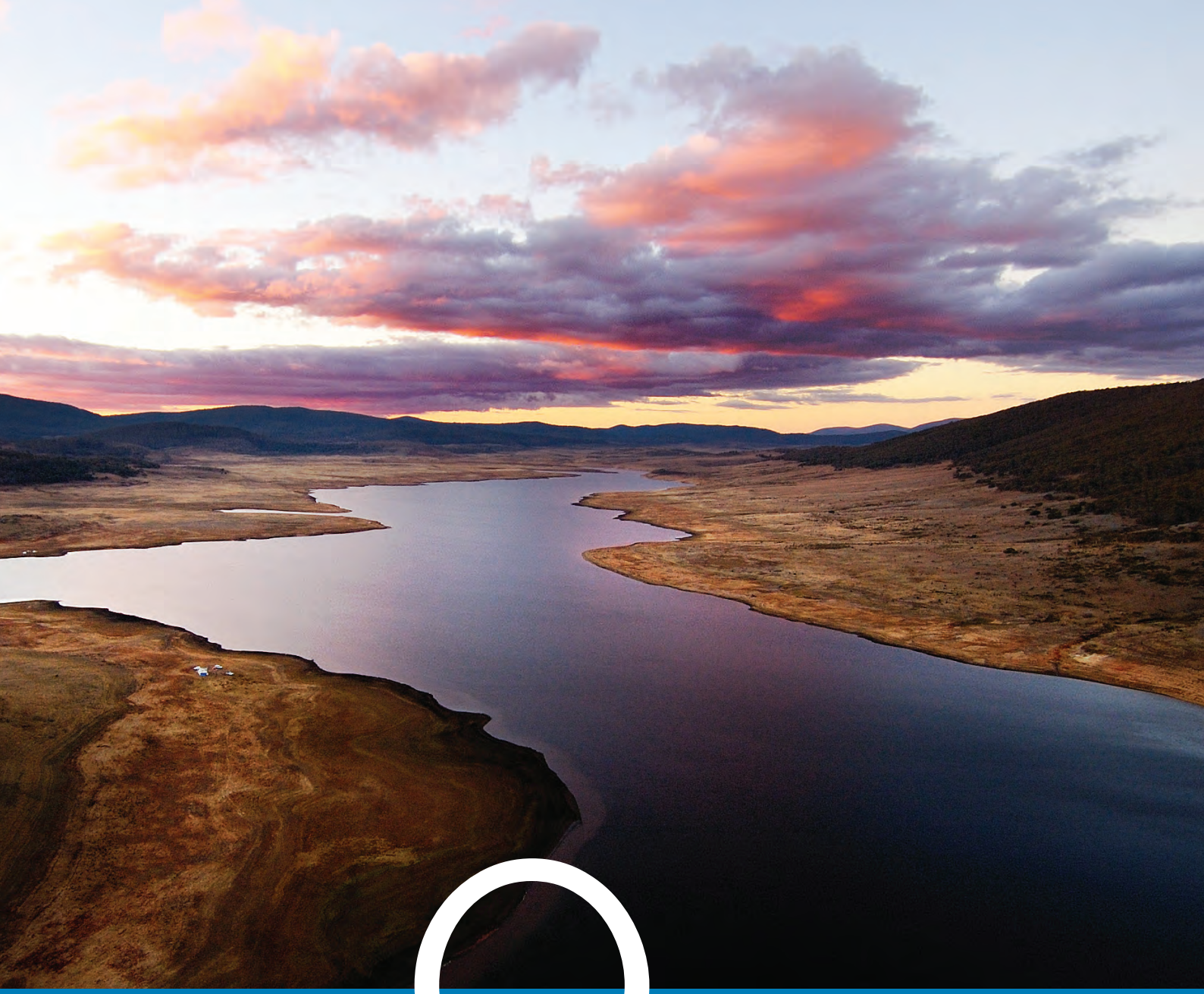


APPENDIX O

REVISED PROJECT DESCRIPTION

Snowy 2.0 Main Works

Preferred infrastructure report and response to submissions

Prepared for Snowy Hydro Limited
February 2020

EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

Snowy 2.0 Main Works

Preferred infrastructure report and response to submissions

Report Number

J17188 Appendix O - Revised project description

Client

Snowy Hydro Limited

Date

7 February 2020

Version

v1 Final

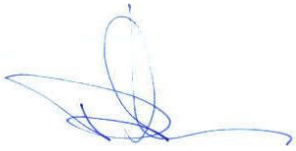
Prepared by

Alex Frolich
Associate Environmental Scientist
7 February 2020

Lawrence Wallis
Senior Environmental Scientist
7 February 2020

Approved by

Brett McLennan
Director
7 February 2020



Duncan Peake
Director
7 February 2020

1 Description of the Project

1.1 Introduction

This chapter explains how Snowy 2.0 Main Works will be built over the proposed six year construction period, and how the core elements will be operated and fully integrated into the existing Snowy Scheme. This chapter incorporates change made following public exhibition and presented in the Preferred infrastructure report and response to submissions document (PIR-RTS). The proposed phases of Snowy 2.0 Main Works comprise construction and operation. The structure of the chapter is therefore as follows:

- Section 1.1 – provides an overview of Snowy 2.0 and how it will function, including an introduction to the principles that enable Snowy 2.0 to be built and to function, the guiding design principles and overview of the construction areas, project elements and access arrangements and the sequencing of the works;

- Section 1.2– provides information relating to the construction of Snowy 2.0 Main Works;

    - Section 1.2.1 – summarises the sequencing of construction activities and outlines the typical methods to be used during construction of Snowy 2.0 Main Works;

    - Section 1.3.2 – describes the construction of permanent infrastructure, mostly underground;

    - Section 1.3.3 – describes the supporting temporary construction sites and infrastructure needed to build permanent elements of Snowy 2.0 Main Works;

    - Section 1.3.4 – describes the temporary and permanent access road requirements;

