

REPORT

QUARTERLY ENVIRONMENTAL WATER REPORT DECEMBER 2023 TO FEBRUARY 2024

S2-FGJV-ENV-REP-0100

MAY 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.

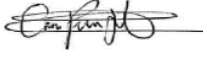


Revision Record

| | | | | | |
|-------------|-------------|-------------------------|--------------------|--------------------|-----------------|
| A | 06/06/2024 | Issued for information | C. Pedraza | E. Porter | M. Franceschi |
| Rev. | Date | Reason for Issue | Responsible | Accountable | Endorsed |



Document Verification

RACIE Record

| | |
|----------------------|--|
| R esponsible: | Name: Carolina Pedraza Job Title: Environmental Approvals Advisor Signed:  Date: 11/06/2024 |
| A ccountable: | Name: Ellen Porter Job Title: Environment Manager Signed:  Date: 14/06/2024 |
| C onsulted: | See distribution list on Page 3. |
| I nformed: | See distribution list on Page 3. |
| E ndorsed: | Name: Massimo Franceschi Job Title: Project Director Signed:  Date: 14/06/2024 |

RACIE Terms

| | |
|----------|---|
| R | Responsible The person who actually produces the document. |
| A | Accountable The person who has the answer for success or failure of the quality and timeliness of the document. |
| C | Consulted Those who must be consulted before the document is published. |
| I | Informed Those who must be informed after the document is published. |
| E | Endorsed Those who must approve the document before publication. |



**Document Distribution
Consulted Distribution List**

| Date | Format ⁽¹⁾ | Addressee / Job Title | Company | Location ⁽²⁾ |
|------|-----------------------|-----------------------|---------|-------------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Informed Distribution List

| Date | Format ⁽¹⁾ | Addressee / Job Title | Company | Location ⁽²⁾ |
|-------------|-----------------------|-----------------------|---------|-------------------------|
| August 2023 | OHC | Central Archive | FGJV | Cooma |
| August 2023 | EC | Chris Buscall | SHL | Cooma |
| | | | | |
| | | | | |
| | | | | |

NOTE: (1) *OHC* – Original Hard Copy / *EC*–Electronic Copy / *HC* – Hard Copy / *Aconex* –Electronic Document Management System

Revision Tracking

| Rev. | Date | Description of Revision |
|------|------------|-------------------------|
| A | 11/06/2024 | Issued for information |
| | | |
| | | |
| | | |
| | | |

CONTENTS

| | |
|---|-----------|
| ABBREVIATIONS AND DEFINITIONS | 5 |
| 1. INTRODUCTION | 6 |
| 2. PURPOSE | 6 |
| 3. OVERVIEW | 7 |
| 3.1. Reporting period | 7 |
| 3.2. Construction progress | 7 |
| 3.3. Regulatory actions | 7 |
| 4. WEATHER CONDITIONS..... | 8 |
| 5. SURFACE WATER MONITORING PROGRAM | 9 |
| 5.1. Routine surface water quality monitoring | 9 |
| 5.2. Event based monitoring..... | 10 |
| 6. GROUNDWATER MONITORING PROGRAM..... | 11 |
| 6.1. Groundwater quality | 11 |
| 6.2. Groundwater levels | 11 |
| 6.3. Groundwater inflows..... | 12 |
| 7. TRENDS..... | 12 |
| 8. CONCLUSION | 15 |
| Appendix A – Trend Analysis summary..... | 16 |

TABLE OF TABLES

| | |
|--|----|
| Table 2-1: Monitoring overview | 6 |
| Table 3-1: Key construction activities for 01 December to 29 February 2024 | 7 |
| Table 4-1: Weather conditions for 01 December 2023 to 29 February 2024..... | 9 |
| Table 5-1: Design rainfall depths (SWMP Section 5.1.1)..... | 10 |
| Table 6-1: Water access licence | 12 |

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 |
| FGJV | Future Generation Joint Venture |
| MAT | Main Access Tunnel |
| MDB | Murray Darling Basin |
| NEM | National Electricity Market |
| SHL | 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 (SHL) 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 2,200 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 (FGJV) 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 licenses |

3. OVERVIEW

3.1. Reporting period

This Environmental Water Report covers the monitoring period from 01 December to 29 February 2024.

