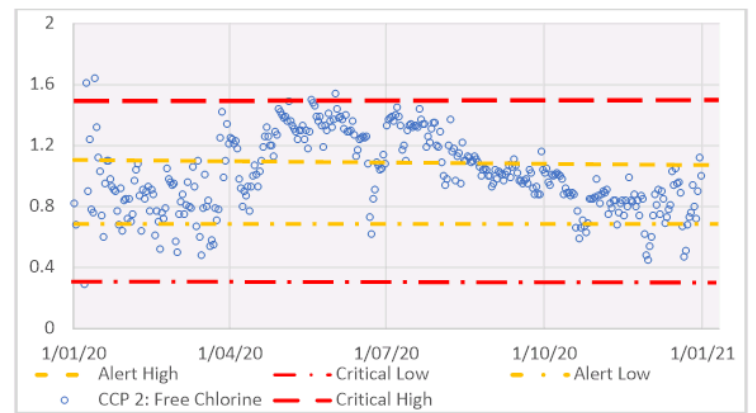


Figure 4: Batlow CCP2: Free Chlorine

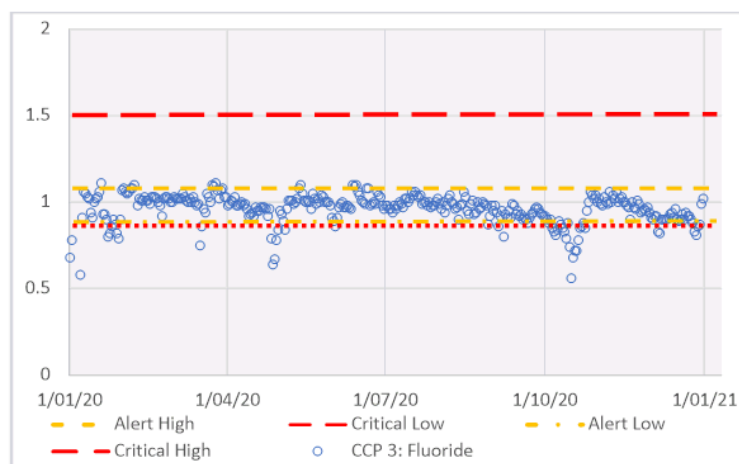


Figure 5: Batlow CCP3: Fluoride

4.2. Brungle

The current CCPs for the Brungle scheme are presented in Table 4.

Table 4 Brungle Scheme CCPs

Critical Control Point	Parameter	Operational Target	Adjustment Limit	Critical Limit
Brungle CCP 1: Filtration	Turbidity	<0.4 NTU	>0.4 NTU (instantaneous)	>0.4 NTU after 24 hours
	TMP	50 kPa	70 kPa	>150 kPa
Brungle CCP 2: Primary Disinfection	pH	pH 7.5 - 7.8	pH <7.5 or >7.8 for >24 hours	pH >8.2 (instantaneous)
	Turbidity	Turbidity <0.3 NTU	Turbidity >0.5 NTU (instantaneous)	Turbidity >1.0 NTU (instantaneous)
Brungle CCP 3: Distribution Reservoirs	Reservoir integrity	Free Chlorine 0.7 - 1.0 mg/L	Free chlorine <0.7 mg/L or > 1 mg/L (instantaneous)	Free chlorine <0.3 mg/L or >1.5 mg/L (instantaneous)
		Vermin proof	Evidence of integrity breach	Integrity breach not rectified
		Secure and leak proof	Evidence of security breach	Security breach not rectified

Table 5 Brungle CCP Data Analysis

Parameter	Min	5th %ile	Mean	95th %ile	Max	Count
CCP 1: Turbidity (NTU)	0.03	0.061	0.159	0.383	0.48	93
CCP 2: pH	7.26	7.320	7.648	7.964	8.50	94
CCP 2: Turbidity (NTU)	0.01	0.067	0.160	0.314	0.41	94
CCP 2: Chlorine Residual (mg/L)	0.26	0.779	1.576	2.435	2.80	94



Filtered water turbidity exceeded the alert/critical limit three times (9th, 23rd April and 13th July). Due to records not being taken daily, it is uncertain whether any of these events were greater than 24 hours duration. There were no issues with filtration TMP pressure.

pH predominantly remained within limits but did exceed critical limits once on 10 August. It was also above the alert level on 17 occasions.

Due to the retention time of water within the reservoir, manual dosing is used to achieve a high free chlorine residual. Frequent high critical limit exceedances were seen but the process is under control and performing as required to achieve a residual within the network. There was one CCP critical low breach (10 March) and two alert limit readings. Disinfection turbidity stayed within process limits.

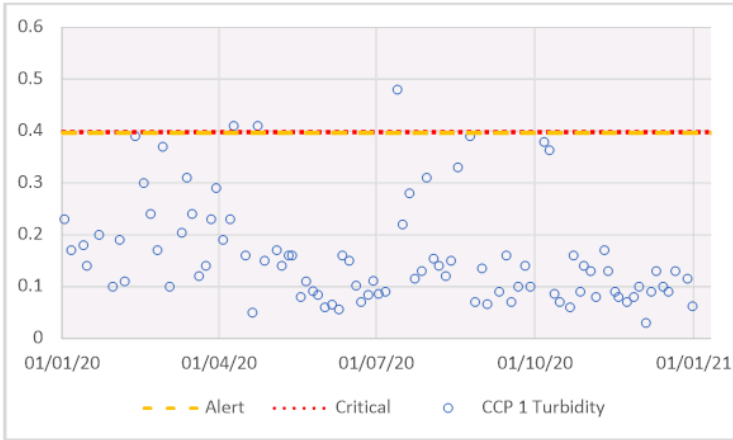


Figure 6: Brungle CCP1: Turbidity

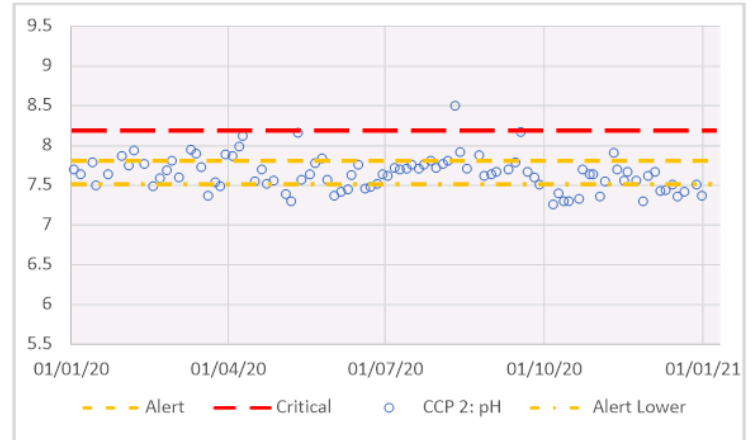


Figure 8: Brungle CCP2: pH to Town

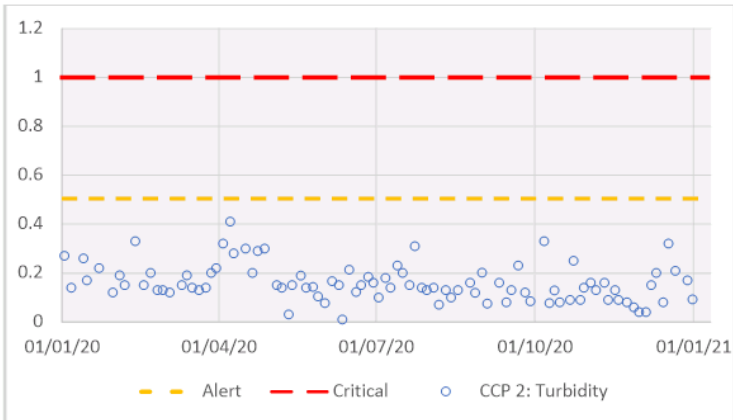


Figure 7: Brungle CCP2: Turbidity

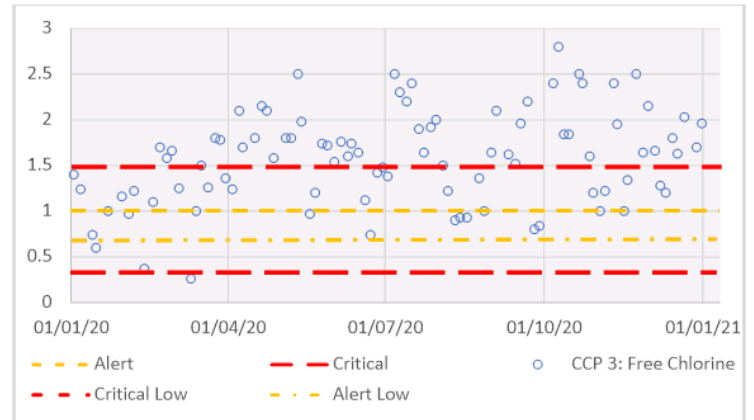


Figure 9: Brungle CCP2: Free Chlorine Residual



4.3. Khancoban

The current CCPs for the Khancoban scheme are presented in Table 6.

Table 6 Khancoban Scheme CCPs

Critical Control Point	Parameter	Operational Target	Adjustment Limit	Critical Limit
Khancoban CCP 1: Primary Disinfection	Chlorine residual	0.6 mg/L – 1 mg/L	< 0.5 mg/L or > 2 mg/L	< 0.3 mg/L > 24 hr or 5 mg/L
Khancoban CCP 2: Distribution Reservoirs	Reservoir integrity	Vermin proof	Evidence of integrity breach	Integrity breach not rectified
		Secure and leak proof	Evidence of security breach	Security breach not rectified

Table 7 Khancoban CCPs Data Analysis

Parameter	Min	5th %ile	Mean	95th %ile	Max	Count
Chlorine Residual Balance Tank	0.41	0.750	1.271	1.800	2.30	366

Chlorine residual has typically remained within limits, with no critical limit breaches. CCP alerts were managed with corrective actions and the process was brought back within limits.

