



REPORT

QUARTERLY ENVIRONMENTAL WATER REPORT JUNE 2023 TO AUGUST 2023

S2-FGJV-ENV-REP-0093

JANUARY 2024

This Report has been prepared to satisfy the reporting requirements in the Main Works – Water Management Plan (WMP) and to meet Condition of Approval (CoA) 31(c)(d) of the Infrastructure Approval Schedule which requires publicly available reporting of the outcomes of the WMP. The Report provides commentary on the performance of the monitoring programs as part of the WMP.

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ABBREVIATIONS AND DEFINITIONS

Acronym	Definition
AWS	Automatic weather stations
BoM	Bureau of Meteorology
CoA	Condition of Approval
ECVT	Emergency Cable and Ventilation Tunnel
EPL	Environmental Protection Licence
Future Generation	Future Generation Joint Venture
MAT	Main Access Tunnel
MDB	Murray Darling Basin
NEM	National Electricity Market
Snowy Hydro	Snowy Hydro Limited
Snowy Scheme	Snowy Mountains Hydro-electric Scheme
SWMP	Surface Water Management Plan
TARP	Trigger Action Response Plan
TBM	Tunnel Boring Machine
WMP	Water Management Plan
WQO	Water Quality Objectives

1. INTRODUCTION

Snowy Hydro Limited (Snowy Hydro) is constructing a pumped hydro-electric expansion of the Snowy Mountains Hydro-electric Scheme (Snowy Scheme), called Snowy 2.0. Snowy 2.0 will be built by the delivery of two projects: Exploratory Works and Snowy 2.0 Main Works (which has commenced).

Snowy 2.0 is a pumped hydro-electric project that will link the existing Tantangara and Talbingo reservoirs through a series of new underground tunnels and a hydro-electric power station. Most of the project’s facilities will be built underground, with approximately 27 kilometres of concrete-lined tunnels constructed to link the two reservoirs and a further 20 kilometres of tunnels required to support the facility. Intake and outlet structures will be built at both Tantangara and Talbingo Reservoirs.

Snowy 2.0 will increase the generation capacity of the Snowy Scheme by an additional 2,000 MW, and at full capacity will provide approximately 350,000 MWh of large-scale energy storage to the National Electricity Market (NEM). This will be enough to ensure the stability and reliability of the NEM, even during prolonged periods of adverse weather conditions.

WeBuild, Clough and Lane have formed the Future Generation Joint Venture (Future Generation) and have been engaged to deliver both Stage 2 of Exploratory Works and Snowy 2.0 Main Works.

2. PURPOSE

This Environmental Water Report has been prepared to satisfy the reporting requirements in the Main Works – Water Management Plan (WMP) and to meet Infrastructure Approval CSSI 9687 (CoA) Schedule 3, Condition 31(c)(d) which requires publicly available reporting of the outcomes of the WMP. The Environmental Water Report is intended to provide commentary on the performance of the monitoring programs as part of the WMP (identified in Table 2-1).

Table 2-1: Monitoring overview

Aspect	Objective
Surface Water Monitoring Program	
Routine receiving surface water quality monitoring	<ul style="list-style-type: none"> inform and assess the performance of management processes/measures that seek to minimise the Project’s impact on surface water quality help determine source and extent of any water quality changes collect baseline data to characterise water quality and determine site specific values
Event based wet weather overtopping water quality monitoring	
Groundwater Monitoring Program	
Groundwater level monitoring	<ul style="list-style-type: none"> inform and assess the performance of management processes/measures that seek to minimise the Project’s impact on regional and local (including alluvial) aquifers and GDEs
Groundwater quality monitoring	
Water extraction monitoring	<ul style="list-style-type: none"> inform and assess water consumption, site water balance and compliance with water access licences

3. OVERVIEW

3.1. Reporting period

This Environmental Water Report covers the monitoring period from 01 June to 31 August 2023.

3.2. Construction progress

Table 3-1 summarises the key construction activities which have been undertaken during the reporting period.

Table 3-1: Key construction activities for 01 June to 31 August 2023.

