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REPORT

SPOIL REPORT AUGUST 2024 – JANUARY 2025

S2-FGJV-ENV-REP-0117

REV B

MARCH 2025

ABSTRACT

This report provides an overview of the spoil management during the nominated reporting period in accordance with Schedule 3 Condition 7 (f).

Revision Record

A	Feb 2025	For Review	Kane Koning/Nisha Gautam	E. Porter	M. Franceschi
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E ndorsed:	Name: Dave Drummond Job Title: QHSE Director Signed: Signed by: Dave DRUMMOND 20030A67088E43C... Date: 28 March 2025

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A	Feb 2025	Issued for information
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CONTENTS

LIST OF TABLES

1. INTRODUCTION

1.1. Background

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 commenced in October 2020).

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 were engaged to deliver Stage 2 of Exploratory Works and Snowy 2.0 Main Works.

1.2. Purpose and Scope

This Biannual Spoil Monitoring Report (the Report) has been prepared to satisfy the reporting requirements for:

- Schedule 3, Condition 7 of the Infrastructure Approval; and
- Section 9.5 of the Spoil Management Plan (S2-FGJV-ENV-PLN-0019).

Table 1-1 details the relevant conditions of the Infrastructure Approval as well as the sections of the Report where the conditions have been addressed.

The scope of this report covers the period from 1 August 2024 and 31 January 2025.

Table 1-1 Summary of Approval Requirements Covered in this Report

Condition	Report Section
Spoil Management Plan – Section 9.5 – Table 9-4	
Report on:	
a) Volume of spoil excavated from tunnelling	Section 2.1
b) Volume placed at each emplacement area: i. Ravine Bay; ii. GFO1; iii. Lobs Hole; iv. Tantangara; or v. Rock Forest.	Section 2.1
c) Volume disposed of off-site (if any).	Section 2.2
d) Volume reused elsewhere in KNP (if any).	Section 2.3
e) Volume of AMD material treated (if any).	Section 2.4
f) Volume of NOA excavated and placed in encapsulation (if any).	Section 2.5
Infrastructure Approval - Schedule 3 - Condition 7 (f)	
Include a program to monitor and publicly report on:	
a) the management of spoil on site;	Section 3
b) the implementation of each of the detailed plans, including the effectiveness of the proposed mitigation and contingency measures; and	Section 3
c) progress against the detailed completion criteria and performance indicators of each permanent spoil emplacement area.	Section 4.2

Note: KNP – Kosciuszko National Park
AMD – Acid and metalliferous drainage
NOA – Naturally occurring asbestos

2. SPOIL VOLUME

2.1. Volume of Emplaced Spoil

Spoil quantities are calculated by the volume of material transferred from the excavation area to the respective emplacement area, based on the number of truck movements accounting for truck size. A total of 754,416 m^3 of ex-situ spoil materials was generated during this period.

Table 2-1 Summary of Spoil Volumes (m^3) between 1 August 2024 and 31 January 2025

Emplacement Area	MAT Portal and ECVT	Talbingo TBM	Talbingo Intake	Marica Upstream Surge Shaft	Tantangara TBM	Tantangara Intake and Shaft
Ravine Bay	213,613	216,066	36,702	-	-	-
GF01	44,490	3,349	1,060	-	-	-
Main yard	2,636	800	-	-	-	-
Tantangara TSE	-	-	-	-	126,066	53,090
Tantangara PSE	-	-	-	-	170	-
Rock Forest PSE	-	-	-	-	-	-
Marica TSE	-	-	-	20,052	-	-
Total	**260,739**	**220,215**	**37,762**	**20,052**	**126,236**	**53,090**

2.2. Offsite Disposal

A summary of the offsite disposal of soil and rock materials is presented in Table 2-2.

Table 2-2 Summary of Offsite Disposal

Project Area	Waste Classification Certificate Number	Volume m^3	Classification	Description
Waste Classification Assessment for ECVT Wedge Pit Material, Lobs hole (CS042)	754-SYDGE230005D-L91	14	General Solid Waste – non-putrescible.	Sludge
Waste Classification Assessment for Non-Destructive Digging Waste, Lobs hole (CS044)	754-SYDGE230005D-L95	9	General Solid Waste – non-putrescible.	NDD Material
Waste Classification Assessment for Waste Material from Triple Interceptor Pit, Main Yard (CS047)	754-SYDGE230005D-L94	21	General Solid Waste – non-putrescible.	Sediment
Waste Classification Assessment for Non-Destructive Digging Waste, Lobs Hole (CS045)	754-SYDGE230005D-L96	13	General Solid Waste – non-putrescible.	NDD Material
Waste Classification Assessment for Sediment Material at ECVT Lined Basin (CS048)	754-SYDGE230005D-L97	350	General Solid Waste – non-putrescible.	Sediment
Waste Classification Assessment for HDD Drilling Mud, Turkey's Nest (MWUTN)	754-SYDGE230005D-L62	24	General Solid Waste – non-putrescible.	HDD Mud
Waste Classification Assessment for Tank 3 & 4 - Michels Spoil (MWUTN)	754-SYDGE230005D-L65	13	General Solid Waste – non-putrescible.	HDD Mud
Waste Classification Assessment for Filter Cake Waste (CS011), Tantangara	754-SYDGE230005D-L52	3,155	General Solid Waste – non-putrescible.	Filter Cake
Waste Classification Assessment for Waste Material from Diesel Spill, Tantangara, (CS0024)	754-SYDGE230005D-L89	75	General Solid Waste – non-putrescible.	Excavated material with diesel spill
Waste Classification Assessment for Waste Material in Evoro Soil Bins EV49, Q3 Laydown, Tantangara (CS0025)	754-SYDGE230005D-L90	32	General Solid Waste – non-putrescible.	Silt clay and Disel spill
Waste Classification Assessment for Waste Material in Evoro Soil Bins EV50, Q3 Laydown, Tantangara (CS0026)	754-SYDGE230005D-L92	20	General Solid Waste – non-putrescible.	Soil
Waste Classification Assessment for Waste Material in Evoro Soil Bin EV27, Q3 Laydown, Tantangara (CS0027)	754-SYDGE230005D-L93	20	General Solid Waste – non-putrescible	Excavated material with diesel spill
Waste Classification Assessment for Waste Material from Triple Interceptor Pit, Main Yard (CS034)	754-SYDGE230005D-L76 - WCR CS034	45	General Solid Waste – Non-putrescible	Sludge
Waste Classification Assessment for Tunnel Boring Machine (TBM) Waste, Talbingo Spoil Yard (CS035)	754-SYDGE230005D-L75 - WCR CS035	230	General Solid Waste – Non-putrescible	Gravel to clay material

Project Area	Waste Classification Certificate Number	Volume m^3	Classification	Description
Waste Classification Assessment for Stockpiled Waste Material, Lobs Hole (CS036)	754-SYDGE230005D-L81	50	General Solid Waste – Non-putrescible	Dried Sludge
Waste Classification Assessment for ECVT Sludge / Waste Material (CS038)	754-SYDGE230005D-L80	75	General Solid Waste – Non-putrescible	Sludge
Waste Classification Assessment for Main Office Stockpile Material, Lobs Hole (CS039)	754-SYDGE230005D-L83	143	General Solid Waste – non putrescible	Sediment material
Waste Classification Assessment for NDD Mud, Lick Hole Gully (CS041)	754-SYDGE230005D-L88_Rev1.	40	General Solid Waste – non-putrescible	NDD waste
Waste Classification Assessment for Waste Material in Evoro Soil Bins EV28, Q3 Laydown, Tantangara (CS021)	754-SYDGE230005D-L78	50	General Solid Waste – non-putrescible	Excavated material with spilled oil and diesel
Waste Classification Assessment for Waste Material in Evoro Soil Bins EV13, Q3 Laydown, Tantangara (CS022)	754-SYDGE230005D-L84	50	General Solid Waste – non-putrescible	Excavated material with spilled oil and diesel
Waste Classification Assessment for Waste Material in Evoro Soil Bins EV27, Q3 Laydown, Tantangara (CS023)	754-SYDGE230005D-L85_opt	30	General Solid Waste – non-putrescible	Excavated material with spilled oil and diesel
Waste Classification Assessment for Waste Material in Contaminated Soil Bins #100738, Zone 10, Marica (CS0008)	754-SYDGE230005D-L86	30	General Solid Waste – non-putrescible	Excavated Material
Waste Classification Assessment for Waste Material in Contaminated Soil Bin, Zone 10, Marica (CS0009)	754-SYDGE230005D-L87	15	General Solid Waste – non-putrescible	Clay/Silt excavated Material
Waste Classification Assessment for Sewage Treatment Plant Waste, Tantangara (CS0028)	754-SYDGE230005D-L98	30	General Solid Waste – putrescible	Filter Cake
Waste Classification Assessment for Filter Cake Waste from Construction Water Treatment Plant (CS026)	754-SYDGE230005D-L53v2	311	General Solid Waste – non-putrescible	Filter Cake
Waste Classification Assessment for Filter Cake Waste, Tantangara (CS011)	754-SYDGE230005D-L52	597	General Solid Waste – putrescible	Filter Cake
Total		**5442**		