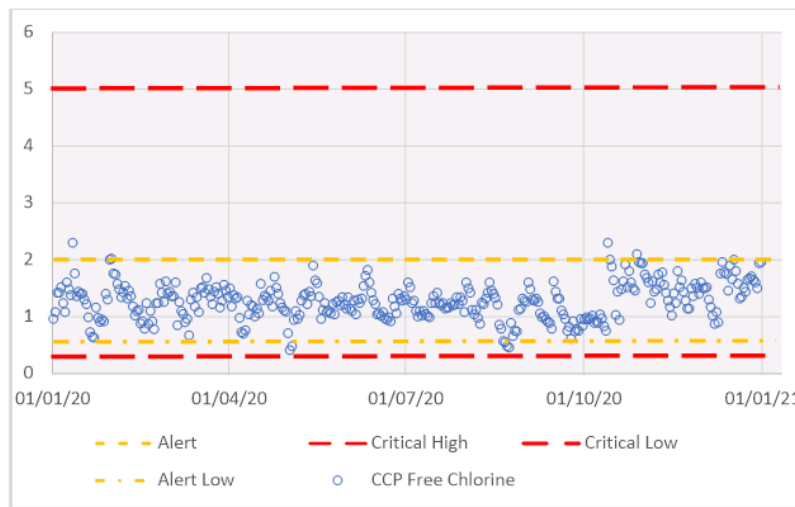


Figure 10: Khancoban Balance Tank Free Chlorine Residual



4.4. Talbingo

The current CCPs for the Talbingo scheme are presented in Table 8.

Table 8 Talbingo Scheme CCPs

Critical Control Point	Parameter	Operational Target	Adjustment Limit	Critical Limit
Talbingo CCP 1: Filtration	Turbidity	<0.1 NTU	>0.2 NTU (instantaneous)	>0.8 NTU for 15 minutes
Talbingo CCP 2: Primary Disinfection	pH	pH 7.5 - 7.8	pH <7.5 or >7.8 for >24 hours	pH >8.2 (instantaneous)
	Turbidity	Turbidity <0.3 NTU	Turbidity >0.5 NTU (instantaneous)	Turbidity >1.0 NTU (instantaneous)
	Chlorine residual	Free Chlorine 0.7 - 1.0 mg/L	Free chlorine <0.7 mg/L or >1 mg/L (instantaneous)	Free chlorine <0.3 mg/L or >1.5 mg/L (instantaneous)
Talbingo CCP 3: Distribution Reservoirs	Reservoir integrity	Vermin proof	Evidence of integrity breach	Integrity breach not rectified
		Secure and leak proof	Evidence of security breach	Security breach not rectified

Table 9 Talbingo CCP Data Analysis

Parameter	Min	5th %ile	Mean	95th %ile	Max	Count
CCP1: Turbidity	0.049	0.053	0.114	0.285	0.825	107
CCP 2: pH	7.000	7.372	7.763	8.020	8.25	365
CCP 2: Turbidity (NTU)	0.061	0.068	0.105	0.185	0.264	365
CCP 2: Chlorine Residual	0.060	0.730	0.916	1.099	2.300	363

Due to the bushfires a boil water advisory was in place from 7th to 10th January, this was precautionary as the catchment was impacted by the bushfire and the plant was producing treated water with a low chlorine residual. Jar testing was conducted, and water was diverted back to the reservoir on the 8th January. Outside of this event there were no critical limit exceedances for filtration.

Treated water turbidity was always within the Operational Target range.

Treated water pH exceeded its critical limit only once on 5th May but was consistently (45% of records) above the alert level.

Free chlorine critical limit breaches in January were due to the bushfire and subsequent flushing. There was one other critical high breach of the CCP on 5th February. Alerts were managed with corrective actions and there were no critical limit breaches following this.

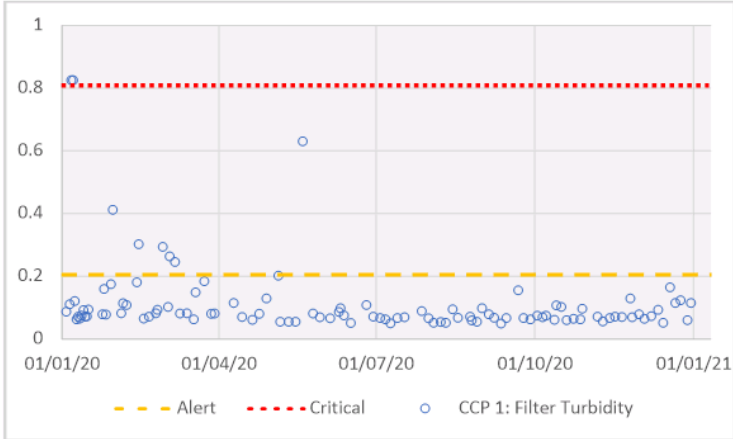


Figure 11: Talbingo CCP1: Turbidity

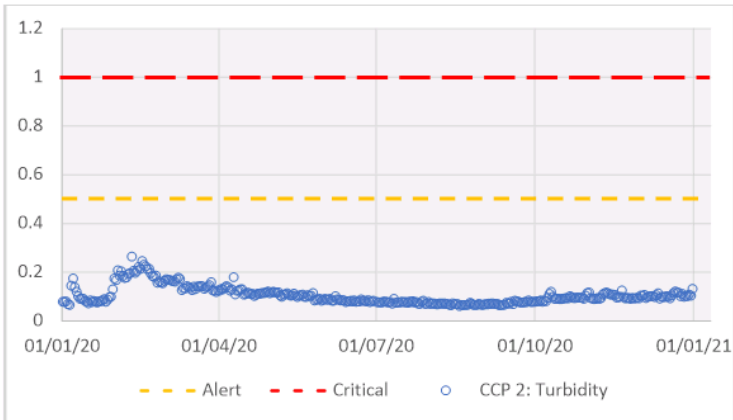


Figure 12: Talbingo CCP2: Turbidity

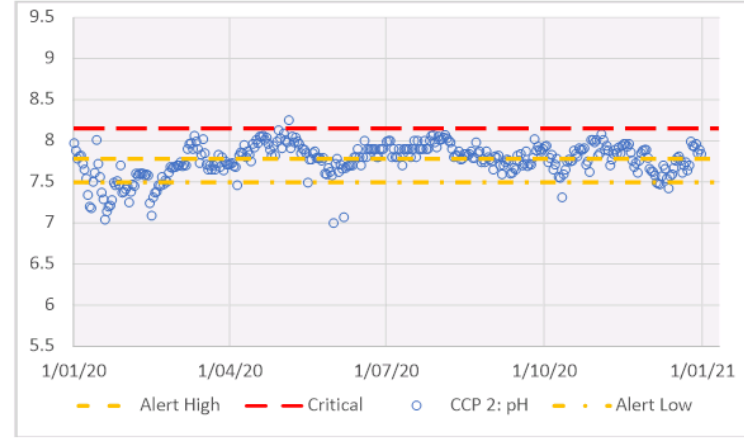


Figure 13: Talbingo CCP2: pH to Town

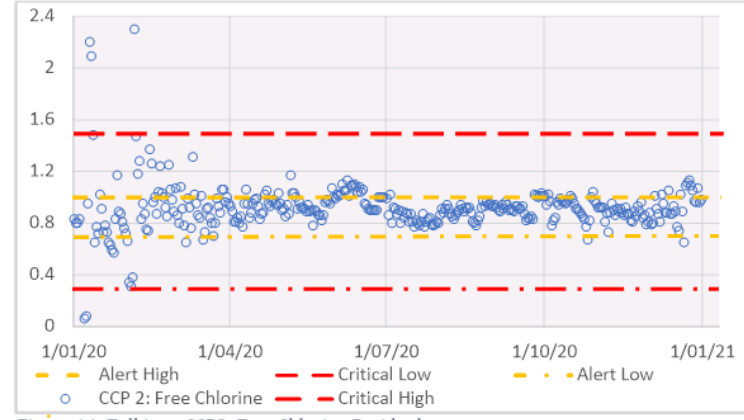


Figure 14: Talbingo CCP2: Free Chlorine Residual



4.5. Tumbarumba

The current CCPs for the Tumbarumba scheme are presented in Table 10.

Table 10 Tumbarumba Scheme CCPs

Critical Control Point	Parameter	Operational Target	Adjustment Limit	Critical Limit
Tumbarumba CCP 1: Filtration	Turbidity	<0.2 NTU	0.4 NTU	>0.5 NTU
Tumbarumba CCP 2: Primary Disinfection	Chlorine residual	Free Chlorine 0.6 mg/L	Free chlorine <0.45 mg/L or >1.2 mg/L (Instantaneous)	Free chlorine <0.3 mg/L or >1.5 mg/L (Instantaneous)
Tumbarumba CCP 3: Fluoridation	Fluoride	0.9 - 1.1 mg/L	<0.9 mg/L or >1.1 mg/L (Instantaneous)	<0.9 mg/L for greater than 72 hours or >1.5 mg/L (Instantaneous)*
Tumbarumba CCP 4: Distribution Reservoirs	Reservoir integrity	Vermin proof	Evidence of integrity breach	Integrity breach not rectified
		Secure and leak proof	Evidence of security breach	Security breach not rectified

Table 11 Tumbarumba CCP Data Analysis

Parameter	Min	5th %ile	Mean	95th %ile	Max	Count
CCP1: Filter 1 Turbidity	0.020	0.023	0.052	0.169	1.18	1201
CCP2: Filter 2 Turbidity	0.023	0.027	0.053	0.170	0.780	1201
CCP2: Chlorine Residual	0.480	0.600	0.852	1.140	2.240	335
CCP3: Fluoride	0.196	0.784	1.272	1.172	1.272	338

Data for early January is not available due to bushfire related power outage and direct supply of raw water from the dam to town to meet high demand (>100L/s) for firefighting. A Boil Water notice was issued.

Filtered water turbidity was recorded in SCADA and for the purposes of this report the highest reading from each day has been used. There was a critical control point breach for filter turbidity on 20th March, where Filter 1 recorded 1.180 NTU and Filter 2 recorded 0.780 NTU. This coincides with the repair of the Filter Water flowmeter. There were an additional 3 alert readings for both filters on 2nd March (when Filter Water flowmeter failed) and filter 1 on 11th February and 6th April.