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 to 29 February 2024

| Location | Key construction activities |
|-----------------------|--|
| Lobs Hole Ravine Road | <ul style="list-style-type: none"> Irrigation via water carts. Ongoing maintenance. |
| Lobs Hole | <ul style="list-style-type: none"> TBM1 has installed a total of 1,461 permanent rings and completed ECVT01 tunnel. TBM1 modification works completed for IPS construction. Drill and blast activities are ongoing in the underground caverns and cross passages. PAD F: Underground services work completed. |
| Marica | <ul style="list-style-type: none"> USS excavation works are ongoing. (68.82m cumulative achieved). Bench 1-34 excavation and supporting completed. Bench 35 excavation and supporting ongoing. Marica trail road sealing is ongoing. Joining works for HV cables ongoing. |
| Plateau | <ul style="list-style-type: none"> Water Quality Monitoring ongoing. Bore hole 2 reaming completed, casing installation ongoing. Bore hole 3 drilled up to CH + 700 |
| Rock Forest | <ul style="list-style-type: none"> NA – site under operational use as laydown area. |
| Talbingo | <ul style="list-style-type: none"> TRT – TBM 2 installed 144 rings during the period, totalling 739 permanent rings. TRT-D&B Tunnel: installation of temporary invert and fishtanks ongoing. Intake stage 2 drill and blast excavation and ground support works ongoing. (57,154 m³ Cumulative achieved). |
| Tantangara | <ul style="list-style-type: none"> In HRT, TBM3 resumed excavation and installed 67 rings during the period, totalling 160 permanent rings. TBM3 ground improvement measures completed. Surface monitoring works ongoing. STP processing for muck coming from TBM3 ongoing. TBM3 conversion to open mode. Gate shaft excavation ongoing. (30.51 m³ cumulative achieved). |

3.3. Regulatory actions

A Clean-Up Notice was received in December 2023 relating to nutrients, and more specifically nitrogen and nitrate concentrations in ground water and surface water from the Project spoil emplacement areas exceeding the relevant WQOs, primarily at GF01. FGJV is actively addressing the ongoing high levels of nitrogen and nutrients, including:

- conducting spoil coring of emplacement areas including GF01, Main Yard, and Lick Hole Gully to identify hot spots;

- conducting additional water sampling with weekly in situ and comprehensive sampling in accordance with TARP 1;
- installation of additional groundwater bores;
- groundwater extraction with treatment of groundwater and leachate basin water at the construction water treatment plants;
- review of water and spoil by water experts and consultants; and
- investigation of options for improvements to the onsite treatment systems and processes.

The following actions are being carried out to manage, limit, and control the impacts in the area:

- The filter cake disposal and related materials at GF01 ceased on 1 December 2023.
- A Nitrogen Management Plan is under preparation in consultation with the EPA.
- Drill and blast activities are being assessed, and a quality procedure will be generated to improve the methodology.
- FGJV is conducting some trials to decrease spoil's nutrient load before placement.
- The water from the leachate basins is transported to the water treatment plants for treatment.

The surface water from EPL 55, downstream from GF01, is pumped to the leachate basin at GF01 when there is a flow and is transported to the water treatment plants for treatment.

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 FGJV 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 FGJV 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 2023 to 29 February 2024.

| Parameter | Lobs Hole ¹ | | | Marica (Cabramurra - 072161) | | | Tantangara ² | | |
|--------------------|------------------------|------|-------|------------------------------|-------|------|-------------------------|-------|-------|
| | Dec | Jan | Feb | Dec | Jan | Feb | Dec | Jan | Feb |
| Temperature | | | | | | | | | |
| Mean maximum | 33.3 | 33.1 | 32.9 | 23.7 | 23.9 | 24.9 | 21.5 | 16.7 | 32.1 |
| Mean minimum | 6.9 | 7.5 | 7.9 | 7.6 | 13.6 | 15.4 | 11.1 | 5.7 | 4.6 |
| Rainfall | | | | | | | | | |
| Monthly | 71.0 | 44.2 | 145.2 | 18.8 | 51.0 | 21.0 | 167.6 | 122.0 | 39.0 |
| Long Term Average | 70.0 | 65.2 | 56.3 | 80.6 | 114.0 | 65.0 | 74.1 | 63.1 | 129.0 |

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

Less rainfall was experienced in all locations that the same period in 2023, with exception of Lobs Hole in February and Tantangara during December and February. Further the mean maximum temperature was generally high in 2024 than the same period in 2023, but the mean minimum temperatures were lower in 2024 than the same reporting period in 2023.