Filter cake and Sludge is currently being transported offsite in accordance with the NSW EPA Clean-Up Notice (SR-1638).

Disposal sites which have been used during this period are presented in Table 2-3.

Table 2-3 Summary of Disposal Locations

Tipping Location	Address	EPA Licence Number
Bellettes	10 Killarney Road, Gilmore, NSW, 2720	20596
Cleanaway Kemps Creek	1725 Elizabeth Drive, Kemps Creek, NSW 2178	4068
HiQ -Minda Landfill -Windellama	Oallen Ford Road, Windellama, NSW 2580	10398

2.3. Volumes Reused

Approximately volumes of spoil material reused within the Project are outlined below:

- 10,780 m^3 of spoil was reused at Lobs Hole for constructing and / or maintenance between Pad G, Camp Pad, UGL Pad, Electrical Pad, Voith Pad and Talbingo Adit.
- 3000 m^3 of spoil was reused at Marica for constructing and / or maintenance of M4 / Pad 4.
- Approximately, 29,800 m^3 of spoil was reused at Tantangara for road works and fill for Permanent Emplacement Area (PSE).
- Small quantities of Virgin Excavated Natural Material (VENM) were used for the road maintenance as required.

2.4. PAF Treatment and Validation

In accordance with the Spoil Management Plan, material identified as PAF requires treatment and validation prior to incorporating spoil into the emplacement area. Treatment methods are dependent on the testing results and availability of suitable site won material with acid neutralising capacity.

During the reporting period a small quantity of reactive material was identified as per Table 2-4. This reactive material was subsequently treated and validated as having achieved an NPR>3 prior to incorporation into the emplacement areas. Furthermore, records of PAF treatment are provided in Table 2-4.

2.5. NOA Encapsulation

No NOA was encountered during this reporting period.

Table 2-4 PAF treatment and validation details between 1 August 2024 and 31 Jan 2025

Type	PAF - Source Location	PAF - Specific Source	PAF Spoil ~ Volume (m3)	NAF with ANC - Spoil Location	NAF Specific Source	NAF with ANC ~ Volume (m3)	~ Blending Ratio (PAF: NAF with ANC)	NPR Following Neutralisation
TBM	HRT01-01	CH 392.5 - 398.5	600	HRT01-01	CH 393.7 to 398.2	300	2:1	16.7
D&B	MHC	CH12 - CH19.5	800	NAF from MHC	Various Chainages with sufficient ANC	1,600	1:2	37.4
D&B	TAN-GATE	Lot 9, 42-43 and 45-46 m	1,600	TAN-GATE	Lot 9, 41-48 m (excluding PAF)	3,000	1:2	680.6
TBM	HRT01-02	R701-710	2,000	HRT01-02	R 695-710, R 711-715	2,000	1:1	3.2
TBM	HRT01-02	R 751-755	1,000	HRT01-02	R 736 - 800	1,400	1:1	TBC*
D&B	CT02-BIS	CH 5 - 13	550	N/A	N/A	2,200	1:4	35.1
D&B	CT02-BIS	CH 13-21	550	Machine Hall and Manifold 1	Various chainages with Sufficient ANC	1,100	1:2	30.0
TBM	HRT01-02	R 971 - 975	1,000	HRT01-02	R 976 - 1000	4,875	1:5	14.4
TBM	HRT01-02	R 1071 - 1080	2,000	HRT01-02	R 1081 - 1100	4,000	1:2	4.3
Total	-	-	**10,100**	-	-	**18,775**	-	-

Notes to Table
* Samples pending access.

3. SPOIL MANAGEMENT

3.1. Introduction

Spoil is currently managed under the spoil management plan with mitigation and control measures provided in Appendix A.

3.2. Additional Nitrate Controls

Additional controls have been implemented on the project to mitigate potential nitrate contamination. These include:

- The Nitrogen Management Plan (S2-FGJV-PLN-0367) has been issued to provide information and guidance on relevant works:
    - Controls listed in the Nitrogen Management Plan are being applied on the Project and further works are being developed in line with Nitrogen controls.
    - Development of Nitrogen-specific training module is underway with an external provider.
- Groundwater extraction has been undertaken from several wells during the reporting period, as reported on a fortnightly basis to the NSW EPA.
- Comprehensive Nitrogen datasets have been compiled for works across the Project and are used to direct ongoing sampling for Nitrogen concentrations in spoil and water.
- Sampling of spoil material for Nitrogen continues at D&B work fronts following blasting and at Emplacement Areas following emplacement.
- The construction of the Tantangara PSE has commenced with spoil currently being placed in a lined area with leachate collection system.
- Additional controls have been implemented in Marica following the commencement of D&B works including:
    - Installation of a lined temporary spoil emplacement area in line with design, to hold spoil prior while on stored temporarily on site.
    - The addition of an ion exchange unit at the Marica water treatment plant to further remove nitrates and nitrates from construction water.
    - Relining of leachate collection ponds downstream of the spoil emplacement area.
    - Additional testing requirements for D&B spoil which is tested for nitrates post blasting, and
    - Works are currently being supervised by the spoil manager and / or spoil advisors.

4. CONCLUSIONS

4.1. Spoil Summary

During the reporting period, spoil characterisation was carried out in accordance with the Spoil Management Plan.

- A total of 754,000 m^3 of ex-situ spoil materials was generated during this period:
  - 10,100 m^3 of PAF was identified during this reporting period.
  - No NOA was encountered during this reporting period.
  - Sludge and Filter Cake materials are currently being disposed of offsite.
- The following spoil emplacement areas were active during this reporting period
  - Ravine Bay PSE
  - GF01 PSE
  - Main Yard TSE
  - Marica TSE
  - Tantangara TSE
  - Tantangara PSE
- Additional measures have been implemented to further mitigate the potential risk of nitrate contamination resulting from blasting activities.

4.2. Assessment Against Completion Criteria

During this reporting period no spoil emplacement areas were finalised and as such completion criteria listed in Section 7 of the Spoil Management Plan (S2-FGJV-ENV-PLN-0019) have yet to be assessed.