Location	Key construction activities
Lobs Hole Ravine Road	<ul style="list-style-type: none"> • Irrigation via water carts along Ravine Road to dewater Pad 2, MY07 and F1 sediment basins. • Clearing for road widening works between R7-R15. • ERSED Improvement and implementation of additional controls at R5 laydown area – Rollover to divert surface flows into basin. • Ongoing maintenance of road, and erosion and sediment (ERSED) controls along Ravine Rd from R0-R15.
Lobs Hole	<ul style="list-style-type: none"> • Drill and Blast of cross passages ongoing at MAT Portal tunnel. • EPL 4 (MAT Portal) – Bailer used to purge sludge that infiltrated GW bore. • Marica West HDD extensive drilling works commenced, and two (2) pilot holes reached intersection point (1500m) in this reporting period. • Multiple ERSED Improvement works across site – F4 basin repairs, F10.5 Basin enlargement, Stonewalling of Track 8 Batters etc. • Major road maintenance works ongoing from the Batch plant to MAT/ECVT axis - dirty water drains are being reinstated. • Desilting of the last sets of sediment basins • F7 Transgrid Construction works ongoing with revised PESCP. • Concreting of ECVT Level Spreader and commencing works on the batter chute • Hydroseeding of additional topsoiled batters across different areas of Lobs Hole – Pad 50, Pad F, MAT Portal • MAT – TAL Pipeline works recommenced
Marica	<ul style="list-style-type: none"> • Spreading of road base along Marica trail progressed between CUT 6 and CH 4100. • Rehab work and Litter remediation on the SMH portion completed. • Rework of the road base compaction at Eucumbene crossing completed. • Road work at Gooandra creek crossing completed. • NAF material sheeting of Gooandra laydown area completed. • Installation of rooms for the camp extension works – ongoing. • Eucumbene Gabion Basket work completed. • Sediment basin maintenance for MC02, MT04, MT05, MT02, MT01 and MT03 completed. • Desilting of sediment basins completed. • Hydroseeding completed at site entry MT CH0 to CH150. • Sediment basin below spoil pad at surge shaft backfilled and compacted. • Installation and cable pulling works ongoing along Marica Trail. • Water crossings upgrades commenced- Tantangara, Blankets, and CH2100-2200
Plateau	<ul style="list-style-type: none"> • Trenching along the alignment ongoing. • Site rehabilitation is progressing. • Water Quality Monitoring ongoing. • Under-boring ongoing.

Location	Key construction activities
Rock Forest	<ul style="list-style-type: none"> • NA – site under operational use as laydown area.
Talbingo	<ul style="list-style-type: none"> • Mining commenced at Talbingo Adit with TBM 2. • TBM cradle construction and U/G services completed. • Intermittent discharge of water at the RO plant based on result compliance against WQ criteria. • Talbingo Intake works ongoing. • Talbingo Adit Portal (TAP01) Basin repairs completed. • Elevated Nitrogen levels observed in GW at GF01. Weekly comprehensive sampling commenced. • Workshop and Palmers pad construction works ongoing.
Tantangara	<ul style="list-style-type: none"> • Spreading of road base along Marica trail progressed between CUT 6 and CH 4100. • Rehab work and Litter remediation on the SMH portion completed. • Rework of the road base compaction at Eucumbene crossing completed. • Road work at Gooandra creek crossing completed. • NAF material sheeting of Gooandra laydown area completed. • Installation of rooms for the camp extension works – ongoing. • Eucumbene Gabion Basket work completed. • Sediment basin maintenance for MC02, MT04, MT05, MT02, MT01 and MT03 completed. • Desilting of sediment basins completed. • Hydroseeding completed at site entry MT CH0 to CH150. • Sediment basin below spoil pad at surge shaft backfilled and compacted. • Installation and cable pulling works ongoing along Marica Trail. • Water crossings upgrades commenced- Tantangara, Blankets, and CH2100-2200

4. WEATHER CONDITIONS

There are several weather stations along the alignment of the project that report real-time data. These include:

- “Lobs Hole” - which is an Automatic Weather Station managed by Future Generation in Lobs Hole construction site.
- “Cabramurra” - an Automatic Weather Station located near the lookout in the Cabramurra township managed by the Bureau of Meteorology
- “Tantangara” - an Automatic Weather Station managed by Future Generation in Tantangara construction site.

The Tantangara and Cabramurra gauges are in sub-alpine environments, with elevations of approximately 1220 m and 1475 m, respectively. Cabramurra records substantially higher annual rainfall amount than the lower-elevation gauges at Lobs Hole and Tantangara. Tantangara and Lobs Hole weather stations record actual onsite conditions at the respective construction sites, while Cabramurra weather station, at 1470 m is representative of conditions at Marica – which has an elevation of 1480 m and is approximately 15 km north of the Cabramurra Station.

