REPORT

QUARTERLY ENVIRONMENTAL WATER REPORT DECEMBER 2022 TO FEBRUARY 2023

S2-FGJV-ENV-REP-0074

APRIL 2023

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) Scehdule 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	• 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	• 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	• 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 December 2022 to 28 February 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 December 2022 to 28 February 2023.

Location	Key construction activities
Lobs Hole Ravine Road	• Asphalt laying of Ravine Road is completed. Signs and line marking remains.
Lobs Hole	• TBM1 installation of permanent rings is ongoing. • Final main camp accommodation buildings on are commissioned with covered walkways and footpaths installation in progress. • Main Yard - Fill and materials processing ongoing from TBMs spoil, Ravine Road and Talbingo intake works.
Marica	• Excavation, shotcrete, and rockbolting works for Surge Shaft ongoing. • Office area car park extension is ongoing.
Plateau	• Trenching along the alignment ongoing. • Site rehabilitation is progressing. • Water Quality Monitoring ongoing. • Under-boring ongoing.
Rock Forest	• NA – site under operational use as laydown area.
Talbingo	• Construction water treatment plant installation is in progress. • Grout plant installation is ongoing. • CWTP balance tanks works completed. • Construction water treatment plant installation is ongoing. • Adit portal office installation is ongoing. • Grout plant installation is ongoing. • Vertical Belt Storage installation works ongoing.
Tatangara	• TBM3 reached in unfavorable conditions with remediation works ongoing. • Sink hole encountered on 12-Dec-22, remedial measures ongoing where possible. Modification process ongoing. • Bore holes drilling for geotechnical investigations commenced. • Slurry treatment plant installation commenced. • Gate shaft shed finishing works ongoing. • Excavation and Installation of service lines is in progress. • Tantangara Road maintenance is ongoing with LEED • Spoil Road environmental maintenance ongoing.

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 December 2022 to 28 February 2023.

Parameter	Lobs Hole[1]			Marica (Cabramurra)			Tantangara[2]		
	Dec	Jan	Feb	Dec	Jan	Feb	Dec	Jan	Feb
Temperature									
Mean maximum	23.5	26.3	27.2	15.9	20.1	19.4	21.1	25.0	23.3
Mean minimum	9.3	11.0	11.5	7.2	11.2	9.8	6.0	9.8	8.4
Rainfall									
Monthly	99.0	78.8	48.0	118.6	152.0	38.2	117.6	134.8	35.8
Long Term Average	69.0	64.2	54.4	92.8	63.4	60.0	59.4	58.8	52.4

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 months of summer, higher than average rainfall was experienced across the region, with precipitation being significantly higher than the long-term average for December 2022 and January 2023 for all sites. Lower than average results were experienced for all sites in February 2023 (**Table 4-1**). The ongoing influence of La Nina across Eastern Australia caused local impacts within the Snowy 2.0 construction works in December 2022 and January 2023. La Nina was predicted to end in February 2023 which is reflected in the weather condition results across the region.

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.

Publically available surface water quality monitoring results undertaken in accordance with EPL - 21266 can be accessed here.

The surface water monitoring results are consistent with those observed in the previous reporting period. There were several occasions where EPL monitoring results at Rock Forest, Tantangara, Marica and Lobs Hole exceeded the Water Quality Objectives however, these exceedance results

are generally consistent with the background monitoring of upstream and downstream areas of the Snowy 2.0 construction activities.

As the samples were collected during or following rainfall in each monitoring period, exceedances that did occur for nutrients, metals and turbidity were characteristic of wet weather conditions which typically results in more exceedances than in a period of dry weather. In some instances, there have been consistent exceedances for oil and grease at a number of the EPL locations, however there was no visible evidence of sheens. Investigations are being carried out with the laboratories, with a stronger focus on the potential for naturally occurring oils causing the exceedances, rather than those from project related sources. Corrective actions are being developed and implemented in the interim including training in sampling procedures. For the reporting period, the quarterly monitoring results demonstrate that the 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 generally over the reporting period, no discharge was occurring at the time the samples at EPL 41 or EPL50 were collected in December or January monitoring rounds as the RO plants were not required to discharge for an extended period of time. In the February 2023 monitoring round, EPL41 was sampled during a discharge event with in-situ parameters within water quality however, comprehensive results indicated minor exceedances of the WQO, including aluminium at 500ug/L and nitrogen at 790 ug/L. However, the nitrogen exceddances is only an exceedance of the 90th percentile and all results are within background ranges of water quality for the area. These results are being investigated with the aid of the de-watering team. 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.