Appendix A. SPOIL MANAGEMENT MEASURES

A.1. Spoil Mitigation Measures

Measure / Requirement	Implementation
Training will be provided to all project personnel, including relevant sub-contractors on spoil management practices and the requirements from this plan through inductions, toolboxes and targeted training.	Training has been and continues to be provided to all relevant project personnel involved in spoil works. Nitrogen-specific interactive training module currently being developed to cover broad aspects of nitrogen-impacted spoil management and provide context on related issues.
Management measures from this plan will be included in relevant site environmental documents including for example, Work Packs and/or Site Environmental Plans (SEPs).	Management measures from the spoil management plan are currently being implemented and have been correlated to site work packs such as the Inspection and Test Plan (ITP) for spoil. The current revision of the spoil reuse procedure is being finalised and will cover all aspects of spoil characterisation for emplacement, on-site reuse, off-site reuse and off-site disposal of spoil materials. A technical work instruction has been developed and will be implemented to cover desilting and silt management of material from sediment basins. This document will allow assessment of silt for suitability of reuse, reuse or disposal.
The spoil characterisation program in Appendix A will be implemented. The program will enable adequate assessment of contaminated materials, NOA, acid metalliferous drainage (AMD)/neutral metalliferous drainage (NMD)/saline drainage (SD) material and reduce the risk of material being misclassified as 'benign' and being managed inappropriately.	Spoil characterisation is ongoing across the project. In accordance with Appendix A of the SMP, adequate assessment of materials is facilitated through high sampling frequency, QA/QC testing and validation testing. Nutrients continue to be screened for in D&B and emplacement validation works, where they are deemed to be a CoPC.
Targeted investigations will be undertaken prior to construction along the surface disturbance areas using a risk-based approach. The results of these targeted investigations will determine the level of management to be implemented.	Investigations were carried out prior to placement of material at Main Yard to determine the most suitable design and placement methodology. Samples are currently being taken from in-situ spoil materials prior to excavation based on sampling densities prescribed in the Spoil Management Plan.
Material which has been assessed as not suitable for reuse on land or for subaqueous disposal or cannot be reused will be classified in accordance with the Waste Classification Guidelines (NSW EPA 2014).	Where material has not been suitable for reuse, such as filter cake, sludge and anthropogenically contaminated material, it has been classified in accordance with the Waste Classification Guidelines and disposed offsite at an appropriately licenced facility. Consideration is now given to classifying materials as Excavated Natural Material prior to classifying for off-site reuse or off-site disposal, where appropriate.
Prior to the importation of any VENM during construction, the VENM source(s) will be identified and assessed against the definition of VENM in the Waste Classification Guidelines (NSW EPA, 2014) and the POEO Act. The VENM source(s) will be assessed by an appropriately qualified contaminated land consultant.	During the reporting period, no VENM was imported to the project.

Measure / Requirement	Implementation
Spoil generation will be minimised through design optimisation and beneficial reuse as set out in Section 6.2 of the Spoil Management Plan.	The design has been optimised to minimise spoil generation and maximise beneficial reuse.
Spoil is to be only re-used, placed, or disposed of in accordance with its classification as set out in Section 6.1 of the Spoil Management Plan.	Excavated spoil material has been reused where possible, most spoil excavated has been retained within the project area.
Apart from the spoil that is provided to the NPWS for use in other parts of the Kosciuszko National Park, sent off-site, used to construct temporary or permanent infrastructure for the development or used to rehabilitate the site, the Proponent must ensure that all the spoil generated by the development is disposed of in the following emplacement areas: • Ravine Bay; • GFO1; • Lobs Hole; • Tantangara; or • Rock Forest.	All spoil not reused or disposed off-site within the reporting period has been placed within the spoil emplacement areas listed here.
TBM spoil must not be placed in the active storages or below the full supply level of either the Talbingo Reservoir or Tantangara Reservoir without the approval of the Planning Secretary.	During the reporting period, TBM spoil was not placed in the active storages or below the fully supply level of Talbingo or Tantangara Reservoir.
Spoil from dredging, channel excavation or underwater blasting must not be placed in the eastern and western emplacement areas, or in the active storages or below the full supply level of either the Talbingo Reservoir or Tantangara Reservoir without the approval of the Planning Secretary.	During the reporting period, no spoil was generated from dredging, channel excavation, or underwater blasting.
The beneficial reuse of non-reactive spoil on the project will be maximised where possible.	Spoil reuse has been maximised through utilisation at portal pads and roads where possible. It should be noted that the amount of spoil generated on the project greatly exceeds the amount of spoil which is required for project works. The current revision of the spoil reuse procedure is being finalised and will cover all aspects of spoil characterisation for emplacement, on-site reuse, off-site reuse and off-site disposal of spoil materials. A technical work instruction has been developed and will be implemented to cover desilting and silt management of material from sediment basins. This document will allow assessment of silt for suitability of reuse, reuse or disposal.
The beneficial reuse of non-reactive spoil elsewhere in the KNP will be maximised where possible (as requested and approved by NPWS).	During this reporting period, no spoil has been reused elsewhere in the KNP.

Measure / Requirement	Implementation
Off-site disposal of spoil will be minimised where possible. Surplus spoil will be directed to the permanent spoil emplacement areas as a priority over off-site disposal.	Where the material does not pose an adverse risk to human health or the environment it is reused within the project. It should be noted that filter cake and sludge materials are currently being taken offsite as per EPA directive.
Spoil left at Lobs Hole, Marica and Tantangara for incorporation into the final landform should be minimised.	Where possible spoil is placed within the permanent spoil emplacement areas rather than stockpiled within the temporary spoil emplacement areas for final rehabilitation. In Lobs Hole, Ravine Bay is now operational with this emplacement area receiving most of the spoil excavated from Talbingo, MAT Portal as well as ECVT. In Tantangara, Tantangara PSE is now operational and has begun receiving material from active work fronts. In Marica, works have commenced to build Rock Forest PSE.
The Exploratory Works western emplacement area must only receive non-reactive spoil, which has a low geochemical risk and is suitable for reuse. Reactive spoil must not be directed to the Exploratory Works western emplacement area.	The Exploratory Works western emplacement area has only received material that has a low geochemical risk.
The Contaminated Land Management Plan (S2-FGJV-ENV-PLN-0049) will be implemented to ensure appropriate management of contaminated material on site.	Spoil has been managed in accordance with the Contaminated Land Management Plan. Some spoil including filter cake and sludge material was disposed offsite during the reporting period as per EPA directive. Overall, the amount of material transported offsite was a small percentage of total spoil.
An unexpected finds procedure is included in the Contaminated Land Management Plan (S2-FGJV-ENV-PLN-0049). Workers will be trained to identify potential contamination that may be encountered during construction.	Training has been provided to all relevant project personnel involved in spoil works. Nitrogen Management training will be executed once finalised.
The Naturally Occurring Asbestos Management Plan (Appendix D of this Plan) will be implemented to ensure appropriate management of Naturally Occurring Asbestos encountered during works.	Naturally Occurring Asbestos has been identified along the headrace tunnel at 7.5 km. During the reporting period, excavation did not occur along the 7.5 km alignment.
The Acid and Metalliferous Drainage Management Plan (Appendix E of the Spoil Management Plan) will be implemented to ensure appropriate management of AMD material encountered during works.	During the reporting period, the AMD Management Plan was implemented, including testing for AMD material.
The Waste Management Plan (S2-FGJV-ENV-PLN-0048) will be implemented to ensure appropriate classification, use and disposal of waste from the project.	All spoil which is not suitable for onsite reuse is categorised for offsite reuse or offsite disposal in accordance with the NSW EPA waste classification guidance.