A summary of climate data for the ravine and plateau areas is provided in Table 4.1

Table 4-1: Weather conditions for 01 June 2023 to 31 August 2023.

Parameter	Lobs Hole ¹			Marica (Cabramurra)			Tantangara ²		
	June	July	Aug	June	July	Aug	June	July	Aug
Temperature									
Mean maximum	11.7	12.5	14.6	4.4	6.0	7.8	8.2	9.9	12.6
Mean minimum	3.5	0.8	1.9	0.8	0.8	1.2	-0.6	-2.5	-2.9
Rainfall									
Monthly	122.0	53.0	51.0	172.0	106.0	78.2	120.8	62.8	59
Long Term Average	102.3	103.6	106.2	124.5	113.8	127.7	57.8	53.8	59.7

1. Lobs Hole long term average rainfall is taken from the Tumbarumba weather station.

2. Tantangara long term average rainfall is taken from the Adaminaby Alpine Tourist Park weather station.

During the third quarter 2023, there was greater than average rainfall for Lobs Hole and Marica (Cabramurra) with respect to the long-term average for June and greater than average rainfall for Tantangara with respect to the long-term average for June and July. There was less than average rainfall for Lobs Hole and Marica (Cabramurra) during July and August, and average rainfall for August at Tantangara (Table 4.1). La Nina conditions were officially reported to have ended in March 2023, however the seasonal variation contributed to the rainfall at all locations.

5. SURFACE WATER MONITORING PROGRAM

5.1. Routine surface water quality monitoring

Routine surface water quality monitoring is undertaken in accordance with CoA31 and the Environment Protection Licence No. 21266 (EPL - 21266) to determine if the project is resulting in any impacts to receiving water quality against the Water Quality Objectives (WQO). The WQOs are specified in Table 2-2 of the Main Works – Surface Water Monitoring Program.

Publicly available surface water quality monitoring results undertaken in accordance with EPL - 21266 can be accessed [here](#).

There were several occasions where EPL monitoring results at Rock Forest, Tantangara, Marica and Lobs Hole exceeded the Water Quality Objectives. However, these, exceedances are minor and are generally consistent with the background monitoring of upstream areas of the Snowy 2.0 construction activities.

Marica had slight exceedances of Ammonia throughout the quarter, though this is representative of background conditions, with upstream and downstream values showing similar results. There were a number of minor elevations in metals in surface water during July and August across the sites which were within historical ranges and are similar to background concentrations in the respective locations. A number of samples had elevated phosphorus in August which is consistent with background conditions.

Rock Forest had exceedances in Nitrogen, Phosphorus, Aluminium, and Iron in June, as well as Ammonia in July, but the concentrations are similar upstream indicating the exceedances are representative of background conditions. The exceedances likely result from agricultural activities along with elevated turbidity recorded in August. There were a number of minor elevations in

metals in surface water in July and August at Rock Forest sites which were within historical ranges and are similar to background concentrations in the respective locations.

Tantangara surface water quality is generally within WQO for June and is representative of background conditions. There were higher Ammonia readings for July, and pH, phosphorus, and ammonia in August. This could be due to runoff from heavy rainfall and natural springs as it was also recorded upstream of the Project works. There were a number of minor elevations in metals in surface water at Tantangara which were within historical ranges and are similar to background concentrations in the respective locations.

A few minor exceedances of metals and nutrients occurred at Lobs Hole in June to August, though were generally representative of background conditions with similar exceedances observed at upstream locations. There were greater exceedances of Nitrogen and Ammonia and EPL24 which are consistent with historical data for the location. A number of samples had elevated pH, phosphorus, and ammonia in August which is consistent with background for the reporting period. Nitrogen and nitrate concentrations at EPL24 and EPL6 are being investigated further.

There was exceedances of Turbidity and Dissolved Oxygen was outside the WQO for many EPL's. The turbidity was likely due to runoff from heavy rainfall periods during winter causing high flow upstream and downstream. DO outside WQO parameters can be caused by changes in temperature and fluctuations of naturally occurring bacteria.