The rainfall at Lobs Hole in February 2024, and Tantangara for December 2023 and January 2024 exceeded the long-term average. However, Marica throughout the reporting period, Lobs Hole in December 2023 and January 2024, and Tantangara in February 2024 received significantly less rainfall than the long-term average.

The lower-than-average rainfalls, higher maximum temperatures, and lower minimum temperatures are congruent with the "El niño" event declared by the World Meteorological Organization. It is expected to be finished in April 2024. Despite the "El niño" event, some heavy rain events were experienced at each site.

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. In the surface water samples collected for the reporting period exceedances of metals, nitrogen, nutrients, and in May, turbidity were observed. In part this is characteristic of water quality collected following rainfall event, however these exceedances are being investigated, and actions are being taken to manage and mitigate the issue, including water extraction and treatment.

Investigations into the exceedance of some metals such as Iron and Copper have resulted in them being more likely the result of runoff from heavy rainfall and the location of an old Copper mine. Water quality sampling and testing of discharge points around site have been conducted to identify

sources of nutrient buildup in the water. Corrective actions are being developed and implemented in the interim including training in sampling procedures and treatment.

The results obtained during this reported period show an increase in nutrient concentrations, specifically in the proximity of the spoil emplacement areas GF01 and Main Yard with the ongoing implementation of TARP 1 including spoil monitoring points and treatment of water to manage and mitigate the impact of leachate to water. Weekly monitoring of the EPL points across sites was ongoing to readily assess changes in concentration of analytes near the spoil emplacement areas.

Regarding the field, inorganics, hydrocarbons, and metals results show that water quality is relatively consistent across multiple EPL monitoring locations. The exceedances have mostly stayed the same since the onset of the proximal construction of Snowy 2.0.

Water was being discharged to Talbingo and Tantangara reservoirs over the reporting period, where the water quality met the water quality criteria was met, as informed by sampling that was conducted at EPL 41 and EPL 50.

Exceedances of the WQO were identified in the reservoir at EPL sampling locations during the reporting period, however there is no evidence that the source of exceedances originate from the final discharge points at the RO plants, as the discharge is limited, and the volume discharged during the period is not representative of changing the water quality from the reservoir. Samples were taken at other discharge areas around site to determine the location or source of nutrient and metal accumulation.

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 four times, including:

- 1-3 December 2023 (39 mm at Lobs Hole, 31.4 mm at Tantangara) – event continuation from 29 November 2023 notification.
- 6-10 January 2024 (49 mm at Lobs Hole, 76 mm at Marica)
- 13-17 January 2024 (37 mm at Lobs Hole, 48.8 mm at Tantangara)

- 18-22 January 2024 (44.4 mm at Lobs Hole, 60 mm at 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. 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 and EC exceedances downstream. There was also high turbidity and 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](#).

In this reporting period there were further groundwater samples collected at the GF01 spoil emplacement area and Main Yard area in accordance with the Leachate Detection Procedure. Groundwater samples were collected at 16 locations across all Project areas. Elevated nutrient and metal concentrations were observed in groundwater around the spoil emplacement areas. During the period reported, additional wells installed including EPL 56, 57, 58, 95, 92, 82, and 83 were purged as part of the actions FGJV have taken to mitigate the high levels of nutrients on-site; these points are located close to the Spoil Emplacement Areas (GF01 and Main Yard).

The metals exceedances for EPL 1, EPL 4 and EPL 25 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. Wells (EPL1, 4 and 25) 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 throughout reporting period from December 20223 to February 2024, 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. This information is held by SHL.

For this period, the boreholes sampled by FGJV responded to the weather in terms of rain and temperatures, and the water level fluctuated between 5 meters, especially in the points located in GF01. Some boreholes have been added as a response to the TARP action, and this is being followed by close monitoring and sampling.

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:

- December 8.10 ML
- January 7.98 ML
- February 7.75 ML

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

- December 13.88 ML
- January 14.70 ML
- February 20.48 ML

Groundwater inflows in December, January and February were less than those in the previous quarter for Lobs Hole which is likely a result of reduced tunnelling activities occurring, particularly in MAT Portal as the TBM has ceased tunnelling. The Tantangara TBM is increasing its activity, which has increased the inflow compared to the last quarter.

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. A summary of the increasing and decreasing trends are the following.