Measure / Requirement	Implementation
Material which is not suitable for reuse or placement or on onsite remediation, will be transported to a facility that is lawfully permitted to receive that material.	All spoil which is not suitable for onsite reuse is categorised for offsite reuse or offsite disposal in accordance with the NSW EPA waste classification guidance All filter cake and sludge material is currently being disposed offsite under EPA directive.
The Stockpile Procedure (Appendix C of the Spoil Management Plan) will be developed to ensure temporary stockpiling is appropriately managed and that any adverse impacts are controlled and rectified.	Stockpiling of material has been carried out in accordance with the Stockpiling Procedure including, but not limited to, the location of stockpiling, erosion and sediment controls, stockpile heights, and management.
The Surface Water Management Plan (S2-FGJV-ENV-PLN-0011) will be implemented to ensure impacts on surface waters, because of spoil handling and placement, are minimised.	Impacts on surface water have been minimised in accordance with the measures outlined in the Surface Water Management Plan (S2-FGJV-ENV-PLN-0011) including the diversion or clean water and the management of storm water and leachate water.
Site-based Erosion and Sediment Control Plans (ESCPs) will be prepared by a suitably qualified erosion and sediment control specialist.	All ESCPs have been prepared by SEEC, a qualified erosion and sediment control specialist.
An Asbestos Management Plan (S2-FGJV-HAS-PLN-0010) has been developed and will be implemented to manage Asbestos Containing Materials ACM (ACM), or areas are suspected of containing ACM (such as historical buildings). The AMP addresses unexpected finds of ACM. Specifically, protocols will be stipulated for separation, monitoring, validation and clearance of asbestos	The Asbestos Management Plan has been followed. During the reporting period, no asbestos was identified within the site. During this period no excavations were undertaken within an area of known asbestos.
An Occupational Hygienist (Hygienist) will be on-site for the duration of the excavation works where ACM has been identified from pre-construction or where unexpected finds of ACM are encountered.	During the reporting period, no ACM was identified on site.
The process Water Treatment Plants will receive all tunnel drainage, including tunnel drainage containing AMD components for excavations in Possible, Likely and Confirmed AMD hazard areas. The water will be reused in the tunnelling process following treatment. Any discharge to the environment will only occur where the water is treated, so as to comply with the criteria in EPL 21266.	During the reporting period, process water treatment plants were commissioned at Tantangara. During the previous reporting period, the Talbingo process water treatment plants were commissioned. All treated process water was either reused in accordance with the Water Reuse Procedure e.g. for tunnelling and dust suppression or discharged at the nominated EPL discharge point in Talbingo or Tantangara Reservoir.
The Topsoil Strategy (Appendix B of the Spoil Management Plan S2-FGJV-ENV-PLN-0019) will be implemented to ensure the surface of the emplacement areas will be suitable to sustain the target PCTs in the long term.	Measures have been implemented in accordance with the topsoil strategy, including, but not limited to: Stockpiled, signposted and separated from other materials Height will not exceed 2.5m to minimise the risk of compaction and to maintain the viability of the soil Stockpiles monitored and managed for weeds

Measure / Requirement	Implementation
A hold point process will be established and implemented requiring approval by the FGJV Environment Manager or Construction Manager prior to the placement of material generated from dredging, channel excavation or underwater blasting. This hold point process will note that this material cannot be placed in the Exploratory Works eastern and western emplacement areas without the approval of the Planning Secretary.	During the reporting period, spoil was not generated as a result of dredging, channel excavation or underwater blasting.
The western emplacement area will be used to store cuttings and other material that has a low geochemical risk. This landform will be built in a manner that limits compaction and will be top-soiled and vegetated to stabilise the landform. To note, the Exploratory Works western emplacement area will be filled during Main Works for the purposes of constructing the Main Yard. Nevertheless, only non-reactive spoil will be placed at this location.	The western emplacement area has only received material that has a low geochemical risk.
Any remnant mine workings located within the eastern and western rock and soil emplacement areas will be rehabilitated (if necessary).	During the reporting period, no works were required on the remanent mine workings.
The eastern emplacement area will be used to store any material generated during Exploratory Works that has higher geochemical risk. Excavated material will be geochemically characterised prior to placement. If any potentially acid forming material is encountered, it will be placed in a select area of the emplacement. The potential for acid rock drainage will be treated by placing and compacting layers of limestone (or other suitable ANC material) between each rock and sediment layer as required. The volume of limestone (or other suitable ANC material) in each layer will be determined stoichiometrically so that the maximum potential acidity from the overlying layer of rock and sediment is treated. This approach will neutralise AMD within the stockpile. Once design levels are reached, the landform will be top-soiled and vegetated. To note, the Exploratory Works eastern emplacement area will be filled during Main Works for the purposes of constructing the Main Yard. PAF material will be managed as set out in Appendix E of the Spoil Management Plan (S2-FGJV-ENV-PLN-0019).	During the reporting period, spoil characterisation was carried out in accordance with Appendix A of the Spoil Management Plan. PAF material was encountered within the Powerhouse Complex (various work fronts), Tantangara Gate Shaft and the Tantangara HRT tunnel, which was treated using spoil with adequate ANC.
Runoff from Lick Hole Gully during Exploratory Works will be diverted around or through the eastern emplacement area. The diversion works will comprise a dam upstream of the diversion inlet and either a gravity or pump assisted diversion system. The diversion works will have a 1% AEP capacity. The dam upstream of the diversion inlet will be designed as a detention basin and will not permanently hold water. To note, the Exploratory Works eastern emplacement area will be filled during Main Works for the purposes of constructing the Main Yard and the final Lobs Hole emplacement area. Final design of the Lobs Hole emplacement area will be addressed in accordance with the staging specified in Section 1.6 and the Rehabilitation Management Plan. Operational controls that require ongoing management following completion of construction would be of no impost the NPWS.	The Lick Hole Gully clean water diversion drain has been designed with a 1% AEP capacity.

Measure / Requirement	Implementation
A high-flow diversion drain will be established to convey runoff from Lick Hole Gully around the emplacement area in a controlled manner, avoiding uncontrolled overflows through the emplacement area. This diversion drain will only be engaged if a flood greater than a 1%AEP event occurs. To note, the Exploratory Works eastern emplacement area will be filled during Main Works for the purposes of constructing the Main Yard and the final Lobs Hole emplacement area. Final design of the Lobs Hole emplacement area will be addressed in accordance with the staging specified in Section 1.6 and the Rehabilitation Management Plan. Operational controls that require ongoing management following completion of construction would be of no impost the NPWS.	A clean water diversion drain was constructed to convey Lick Hole Gully around the emplacement area. Lobs Hole Main Yard emplacement area has been approved under a staged approach and final design of Lobs Hole Main Yard emplacement will be prepared at a later date but prior to land forming and rehabilitation.
Seepage from the eastern emplacement area will be collected in a water management dam. Collected water will either be irrigated to the emplacement (to promote evaporation) or treated in the process water treatment plant. Discharge of seepage water to the Yarrangobilly River will be avoided. To note, the Exploratory Works eastern emplacement area will be filled during Main Works for the purposes of constructing the Main Yard and the final Lobs Hole emplacement area. Final design of the Lobs Hole emplacement area will be addressed in accordance with the staging specified in Section 1.6 and the Rehabilitation Management Plan.	A water management basin was constructed at the base of the eastern emplacement area. Water from the basin is being taken to the water treatment plant in accordance with the Spoil Management Plan (S2-FGJV-ENV-PLN-0019). Final design of Lobs Hole Main Yard emplacement will be prepared prior to final land forming and rehabilitation.
The western emplacement will be designed to prevent the risk of emplacement material being entrained in flood waters during a 1 in 5000-year flood event. To note, the Exploratory Works eastern emplacement area will be filled during Main Works for the purposes of constructing the Main Yard and the final Lobs Hole emplacement area. Final design of the Lobs Hole emplacement area will be addressed in accordance with the staging specified in Section 1.6 and the Rehabilitation Management Plan.	Lobs Hole Main Yard emplacement area has been approved under a staged approach and final design of Lobs Hole Main Yard emplacement will be prepared at a later date but prior to land forming and rehabilitation.
The monitoring in Section 9 of this Plan will be implemented to identify and track the performance of: • the management of spoil on site; • the implementation of each of the detailed plans, including the effectiveness of the proposed mitigation and contingency measures; and • progress against the detailed completion criteria and performance indicators of each permanent spoil emplacement area.	This report addresses this management measure.
Monitoring measures to be included as part of the Surface and Groundwater Monitoring Program, to monitor potential impacts from the placement of spoil.	Monitoring and mitigation measures relating to spoil management are included in the Surface Water Management Plan (S2-FGJV-ENV-PLN-0011) and Groundwater Management Plan (S2-FGJV-ENV-PLN-0012).