For the reporting period, the quarterly monitoring results demonstrate that the water quality is being managed to ensure there is minimal disturbance from discharge and reuse of water. The current water quality is relatively consistent across multiple EPL monitoring locations with the exceedances not shown to have changed significantly since the onset of the proximal construction of Snowy 2.0.

While water was being discharged to Talbingo and Tantangara reservoirs over the reporting period, sampling was conducted at EPL41 and EPL50. During June 2023 monitoring round, EPL41 was sampled during a discharge event with in-situ parameters within WQO, however, comprehensive results indicated a minor exceedance of the WQO for nitrogen Aluminium, Chromium, Copper, and Zinc. Discharge ceased while the results were being investigated and a TARP raised. No discharge occurred to Talbingo during July, with water bi-weekly monitoring ongoing through August. Water was predominantly used for irrigation, and only discharged in August when results indicated it was within WQO.

During the June and July 2023 monitoring rounds, exceedances were observed for EPL50, however no discharge was occurring. Nitrogen concentration slightly exceeded the 90th percentile concentration during August sampling, however reservoir EPL locations were within WQO.

Further, exceedances of the WQO were identified at the reservoir EPL locations however there is no evidence that the source of exceedances originate from the final discharge points at the RO plants, with levels consistent with upstream monitoring locations.

5.2. Event based monitoring

Event based wet weather overtopping water quality monitoring is undertaken in accordance with the SWMP Trigger Action Response Plan (TARP 2) to monitor stormwater overtopping sediment basin discharges. Sediment basins for the Project have been designed to meet the design rainfalls depths identified in Table 5-1.

Table 5-1: Design rainfall depths (SWMP Section 5.1.1)

Catchment	Description	85 th percentile, 5-day rainfall (mm)	90 th percentile, 5-day rainfall (mm)	95 th percentile, 5-day rainfall (mm)
Yarrangobilly River	Surface works at Lobs Hole and Marica	28.1	35.6	49.0
Upper Eucumbene River	Surface works between Marica and the Snowy Mountain Highway	35.2	43.4	56.9
Tantangara construction compound	Surface works adjacent to the southern portion of Tantangara Reservoir	30.5	37.0	51.0
Goorudee Rivulet	Surface works at Rock Forest	20.0	25.7	36.1

During the reporting period, rainfall exceeded the design rainfall criteria three times, including:

- 6-10 June 2023 (44.6 mm – Lobs Hole, 43.4mm - Marica)
- 23-27 June 2023 (38.2 mm – Lobs Hole, 55.8mm – Tantangara, 52.4mm - Marica)
- 5-9 July 2023 (39.6 mm – Tantangara, 58.8mm – Marica)

Across the sites, water quality results of upstream and downstream were generally consistent following significant rainfall events where turbidity, electrical conductivity, dissolved oxygen and pH frequently exceeded the WQO. However most other water quality parameters were within the WQO. It is identified in the Surface Water Management Plan that during periods of wet weather, the WQO are frequently exceeded. Water samples were collected for comprehensive water testing and the EPA were notified of the releases in accordance with R4.1 of EPL 21266. During discharge there were some turbidity exceedances downstream. There was also high DO upstream and downstream. However, most were within the WQO parameters.

6. GROUNDWATER MONITORING PROGRAM

6.1. Groundwater quality

Groundwater quality monitoring is undertaken in accordance with EPL - 21266 to determine if the project is resulting in any impacts to groundwater. Groundwater quality trigger levels for the Project are outlined in Table C-1 of the Main Works – Groundwater Monitoring Program.

Publicly available groundwater quality monitoring results undertaken in accordance with EPL - 21266 can be accessed [here](#).

Elevated concentrations of nutrients and metals were observed in August. The metals exceedances are representative of natural conditions as these metals occur naturally within the project area. The nutrient exceedances fall within standard variation for these wells with no evidence of impacts to Yarrangobilly River.

In this reporting period there were further groundwater sample collected at the GF01 spoil emplacement area in accordance with the Leachate Detection Procedure. Exceedances of Nitrogen, Ammonia, and a number of metals were observed in sediment basin and surface water at GF01 with some similar exceedances noted upstream at EPL 53. Comprehensive and in situ samples are

collected on a weekly basis while an investigation is being undertaken to determine the source of elevated Nitrogen.

Elevated concentrations of nutrient and metal concentrations were observed in groundwater at Tantangara, however these appear representative of background conditions.