On 2nd March, the Filter Water flowmeter failed which resulted in the cessation of auto-dosing Chlorine and Soda Ash. Fluoride dosing was turned off on 4th March until the meter was again operational on 20th March. From Monday 23rd there were no critical breaches, there were 73 high alerts which were managed with corrective actions.

Following the bushfire event, higher free chlorine was targeted to ensure flushing at extremities of network, this led to a high reading (1.59mg/L on 13th February), once flushing was no longer required CCP targets were reinstated. A critical high breach on the 9th March (2.24mg/L) occurred following a power failure on the 2nd March that interfered with auto-dosing of chlorine.

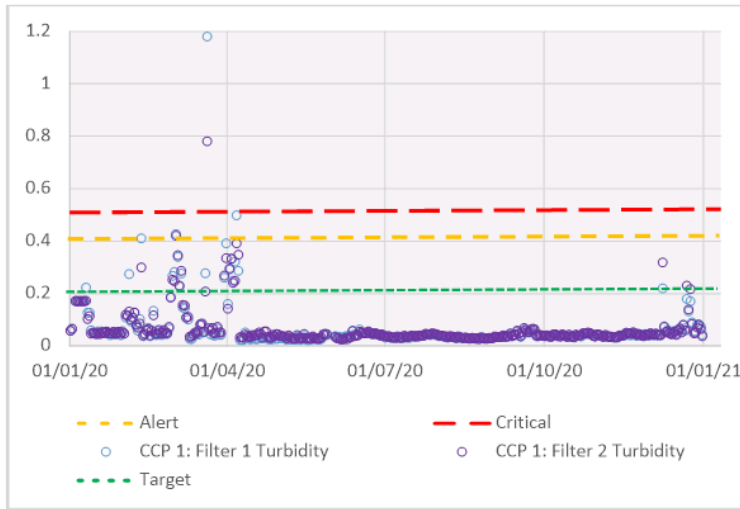


Figure 15: Tumberumba CCP1: Filter Turbidity

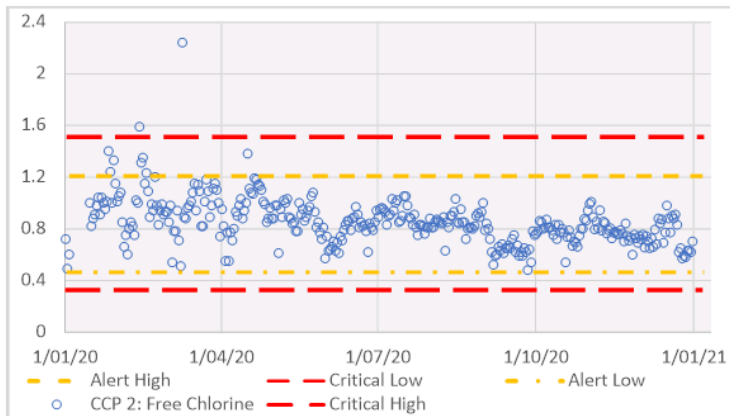


Figure 16: Tumberumba CCP2: Free Chlorine Residual

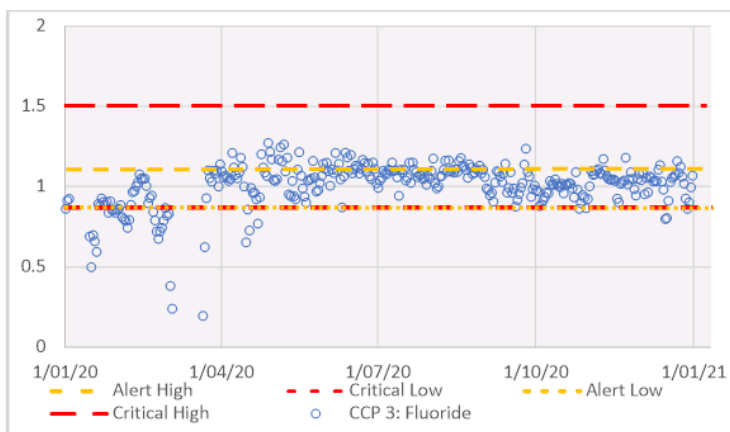


Figure 17: Tumberumba CCP3: Fluoride



4.6. Tumut

The current CCPs for the Tumut scheme are presented in Table 12.

Table 12 Tumut Scheme CCPs

Critical Control Point	Parameter	Operational Target	Adjustment Limit	Critical Limit
Tumut OCP 1: Raw Water Extraction	Turbidity, rainfall	<1 NTU	-	Operator adjustable
		No rain event	Rain event or forecast of rain event	
Tumut CCP 2: Filtration	Turbidity, rainfall	<0.2 NTU	>0.5 NTU	>1 NTU
Tumut CCP 3: Primary Disinfection	pH	pH 7.5 - 7.8	pH <7.5 or >7.8 for >24 hours	pH >8.2 (instantaneous)
	Turbidity	Turbidity <0.3 NTU	Turbidity >0.5 NTU (instantaneous)	Turbidity >1.0 NTU (instantaneous)
	Chlorine residual	Free Chlorine 0.7 - 1.0 mg/L	Free chlorine <0.7 mg/L or >1.2 mg/L (instantaneous)	Free chlorine <0.3 mg/L or >1.5 mg/L (instantaneous)
Tumut CCP 4: Fluoridation	Fluoride	0.9 - 1.1 mg/L	<0.9 mg/L or >1.1 mg/L (instantaneous)	<0.9 mg/L for greater than 72 hours or > 1.5 mg/L (instantaneous)
Tumut CCP 5: Distribution Reservoirs	Reservoir integrity	Vermin proof	Evidence of integrity breach	Integrity breach not rectified
		Secure and leak proof	Evidence of security breach	Security breach not rectified

Table 13 Tumut CCP Data Analysis

Parameter	Min	5th %ile	Mean	95th %ile	Max	Count
OCP1: Raw Water Turbidity	0.835	1.103	6.225	20.80	176	366
CCP2: Average Filter Turbidity	0.060	0.075	0.161	0.349	0.654	365
CCP3: Filtered Water Turbidity	0.046	0.065	0.154	0.338	0.692	366
CCP3: Treated Water pH	6.89	7.07	7.37	7.80	8.30	366
CCP3: Treated Water Residual Chlorine	0.14	0.90	1.261	1.660	2.100	366
CCP4: Treated Water Fluoride	0.42	0.95	1.091	1.18	1.23	366

Rainfall in late January washed ash from the bushfires into the waterways and raw water storages, and from January 25, the operational raw water turbidity target of <1.0 NTU was not reached. This was managed by filtration. Raw water quality will improve over time as vegetation regeneration occurs and ash is incorporated into the soil and sediment.

Despite the poor quality of the raw water, there were no turbidity critical limit exceedances.

For pH there were three high critical limit breaches, though typically pH was below the low alert limit.

Free Chlorine breached the high critical control point on 65 occasions in 2020.

Low fluoride alerts were managed with corrective actions and there were no critical limit breaches.