Measure / Requirement	Implementation
The permanent spoil emplacement areas will be designed to comply with the design objectives in Table 2 (of the COA entitled Design Objectives for Permanent Spoil Emplacement Areas).	The Lobs Hole Main Yard design is currently for the temporary phase of works. Design of the Lobs Hole permanent emplacement area (final design) will be developed at a later stage so as to comply with Design Objectives in schedule 3 condition 6 of the Infrastructure Approval. GF01 and Ravine Bay spoil emplacement is being constructed in accordance with the design and will be land formed once placement is complete to meet the approved criteria. The permanent spoil emplacement design for Tantangara is currently being finalised during this reporting. However, Stage 1 has already been finalised and construction works are underway, with Stage 1 already receiving spoil excavated from Tantangara work fronts is emplaced at the permanent emplacement or temporarily stockpiled at S1 Laydown dependent on available space.
New landforms will: be safe, stable and non-polluting; maximise surface drainage to the natural environment.	Ravine Bay spoil emplacement area continues to be constructed during this period, it was constructed generally in accordance with the NSW EPA solid waste landfill guidelines. GF01 spoil emplacement is being constructed in accordance with the design however some elevated nutrient concentrations have been observed in water in the locality of the emplacement area. Water is being removed and treated at the site water treatment facilities while remediation an appropriate remediation option is being determined. Water quality downstream is being closely monitored with limited impacts observed to date. Surface drainage has been installed that directs any surface water run-off away from the slope area and into a controlled drainage system. Surfaces of placed material have been sloped to provide drainage towards basins /collection points. Tantangara Permanent Spoil Emplacement design is currently being finalised during this reporting period.

Measure / Requirement	Implementation
Detailed plans for each of the permanent spoil emplacement areas that have been prepared using both analogue and erosional-based methods will be developed for approval prior to commencement of construction of the applicable placement area. The plans will: describe how the development of each emplacement area would be co-ordinated with the rehabilitation of the site in accordance with the approved Rehabilitation Management Plan. describe the measures that would be implemented to comply with the spoil management requirements in condition 4 and the design objectives in Table 2 of the COA. include a topsoil strategy outlining measures the measures that would be implemented to ensure the surface pf the emplacement areas will be suitable to sustain the target PCTs in the long term, having regard to the approved strategy in the Rehabilitation Management Plan. identify the key risks for the successful completion of each emplacement area and the contingency measures that would be implemented to address these risks; and include detailed completion criteria and performance indicators for each emplacement area, including criteria for triggering remedial action (if necessary)	The Lobs Hole Main Yard design is currently for the temporary phase of works. Design of the Lobs Hole permanent emplacement area (final design) will be developed at a later stage to comply with Design Objectives in schedule 3 condition 6 of the Infrastructure Approval. GF01 spoil emplacement is being constructed in accordance with the design which meets the Design Objectives in schedule 3 condition 6 of the Infrastructure Approval. Once the Rehabilitation Management Plan is approved, the final landform, including PCT and topsoil quantities will be reviewed for implementation.
The Rehabilitation Management Plan (S2-FGJV-ENV-PLN-0023) will be implemented (once approved) for the new landforms at Tantangara Reservoir, Lobs Hole and Talbingo Reservoir.	The Main Works Rehabilitation Management Plan is undergoing the approval process. The plan will be implemented once approved.
Mitigations will be included in the Rehabilitation Management Plan to minimise impacts to Alpine humus soils and peat bogs/fens.	The Main Works Rehabilitation Management Plan is undergoing the approval process. The plan will be implemented once approved.
The Rehabilitation Management Plan (refer to REHAB01) will be implemented and will include measures to minimise: • loss of soil; • loss of organic matter and nutrient decline; • soil structural decline; and • compaction.	The Main Works Rehabilitation Management Plan is undergoing the approval process. The plan will be implemented once approved.
Regular rehabilitation monitoring will be undertaken to identify any defects, such as slumping, erosion or poor vegetation establishment. Identified defects will be rectified.	The Main Works Rehabilitation Management Plan is undergoing the approval process. The plan will be implemented once approved.

A.2. Contingency Measures – Lobs Hole (Main Yard)

Risk	Contingency	Implementation
The timing of construction stages prevents adequate spoil volume or spoil quality being available for development of the final landform	The Main Yard will be progressively decommissioned as areas within the facility are no longer required to support construction. In the unlikely event that material is no longer available direct from tunnelling or other nearby surface works, spoil can be sourced from GF01 or Ravine Bay emplacement areas (or both) if required.	Excess material from Mainyard has been moved to Ravine Bay and GF01. Spoil can be sourced from Ravine Bay if required.
The timing of construction stages results in excess spoil needing to be retained at the Lobs Hole emplacement areas, contrary to the requirement of schedule 3, condition 6 of the Infrastructure Approval	The Main Yard will be progressively decommissioned as areas within the facility are no longer required to support construction. Material can be drawn down progressively and diverted to GF01 or Ravine Bay (or both). Ravine Bay emplacement area 1.4 million m^3 capacity. Excess material can be directed to Ravine Bay if required.	Spoil placement at Ravine Bay PSE is ongoing. Ravine Bay PSE retains spare capacity in the unlikely circumstance there is excess spoil.
Contamination caused by development or operation of Main Yard construction pads	Respond to incidents and execute remediation where required. Retain records to demonstrate either: no residual risk from contamination; or residual risk from contamination is not unacceptable.	Only minor spills have occurred within the Main Yard construction pads. All spills cleaned up removing any potential source of contamination. Impacted spoil is disposed of appropriately offsite after classification.
Temporary foreign or unsuitable objects prevent effective filling and / or compaction	Upon completion of use of area for purposes of supporting construction remove all foreign / unsuitable objects that are not proposed to form part of the Lobs Hole emplacement area final design. Undertake inspection of each area within the Main Yard facility that is being decommissioned. Retain records.	Spoil placement at Main Yard PSE was undertaken within this reporting period. All foreign materials are removed where possible prior to placement. Given the spoil placed within this area is natural soil and rock materials there have not been any significant issues with foreign materials.

Risk	Contingency	Implementation
Soil and water impact during removal of controls supporting Main Yard as a construction compound and development of the site for emplacement	Develop and maintain specific erosion and sediment control plans based on risk for each transition (e.g.: removal of hardstand, removal of basins, regrading). Implement and maintain the controls as specified by the erosion and sediment control plans.	Specific ERSED plans have been prepared for spoil placement. Spoil placement occurred within main yard during this reporting period. Prior to commencing decommissioning of the construction pads, the ERSED plans will be updated to address specific risks for each transition stage. An update will be provided regarding updated ERSED plans and decommissioning works at a later stage.
The Main Yard temporary works design and execution are unable to be modified upon completion and result in risk for landform's future intended use.	Include check of Main Yard temporary works against criteria and objectives in the design for final emplacement area, the Rehabilitation Management Plan, and the Recreation Management Plan. Ensure work with potential to undermine the proposed outcomes from the final works are avoided.	Once the Rehabilitation and the Recreation Management Plans have been approved, they will be reviewed against the Main Yard temporary works to mitigate the potential for the undermining of proposed outcomes from the final works.

