

REPORT

QUARTERLY ENVIRONMENTAL WATER REPORT SEPTEMBER TO NOVEMBER 2022

S2-FGJV-ENV-REP-0068

JANUARY 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.

Revision Record

| | | | | | |
|-------------|-------------|-------------------------|--------------------|--------------------|--------------------|
| A | 05/01/2022 | Issued for information | Jessica Adams | Ellen Porter | Massimo Franceschi |
| Rev. | Date | Reason for Issue | Responsible | Accountable | Endorsed |

Document Verification

RACIE Record

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CONTENTS

| | |
|---|-----------|
| ABBREVIATIONS AND DEFINITIONS | 5 |
| 1. INTRODUCTION | 6 |
| 2. PURPOSE | 6 |
| 3. OVERVIEW | 7 |
| 3.1. Reporting period | 7 |
| 3.2. Construction progress | 7 |
| 4. WEATHER CONDITIONS..... | 8 |
| 5. SURFACE WATER MONITORING PROGRAM | 8 |
| 5.1. Routine surface water quality monitoring | 8 |
| 5.2. Event based monitoring..... | 9 |
| 6. GROUNDWATER MONITORING PROGRAM | 10 |
| 6.1. Groundwater quality | 10 |
| 6.2. Groundwater levels..... | 10 |
| 6.3. Groundwater inflows..... | 11 |
| 7. CONCLUSION | 11 |

TABLE OF TABLES

| | |
|---|----|
| Table 2-1: Monitoring overview | 6 |
| Table 3-1: Key construction activities for 01 September to 30 November 2022 | 7 |
| Table 4-1: Weather conditions for 01 September to 30 November 2022..... | 8 |
| Table 5-1: Design rainfall depths (SWMP Section 5.1.1)..... | 9 |
| Table 6-1: Water access licence | 11 |

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 Condition of Approval (CoA) 31(c)(d) of the Infrastructure Approval Schedule 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 licenses |

3. OVERVIEW

3.1. Reporting period

This Environmental Water Report covers the monitoring period from 01 September to 30 November 2022.

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 September to 30 November 2022.

| Location | Key construction activities |
|-----------------------|---|
| Lobs Hole Ravine Road | <ul style="list-style-type: none"> Ongoing construction of road, and erosion and sediment (ERSED) controls along Ravine Rd from R0-R15. Asphalting of Ravine Road ongoing. |
| Lobs Hole | <ul style="list-style-type: none"> Tunnelling works complete at MAT Portal. Tunnelling works are ongoing at ECVT. Level spreader and rock-lined batter chute works close to completion. Fill and materials processing ongoing from TBMs spoil into Main Yard and Lick Hole Gully. Stage 5 earthworks are ongoing and are close to completion. |
| Marica | <ul style="list-style-type: none"> Marica Trail widening between CH0 – CH2100 build substantially to IFC design. Trunk services installation along Marica Trail ongoing. Road construction works continue including installation of culverts for creek crossings. Surge shaft excavation is ongoing. Underground utilities installation is ongoing. Shaft pad surface drainage FRP works is in progress Bottom HDD pad facilities installation completed and in use All accommodation blocks installation completed and commissioned. |
| Plateau | <ul style="list-style-type: none"> Trenching along the alignment ongoing. Site rehabilitation is progressing. Water Quality Monitoring ongoing. Under-boring ongoing. |
| Rock Forest | <ul style="list-style-type: none"> NA – site under operational use as laydown area. |
| Talbingo | <ul style="list-style-type: none"> Drill and blast activities are ongoing. Talbingo Adit Portal beginning to assemble TBM Talbingo Intake at excavation level RL 581. Earthworks footprint complete. GF01 clearing commenced and leachate preparation works commenced GF01 expected to take TBM spoil January 2023. |
| Tantangara | <ul style="list-style-type: none"> HRT Adit TBM continues operating in geohazards conditions. Remediation works are ongoing. Gate shaft excavation is ongoing. Shed structural installation in progress. Warehouse completed and workshop installation works are ongoing. All accommodation blocks installation completed. Tantangara road maintenance is ongoing with LEED. Quarry trail road widening from FGJV. |

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 September to 30 November 2022.

| Parameter | Lobs Hole ¹ | | | Marica (Cabramurra) | | | Tantangara ² | | |
|--------------------|------------------------|-------|-------|---------------------|-------|-------|-------------------------|-------|-------|
| | Sep | Oct | Nov | Sep | Oct | Nov | Sep | Oct | Nov |
| Temperature | | | | | | | | | |
| Mean maximum | 15.2 | 18.1 | 19.1 | 7.9 | 10.6 | 11.2 | 11.9 | 15.2 | 16.5 |
| Mean minimum | 4.6 | 8.3 | 7.8 | 1.4 | 4.2 | 3.9 | 1.2 | 4.7 | 4.0 |
| Rainfall | | | | | | | | | |
| Monthly | 151.4 | 130.8 | 169.2 | 167.6 | 289.4 | 209.6 | 160.4 | 170.2 | 199.2 |
| Long Term Average | 90.5 | 95.3 | 76.9 | 126.7 | 111.7 | 122.2 | 60.1 | 67.8 | 58.9 |

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

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

During the months of spring, higher than average rainfall was experienced across the region, with precipitation being significantly higher than the long-term average across all months and sites (**Table 4-1**). The ongoing influence of La Nina across Eastern Australia caused local impacts within the Snowy 2.0 construction works.