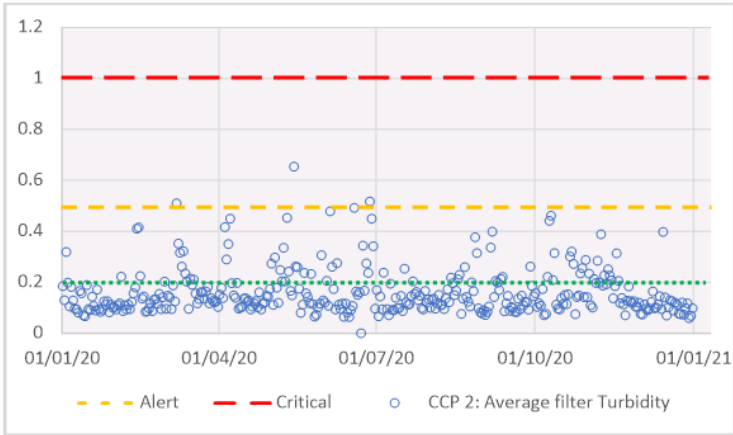


Figure 18: Tumut CCP2: Average Filtered Turbidity

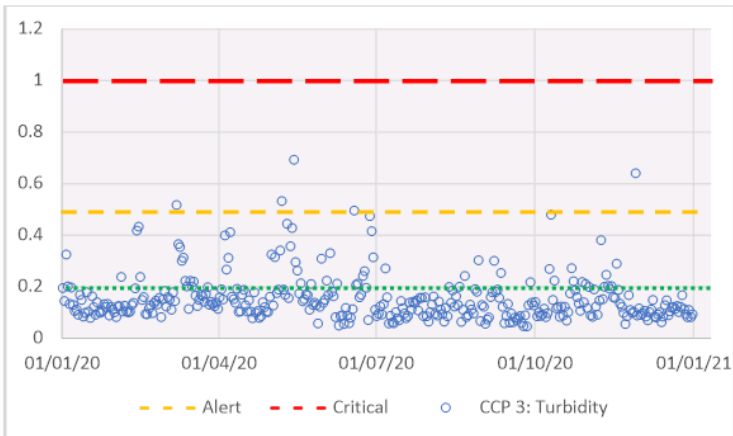


Figure 19: Tumut CCP3: Turbidity

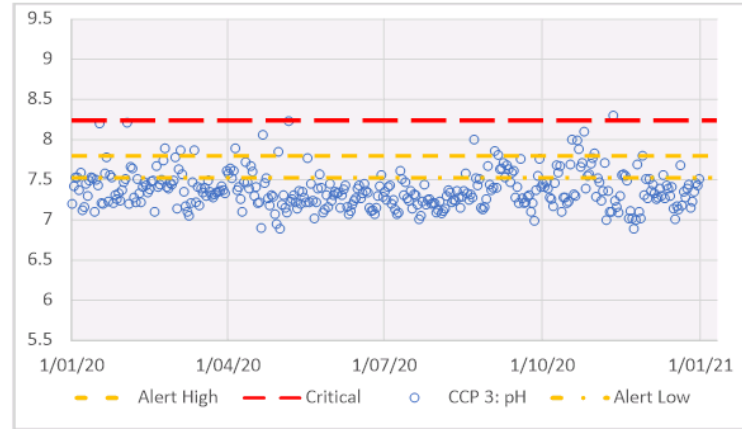


Figure 20: Tumut CCP3: pH

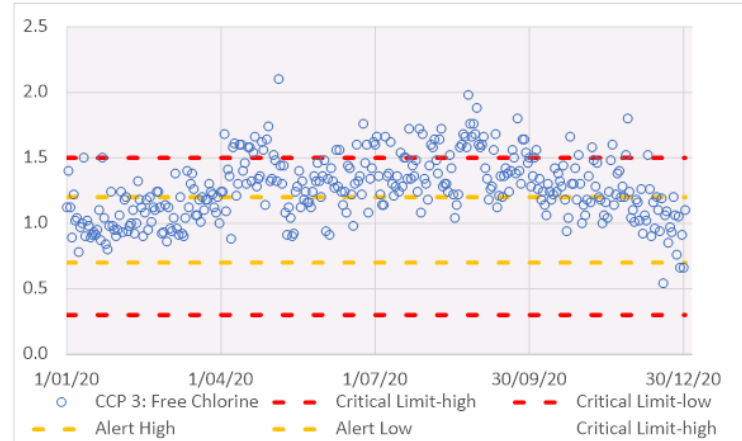


Figure 21: Tumut CCP3: Free Chlorine Residual

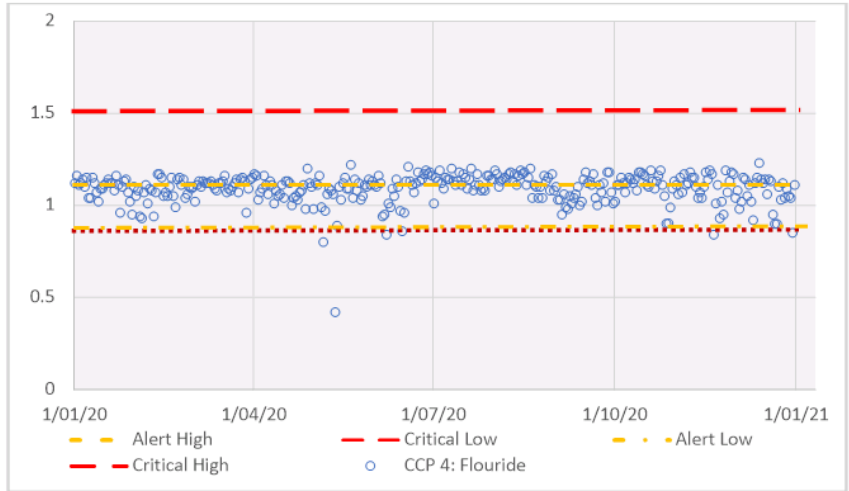


Figure 22: Tumut CCP4: Fluoride



5. RESERVOIR INTEGRITY

SVC has a CCP for reservoir integrity. Maintaining the integrity of the distribution system is an important barrier in keeping the supply safe from potential recontamination. This includes ensuring that the service reservoirs are not vulnerable to contamination, for example, by vermin, birds, or rainwater runoff ingress. Security of the facilities is also examined to deter contamination by human agency.

SVC has a planned schedule of detailed reservoir inspections for each facility at either two-yearly or four-yearly intervals. A detailed inspection was undertaken in February 2020 and issues were highlighted for maintenance.

The Risk Assessment Review recognized that reservoir integrity is a CCP and should be monitored weekly as a minimum. Records needed to be consistently kept, and a program for reservoir and clear water tank inspections including consistent record keeping as required for CCPs needs to be developed.

There was evidence for two breaches of Reservoir Integrity.

- Khancoban Scheme: There was evidence of vermin (birds) within the Khancoban No. 1 reservoir, with two birds nests discovered.
- Tumut Scheme: A dead bird was discovered within the Lambie reservoir. Repairs to the vent mesh had been undertaken to maintain the reservoir's vermin-proofing, and thus it is thought that the bird entered the reservoir during a period prior to repairs and was trapped inside when repairs were completed.

Summary of other issues:

- Damage to roof and guttering may be allowing contaminated water to drain into reservoirs at "Golf Club" reservoir (Tumut), Khancoban No2, Talbingo HL, Tumbarumba.
- Minor corrosion has been noted in the Cherry Lane Steel (Batlow) and Khancoban No1 reservoirs, and major corrosion was contaminating water at Talbingo HL reservoir.
- Despite some vandalism within the "Golf Club" reservoir compound (Tumut), there was no evidence of security breaches of the reservoirs. However, many of the reservoir hatches were not secured by locks (Adelong Break Tank, Brungle, Cherry Lane Steel (Batlow), Khancoban No1, Khancoban No2, Talbingo HL, Tumbarumba) and were thus not secure.
- Several reservoirs required, or will soon require maintenance to vermin proofing meshes, namely "Golf Club" (Tumut), Khancoban No. 2.
- The majority of the reservoirs did not have adequate Workplace Health and Safety requirements, such as entrance hatches being too small, lack of handrails around entry hatches, lack of solid platforms from which rescues could be undertaken, lack of internal ladders or damaged ladders, or cages around external ladders.



6. INCIDENTS REPORTED TO NSW HEALTH

There were several Water Quality Incident-Non-compliances against the drinking water quality criteria (ADWG health-based guideline values). This was managed under the drinking water quality Incident and Emergency Response Plan (IERP) - Drinking Water Quality Management System (DWQMS), which was effectively implemented and effective for the prevailing circumstances. Section 7 includes more details on verification monitoring.

Bushfires caused power outages at water treatment plants and initiated a Boil Water Alert for several towns.

1. Batlow Water Supply

Boil Water Notice active from 3 January to 22 January 2020.

2. Tumbarumba Water Supply

Boil Water Notice active from 3 January to 26 January 2020.

3. Tumut/Adelong

Adelong Boil Water Alert active from 3 January to 7 January 2020.

4. Talbingo Water Supply

Boil Water Alert active from 7 January to 10 January 2020.

5. Tumut/Adelong/Cloverdale

Precautionary Boil Water Alert active from 28 August to 1 September 2020.

A short period of elevated turbidity observed within the Tumut Water Treatment Plant on Friday 28 August 2020 necessitated a precautionary Boil Water Alert to be issued and increased water quality testing to be undertaken throughout the system. All sampling results from water quality testing undertaken since Friday 28 August came back within Australian Drinking Water Guidelines and alert was lifted.



7. VERIFICATION MONITORING PERFORMANCE

Verification of drinking water quality provides an assessment of the overall performance of the system and the ultimate quality of drinking water being supplied to consumers. This incorporates monitoring drinking water quality as well as assessment of consumer satisfaction.

7.1. Reticulation Water Quality Monitoring

Drinking water quality monitoring is a wide-ranging assessment of the quality of water in the reticulation or distribution system and importantly, as supplied to the consumer. It includes regular sampling and testing to assess whether water quality is complying with ADWG guideline values. Monitoring of drinking water is regarded as the final check that, overall, the barriers and preventive measures implemented to protect public health are working effectively.

The reticulation drinking water quality data for the schemes for the reporting period is presented in Appendix A. All schemes were 100% compliant with the ADWG health-based guidelines. There were some issues regarding Fluoride, Free Chlorine, and high pH, which are summarized below. Typically, chlorine residual was maintained well within reticulation networks.

- Khancoban had no exceptions recorded.
- In Batlow, there were two instances of detection of Total Coliforms, on 3 March (29 mpn/100 mL) and 18 March (1 mpn/100 mL). Batlow also had some instances of low fluoride and 10 instances of low free chlorine (82% compliant). pH was 94% compliant.
- In Brungle there was 91% compliance for free chlorine (two low results on 8 April), and one detection of Total Coliforms (1 mpn/100 mL, also on 8 April) from 34 samples. pH was 97% compliant.
- Morgans Reserve had two detections of Total Coliforms on 22 September (15 mpn/100 mL) and 10 November (4 mpn/100 mL), which equates to 13% of samples. There was also one low free Chlorine exception on 8 April (7%).
- In Talbingo, there were 6 instances of high pH exceptions (25% of samples), including two on 8 April and two on 22 October. There were also two exceptions of low free Chlorine, both on 8 April.
- Tumbarumba had some low Fluoride levels, and all other samples were 100% compliant.
- Tumut had some minor issues with low Fluoride. There was 99% compliance for free Chlorine and 97% compliance for pH.



7.2. Sampling Frequency Compliance

Sampling Frequency did not achieve 100% compliance with the monitoring program. In 4 of the 14 sampling programs, the number of actual samples collected was less than the number of samples allocated for the verification monitoring program. The remaining 10 were at or exceeded requirements.

- Brungle microbiology collected and tested 34 of the 36 samples that were allocated (94%).
- Khancoban microbiology collected and tested 22 of the 26 samples that were allocated (85%).
- Tumbarumba microbiology collected and tested 45 of the 52 samples that were allocated (87%).
- Tumut microbiology collected and tested 72 of the 76 samples that were allocated (95%).

Appendix A includes the report extracted from the NSW Health database (see Table 6).

7.3. Water Quality Customer Complaints

There were a total of nine water quality customer complaints received, refer to Table 3. The dirty water complaints were investigated and actions such as flushing hydrants near the property until it gets cleared, or checking chlorine residual level were undertaken. Five of the complaints occurred in February, two in October, and two on the same day in December. The low number of complaints indicates very good customer satisfaction.

Table 14 Snowy Valleys Council Customer Water Quality Complaints

Taste & Odour	Dirty Water	Pressure	Other
1	7	2	1

8. IMPROVEMENT PLAN IMPLEMENTATION

An Improvement Plan is part of a management system and demonstrates the continual improvement process in place for an organisation. SVC has an Improvement Plan, which is part of their DWMS.