Surface water

The following decreasing trends were identified:

- Aluminium – EPL 5, 6, 8, 9, 11, 12, 14, 15, 16, 24, 52, 27, 28, 29, 30, 31, 32, 34, 35, 38, 51
- Arsenic – EPL 8, 12, 14, 16, 41, 55
- Chromium III + IV – EPL 8, 14, 16, 41, 52, 55, 50, 51
- Copper – EPL 8, 12, 14, 16, 41, 50, 51, 52
- Iron – EPL 5, 8, 9, 10, 12, 14, 15, 16, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 52,
- Manganese – EPL 5, 6, 8, 9, 12, 14, 15, 16, 24, 30, 31, 32, 33, 34, 35, 36, 37, 41, 50, 52, 55
- Nickel – EPL 8, 16, 36, 37, 41, 50, 51, 52, 55,
- Lead – EPL 8, 14, 16, 41, 50, 51, 52, 55,
- Silver - EPL 8, 14, 16, 41, 50, 51, 52, 55,
- Zinc – EPL 8, 14, 16, 41, 50, 51, 52, 55,
- Ammonia – EPL 8, 12, 14, 24, 37, 41, 52,
- Cyanide – EPL 6, 8, 12, 14, 15, 24, 37, 41, 52,
- Kjeldahl Nitrogen – EPL 8, 14, 52, 53
- Nitrate + Nitrite – EPL 5, 8, 12, 14, 15, 41, 52, 55,
- Nitrogen – EPL 8, 14, 41, 52, 55
- Total Phosphorus – EPL 8, 52, 55,
- Reactive Phosphorus – EPL 5, 6, 8, 9, 10, 11, 12, 14, 15, 16, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40
- Hardness – EPL 52
- Total suspended solids – EPL 10, 11, 12, 14, 15, 16, 31, 35
- Oil and Grease – EPL 5, 6, 8, 9, 11, 12, 14, 15, 16, 24, 26, 27, 30, 31, 33, 34, 35, 36, 37, 38, 40, 41, 55

The following increasing trends were identified:

- Reactive Phosphorus – EPL 41, 52
- Total suspended solids – EPL 52

Groundwater

The following decreasing trends were identified:

- Aluminium – EPL 1, 56, 57, 58, 71
- Arsenic – EPL 56, 57, 58
- Chromium III + IV – EPL 56, 57, 58
- Copper – EPL 56, 57, 58
- Iron – EPL 1, 56, 57, 58, 71.
- Lead – EPL 56, 57, 58,
- Manganese – EPL 1, 56, 57, 58, 71, 81
- Nickel – EPL 4, 25, 56, 57, 58, 72, 80
- Silver – EPL 56, 57, 58,
- Zinc – EPL 56, 57, 58,
- Ammonia – EPL 56, 80
- Kjeldahl Nitrogen – EPL 56, 57, 58,
- Nitrate + Nitrite – EPL 56, 57, 58,
- Nitrogen – EPL 56, 57, 58,
- Total Phosphorus – EPL 56, 57, 58,
- Reactive Phosphorus EPL 2, 25
- Hardness – EPL 72
- Total Suspended solids – EPL 57

The following increasing trends were identified:

- Arsenic – EPL 1
- Chromium III + IV – EPL 1
- Kjeldahl Nitrogen – EPL 1
- Nitrate + Nitrite – EPL 1
- Total Phosphorus – EPL 1, 2, 4, 25
- Total Suspended solids – EPL 1
- Reactive Phosphorus – EPL 41, 52, 56, 57, 58, 72
- Total Suspended solids – EPL 52

The results obtained from the trends show that the level of decrease was higher than that of increase in both surface water and groundwater. Thus, it can be concluded that the actions carried out by the construction team and Enviro have been reflected in the results. However, weekly monitoring and actions continue to be taken to mitigate and control the impacts that may be generated. Notably, the nitrogen concentrations in groundwater and surface water are decreasing.

8. CONCLUSION

EPL monitoring results that exceeded the WQO are generally consistent with natural events such as rainfall and changes in seasonal weather, except nutrients. Background monitoring in the previous quarter has similar readings that display exceedances of particular analytes.

Exceedances of nitrogen are being investigated to identify sources and inform ways to decrease concentrations and remediate the spoil emplacement areas. Nutrient concentrations that activated a Trigger Action Response Plans (TARP1) in the previous reporting period resulted in the continuation of additional monitoring at representative points. The laboratory results are being compiled and analyzed to create a baseline and monitor the behaviour of water with regard to direction and flow rate according to the seasons and periods of rain in each location.