A.3. Contingency Measures – Lobs Hole (GF01)

Risk	Contingency	Implementation
The works deviate from the design criteria specified.	The design criteria form the Basis of Design (BoD) and these will be used to ensure the achievement of the objectives. Measurement tools are in place to ensure the construction does not deviate from these design criteria. This will be managed through the FGJV technical team design review process. Where concept design changes or deviation from the design criteria is expected, agencies will be consulted.	Placement of spoil in GF01 is ongoing but is monitored and surveyed to ensure construction is implemented in accordance with the approved design. No deviations from the design were recorded in the reporting period.
The timing of construction stages results in insufficient or excessive spoil volume being available for development of the final landform.	GF01 is to be utilised for on-land material placement before there is access to the other emplacement areas. Should less material be placed into GF01 than expected, the landform can be constructed to a lower level or with flatter slopes.	Placement of spoil in GF01 was ongoing through the reporting period.
Material placed into GF01 contains contamination (other than PAF and NOA material).	Respond to incidents as per the Unexpected Finds Protocol and Section 6.6 of the Spoil Management Plan.	Excess nitrogen compounds were identified within groundwater adjacent to GF01. The source of the nitrates was found to be residual nitrates from drill and blast activities. A Nitrogen Management Plan has been prepared which details various controls which are being implemented to control potential nitrate pollution.
Temporary foreign or unsuitable objects prevent effective filling and / or compaction	Ensure only spoil is placed in the area. Undertake inspections of spoil being laid and compacted. Retain records. These are considered “business as usual” controls.	Spoil relating to TBM, and D&B is placed in GF01. Regular inspections are undertaken of the emplacement area and material not suitable for placement will be disposed of, offsite at a suitable facility. During this reporting period material that was taken off site included filter cake and sludge as per EPA directives.

Risk	Contingency	Implementation
Soil and water impact(s) during construction	Develop and maintain specific erosion and sediment control plans throughout construction based on risk for each of the spoil layers. Implement and maintain the controls as specified by the erosion and sediment control plans.	Specific ERSED plans have been prepared and implemented for the spoil emplacement area.
GF01 design is modified, and this results in changes to the landform's future intended use, or approved form.	Check any changes to the GF01 design against criteria and objectives in the design for the final emplacement area, the Rehabilitation Management Plan and the Recreation Management Plan. Any changes required need to align with the currently proposed outcomes.	No deviations from the design were recorded in the reporting period.
Rehabilitation is inadequate and does not achieve the required outcomes	Ensure that the Rehabilitation Management Plan is followed, including requirements for topsoil placement and surface finishing prior to rehabilitation, ensuring a successful handover.	The Main Works Rehabilitation Management Plan is currently not approved. The plan includes management measures to minimise loss of soil, organic matter, nutrient decline, soil structural decline and compaction. The plan will be implemented once approved.
Volumes of topsoil are inadequate	Topsoil volume requirements will be calculated and if there is not enough topsoil within the site that can be reused, topsoil and other required materials may be ordered from an external source to meet the demand.	Topsoil was removed from GF01 prior to spoil emplacement and has been appropriately stockpiled in a location recorded in a register. This topsoil will be used during rehabilitation. If there is an insufficient quantity of topsoil in accordance with the Main Works Rehabilitation Management Plan, further topsoil will be sourced.
Material placed has a higher risk of erosion than expected.	Although an outer topsoil layer will be placed over the excavated tunnel material, there is the risk that the TBM material will be highly erodible due to the possible percentage of silt sized particles. It may be necessary to place a layer of coarser D&B material over the final surface before topsoiling. The surface will then be ripped to increase infiltration and form a coarser final surface.	Placement of spoil in GF01 was ongoing through the reporting period.

Risk	Contingency	Implementation
PAF presence	To be treated as per characterisation program (Appendix A of the SMP) and the Lobs Hole Material Characterisation Procedure outlined in Attachment A of this plan. Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed and workshopped with the NSW EPA to ensure effective site management and will be monitored under the Project EPL.	During the reporting period, spoil characterisation was carried out in accordance with Appendix A of the Spoil Management Plan and PAF materials were treated as per PAF neutralisation procedure.
Rock drainage lines not constructed correctly or rock too small and experiences erosion.	Ensure robust rock sizing for drainage lines, use of suitable rock with the correct grading, and proper construction controls. Implement and maintain the controls as specified by the erosion and sediment control plans.	Drainage lines installed for construction purposes have been constructed from suitable sized rock to minimise erosion. This is monitored regularly.
Soil and water impact(s) during removal of controls	The basin can remain in place until rehabilitation is completed, and an acceptable water quality achieved.	The basin has been constructed and will remain in place until rehabilitation is complete.
Long term stability not demonstrated	Undertake LEM to confirm long term stability and address any areas of higher erosion risk.	LEM was not undertaken during in the reporting period.

A.4. Contingency Measures – Ravine Bay

Risk	Contingency	Implementation
The works deviate from the design criteria specified.	The design criteria form the Basis of Design (BoD) and these will be used to ensure the achievement of the objectives. Measurement tools are in place to ensure the construction does not deviate from these design criteria. This will be managed through the FGJV technical team design review process. Where concept design changes or deviation from the design criteria is expected, agencies will be consulted.	The Ravine Bay spoil emplacement area has been designed with additional controls to mitigate potential nitrate contamination from blasting. The Ravine Bay spoil emplacement areas has been designed generally in accordance with the NSW EPA solid waste landfill guidelines. The spoil emplacement area has been developed in consultation with the NSW EPA with an independent third party providing a quality control assessment.
The timing of construction stages results in insufficient or excessive spoil volume being available for development of the final landform.	Ravine Bay is to be utilised for on-land material placement before there is access to the other emplacement areas. Should less material be placed into Ravine Bay than expected, the landform can be constructed to a lower level or with flatter slopes.	Placement of spoil in Ravine Bay commenced during this reporting period. The design of the emplacement area has been designed with a capacity of 1.4 million cubic meters. Additional compaction of spoil materials may be considered should additional spoil be required to be placed within Ravine Bay.
Material placed into Ravine Bay contains contamination (other than PAF and NOA material).	Respond to incidents as per the Unexpected Finds Protocol and Section 6.6 of the Spoil Management Plan.	During the reporting period higher than expected concentrations of Nitrogen were observed during routine water monitoring for Ravine Bay and the steps in Section 6.6 of the Spoil Management Plan were implemented. The nitrogen management plan is currently in consultation with the NSW EPA. This plan outlines control measures which should be implemented to prevent potential nitrate contamination.
Temporary foreign or unsuitable objects prevent effective filling and / or compaction	Ensure only spoil is placed in the area. Undertake inspections of spoil being laid and compacted. Retain records. These are considered “business as usual” controls.	All foreign materials are removed where possible prior to placement. Given the spoil placed within this area is natural soil and rock materials there have not been any significant issues with foreign materials. Filter cake and sludge is currently being transported offsite as per NSW EPA directives.

Risk	Contingency	Implementation
Soil and water impact(s) during construction	Develop and maintain specific erosion and sediment control plans throughout construction based on risk for each of the spoil layers. Implement and maintain the controls as specified by the erosion and sediment control plans.	Specific ERSED plans have been prepared and implemented for the spoil emplacement area.
Ravine Bay design is modified, and this results in changes to the landform's future intended use, or approved form.	Check any changes to the Ravine Bay design against criteria and objectives in the design for the final emplacement area, the Rehabilitation Management Plan and the Recreation Management Plan. Any changes required need to align with the currently proposed outcomes.	Following the identification of nitrate exceedances in groundwater additional control measures were introduced. One of these control measures was the redesign of the Ravine Bay spoil emplacement area to include a GCL. The redesign has not resulted in a significant change to the proposed final landform.
Rehabilitation is inadequate and does not achieve the required outcomes	Ensure that the Rehabilitation Management Plan is followed, including requirements for topsoil placement and surface finishing prior to rehabilitation, ensuring a successful handover.	The Main Works Rehabilitation Management Plan is undergoing the approval process. The plan includes management measures to minimise loss of soil, organic matter, nutrient decline, soil structural decline and compaction. The plan will be implemented once approved.
Volumes of topsoil are inadequate	Topsoil volume requirements will be calculated and if there is not enough topsoil within the site that can be reused, topsoil and other required materials may be ordered from an external source to meet the demand.	Topsoil was removed from Ravine Bay prior to spoil emplacement and has been appropriately stockpiled in a location recorded in a register. This topsoil will be used during rehabilitation. If there is an insufficient quantity of topsoil in accordance with the Main Works Rehabilitation Management Plan, further topsoil will be sourced.
Material placed has a higher risk of erosion than expected.	Although an outer topsoil layer will be placed over the excavated tunnel material, there is the risk that the TBM material will be highly erodible due to the possible percentage of silt sized particles. It may be necessary to place a layer of coarser D&B material over the final surface before topsoiling. The surface will then be ripped to increase infiltration and form a coarser final surface.	Placement of spoil in Ravine Bay has recently commenced and is a mixture of TBM and D&B spoil. A significant amount of spoil which will need to be placed over several months before the composition and erodibility of the final layer will need to be assessed.