8.1. Status

The Improvement Plan was reviewed and updated during the preparation of this Annual Report. For detailed progress and commentary, refer to the Improvement Plan.

8.2. New Additions

The risk assessment was reviewed as part of the 2020 Risk Assessment Review and as such there were limited changes. There was one addition to the Improvement Plan:

- Add Algae in the Tumbarumba raw water supply to the Risk Register and create an SOP for Algae Management.



9. DWMS REVIEW OUTCOMES

A Risk Assessment Review was undertaken during 2020 that will result in some changes to Critical Control Point limit values and treatment and operational processes moving forward into 2021. These include:

- protozoan removal requirements CCP adjustment and online monitoring
- inclusion of triggers for pressure decay testing in response to exceedance of the adjustment limit.
- reservoir inspections and record keeping as per CCP requirements
- potable water standpipes
- pesticide investigations
- adjustments in intake due to changes flow in the Tumut River from cessation of dam releases.

10. DWMS AUDIT OUTCOMES

There was no formal DWMS audit undertaken in 2020.



DOCUMENT HISTORY AND TRACKING

Document History

Version	Section/s Modified	Brief Description of Amendment	Author	Approver	Issue Date
0.1	N/A	N/A	Stacey Edwards	Stacey Edwards	21/04/2021
1.0	N/A	Client Feedback Incorporated	Stacey Edwards	Stacey Edwards	2/06/2021

Document Tracking

Document Name	DWMS Annual Report 2020
Prepared by	Stacey Edwards
Reviewed by	Laxmi Pandey
Approved by	Stacey Edwards
Date Approved	2/06/2021
Status	Final
Document Number	REC-21-068
Version Number	1.0

Viridis Consultants Pty Ltd
 PO Box 131
 Bulimba Qld 4171
 Australia

1300 799 310

www.viridis.net.au
 ABN: 49 129 185 271

© Viridis Consultants Pty Ltd 2021

Viridis Consultants Pty Ltd has produced this document in accordance with instructions from SVC for their use only. The concepts and information contained in this document are the copyright of Viridis Consultants Pty Ltd. Use or copying of this document in whole or in part without written permission of Viridis Consultants Pty Ltd constitutes an infringement of copyright.

Viridis Consultants Pty Ltd does not warrant this document is definitive nor free from error and does not accept liability for any loss caused, or arising from, reliance upon the information provided herein.

This document is and shall remain the property of Viridis Consultants Pty Ltd. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.



A. VERIFICATION MONITORING



Table 15 Batlow Verification Monitoring

Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Chemistry	Aluminium	0.2000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	2	0	0.01	0.01	100.00
	Antimony	0.0030	mg/L	0.0001	0.0001	0.0000	5E-05	0.0005	2	0	0.0005	0.0005	100.00
	Arsenic	0.0100	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	2	0	0.0005	0.0005	100.00
	Barium	2.0000	mg/L	0.0102	0.0102	0.0054	0.006	0.014	2	0	0.014	0.0064	100.00
	Boron	4.0000	mg/L	0.0044	0.0044	0.0019	0.003	0.0057	2	0	0.0057	0.003	100.00
	Cadmium	0.0020	mg/L	0.0001	0.0001	0.0000	5E-05	0.0005	2	0	0.0005	0.0005	100.00
	Calcium	10000.0000	mg/L	4.5500	4.5500	0.7778	4	5.1	2	0	5.1	4	100.00
	Chloride	250.0000	mg/L	6.5000	6.5000	2.1213	5	8	2	0	8	5	100.00
	Chromium	0.0500	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	2	0	0.0005	0.0005	100.00
	Copper	2.0000	mg/L	0.0050	0.0050	0.0057	0.001	0.009	2	0	0.009	0.001	100.00
	Fluoride	1.5000	mg/L	0.8750	0.8750	0.1202	0.79	0.96	2	0	0.96	0.79	100.00
	Iodine	0.5000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	2	0	0.01	0.01	100.00
	Iron	0.3000	mg/L	0.0150	0.0150	0.0071	0.01	0.02	2	0	0.02	0.01	100.00
	Lead	0.0100	mg/L	0.0003	0.0003	0.0002	1E-04	0.0004	2	0	0.0004	0.0001	100.00
	Magnesium	10000.0000	mg/L	0.8700	0.8700	0.1838	0.74	1	2	0	1	0.74	100.00
	Manganese	0.5000	mg/L	0.0055	0.0055	0.0057	0.002	0.0095	2	0	0.0095	0.0015	100.00
	Mercury	0.0010	mg/L	0.0004	0.0004	0.0000	4E-04	0.0004	2	0	0.0004	0.0004	100.00
	Molybdenum	0.0500	mg/L	0.0001	0.0001	0.0000	5E-05	0.0005	2	0	0.0005	0.0005	100.00
	Nickel	0.0200	mg/L	0.0002	0.0002	0.0000	2E-04	0.0002	2	0	0.0002	0.0002	100.00
	Nitrate	50.0000	mg/L	0.5000	0.5000	0.0000	0.5	0.5	2	0	0.5	0.5	100.00
	Nitrite	3.0000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	pH	6.5 - 8.5		7.3500	7.3500	0.0707	7.3	7.4	2	0	7.4	7.3	100.00
	Selenium	0.0100	mg/L	0.0035	0.0035	0.0000	0.004	0.0035	2	0	0.0035	0.0035	100.00
	Silver	0.1000	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	2	0	0.0001	0.0001	100.00
	Sodium	180.0000	mg/L	3.5000	3.5000	0.7071	3	4	2	0	4	3	100.00
	Sulfate	500.0000	mg/L	0.7500	0.7500	0.3536	0.5	1	2	0	1	0.5	100.00
	Total Dissolved Solids (TDS)	600.0000	mg/L	28.0000	28.0000	8.4853	22	34	2	0	34	22	100.00
	Total Hardness as CaCO3	200.0000	mg/L	14.9500	14.9500	2.7577	13	16.9	2	0	16.9	13	100.00
	True Colour	15.0000	Hazen Units (HU)	0.7500	0.7500	0.3536	0.5	1	2	0	1	0.5	100.00
	Turbidity	5.0000	NTU	0.5250	0.5250	0.6718	0.05	1	2	0	1	0.05	100.00
	Uranium	0.0170	mg/L	0.0001	0.0001	0.0000	5E-05	0.0005	2	0	0.0005	0.0005	100.00
	Zinc	3.0000	mg/L	0.0200	0.0200	0.0000	0.02	0.02	2	0	0.02	0.02	100.00
Fluoride Barcode	Fluoride	1.5000	mg/L	0.9000	0.9050	0.0847	0.75	1.03	12	0	1.03	0.75	100.00
Microbiology	E. coli	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	55	0	0	0	100.00
	Free Chlorine	0.2 - 5	mg/L	0.5949	0.6100	0.3479	0.05	1.3	55	10	1.17	0.08	81.82
	pH	6.5 - 8.5		7.5708	7.5000	0.4446	6.32	9.17	53	3	8.2	6.94	94.34
	Temperature	30.0000	C	14.2875	13.9500	3.2776	10.4	19.3	16	0	19.3	10.4	100.00
	Total Chlorine	5.0000	mg/L	0.6947	0.6500	0.3878	0.09	1.46	55	0	1.3	0.11	100.00
	Total Coliforms	0.0000	mpn/100 mL	0.5455	0.0000	3.9102	0	29	55	2	0	0	96.36
	Turbidity	5.0000	NTU	0.2395	0.1800	0.1467	0.01	0.64	53	0	0.52	0.08	100.00
Operational Monitoring	Fluoride (daily WU)	0.9 - 1.5	mg/L	0.9807	1.0000	0.0863	0.58	1.11	177	20	1.08	0.79	88.70
	Fluoride (weekly WU)	0.9 - 1.5	mg/L	0.9734	0.9800	0.0641	0.8	1.1	41	4	1.09	0.86	90.24