Further actions have been carried out to minimise ongoing contamination of the area and reduce the impacts mentioned above. Likewise, research and testing have continued regarding different options to reduce the concentration of nutrients.

Due to the high levels of nutrients, discharge to the reservoir has been limited. The water is being reused treated and re-used on site when needed.

Across the sites, water quality results display a general increasing trend in turbidity downstream of the construction works likely resulting from overtopping of ERS&D control measures (sediment basins) during rainfall. Some other minor exceedances observed were consistent with the historical ranges and similar to background concentrations in the respective locations. The nitrogen concentrations in groundwater and surface water are generally decreasing across site.



APPENDIX A – TREND ANALYSIS SUMMARY

| Location | Site ID | Aluminum (Filtered) | | | | Arsenic (Filtered) | | | | Chromium III - IV (Filtered) | | | | Copper (Filtered) | | | | Iron (Filtered) | | | | Manganese (dissolved) | | | | Nickel (dissolved) | | | | Lead (dissolved) | | | | Silver (dissolved) | | | | Zinc (dissolved) | | | | | | | | | | | | | |
|------------|---------|---------------------|---------|--------|--------------|--------------------|------|--------|----------|------------------------------|--------------|--------|----------|-------------------|--------------|--------------|----------|-----------------|-------|--------------|--------------|-----------------------|--------|--------|--------------|--------------------|------|--------|----------|------------------|--------------|--------|----------|--------------------|--------------|--------------|----------|------------------|--------------|--------------|--------------|------|------|--------------|--------------|--------------|------|-------|--------------|--------------|--------------|
| | | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | Min | Max | StdDev | MK Trend | | | | | | | | | | | | | | |
| Lobbo Hole | 5 | 43.69 | 0.00 | 408.00 | 82.22 | Decreasing | 0.5 | 0.0 | 1.1 | 0.4 | Insufficient | 1.43 | 0.00 | 35.00 | 5.63 | Insufficient | 0.73 | 0.00 | 3.40 | 0.64 | Insufficient | 68.21 | 0.00 | 693.00 | 115.60 | Decreasing | 6.44 | 0.00 | 95.20 | 15.31 | Decreasing | 1.20 | 0.00 | 23.00 | 3.70 | Insufficient | 0.44 | 0.00 | 1.00 | 0.46 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient |
| | 6 | 22.62 | 0.00 | 170.00 | 36.38 | Decreasing | 0.5 | 0.0 | 1.0 | 0.4 | Insufficient | 0.92 | 0.00 | 10.00 | 2.92 | Insufficient | 0.14 | 0.00 | 2.40 | 0.63 | Insufficient | 40.43 | 0.00 | 232.00 | 43.58 | Insufficient | 1.71 | 0.00 | 24.30 | 7.22 | Decreasing | 1.91 | 0.00 | 13.00 | 0.42 | 0.00 | 1.00 | 0.46 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | | |
| | 8 | 38.28 | 0.00 | 436.00 | 83.38 | Decreasing | 0.53 | 0.0 | 1.10 | 0.42 | Insufficient | 0.86 | 0.00 | 14.00 | 2.26 | Insufficient | 0.84 | 0.00 | 4.00 | 0.44 | Insufficient | 57.68 | 0.00 | 748.00 | 119.80 | Decreasing | 6.17 | 0.00 | 61.30 | 10.01 | Decreasing | 0.82 | 0.00 | 3.00 | 1.44 | Insufficient | 0.44 | 0.00 | 1.00 | 0.46 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient |
| | 9 | 23.36 | 0.00 | 187.00 | 36.31 | Insufficient | 0.58 | 0.0 | 1.00 | 0.41 | Insufficient | 0.67 | 0.00 | 6.00 | 1.8 | Insufficient | 0.88 | 0.00 | 4.00 | 0.60 | Insufficient | 100.00 | 0.00 | 122.00 | 20.24 | Insufficient | 0.82 | 0.00 | 5.00 | 0.94 | Insufficient | 0.41 | 0.00 | 1.00 | 0.47 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | | | | | |
| | 11 | 21.50 | 0.00 | 135.00 | 24.66 | Decreasing | 0.06 | 0.0 | 1.00 | 0.42 | Insufficient | 0.87 | 0.00 | 6.00 | 0.95 | Insufficient | 1.00 | 0.00 | 3.00 | 1.47 | Insufficient | 38.36 | 0.00 | 38.00 | 26.05 | Insufficient | 7.94 | 0.00 | 104.00 | 17.67 | Insufficient | 0.63 | 0.00 | 4.00 | 0.61 | Insufficient | 0.48 | 0.00 | 1.00 | 0.47 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient |
| | 12 | 42.17 | 0.00 | 430.00 | 83.33 | Decreasing | 0.54 | 0.0 | 1.10 | 0.43 | Insufficient | 0.55 | 0.00 | 2.00 | 0.45 | Insufficient | 0.91 | 0.00 | 7.40 | 1.63 | Insufficient | 64.46 | 0.00 | 670.00 | 113.90 | Decreasing | 6.27 | 0.00 | 34.70 | 10.07 | Insufficient | 0.62 | 0.00 | 4.00 | 0.63 | Insufficient | 0.43 | 0.00 | 1.00 | 0.47 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient |
| | 14 | 39.45 | 0.00 | 390.00 | 83.33 | Decreasing | 0.46 | 0.0 | 1.10 | 0.43 | Insufficient | 0.48 | 0.00 | 4.00 | 0.64 | Insufficient | 0.65 | 0.00 | 3.70 | 0.70 | Insufficient | 10.00 | 0.00 | 18.00 | 18.00 | Decreasing | 5.37 | 0.00 | 61.10 | 12.15 | Insufficient | 0.57 | 0.00 | 3.00 | 0.61 | Insufficient | 0.48 | 0.00 | 1.00 | 0.46 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient |
| | 15 | 26.16 | 0.00 | 357.00 | 53.55 | Decreasing | 0.47 | 0.0 | 1.00 | 0.43 | Insufficient | 0.46 | 0.00 | 2.00 | 0.51 | Insufficient | 0.80 | 0.00 | 5.00 | 1.00 | Insufficient | 63.19 | 0.00 | 170.00 | 66.00 | Decreasing | 5.30 | 0.00 | 65.70 | 11.23 | Insufficient | 0.65 | 0.00 | 2.00 | 0.45 | Insufficient | 0.46 | 0.00 | 1.00 | 0.46 | Insufficient | 1.73 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient |
| | 17 | 5.00 | 5.00 | 5.00 | 0.00 | Insufficient | 0.25 | 0.0 | 0.40 | 0.07 | Insufficient | 0.20 | 0.00 | 0.20 | 0.00 | Insufficient | 0.59 | 0.00 | 0.70 | 0.14 | Insufficient | 22.00 | 2.00 | 2.00 | 0.00 | Insufficient | 1.35 | 0.50 | 2.20 | 1.20 | Insufficient | 0.50 | 0.50 | 0.50 | 0.42 | Insufficient | 0.30 | 0.10 | 0.10 | 0.00 | Insufficient | 0.01 | 0.01 | 0.01 | 0.00 | Insufficient | 1.00 | 1.00 | 1.00 | 0.00 | Insufficient |
| | 24 | 104.10 | 0.00 | 416.00 | 83.33 | Decreasing | 0.44 | 0.0 | 1.00 | 0.44 | Insufficient | 0.53 | 0.00 | 4.00 | 0.14 | Insufficient | 0.00 | 0.00 | 0.00 | 0.00 | Insufficient | 65.53 | 0.00 | 650.00 | 102.00 | Decreasing | 6.14 | 0.00 | 160.00 | 325.80 | Decreasing | 0.91 | 0.00 | 3.90 | 0.88 | Insufficient | 0.41 | 0.00 | 1.00 | 0.45 | Insufficient | 1.65 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient |
| 41 | 230.60 | 0.00 | 3900.00 | 720.60 | Insufficient | 0.73 | 0.0 | 1.10 | 0.58 | Insufficient | 26.86 | 0.00 | 400.00 | 80.33 | Insufficient | 4.43 | 0.00 | 76.00 | 11.41 | Insufficient | 51.36 | 0.00 | 830.00 | 143.20 | Decreasing | 3.93 | 0.00 | 43.00 | 8.93 | Insufficient | 0.77 | 0.00 | 5.30 | 1.22 | Insufficient | 0.66 | 0.00 | 2.00 | 0.47 | Insufficient | 1.65 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | |
| 52 | 11.06 | 0.00 | 67.00 | 15.51 | Decreasing | 0.43 | 0.0 | 1.30 | 0.44 | Insufficient | 3.84 | 0.00 | 29.00 | 0.53 | Insufficient | 0.76 | 0.00 | 9.00 | 1.00 | Insufficient | 5.00 | 0.00 | 50.00 | 13.95 | Decreasing | 1.86 | 0.00 | 6.00 | 2.14 | Insufficient | 0.32 | 0.00 | 1.00 | 0.33 | Insufficient | 0.45 | 0.00 | 1.00 | 0.47 | Insufficient | 1.65 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | |
| 53 | 39.00 | 20.00 | 58.00 | 26.67 | Insufficient | 0.60 | 0.2 | 1.00 | 0.57 | Insufficient | 0.65 | 0.30 | 1.00 | 0.50 | Insufficient | 3.45 | 0.20 | 5.00 | 1.31 | Insufficient | 52.50 | 50.00 | 55.00 | 3.54 | Insufficient | 0.95 | 0.70 | 1.00 | 0.21 | Insufficient | 0.75 | 0.50 | 1.00 | 0.33 | Insufficient | 0.66 | 0.40 | 1.00 | 0.50 | Insufficient | 1.55 | 1.10 | 1.00 | 0.55 | Insufficient | 2.41 | 2.00 | 2.00 | 0.00 | Insufficient | |
| 54 | 21.00 | 10.00 | 32.00 | 14.11 | Insufficient | 0.60 | 0.20 | 1.00 | 0.45 | Insufficient | 0.65 | 0.30 | 1.00 | 0.50 | Insufficient | 0.75 | 0.50 | 1.00 | 0.35 | Insufficient | 26.00 | 12.00 | 50.00 | 26.97 | Insufficient | 0.75 | 0.50 | 1.00 | 0.35 | Insufficient | 0.75 | 0.50 | 1.00 | 0.35 | Insufficient | 0.55 | 0.30 | 1.00 | 0.55 | Insufficient | 1.50 | 1.10 | 1.00 | 0.55 | Insufficient | | | | | | |
| 55 | 24.12 | 0.00 | 500.00 | 86.46 | Decreasing | 0.25 | 0.00 | 1.00 | 0.31 | Decreasing | 0.78 | 0.00 | 4.00 | 1.01 | Decreasing | 0.62 | 0.00 | 3.00 | 0.77 | Insufficient | 35.00 | 0.00 | 483.00 | 34.43 | Decreasing | 4.43 | 0.00 | 68.00 | 15.47 | Decreasing | 0.42 | 0.00 | 2.00 | 0.42 | Decreasing | 0.51 | 0.00 | 12.00 | 2.05 | Decreasing | 0.25 | 0.00 | 5.00 | 0.83 | Decreasing | 1.53 | 0.00 | 3.00 | 2.11 | Decreasing | |
| 56 | 10.50 | 0.00 | 44.00 | 11.64 | Insufficient | 0.51 | 0.00 | 1.00 | 0.44 | Insufficient | 0.53 | 0.00 | 2.00 | 0.43 | Insufficient | 0.62 | 0.00 | 1.00 | 0.33 | Insufficient | 33.52 | 0.00 | 39.00 | 22.61 | Insufficient | 4.01 | 0.00 | 18.00 | 3.57 | Insufficient | 0.62 | 0.00 | 1.00 | 0.33 | Insufficient | 0.48 | 0.00 | 1.00 | 0.47 | Insufficient | 1.65 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | |
| 27 | 3.60 | 0.00 | 32.00 | 3.90 | Decreasing | 0.52 | 0.0 | 1.00 | 0.44 | Insufficient | 0.57 | 0.00 | 3.00 | 0.58 | Insufficient | 0.64 | 0.00 | 1.00 | 0.37 | Insufficient | 34.25 | 0.00 | 34.00 | 21.60 | Insufficient | 3.58 | 0.00 | 12.00 | 2.52 | Insufficient | 0.64 | 0.00 | 1.00 | 0.47 | Insufficient | 1.65 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | | | | | | |
| 28 | 38.33 | 0.00 | 171.00 | 41.68 | Insufficient | 0.58 | 0.0 | 1.00 | 0.42 | Insufficient | 0.62 | 0.00 | 2.00 | 0.52 | Insufficient | 0.75 | 0.00 | 2.00 | 0.43 | Insufficient | 132.20 | 0.00 | 380.00 | 106.80 | Decreasing | 11.01 | 0.00 | 66.00 | 14.59 | Insufficient | 0.70 | 0.00 | 1.00 | 0.33 | Insufficient | 0.53 | 0.00 | 1.00 | 0.46 | Insufficient | 1.25 | 0.00 | 3.00 | 2.50 | Insufficient | 3.59 | 0.00 | 16.00 | 3.69 | Insufficient | |
| 29 | 37.34 | 0.00 | 312.00 | 39.29 | Insufficient | 0.56 | 0.0 | 1.00 | 0.42 | Insufficient | 0.66 | 0.00 | 2.00 | 0.43 | Insufficient | 0.65 | 0.00 | 1.00 | 0.30 | Insufficient | 137.00 | 0.00 | 404.00 | 112.00 | Decreasing | 11.60 | 0.00 | 110.00 | 21.92 | Insufficient | 0.71 | 0.00 | 1.00 | 0.41 | Insufficient | 0.48 | 0.00 | 1.00 | 0.47 | Insufficient | 1.65 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | |
| 30 | 30.36 | 0.00 | 154.00 | 37.30 | Decreasing | 0.48 | 0.0 | 1.00 | 0.44 | Insufficient | 0.50 | 0.00 | 2.00 | 0.43 | Insufficient | 0.66 | 0.00 | 3.40 | 0.56 | Insufficient | 50.17 | 0.00 | 127.00 | 35.45 | Decreasing | 3.51 | 0.00 | 11.00 | 2.64 | Insufficient | 0.60 | 0.00 | 1.00 | 0.33 | Insufficient | 0.45 | 0.00 | 1.00 | 0.46 | Insufficient | 1.25 | 0.00 | 3.00 | 2.50 | Insufficient | 3.59 | 0.00 | 16.00 | 3.69 | Insufficient | |
| 31 | 34.65 | 0.00 | 150.00 | 34.45 | Insufficient | 0.48 | 0.0 | 1.00 | 0.44 | Insufficient | 0.55 | 0.00 | 2.00 | 0.44 | Insufficient | 0.68 | 0.00 | 2.10 | 0.50 | Insufficient | 48.41 | 0.00 | 189.00 | 37.32 | Decreasing | 3.60 | 0.00 | 16.80 | 3.27 | Insufficient | 0.61 | 0.00 | 2.10 | 0.39 | Insufficient | 0.46 | 0.00 | 1.00 | 0.46 | Insufficient | 1.26 | 0.00 | 3.00 | 2.51 | Insufficient | 3.60 | 0.00 | 16.00 | 3.69 | Insufficient | |
| 32 | 35.38 | 0.00 | 31.00 | 31.07 | Decreasing | 0.57 | 0.0 | 1.00 | 0.42 | Insufficient | 0.58 | 0.00 | 2.00 | 0.43 | Insufficient | 0.71 | 0.00 | 2.00 | 0.45 | Insufficient | 142.50 | 0.00 | 392.00 | 114.60 | Decreasing | 11.65 | 0.00 | 127.00 | 22.23 | Decreasing | 0.72 | 0.00 | 2.40 | 0.45 | Insufficient | 0.51 | 0.00 | 1.00 | 0.47 | Insufficient | 1.65 | 0.00 | 5.00 | 2.40 | Insufficient | 2.41 | 0.00 | 8.00 | 2.32 | Insufficient | |
| 33 | 35.25 | 0.00 | 290.00 | 49.03 | Insufficient | 0.53 | 0.0 | 1.00 | 0.43 | Insufficient | 0.58 | 0.00 | 2.00 | 0.43 | Insufficient | 0.80 | 0.00 | 4.00 | 0.73 | Insufficient | 174.30 | 0.00 | 366.00 | 136.30 | Decreasing | 23.02 | 0.00 | 280.00 | 46.83 | Decreasing | 0.66 | 0.00 | 2.00 | 0.46 | Insufficient | 0.46 | 0.00 | 1.00 | 0.47 | Insufficient | 1.34 | 0.00 | 5.00 | 2.42 | Insufficient | 3.40 | 0.00 | 14.00 | 3.56 | Insufficient | |
| 34 | 26.62 | 0.00 | 102.00 | 25.92 | Decreasing | 0.50 | 0.0 | 1.00 | 0.44 | Insufficient | 0.43 | 0.00 | 1.00 | 0.44 | Insufficient | 0.65 | 0.00 | 2.00 | 0.45 | Insufficient | 128.80 | 0.00 | 420.00 | 125.20 | Decreasing | 5.62 | 0.00 | 37.00 | 4.84 | Decreasing | 0.61 | 0.00 | | | | | | | | | | | | | | | | | | | |