6.2. Groundwater levels

Groundwater level monitoring is undertaken in accordance with the Groundwater monitoring program to determine groundwater drawdown as a result from the Project.

Site specific groundwater level triggers as outlined in Attachment B of the Main Works – Groundwater Monitoring Program have been established to monitor whether observed drawdown is greater than construction related predicted drawdown.

Due to technical issues, groundwater data for this quarter is currently unavailable. This report will be updated once the groundwater data is available.

6.3. Groundwater inflows

Groundwater inflow into the tunnels is monitored during construction and compared to predicted inflows. This data is required to monitor the volume of extracted groundwater against water access licence limits (Table 6-1).

Table 6-1: Water access licence

Water Access Licence	Project	Water Source	Share (ML)
WAL42407 – Specific Purpose Access Licence	Exploratory Works	Upper Tumut water source	227
WAL42408 – Groundwater Licence	Exploratory Works	Lachlan Fold Belt MDB	0
WAL42960 – Groundwater Licence	Exploratory Works	Lachlan Fold Belt MDB	354
RO13-19-093 – via Controlled Allocation	Main Works	Lachlan Fold Belt MDB	3,375
RO1-19-092 – via Controlled Allocation	Main Works	Lachlan Fold Belt South Coast	1,722
Specific Purpose Access Licence	Main Works	Tantangara Water Source	532

The monthly inflows for the Construction Water Treatment Plant (CWTP) at the Main Access Tunnel (MAT) Portal are as follows:

- June 18.68 ML
- July 25.12 ML
- August 20.81 ML

The monthly inflows for the Construction Water Treatment Plant (CWTP) at Tantangara are as follows:

- June 14.95 ML
- July 13.23 ML
- August 15.08 ML

Groundwater inflows between June and August at the MAT Portal were less than those in the previous quarter which is likely a result of the segment lining and reduced tunnelling activities with

D&B activities occurring. The volumes at Tantangara remained similar to those in the previous reporting period where there were no tunnelling operations while awaiting Modification 2 approval.

7. TRENDS

The Mann-Kendall statistical analysis test has been chosen to assess trends within surface water monitoring data. Mann-Kendall is non-parametric test that assesses monotonic trends over time; identified as increasing, decreasing, or showing no significant trend. This test has been selected because it does not assume a specific distribution of the data and is robust against outliers, making it suitable for environmental datasets that may exhibit non-normal behaviour.

In instances where the Mann-Kendall analysis has been inconclusive due to insufficient data, a comparison of key general statistics has been undertaken, including an evaluation of mean, standard deviation, minimum, and maximum values. This comparative analysis has allowed for an assessment of construction monitoring data and whether it falls within the ranges identified in pre-project, baseline data. When calculating the mean value, non-detects have been considered as the detection limit value, rather than half the detection limit value, for a conservative output and thus the mean results in this Report are biased to a higher value.

Detailed Mann-Kendall trend analysis and metric summaries are provided in Appendix A. For each monitoring location, a summary of trends, mean, minimum, maximum and standard deviation is provided.

Surface water

- The following decreasing trends were identified:
- Aluminium – EPL 10, 11, 12, 14, 15, 16, 26, 27, 28, 29, 30, 31, 32, 34, 35, 38, 39, 40, and 41
- Arsenic – EPL 41, 50 and 51
- Chromium III + IV – EPL 41, 50, 51, 52 and 55
- Copper – EPL 52
- Iron – EPL 10, 12, 14, 16, 24, 29, 30, 32, 33, 35, 36, 41, 50, 52
- Manganese – EPL 5, 6, 8, 9, 12, 14, 15, 16, 33, 34, 35, 36, 37, 41, 50, 52 and 55
- Nickel – EPL 36, 37, 41, 50, 51, 52 and 55
- Lead – EPL 41, 50, 51, 52 and 55
- Silver - EPL 41, 50, 51, 52 and 55
- Zinc – EPL 51, 52 and 55
- Ammonia – 37, 41, 52 and 55
- Cyanide – EPL 41
- Kjeldahl Nitrogen – EPL 41 and 52
- Nitrate + Nitrite – EPL 41, 50 and 52
- Nitrogen – EPL 41 and 52
- Total Phosphorus – EPL 8, 9, 41, 52 and 55
- Hardness – EPL 28
- Total suspended solids – EPL 5, 8, 9, 10, 11, 12, 14, 16 and 31