Table 16 Brungle Verification Monitoring

Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Chemistry	Aluminium	0.2000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	2	0	0.01	0.01	100.00
	Antimony	0.0030	mg/L	0.0001	0.0001	0.0000	0	0.00005	2	0	0.00005	0.00005	100.00
	Arsenic	0.0100	mg/L	0.0008	0.0008	0.0004	0	0.001	2	0	0.001	0.0005	100.00
	Barium	2.0000	mg/L	0.0104	0.0104	0.0037	0.01	0.013	2	0	0.013	0.0077	100.00
	Boron	4.0000	mg/L	0.0035	0.0035	0.0043	0	0.0065	2	0	0.0065	0.0004	100.00
	Cadmium	0.0020	mg/L	0.0001	0.0001	0.0000	0	0.00005	2	0	0.00005	0.00005	100.00
	Calcium	10000.0000	mg/L	6.6500	6.6500	4.0305	3.8	9.5	2	0	9.5	3.8	100.00
	Chloride	250.0000	mg/L	8.5000	8.5000	3.5355	6	11	2	0	11	6	100.00
	Chromium	0.0500	mg/L	0.0005	0.0005	0.0000	0	0.0005	2	0	0.0005	0.0005	100.00
	Copper	2.0000	mg/L	0.0455	0.0455	0.0304	0.02	0.067	2	0	0.067	0.024	100.00
	Fluoride	1.5000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	Iodine	0.5000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	2	0	0.01	0.01	100.00
	Iron	0.3000	mg/L	0.0125	0.0125	0.0106	0.01	0.02	2	0	0.02	0.005	100.00
	Lead	0.0100	mg/L	0.0004	0.0004	0.0003	0	0.0006	2	0	0.0006	0.0002	100.00
	Magnesium	10000.0000	mg/L	1.7400	1.7400	0.4808	1.4	2.08	2	0	2.08	1.4	100.00
	Manganese	0.5000	mg/L	0.0015	0.0015	0.0006	0	0.0019	2	0	0.0019	0.001	100.00
	Mercury	0.0010	mg/L	0.0004	0.0004	0.0000	0	0.0004	2	0	0.0004	0.0004	100.00
	Molybdenum	0.0500	mg/L	0.0002	0.0002	0.0001	0	0.0002	2	0	0.0002	0.0001	100.00
	Nickel	0.0200	mg/L	0.0002	0.0002	0.0000	0	0.0002	2	0	0.0002	0.0002	100.00
	Nitrate	50.0000	mg/L	1.0000	1.0000	0.0000	1	1	2	0	1	1	100.00
	Nitrite	3.0000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	pH	6.5 - 8.5		7.4500	7.4500	0.2121	7.3	7.6	2	0	7.6	7.3	100.00
	Selenium	0.0100	mg/L	0.0035	0.0035	0.0000	0	0.0035	2	0	0.0035	0.0035	100.00
	Silver	0.1000	mg/L	0.0001	0.0001	0.0000	0	0.0001	2	0	0.0001	0.0001	100.00
	Sodium	180.0000	mg/L	7.5000	7.5000	2.1213	6	9	2	0	9	6	100.00
	Sulfate	500.0000	mg/L	1.5000	1.5000	0.7071	1	2	2	0	2	1	100.00
	Total Dissolved Solids (TDS)	600.0000	mg/L	32.5000	32.5000	4.9497	29	36	2	0	36	29	100.00
	Total Hardness as CaCO3	200.0000	mg/L	23.8000	23.8000	###	15.3	32.3	2	0	32.3	15.3	100.00
	True Colour	15.0000	Hazen Units (HU)	2.2500	2.2500	2.4749	0.5	4	2	0	4	0.5	100.00
	Turbidity	5.0000	NTU	0.3000	0.3000	0.1414	0.2	0.4	2	0	0.4	0.2	100.00
	Uranium	0.0170	mg/L	0.0001	0.0001	0.0000	0	0.00005	2	0	0.00005	0.00005	100.00
	Zinc	3.0000	mg/L	0.0450	0.0450	0.0212	0.03	0.06	2	0	0.06	0.03	100.00
Microbiology	E. coli	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	34	0	0	0	100.00
	Free Chlorine	0.2 - 5	mg/L	0.7694	0.7600	0.4893	0.1	2.2	33	3	1.46	0.14	90.91
	pH	6.5 - 8.5		7.8243	7.8700	0.2970	7.4	8.65	28	1	8.2	7.4	96.43
	Temperature	30.0000	mg/L	17.7700	17.7000	2.5051	13.8	21.7	10	0	21.7	13.8	100.00
	Total Chlorine	5.0000	mpn/100 mL	0.8891	0.9300	0.5047	0.14	2.21	33	0	1.6	0.22	100.00
	Total Coliforms	0.0000	NTU	0.0294	0.0000	0.1715	0	1	34	1	0	0	97.06
	Turbidity	5.0000		0.2006	0.1900	0.1416	0.02	0.55	32	0	0.53	0.03	100.00



Table 17 Khancoban Verification Monitoring

Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Chemistry	Aluminium	0.2000	mg/L	0.0400	0.0400	0.0141	0.03	0.05	2	0	0.05	0.03	100.00
	Antimony	0.0030	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	2	0	0.00005	0.00005	100.00
	Arsenic	0.0100	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	2	0	0.0005	0.0005	100.00
	Barium	2.0000	mg/L	0.0038	0.0038	0.0007	0.003	0.0043	2	0	0.0043	0.0033	100.00
	Boron	4.0000	mg/L	0.0012	0.0012	0.0011	4E-04	0.002	2	0	0.002	0.0004	100.00
	Cadmium	0.0020	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	2	0	0.00005	0.00005	100.00
	Calcium	10000.0000	mg/L	3.3500	3.3500	0.3536	3.1	3.6	2	0	3.6	3.1	100.00
	Chloride	250.0000	mg/L	5.0000	5.0000	0.0000	5	5	2	0	5	5	100.00
	Chromium	0.0500	mg/L	0.0018	0.0018	0.0000	5E-04	0.003	2	0	0.003	0.0005	100.00
	Copper	2.0000	mg/L	0.1915	0.1915	0.0714	0.141	0.242	2	0	0.242	0.141	100.00
	Fluoride	1.5000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	Iodine	0.5000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	2	0	0.01	0.01	100.00
	Iron	0.3000	mg/L	0.0400	0.0400	0.0283	0.02	0.06	2	0	0.06	0.02	100.00
	Lead	0.0100	mg/L	0.0006	0.0006	0.0000	6E-04	0.0006	2	0	0.0006	0.0006	100.00
	Magnesium	10000.0000	mg/L	1.0200	1.0200	0.4101	0.73	1.31	2	0	1.31	0.73	100.00
	Manganese	0.5000	mg/L	0.0012	0.0012	0.0000	0.001	0.0012	2	0	0.0012	0.0012	100.00
	Mercury	0.0010	mg/L	0.0004	0.0004	0.0000	4E-04	0.0004	2	0	0.0004	0.0004	100.00
	Molybdenum	0.0500	mg/L	0.0018	0.0018	0.0023	2E-04	0.0034	2	0	0.0034	0.0002	100.00
	Nickel	0.0200	mg/L	0.0075	0.0075	0.0103	2E-04	0.0147	2	0	0.0147	0.0002	100.00
	Nitrate	50.0000	mg/L	0.5000	0.5000	0.0000	0.5	0.5	2	0	0.5	0.5	100.00
	Nitrite	3.0000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	pH	6.5 - 8.5		6.8500	6.8500	0.0707	6.8	6.9	2	0	6.9	6.8	100.00
	Selenium	0.0100	mg/L	0.0035	0.0035	0.0000	0.004	0.0035	2	0	0.0035	0.0035	100.00
	Silver	0.1000	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	2	0	0.0001	0.0001	100.00
	Sodium	180.0000	mg/L	2.5000	2.5000	0.7071	2	3	2	0	3	2	100.00
	Sulfate	500.0000	mg/L	1.0000	1.0000	0.0000	1	1	2	0	1	1	100.00
	Total Dissolved Solids (TDS)	600.0000	mg/L	19.0000	19.0000	1.4142	18	20	2	0	20	18	100.00
	Total Hardness as CaCO3	200.0000	mg/L	12.5500	12.5500	0.7778	12	13.1	2	0	13.1	12	100.00
	True Colour	15.0000	Hazen Units (HU)	2.0000	2.0000	1.4142	1	3	2	0	3	1	100.00
	Turbidity	5.0000	NTU	1.1000	1.1000	1.4142	0.1	2.1	2	0	2.1	0.1	100.00
Uranium	0.0170	mg/L	0.0001	0.0001	0.0000	5E-05	0.0001	2	0	0.0001	0.00005	100.00	
Zinc	3.0000	mg/L	0.0150	0.0150	0.0071	0.01	0.02	2	0	0.02	0.01	100.00	
Microbiology	E. coli	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	22	0	0	0	100.00
	Free Chlorine	0.2 - 5	mg/L	0.9232	0.9000	0.3056	0.39	1.78	22	0	1.44	0.47	100.00
	pH	6.5 - 8.5		7.2341	7.2500	0.1228	6.8	7.45	22	0	7.4	7.15	100.00
	Temperature	30.0000	C	20.0000	20.0000	0.0000	20	20	1	0	20	20	100.00
	Total Chlorine	5.0000	mg/L	0.9973	0.9300	0.3095	0.42	1.8	22	0	1.52	0.55	100.00
	Total Coliforms	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	22	0	0	0	100.00
	Turbidity	5.0000	NTU	0.6305	0.5600	0.2394	0.31	1.11	20	0	1.11	0.36	100.00



Table 18 Morgans Reserve Verification Monitoring

Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Chemistry	Aluminium	0.2000	mg/L	0.0200	0.0200	0.0141	0.01	0.03	2	0	0.03	0.01	100.00
	Antimony	0.0030	mg/L	0.0001	0.0001	0.0000	5E-05	0.0005	2	0	0.00005	0.00005	100.00
	Arsenic	0.0100	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	2	0	0.0005	0.0005	100.00
	Barium	2.0000	mg/L	0.0068	0.0068	0.0003	0.007	0.007	2	0	0.007	0.0066	100.00
	Boron	4.0000	mg/L	0.0020	0.0020	0.0015	9E-04	0.003	2	0	0.003	0.0009	100.00
	Cadmium	0.0020	mg/L	0.0001	0.0001	0.0000	5E-05	0.0005	2	0	0.00005	0.00005	100.00
	Calcium	10000.0000	mg/L	4.8500	4.8500	0.0707	4.8	4.9	2	0	4.9	4.8	100.00
	Chloride	250.0000	mg/L	4.5000	4.5000	0.7071	4	5	2	0	5	4	100.00
	Chromium	0.0500	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	2	0	0.0005	0.0005	100.00
	Copper	2.0000	mg/L	0.0080	0.0080	0.0099	0.001	0.015	2	0	0.015	0.001	100.00
	Fluoride	1.5000	mg/L	0.9600	0.9600	0.0141	0.95	0.97	2	0	0.97	0.95	100.00
	Iodine	0.5000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	2	0	0.01	0.01	100.00
	Iron	0.3000	mg/L	0.0050	0.0050	0.0000	0.005	0.005	2	0	0.005	0.005	100.00
	Lead	0.0100	mg/L	0.0002	0.0002	0.0001	1E-04	0.0002	2	0	0.0002	0.0001	100.00
	Magnesium	10000.0000	mg/L	1.1100	1.1100	0.2546	0.93	1.29	2	0	1.29	0.93	100.00
	Manganese	0.5000	mg/L	0.0007	0.0007	0.0003	5E-04	0.0009	2	0	0.0009	0.0005	100.00
	Mercury	0.0010	mg/L	0.0004	0.0004	0.0000	4E-04	0.0004	2	0	0.0004	0.0004	100.00
	Molybdenum	0.0500	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	2	0	0.0001	0.0001	100.00
	Nickel	0.0200	mg/L	0.0002	0.0002	0.0000	2E-04	0.0002	2	0	0.0002	0.0002	100.00
	Nitrate	50.0000	mg/L	0.5000	0.5000	0.0000	0.5	0.5	2	0	0.5	0.5	100.00
	Nitrite	3.0000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	pH	6.5 - 8.5		7.5000	7.5000	0.0000	7.5	7.5	2	0	7.5	7.5	100.00
	Selenium	0.0100	mg/L	0.0035	0.0035	0.0000	0.004	0.0035	2	0	0.0035	0.0035	100.00
	Silver	0.1000	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	2	0	0.0001	0.0001	100.00
	Sodium	180.0000	mg/L	5.5000	5.5000	0.7071	5	6	2	0	6	5	100.00
	Sulfate	500.0000	mg/L	1.0000	1.0000	0.0000	1	1	2	0	1	1	100.00
	Total Dissolved Solids (TDS)	600.0000	mg/L	32.0000	32.0000	1.4142	31	33	2	0	33	31	100.00
	Total Hardness as CaCO3	200.0000	mg/L	16.7000	16.7000	0.8485	16.1	17.3	2	0	17.3	16.1	100.00
	True Colour	15.0000	Hazen Units (HU)	0.5000	0.5000	0.0000	0.5	0.5	2	0	0.5	0.5	100.00
	Turbidity	5.0000	NTU	0.0750	0.0750	0.0354	0.05	0.1	2	0	0.1	0.05	100.00
	Uranium	0.0170	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	2	0	0.00005	0.00005	100.00
	Zinc	3.0000	mg/L	0.0300	0.0300	0.0141	0.02	0.04	2	0	0.04	0.02	100.00
Microbiology	E. coli	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	15	0	0	0	100.00
	Free Chlorine	0.2 - 5	mg/L	0.6553	0.6200	0.3029	0.13	1.07	15	1	1.07	0.13	93.33
	pH	6.5 - 8.5		7.9564	7.8950	0.2111	7.72	8.45	14	0	8.45	7.72	100.00
	Temperature	30.0000	C	18.0800	17.1000	3.4781	14.1	22	5	0	22	14.1	100.00
	Total Chlorine	5.0000	mg/L	0.7467	0.7300	0.3099	0.14	1.2	15	0	1.2	0.14	100.00
	Total Coliforms	0.0000	mpn/100 mL	1.2667	0.0000	3.9364	0	15	15	2	15	0	86.67
	Turbidity	5.0000	NTU	0.2700	0.2400	0.1793	0.07	0.66	14	0	0.66	0.07	100.00