Risk	Contingency	Implementation
PAF presence	To be treated as per characterisation program (Appendix A of the SMP). Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed and workshopped with the NSW EPA to ensure effective site management and will be monitored under the Project EPL.	During the reporting period, spoil characterisation was carried out in accordance with Appendix A of the Spoil Management Plan and PAF materials were treated as per PAF neutralisation procedure.
Rock drainage lines not constructed correctly or rock too small and experiences erosion.	Ensure robust rock sizing for drainage lines, use of suitable rock with the correct grading, and proper construction controls. Implement and maintain the controls as specified by the erosion and sediment control plans.	Drainage lines installed for construction purposes have been constructed from suitable sized rock to minimise erosion. The design of Ravine Bay including drainage lines has been undertaken in consultation with the NSW EPA as well as technical experts.
Soil and water impact(s) during removal of controls	The basin can remain in place until rehabilitation is completed, and an acceptable water quality achieved.	The basin has been constructed and will remain in place until rehabilitation is complete.
Long term stability not demonstrated	Undertake LEM to confirm long term stability and address any areas of higher erosion risk.	The Ravine Bay emplacement area was designed with a highly compacted low hydraulic conductivity base. Spoil placed within the emplacement area is currently subject to a proof roll test to ensure sufficient compaction.

A.5. Contingency Measures - Tantangara

Risk	Contingency	Implementation
Clearing and grubbing outside approved area.	Disturbance boundaries are set out on site with no-go areas demarcated.	The Disturbance boundaries to be installed prior to carrying out clearing and grubbing works.
The works deviate from the design criteria specified.	The design criteria form the Basis of Design (BoD) and these will be used to ensure the achievement of the objectives. Measurement tools are in place to ensure the construction does not deviate from these design criteria. This will be managed through the FGJV technical team design review process. Where concept design changes or deviation from the design criteria is expected, agencies will be consulted.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete.
The timing of construction stages results in insufficient or excessive spoil volume being available for development of the final landform.	Sequencing is not relevant to Tantangara, and there is flexibility around landform volumes which can be increased or decreased significantly by changing the slopes and adjusting the footprint.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete,.
Material placed into Tantangara contains contamination (other than the PAF and NOA material).	Respond to incidents as per the Unexpected Finds Protocol and Section 6.6 of the Spoil Management Plan.	Spoil from Tantangara Adit and Tantangara Intake is currently being placed at S1 temporary laydown. The unexpected finds protocol is being followed for temporary stockpiling at S1 and will continue to be followed for permanent spoil placement. No unexpected finds have been made to date.
Temporary foreign or unsuitable objects prevent effective filling and / or compaction	Ensure only spoil is placed in the area. Undertake inspections of spoil being laid and compacted. Retain records. These are considered “business as usual” controls.	Spoil form Tantangara Adit and Tantangara Intake is currently being placed at S1 temporary laydown, during reporting period. Placement of spoil to Tantangara has now commenced (170 m^3 during reporting period) and will continue to do so. If foreign materials are found within spoil materials, they are typically classified for offsite disposal or offsite reuse.

Risk	Contingency	Implementation
Soil and water impact(s) during construction	Develop and maintain specific erosion and sediment control plans throughout construction based on risk for each of the spoil layers. Implement and maintain the controls as specified by the erosion and sediment control plans.	Spoil form Tantangara Adit and Tantangara Intake is currently being placed at S1 temporary laydown. Specific erosion and sediment control plans has been prepared prior to placement of spoil.
Tantangara design is modified, and this results in changes to the landform's future intended use, or approved form.	Check any changes to the Tantangara design against criteria and objectives in the design for the final emplacement area, the Rehabilitation Management Plan, and the Recreation Management Plan. Any changes required need to align with the currently proposed outcomes.	Stage 2 of the Tantangara PSE design is currently being finalised. This section will be updated once the design is complete.
Rehabilitation is inadequate and does not achieve the required outcomes	Ensure that the Rehabilitation Management Plan is followed, including requirements for topsoil placement and surface finishing prior to rehabilitation, ensuring a successful handover.	This section will be updated once the design is complete, placement of spoil and rehabilitation works commence.
Volumes of topsoil are inadequate	Topsoil volumes requirements will be calculated and if there is not enough topsoil within the site that can be reused, topsoil and other required materials may be ordered from an external source to meet the demand.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete, placement of spoil has commenced, and the quantity of topsoil required has been determined.
Material placed has a higher risk of erosion than expected.	Although an outer topsoil layer will be placed over the excavated tunnel material, there is the risk that the TBM material will be highly erodible due to the possible percentage of silt sized particles. It may be necessary to place a layer of coarser D&B material over the final surface before topsoiling. The surface will then be ripped to increase infiltration and form a coarser final surface.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete, placement of spoil has commenced and potential risks of erosion beyond the design are identified.

Risk	Contingency	Implementation
PAF presence to be managed	To be treated and placed in accordance with Appendices A and E of the SMP and the Tantangara Material Characterisation Procedure outlined in Attachment A of this plan. Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed and workshopped with the NSW EPA to ensure effective site management and will be monitored under the Project EPL.	Material excavated from Tantangara Intake and Tantangara Adit has been tested in accordance with spoil characterisation procedure. Thus far there have not been significant amounts of PAF identified within the Tantangara area. Where PAF is encountered it is treated in accordance with the Spoil Management Plan.
NOA presence to be managed	To be treated and placed in accordance with Appendices A and D of the SMP and the Tantangara Material Characterisation Procedure outlined in Attachment A of this plan.	Excavations were not undertaken through areas of NOA during this reporting period.
Rock drainage lines not constructed correctly or rock too small and experiences erosion.	Ensure robust rock sizing for drainage lines, use of suitable rock with the correct grading, and proper construction controls. Implement and maintain the controls as specified by the erosion and sediment control plans.	The final design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated further once the design is complete, and potential risks of erosion beyond the design are identified.
Soil and water impact(s) during removal of controls	The basins can remain in place until rehabilitation is completed, and an acceptable water quality achieved.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be further updated once the design is complete, and rehabilitation works commence.
Long term stability not demonstrated	Undertake LEM to confirm long term stability and address any areas of higher erosion risk.	Place of spoil at Tantangara has commenced. LEM will be undertaken for the stability and prevent erosion risk.
Final dozing occurs towards water	Final dozing will be undertaken either when water levels are suitably low to limit the risk of entering water, or a bench will be left between the water level and the area to be dozed to ensure the equipment cannot enter the water.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete.

Risk	Contingency	Implementation
Post construction recreational use changes or is not achieved	The landform has been sloped to meet targets that are similar to natural slopes in the general area and should allow easy access. Rock has also been limited to ensure that passage on to the surface is easily achieved, although subject to confirmation by the wave action modelling.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete.
The varying water level causes scour through wave action	Modelling of the wave action and erosion risk will be included in the detailed design. The use of appropriate vegetation in this zone and / or some rock if required will be considered as part of the design. Appropriate sediment controls will be implemented during periods of low reservoir levels to limit placement of D&B material directly into water and reduce sediment loading during placement. D&B benches below FSL will be dozed down as placed to ensure a low gradient is achieved.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete.
Water rising (flooding) the area	Basins and surface water will be monitored regularly during routine site inspections, particularly prior to any shutdowns.	Leachate basins are being monitored regularly and leachate water is taken to the water treatment plant for treatment.
Public risks associated with the reservoir	Ensure appropriate exclusion zones and notifications to the community have been undertaken appropriately.	Placement of spoil is currently all on land above FSL so no further exclusions zones are required.
Climate change changing the occurrence of extreme events	Design, including rock armouring, accounts for the 1% Annual Exceedance Probability (AEP) risk, or a 1 in 100-year Average Recurrence Interval (ARI) storm event. Gradients have been flattened to 1V:7H and 1V:8H below Full Supply Level (FSL) and rock drainage included to manage erosion risks.	The design for Stage 2 of Tantangara PSE is currently being finalised. This section will be updated once the design is complete.