- Oil and Grease – EPL 10,11, 12, 14, 16, 24, 31, 33, 35, 36, 37, 41, 50, 51, 52 and 55

The following increasing trends were identified:

- Arsenic – EPL 5, 6, 8, 9, 26, 27, 28, 30, 31, 36, 52 and 55
- Chromium III + IV – EPL 5, 6, 8, 9, 10, 11, 12, 15, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 and 38
- Copper – EPL 6, 26, 27, 28, 29, 30 and 32
- Iron – EPL 51
- Manganese – EPL 40
- Nickel – EPL 5, 6, 8, 9, 11, 12, 14, 16, 26, 27, 28, 29, 30, 31, 32, 34 and 38
- Lead – EPL 5, 6, 8, 9, 10, 11, 12, 15, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38 and 41
- Silver – EPL 5, 6, 8, 9, 10, 11, 12, 15, 24, 26, 27, 28, 29, 30, 31, 32, 33, 35, 36 and 38
- Zinc – EPL 5, 6, 8, 9, 11, 12, 15, 24, 26, 27, 28, 29, 30, 32, 34, 36 and 37
- Ammonia – EPL 27 and 51
- Kjeldahl Nitrogen – EPL 27 and 51
- Nitrate + Nitrite – EPL 10, 11, 24, 26, 28, 29, 30, 31, 32, 34, 36, 37, 38, 39 and 40
- Nitrogen – EPL 12, 24, 27, 39 and 51
- Total Phosphorus – EPL 31, 35 and 40
- Reactive Phosphorus – EPL 29, 32, 39 and 51
- Hardness – EPL 6, 12, 14, 15, 16, 24, 30 and 41
- Total suspended solids – EPL 36 and 37

Groundwater

The following decreasing trends were identified:

- Aluminium – EPL 56, 57 and 58
- Arsenic – EPL 56
- Chromium III + IV – EPL 56, 57 and 58
- Copper – EPL 56, 57 and 58
- Iron – EPL 1, 56, 57 and 58
- Lead – EPL 56, and 57
- Manganese – EPL 1, 56 and 57
- Nickel – EPL 25, 56 and 57
- Silver – EPL 58
- Zinc – EPL 57 and 58
- Ammonia – EPL 56, 57 and 58

- Kjeldahl Nitrogen – EPL 56 and 67
- Nitrate + Nitrite – EPL 56
- Nitrogen – EPL 56 and 57
- Total Phosphorus – EPL 56, 57 and 58
- Hardness – EPL 58
- Total Suspended solids – EPL 57

The following increasing trends were identified:

- Copper – EPL 2
- Lead – EPL 2
- Manganese – EPL 58
- Silver – EPL 1 and 2
- Zinc – EPL 2 and 4
- Nitrogen – EPL 2 and 4

8. CONCLUSION

There were several occasions where EPL monitoring results at Rock Forest, Tantangara, Marica and Lobs Hole exceeded the Water Quality Objectives. However, these, exceedances are minor and are generally consistent with the background monitoring of upstream areas of the Snowy 2.0 construction activities.

EPL monitoring results that exceeded the WQO are consistent with natural events such as rainfall and changes in seasonal weather. Background monitoring in the previous quarter has similar readings that display exceedances of particular analytes. Exceedances of the water quality objectives for nutrients and metals are likely due to high rainfall, and naturally occurring concentrations in soils leaching into the waterways. The SWMP, outlines background studies that indicate frequent exceedances of the WQO occurring within all surface waters across the project. There have also been exceedances of nitrogen, that have been investigated to find sources and find a way to lower levels. Updates will be provided as they are available in subsequent reports and corrective actions are being developed and implemented in the interim. Nitrogen and nitrate concentrations at EPL24 and EPL6 are being investigated further.

For the reporting period, the quarterly monitoring results demonstrate that the water quality is being managed to ensure there is minimal disturbance from discharge and reuse of water. The current water quality is relatively consistent across multiple EPL monitoring locations with the exceedances not shown to have changed significantly since the onset of the proximal construction of Snowy 2.0.

Across the sites, water quality results display increasing turbidity from overtopping downstream. However, this is a natural and common occurrence found in basin overtopping due to rainfall. Other analyte readings such as electrical conductivity and pH were consistent with naturally occurring conditions during wet weather, as outlined in the SWMP.