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](#).

In general, the surface water monitoring results are consistent with those observed during the previous reporting period. On several occasions, EPL monitoring results at Rock Forest, Tantangara, Marica and Lobs Hole exceeded the Water Quality Objectives. These exceedance results are generally consistent with the baseline monitoring of upstream and downstream areas of the Snowy 2.0 construction activities. Where exceedances have occurred, such as elevated levels of nitrogen and phosphorus are likely due to high rainfall events. In some instances, there have been exceedances in concentrations, such as oil and grease, likely due to human error or laboratory error. These are being investigated and corrective actions are being developed and implemented.

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 increased since the onset of the proximal construction of Snowy 2.0.

In addition, while water was being discharged to Talbingo and Tantangara reservoirs generally over the reporting period no discharge to either Talbingo or Tantangara reservoirs was occurring at the time the samples at EPL 41 or EPL50 were collected in September, October, or November monitoring rounds. Discharge only occurs when the WQO are met.

Exceedances to the WQO within surface waters across the site are not considered to be caused or added to by the ongoing construction works of Snowy 2.0.

Nitrogen results were unavailable from the laboratory for the November period due to a laboratory error in sample transport.

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 rainfall 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 numerous times, including:

- 9 – 13 September (43mm – Lobs Hole, 38.2mm – Marica)
- 16 – 20 September (44.2mm – Lobs Hole, 71.6mm – Tantangara, 77.2mm – Marica)
- 24 – 28 September (53mm – Lobs Hole, 37.6mm – Tantangara, 46.8mm – Marica)
- 6 – 10 October (34.2mm – Lobs Hole, 41.4mm – Tantangara)

- 14 – 18 October (32.6mm Lobs Hole, 35mm – Tantangara, 50.8mm – Marica)
- 22 – 26 October (30.6mm – Lobs Hole, 99mm – Marica)
- 27 – 31 October (54.6mm – Tantangara, 101.2mm – Marica)
- 1 – 5 November (45.2mm – Lobs Hole, 67.8mm – Tantangara, 39.4mm – Marica)
- 13 – 17 November (58.4mm – Lobs Hole, 54mm Tantangara, 105.4mm – Marica)
- 20 – 24 November (45.6mm – Lobs Hole, 64mm – Tantangara, 55.2mm – Marica)

Across the sites, water quality results upstream and downstream were generally consistent. 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 discharge identified marginal elevations of turbidity levels downstream of the incident location for some results. 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.

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

Groundwater samples were collected on 11 November 2022 .EPL4, EPL25, EPL1 and EPL2 sample results exceeded the water quality objectives for total nitrogen, reactive phosphorus (EPL 1 only), iron, manganese (EPL25 only), nickel (EPL25 only) and zinc (EPL25 only). Groundwater results are generally consistent with previous monitoring rounds. The high iron levels alongside hydrogen sulphide odours are noted through baseline monitoring prior to tunnelling but could be indicative of the potential for acid mine drainage, which has been outlined in the SWMP as potentially occurring in this area. Nutrient concentrations that exceeded WQO are likely a result of natural influence from decomposing plant material.

Exceedances to the WQO within surface waters across the site are not considered to be caused or added to by the ongoing construction works of Snowy 2.0.

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 access restrictions, groundwater data for this quarter is currently unavailable. This report will be updated once the groundwater data is processed.

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:

- September 55.26 ML
- October 45.09 ML
- November 39.54 ML

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

- September 21.26 ML
- October 22.28 ML
- November 26.34 ML

7. CONCLUSION

EPL monitoring results that exceeded the WQO are generally consistent with baseline monitoring as well as potential upstream sources of construction activities. Elevated 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. As displayed in the SWMP, baseline studies indicated that frequent exceedances of the WQO occurred within all surface waters across the project. As Q4 saw no significant exceedances outside of historical variation, it is considered that the cause of these elevated concentrations 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 and 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, manganese, nickel, and zinc). The high iron levels alongside hydrogen sulphide odours are noted through baseline monitoring prior to tunnelling but could be indicative of the potential for acid mine



drainage, which has been outlined in the SWMP as potentially occurring in this area. Elevated nutrient concentrations that exceeded WQO are likely a result of natural influences from historical sources such as decomposing plant material. Due to access restrictions, groundwater level data was collected when practicable, however is not yet available for Q4 2022. 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 Q4 2022. Therefore, exceedances are not considered to be caused or added to by the ongoing construction works of the Snowy 2.0 project.