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	85th percentile, 5-day rainfall (mm)	90th percentile, 5-day rainfall (mm)	95th 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 five times, including:

- 12 – 16 December 2022 (67mm – Marica, 59mm – Lobs Hole, 53mm – Tantangara)

- 15 – 19 January 2023 (53.2mm – Marica, 74.6mm – Tantangara)
- 22 – 26 January 2023 (41.2mm – Marica)
- 29 January – 2 February 2023 (56.2mm – Marica, 49.8mm – Lobs Hole, 52.8mm – Tantangara)
- 9 – 13 February 2023 (35.4 – Lobs Hole)

Across the sites, water quality results of upstream and downstream were generally consistent following significant rainfall events where turbidity, and other water quality parameters commonly exceeded the WQO. It is indentified 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. The discharges at Tantangara, Marcia and Lobs Hole identified marginal elevations of turbidity levels downstream of the overtopping basins. All other analytes were consistent with naturally occurring conditions and therefore no material harm has been caused by the overtopping events. In addition, no harm to health or safety of human beings or the environment that is not trivial has occurred.De-watering of the basins occurs routinely post rain events to minimise the risk of basins overtopping in the next event.

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.

Publically available groundwater quality monitoring results undertaken in accordance with EPL - 21266 can be accessed here.

Groundwater samples were collected on 2 February 2023 for EPL1 and EPL2 (Wallace Creek Bridge) and on 7 February 2023 for EPL4 and EPL25 (Portal Access). In this reporting period there were further groundwater sample collected at the GF01 spoil emplacement area in accordance with the Leachate Detection Procedure. On 18 February 2023, groundwater samples were collected at EPL56 and EPL58.

The metals exceedances for EPL1, EPL2, EPL4. and EPL25 are representative of natural conditions as these metals occur naturally within the project area. The iron exceedance at EPL25 remains consistent with previous quarterly results. Shallower wells (EPL1 and EPL25) are more likely to see higher nutrient exceedances as nutrients likely leach through the soil into the aquifer during rainfall. The nutrient exceedances fall within standard variation for these wells with no evidence of impacts to Yarrangobilly River. The GF01 groundwater bores were sampled in February 2023, to collect baseline information on the wells water quality to monitor any impact from the spoil emplacement.

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 – Groundwate 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 Accesss 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:

- December 45.34 ML
- Janurary 35.70 ML
- February 32.49 ML

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

- December 20.65 ML
- Janurary 15.58 ML
- February 12.90 ML

Groundwater inflows in December, January and February were less than those in the previous quarter which is likely a result of reduced tunnelling activites occurring, particualry in MAT Potral as the TBM has ceased tunnelling.

7. CONCLUSION

EPL monitoring results that exceeded the WQO are generally consistent with background monitoring as well as previous quarterly monitoring results. Exceedances of the water quality objectives for nutrients and metals are likely due to non-construction related activities such as high rainfall, and naturally occurring concentrations in soils leaching into the waterways. As displayed in the SWMP, background studies indicated that frequent exceedances of the WQO occurred within all surface waters across the project. There have been consistent exceedances for oil and grease in many of the EPL locations. Due to a lack of visible evidence of oil and grease on site during sampling, the exceedances are being investigated with the laboratories, with a stronger focus on the potential for naturally occurring oils causing the exceedance, rather than those from project related sources. It is also noted that similar Oil and Grease exceedances were displayed in the previous quarterly report across most of the project EPL locations, including those upstream of construction activites. Updates

will be provided in the next quarterly report and corrective actions are being developed and implemented in the interim. As Q1 2023 displayed no significant exceedances outside of historical variation, it is considered that the cause of the elevated concentrations of analytes in the surface water monitoring are not a result of construction works of Snowy 2.0.

Across the sites, water quality results were generally consistent with previous overtopping event sampling rounds. Sediment basin overtopping discharges identified marginal elevations of turbidity levels downstream of the incident locations and all other analytes were consistent with naturally occurring conditions during wet weather, as outlined in the SWMP. Therefore no material harm has been caused by the overtopping events.

Groundwater results from the four wells in Lobs Hole (EPL1, EPL2, EPL4, EPL25) were consistent with previous monitoring rounds, with elevated nutrients and select metals (iron, copper, nickel, and zinc). The EPL25 minor metals exceedances for zinc, nickel and copper fall within standard fluctuations in this well, and the iron exceedance remains consistent with previous quarterly results. 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. Results of the GF01 groundwater bores will be discussed in the next quarterly report when a better understanding of the baseline groundwater quality has been achieved.

Due to technical issues, groundwater level data was collected when practicable, however is not yet available for Q1 2023. This report will be updated once the groundwater data is finalised.

Harm to health or safety of human beings or the environment that is not trivial has not occurred in Q1 2023. Therefore, exceedances are not considered to be caused or added to by the ongoing construction works of the Snowy 2.0 project.