Risk	Contingency	Implementation
Leachate from the spoil emplacement	A spoil characterisation program has been prepared involving XRF, NAG suite analysis, pH and EC screening and validation testing by a NATA accredited laboratory (Appendix A of the SMP) to ensure material is neutralised prior to placement. A leachate basin will be constructed on site and tested for potential contamination prior to reuse on the stockpile. Attachment A – Tantangara Material characterisation program outlines the steps to ensure material neutralisation and actions in the circumstance contamination is detected. Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed and workshopped with the NSW EPA to ensure effective site management and will be monitored under the Project EPL.	Material excavated from Tantangara Intake and Tantangara Adit has been tested in accordance with spoil characterisation procedure. All material is currently being temporarily stockpiled at S1 laydown. The design for Tantangara PSE is currently being finalised. However, for temporary laydown area, leachate detection monitoring is undertaken in accordance with the Tantangara Leachate Detection Plan (S2-FGJV-ENV-PRO-0057). Additionally, conditional infrastructure auditing is undertaken once a week.
Neutral mine drainage	Kinetic testing has been carried out to understand the reactivity of the excavated rock. The outcomes will be used to better understand the reactivity of sulphides in excavated rocks, the release rates of contaminants, and the water quality evolution in response to long-term oxidation and weathering that may affect the design of the final landforms and the quality of surface and groundwater. Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed and workshopped with the NSW EPA to ensure effective site management and will be monitored under the Project EPL.	The summary of the Kinetic testing on AMD classification for various geological units across the site showed low potential of saline drainage. Placement of spoil at Tantangara PSE has commenced with adequate water quality control and erosion control measures, along with the emplacement validation sampling for AMD testing to ensure effective management of the excavated materials.

A.6. Contingency Measures – Marica and Rock Forest

Risk	Contingency	Implementation
The works deviate from the design criteria specified.	The design criteria form the Basis of Design (BoD) and these will be used to ensure the achievement of the objectives. Measurement tools are in place to ensure the construction does not deviate from these design criteria. This will be managed through the FGJV technical team design review process. Where concept design changes or deviation from the design criteria is expected, SHL will be consulted.	Spoil from Upstream Surge Shaft is currently being placed at the temporary laydown. For the reporting period most spoil placed in the Marica area has been from mechanical excavation. The design of the temporary emplacement area may be amended on the commencement of blasting.
Material placed into Marica contains contamination (other than PAF and NOA material).	Respond to incidents as per the Unexpected Finds Protocol and Section 6.6 of the Spoil Management Plan.	No unexpected finds have been made to date.
Temporary foreign or unsuitable objects prevent effective filling and / or compaction	Ensure only spoil is placed in the area. Undertake inspections of spoil being laid and compacted.	Only natural soil and rock material from Upstream Surge Shaft is placed at temporary spoil pad. Foreign materials are stored in containers and transported offsite.
Soil and water impact(s) during construction	Develop and maintain specific erosion and sediment control plans throughout construction based on risk for each of the spoil layers. Implement and maintain the controls as specified by the erosion and sediment control plans.	Specific erosion and sediment control plans are in place to and are monitored. No soil and water impacts were observed during the reporting period.
Marica design is modified, and this results in changes to the landform's future intended use, or approved form.	Check any changes to the Marica design against criteria and objectives in the design for the final emplacement area, the Rehabilitation Management Plan and the Recreation Management Plan. Any changes required need to align with the currently proposed outcomes.	The Rehabilitation Management Plan for Marica are not yet approved. Once approved, the design will be reviewed against the required criteria and changes made where required.
Rehabilitation is inadequate and does not achieve the required outcomes	Ensure that the Rehabilitation Management Plan is followed, including requirements for topsoil placement and surface finishing prior to rehabilitation, ensuring a successful handover.	The Main Works Rehabilitation Management Plan is pending approval. This section will be updated in subsequent reports requirements for topsoil and surface finish have been determined.

Risk	Contingency	Implementation
Volumes of topsoil are inadequate	Topsoil volume requirements will be calculated and if there is not enough topsoil within the site that can be reused, topsoil and other required materials may be ordered from an external source to meet the demand.	The Main Works Rehabilitation Management Plan is pending approval. This section will be updated in subsequent reports once the quantity of topsoil required has been determined.
PAF presence	To be treated as per characterisation program (Appendix A of the SMP) and the Material Characterisation Procedure outlined in Attachment A of this plan. Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed to ensure effective site management and will be monitored.	Material excavated from USS has been tested in accordance with spoil characterisation procedure. PAF presence was confirmed on the test reports, but no PAF material was excavated during this reporting period.
Laboratory Turn Around Time (TAT) does not meet rate of excavation and placement	Material will be stockpiled at the temporary spoil area until laboratory results are received	During the reporting period spoil was characterised from material from down hole probing and stored in an appropriate location until results confirmed whether treatment was required.
Rock drainage lines not constructed correctly or rock too small and experiences erosion.	Ensure robust rock sizing for drainage lines, use of suitable rock with the correct grading, and proper construction controls. Implement and maintain the controls as specified by the erosion and sediment control plans.	Final design of Rock Forest PSE has not yet been completed. This section will be updated once the final design has been completed.
Soil and water impact(s) during removal of controls	The basin can remain in place until rehabilitation is completed, and an acceptable water quality achieved.	Final design of Rock Forest PSE has not yet been completed. This section will be updated once the final design has been completed. There are several basins adjacent to the temporary spoil emplacement area which were recently relined.
Long term stability not demonstrated	Undertake risk assessment based on the Einstein-Brown equation computed in Geographic Information Systems (GIS) to confirm long term stability and address any areas of higher erosion risk.	Final design of Rock Forest PSE has not yet been completed. This section will be updated once the final design has been completed.
Climate change changing the occurrence of extreme events	Design, accounts for the 1% Annual Exceedance Probability (AEP) risk, or a 1 in 100-year Average Recurrence Interval (ARI) storm event.	Final design of Rock Forest PSE has not yet been completed. This section will be updated once the final design has been completed.

Risk	Contingency	Implementation
Leachate from the spoil emplacement	A spoil characterisation program has been prepared involving XRF, NAG suite analysis, pH and EC screening and validation testing by a NATA accredited laboratory (Appendix A of the SMP) to ensure material is neutralised prior to placement. A leachate basin will be constructed on site and tested for potential contamination prior to reuse on the stockpile. Attachment A – Tantangara Material characterisation program outlines the steps to ensure material neutralisation and actions in the circumstance contamination is detected. Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed and workshopped with the NSW EPA to ensure effective site management and will be monitored under the Project EPL.	Monitoring was undertaken in accordance with the Marica Leachate Detection Plan. Additionally, conditional infrastructure auditing is undertaken once a week.
Neutral mine drainage	Kinetic testing has been carried out to understand the reactivity of the excavated rock. The outcomes will be used to better understand the reactivity of sulphides in excavated rocks, the release rates of contaminants, and the water quality evolution in response to long-term oxidation and weathering that may affect the design of the final landforms and the quality of surface and groundwater. Site specific controls including compaction rates, water quality controls and erosion and sediment controls will be developed and workshopped with the NSW EPA to ensure effective site management and will be monitored under the Project EPL.	The summary of the Kinetic testing on AMD classification for various geological units across the site showed low potential of saline drainage. Placement of spoil at Rock forest has not commenced with adequate water quality control and erosion control measures, along with the emplacement validation sampling for AMD testing to ensure effective management of the excavated materials