Groundwater results from the four wells in Lobs Hole (EPL1, EPL2, EPL4, EPL25) had exceedances in Nitrogen. Shallower wells (EPL1 and EPL25) are more likely to see higher nutrient exceedances and are likely a result of natural influences from historical sources such as decomposing plant material. The nutrient exceedances fall within standard variation for these wells with no evidence of



impacts to Yarrangobilly River. Comprehensive and in situ samples are collected at GF01 on a weekly basis while an investigation is being undertaken to determine the source of elevated Nitrogen. Elevated concentrations of nutrient and metal concentrations were observed in groundwater at Tantangara, however these appear representative of background conditions.



APPENDIX A – TREND ANALYSIS SUMMARY

Location	Site ID	Aluminum				Cyanide				Copper				Lead				Manganese				Nickel				Silver				Zinc												
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max										
Lubbock	1	13.9	5	49	14.8	Insufficient	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	2	4.75	5	11	2.08	Insufficient	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	3	46.17	5	212	80	Insufficient	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	4	30	5	39	8.89	Insufficient	2.8	1	5.97	Insufficient	0.6	0.2	1	0.56	Insufficient	2.43	0.5	3.2	3.33	Insufficient	2.89	4.1	8.0	2.03	Insufficient	1.03	0.1	5.32	Insufficient	3.08	9.18	14.8	4.38	Insufficient	2.39	0.1	5.23	Insufficient				
	5	13.76	5	20	4.08	Insufficient	0.43	0	1.33	Insufficient	3.02	0.2	4.3	1.79	Insufficient	7.08	0.5	32.8	0.53	Insufficient	14.3	1	50	30	Insufficient	0.38	0.1	2.1	0.53	Insufficient	33.67	5	1.08	20.4	Insufficient	0.78	0.5	2.2	0.47	Insufficient		
	6	38.3	5	185	43.38	Insufficient	3.28	2	5.2	0.64	Insufficient	0.3	0.2	1	0.24	Insufficient	2.71	0.5	8	1.95	Insufficient	1.03	0.1	1.47	0.85	Insufficient	1.03	0.1	1.77	0.47	Insufficient	2.97	0.5	1.37	0.46	Insufficient	0.14	0.01	1	0.73	Insufficient	
	7	35.52	5	120	21.01	Insufficient	0.77	0	1.29	Insufficient	0.97	0.2	4	0.79	Insufficient	3.82	0.5	1.91	0.27	Insufficient	11.04	1	70	31.52	Insufficient	1.62	0.2	4.10	0.95	Insufficient	32.68	8	1.64	40.76	Insufficient	2.7	0.7	7.2	3.15	Insufficient		
	Lubbock	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
		2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
		3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
4		50	180	180	80	Insufficient	-	-	-	-	300	500	7071	Insufficient	25	30	30	7071	Insufficient	662	90	306	820	Insufficient	978	10	4100	1761	Insufficient	40	10	50	1832	Insufficient	24.6	231	385	13.24	Insufficient	312	332	-
5		48.29	100	94.2	21.0	Insufficient	46.2	3	21.0	0.92	Insufficient	271.6	1	4.88	0.87	Insufficient	720	2	1.0	1.0	Insufficient	21.4	1	4.88	0.87	Insufficient	8.7	1	1.0	1.0	Insufficient	43.2	24	3072	23.0	Insufficient	13.1	29	3072	23.0	Insufficient	
6		75.34	3	310	70.28	Insufficient	4	4	0	Insufficient	300	500	7071	Insufficient	66.54	1	500	12.44	Insufficient	900.8	7	4800	1233	Insufficient	1538	17	10380	3823	Insufficient	1348	10	70	1100	Insufficient	3171	29	8091	337	Insufficient			
7		89.79	1	780	21.01	Insufficient	4	4	0	Insufficient	3672	9	5400	3776	Insufficient	10749	10	25500	4793	Insufficient	12966	13	36300	7463	Insufficient	5235	2	310	47.33	Insufficient	1257	1	70	1199	Insufficient	45.93	11	91	17.95	Insufficient		

Insufficient: Insufficient data to identify whether a significant trend exists.
 Increasing: Statistically significant evidence of an increasing trend.
 Decreasing: Statistically significant evidence of a decreasing trend.
 Not enough reported values to calculate Max-Min/Max-Min Ratio.
 Insufficient: Insufficient trend is established (detection limit being adjusted/moved during the sample period).