Table 19 Talbingo Verification Monitoring

Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Chemistry	Aluminium	0.2000	mg/L	0.0250	0.0250	0.0071	0.02	0.03	2	0	0.03	0.02	100.00
	Antimony	0.0030	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	2	0	0.00005	0.00005	100.00
	Arsenic	0.0100	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	2	0	0.0005	0.0005	100.00
	Barium	2.0000	mg/L	0.0080	0.0080	0.0013	0.007	0.0089	2	0	0.0089	0.0071	100.00
	Boron	4.0000	mg/L	0.0025	0.0025	0.0021	0.001	0.004	2	0	0.004	0.001	100.00
	Cadmium	0.0020	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	2	0	0.00005	0.00005	100.00
	Calcium	10000.0000	mg/L	4.9500	4.9500	1.3435	4	5.9	2	0	5.9	4	100.00
	Chloride	250.0000	mg/L	4.5000	4.5000	2.1213	3	6	2	0	6	3	100.00
	Chromium	0.0500	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	2	0	0.0005	0.0005	100.00
	Copper	2.0000	mg/L	0.0025	0.0025	0.0007	0.002	0.003	2	0	0.003	0.002	100.00
	Fluoride	1.5000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	Iodine	0.5000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	2	0	0.01	0.01	100.00
	Iron	0.3000	mg/L	0.0075	0.0075	0.0035	0.005	0.01	2	0	0.01	0.005	100.00
	Lead	0.0100	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	2	0	0.0001	0.0001	100.00
	Magnesium	10000.0000	mg/L	0.6400	0.6400	0.1414	0.54	0.74	2	0	0.74	0.54	100.00
	Manganese	0.5000	mg/L	0.0035	0.0035	0.0011	0.003	0.0042	2	0	0.0042	0.0027	100.00
	Mercury	0.0010	mg/L	0.0004	0.0004	0.0000	4E-04	0.0004	2	0	0.0004	0.0004	100.00
	Molybdenum	0.0500	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	2	0	0.0001	0.0001	100.00
	Nickel	0.0200	mg/L	0.0002	0.0002	0.0000	2E-04	0.0002	2	0	0.0002	0.0002	100.00
	Nitrate	50.0000	mg/L	0.5000	0.5000	0.0000	0.5	0.5	2	0	0.5	0.5	100.00
	Nitrite	3.0000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	2	0	0.05	0.05	100.00
	pH	6.5 - 8.5		7.7500	7.7500	0.2121	7.6	7.9	2	0	7.9	7.6	100.00
	Selenium	0.0100	mg/L	0.0035	0.0035	0.0000	0.004	0.0035	2	0	0.0035	0.0035	100.00
	Silver	0.1000	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	2	0	0.0001	0.0001	100.00
	Sodium	180.0000	mg/L	10.5000	10.5000	0.7071	10	11	2	0	11	10	100.00
	Sulfate	500.0000	mg/L	8.0000	8.0000	1.4142	7	9	2	0	9	7	100.00
	Total Dissolved Solids (TDS)	600.0000	mg/L	43.5000	43.5000	6.3640	39	48	2	0	48	39	100.00
	Total Hardness as CaCO3	200.0000	mg/L	15.0000	15.0000	3.9598	12.2	17.8	2	0	17.8	12.2	100.00
	True Colour	15.0000	Hazen Units (HU)	0.5000	0.5000	0.0000	0.5	0.5	2	0	0.5	0.5	100.00
	Turbidity	5.0000	NTU	0.0750	0.0750	0.0354	0.05	0.1	2	0	0.1	0.05	100.00
Uranium	0.0170	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	2	0	0.00005	0.00005	100.00	
Zinc	3.0000	mg/L	0.0250	0.0250	0.0071	0.02	0.03	2	0	0.03	0.02	100.00	
Microbiology	E. coli	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	26	0	0	0	100.00
	Free Chlorine	0.2 - 5	mg/L	0.5919	0.5100	0.2882	0.15	1.13	26	2	1.07	0.19	92.31
	pH	6.5 - 8.5		8.0604	8.1000	0.4862	7.17	8.87	24	6	8.72	7.25	75.00
	Temperature	30.0000	C	18.3500	18.2500	2.5242	15.6	21.4	8	0	21.4	15.6	100.00
	Total Chlorine	5.0000	mg/L	0.6785	0.6100	0.2967	0.23	1.28	26	0	1.16	0.28	100.00
	Total Coliforms	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	26	0	0	0	100.00
	Turbidity	5.0000	NTU	0.2558	0.1950	0.2041	0.03	0.7	24	0	0.7	0.06	100.00



Table 20 Tumarumba Verification Monitoring

Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Chemistry	Aluminium	0.2000	mg/L	0.0333	0.0200	0.0231	0.02	0.06	3	0	0.06	0.02	100.00
	Antimony	0.0030	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	3	0	0.00005	0.00005	100.00
	Arsenic	0.0100	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	3	0	0.0005	0.0005	100.00
	Barium	2.0000	mg/L	0.0053	0.0053	0.0005	0.005	0.0058	3	0	0.0058	0.0049	100.00
	Boron	4.0000	mg/L	0.0015	0.0013	0.0013	4E-04	0.0029	3	0	0.0029	0.0004	100.00
	Cadmium	0.0020	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	3	0	0.00005	0.00005	100.00
	Calcium	10000.0000	mg/L	1.4667	1.4000	0.1155	1.4	1.6	3	0	1.6	1.4	100.00
	Chloride	250.0000	mg/L	3.0000	3.0000	0.0000	3	3	3	0	3	3	100.00
	Chromium	0.0500	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	3	0	0.0005	0.0005	100.00
	Copper	2.0000	mg/L	0.0115	0.0070	0.0138	5E-04	0.027	3	0	0.027	0.0005	100.00
	Fluoride	1.5000	mg/L	0.8733	0.8000	0.1270	0.8	1.02	3	0	1.02	0.8	100.00
	Fluoride (WU result)	1.5000	mg/L	1.0750	1.0750	0.0354	1.05	1.1	2	0	1.1	1.05	100.00
	Fluoride Ratio	0.8 - 1.2		1.2050	1.2050	0.2475	1.03	1.38	2	1	1.38	1.03	50.00
	Iodine	0.5000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	3	0	0.01	0.01	100.00
	Iron	0.3000	mg/L	0.0067	0.0050	0.0029	0.005	0.01	3	0	0.01	0.005	100.00
	Lead	0.0100	mg/L	0.0003	0.0001	0.0003	1E-04	0.0007	3	0	0.0007	0.0001	100.00
	Magnesium	10000.0000	mg/L	0.6133	0.6300	0.0666	0.54	0.67	3	0	0.67	0.54	100.00
	Manganese	0.5000	mg/L	0.0004	0.0002	0.0004	2E-04	0.0009	3	0	0.0009	0.00015	100.00
	Mercury	0.0010	mg/L	0.0004	0.0004	0.0000	4E-04	0.0004	3	0	0.0004	0.0004	100.00
	Molybdenum	0.0500	mg/L	0.0001	0.0001	0.0001	5E-05	0.0002	3	0	0.0002	0.00005	100.00
	Nickel	0.0200	mg/L	0.0004	0.0002	0.0004	2E-04	0.0009	3	0	0.0009	0.0002	100.00
	Nitrate	50.0000	mg/L	0.5000	0.5000	0.0000	0.5	0.5	3	0	0.5	0.5	100.00
	Nitrite	3.0000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	3	0	0.05	0.05	100.00
	pH	6.5 - 8.5		7.5333	7.5000	0.0577	7.5	7.6	3	0	7.6	7.5	100.00
	Selenium	0.0100	mg/L	0.0035	0.0035	0.0000	0.004	0.0035	3	0	0.0035	0.0035	100.00
	Silver	0.1000	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	3	0	0.0001	0.0001	100.00
	Sodium	180.0000	mg/L	16.6667	17.0000	1.5275	15	18	3	0	18	15	100.00
	Sulfate	500.0000	mg/L	17.3333	17.0000	0.5774	17	18	3	0	18	17	100.00
	Total Dissolved Solids (TDS)	600.0000	mg/L	48.3333	48.0000	0.5774	48	49	3	0	49	48	100.00
	Total Hardness as CaCO3	200.0000	mg/L	6.2000	6.2000	0.1000	6.1	6.3	3	0	6.3	6.1	100.00
	True Colour	15.0000	Hazen Units (HU)	0.5000	0.5000	0.0000	0.5	0.5	3	0	0.5	0.5	100.00
	Turbidity	5.0000	NTU	0.7000	0.7000	0.6000	0.1	1.3	3	0	1.3	0.1	100.00
Uranium	0.0170	mg/L	0.0001	0.0001	0.0000	5E-05	0.00005	3	0	0.00005	0.00005	100.00	
Zinc	3.0000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	3	0	0.01	0.01	100.00	
Fluoride Barcode	Fluoride	1.5000	mg/L	0.8091	0.8100	0.0930	0.66	0.96	11	0	0.96	0.66	100.00
	Fluoride (WU result)	1.5000	mg/L	0.9200	0.9000	0.1616	0.68	1.14	11	0	1.14	0.68	100.00
	Fluoride Ratio	0.8 - 1.2		1.1373	1.1000	0.1487	0.97	1.38	11	3	1.38	0.97	72.73
Microbiology	E. coli	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	45	0	0	0	100.00
	Free Chlorine	0.2 - 5	mg/L	0.6429	0.6000	0.1984	0.34	1.28	45	0	0.98	0.38	100.00
	pH	6.5 - 8.5		7.3578	7.4000	0.2383	6.75	7.76	45	0	7.68	6.85	100.00
	Total Chlorine	5.0000	mg/L	0.7427	0.7100	0.2234	0.44	1.4	45	0	1.22	0.47	100.00
	Total Coliforms	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	45	0	0	0	100.00
	Turbidity	5.0000	NTU	0.2233	0.2200	0.0351	0.19	0.26	3	0	0.26	0.19	100.00



Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Operational Monitoring	Fluoride (daily WU)	0.9 - 1.5	mg/L	1.0078	1.0450	0.1475	0.196	1.272	276	47	1.181	0.728	82.97
	Fluoride (weekly WU)	0.9 - 1.5	mg/L	0.9956	1.0380	0.1842	0.039	1.324	95	18	1.21	0.708	81.05



Table 21 Tumut Verification Monitoring

Analysis Type	Characteristic	Guideline Value	Units	Mean	Median	Standard Deviation	Min	Max	Sample Count	Exception Count	95th Percentile	5th Percentile	% meeting guideline values
Chemistry	Aluminium	0.2000	mg/L	0.0350	0.0200	0.0281	0.01	0.09	12	0	0.09	0.01	100.00
	Antimony	0.0030	mg/L	0.0001	0.0001	0.0000	5E-05	0.0001	12	0	0.0001	0.00005	100.00
	Arsenic	0.0100	mg/L	0.0005	0.0005	0.0000	5E-04	0.0005	12	0	0.0005	0.0005	100.00
	Barium	2.0000	mg/L	0.0071	0.0072	0.0009	0.006	0.0088	12	0	0.0088	0.0057	100.00
	Boron	4.0000	mg/L	0.0026	0.0028	0.0011	8E-04	0.0047	12	0	0.0047	0.0008	100.00
	Cadmium	0.0020	mg/L	0.0001	0.0001	0.0001	5E-05	0.0002	12	0	0.0002	0.00005	100.00
	Calcium	####	mg/L	3.7917	3.8000	0.6868	2.6	5.6	12	0	5.6	2.6	100.00
	Chloride	####	mg/L	4.2500	4.0000	1.4222	3	7	12	0	7	3	100.00
	Chromium	0.0500	mg/L	0.0005	0.0005	0.0001	5E-04	0.001	12	0	0.001	0.0005	100.00
	Copper	2.0000	mg/L	0.0087	0.0085	0.0046	0.002	0.016	12	0	0.016	0.002	100.00
	Fluoride	1.5000	mg/L	0.9883	0.9850	0.0430	0.93	1.07	12	0	1.07	0.93	100.00
	Iodine	0.5000	mg/L	0.0100	0.0100	0.0000	0.01	0.01	12	0	0.01	0.01	100.00
	Iron	0.3000	mg/L	0.0121	0.0050	0.0110	0.005	0.04	12	0	0.04	0.005	100.00
	Lead	0.0100	mg/L	0.0003	0.0002	0.0004	1E-04	0.0013	12	0	0.0013	0.0001	100.00
	Magnesium	####	mg/L	1.1650	1.1650	0.3292	0.77	1.89	12	0	1.89	0.77	100.00
	Manganese	0.5000	mg/L	0.0033	0.0023	0.0030	8E-04	0.0109	12	0	0.0109	0.0008	100.00
	Mercury	0.0010	mg/L	0.0004	0.0004	0.0000	4E-04	0.0004	12	0	0.0004	0.0004	100.00
	Molybdenum	0.0500	mg/L	0.0001	0.0001	0.0000	5E-05	0.0001	12	0	0.0001	0.00005	100.00
	Nickel	0.0200	mg/L	0.0002	0.0002	0.0001	2E-04	0.0004	12	0	0.0004	0.0002	100.00
	Nitrate	####	mg/L	0.5417	0.5000	0.1443	0.5	1	12	0	1	0.5	100.00
	Nitrite	3.0000	mg/L	0.0500	0.0500	0.0000	0.05	0.05	12	0	0.05	0.05	100.00
	pH	6.5 - 8.5		7.5167	7.5000	0.1115	7.3	7.7	12	0	7.7	7.3	100.00
	Selenium	0.0100	mg/L	0.0035	0.0035	0.0000	0.004	0.0035	12	0	0.0035	0.0035	100.00
	Silver	0.1000	mg/L	0.0001	0.0001	0.0000	1E-04	0.0001	12	0	0.0001	0.0001	100.00
	Sodium	####	mg/L	5.4167	5.0000	0.7930	4	7	12	0	7	4	100.00
	Sulfate	####	mg/L	0.9583	1.0000	0.1443	0.5	1	12	0	1	0.5	100.00
	Total Dissolved Solids (TDS)	####	mg/L	29.0833	28.0000	5.7912	22	41	12	0	41	22	100.00
	Total Hardness as CaCO3	####	mg/L	14.2667	14.0500	2.5220	9.9	19.3	12	0	19.3	9.9	100.00
	True Colour	####	Hazen Units (HU)	0.5833	0.5000	0.1946	0.5	1	12	0	1	0.5	100.00
	Turbidity	5.0000	NTU	0.6042	0.6000	0.4840	0.05	1.6	12	0	1.6	0.05	100.00
	Uranium	0.0170	mg/L	0.0001	0.0001	0.0000	5E-05	0.0001	12	0	0.0001	0.00005	100.00
	Zinc	3.0000	mg/L	0.0192	0.0200	0.0067	0.01	0.03	12	0	0.03	0.01	100.00
Microbiology	E. coli	0.0000	mpn/100 mL	0.0000	0.0000	0.0000	0	0	75	0	0	0	100.00
	Free Chlorine	0.2 - 5	mg/L	0.7341	0.7400	0.2499	0.11	1.83	75	1	1.1	0.32	98.67
	pH	6.5 - 8.5		7.7810	7.7800	0.4096	6.65	9.1	69	2	8.38	6.91	97.10
	Temperature	####	C	18.5244	18.7000	3.0316	13.7	22.3	25	0	22	13.8	100.00
	Total Chlorine	5.0000	mg/L	0.8379	0.8300	0.2658	0.14	1.92	75	0	1.2	0.42	100.00
	Total Coliforms	0.0000	mpn/100 mL	0.4800	0.0000	2.8962	0	21	75	3	0	0	96.00
	Turbidity	5.0000	NTU	0.2508	0.2000	0.1885	0.04	0.96	72	0	0.62	0.05	100.00
Operational Monitoring	Fluoride (daily WU)	0.9 - 1.5	mg/L	1.0904	1.1100	0.0840	0.413	1.23	305	7	1.18	0.94	97.70
	Fluoride (weekly WU)	0.9 - 1.5	mg/L	1.0424	1.0500	0.0723	0.86	1.21	72	3	1.15	0.9	95.83



Table 22 Verification Sampling Frequency Compliance – Extract from NSW Health database

Public Health Unit	Water Utility	Supply System	Analysis Type	Allocations (any part) in Period	Samples Expected in Period	Samples Collected in Period				Collected as % of Expected Samples
						Allocated	Additional	Repeat	Total	
Greater Southern PHU	Snowy Valleys Council	Batlow SN03	Chemistry	2	2	2	0	0	2	100.00%
		Batlow SN03	Microbiology	52	52	51	3	1	55	103.85%
		Brungle SN04	Chemistry	2	2	2	0	0	2	100.00%
		Brungle SN04	Microbiology	36	36	34	0	0	34	94.44%
		Khancoban SN07	Chemistry	2	2	2	0	0	2	100.00%
		Khancoban SN07	Microbiology	26	26	22	0	0	22	84.62%
		Morgans Reserve SN06	Chemistry	2	2	1	1	0	2	100.00%
		Morgans Reserve SN06	Microbiology	12	12	12	2	1	15	116.67%
		Talbingo SN05	Chemistry	2	2	1	1	0	2	100.00%
		Talbingo SN05	Microbiology	26	26	26	0	0	26	100.00%
		Tumbarumba SN08	Chemistry	2	2	2	1	0	3	150.00%
		Tumbarumba SN08	Microbiology	52	52	45	0	0	45	86.54%
		Tumut SN01	Chemistry	12	12	12	0	0	12	100.00%
		Tumut SN01	Microbiology	76	76	71	1	3	75	94.74%