    - Section 1.3.5 – describes how excavated rock will be managed during construction, including the handling, stockpiling, transport, and placement of rock;

    - Section 1.3.6 – describes how the project area will be accessed during construction, including primary haulage and delivery routes;

    - Section 1.3.7 – describes the construction work requirements, including the workforce and hours of construction;

    - Section 1.3.8 – describes progressive rehabilitation measures to be implemented during construction, and rehabilitation objectives at completion of construction works;

- Section 1.4 – describes the operating regime and maintenance required during the operational phase of Snowy 2.0 Main Works; and

- Section 1.5 – provides a summary of the interactions between Snowy 2.0 Main Works and KNP.

The works described in this chapter form the basis of the environmental impact assessment undertaken.

1.2 Overview of Snowy 2.0 Main Works

1.2.1 Principles of Snowy 2.0

Snowy 2.0 will link the existing Tantangara and Talbingo reservoirs within the existing Snowy Scheme through a series of new underground tunnels and a hydro-electric power station, to be constructed within an underground cavern. Most of the project's facilities will be underground which minimises the project's long-term footprint and impact on the surface.

Operation of Snowy 2.0 will involve the transfer of water through a series of newly established power waterway tunnels and the underground power station to provide for energy generation, as well as large-scale energy storage that will be available on-demand as quick-start electricity generation at critical times of peak demand including times when intermittent renewable energy output or thermal generation is low. To do this, Snowy 2.0 effectively has two operating modes; energy generating mode and pumping mode (for large-scale energy storage). These are shown and explained in Figure 1.1.

Operating in either generating mode or pumping mode will be facilitated by the Snowy Mountains Control Centre (SMCC) in Snowy Hydro's headquarters at Cooma, via the communication networks between Cooma and Snowy 2.0. Decisions concerning the operational mode, flow rates and flow duration will be made remotely by Snowy Hydro on the basis of the state of the NEM with due regard given to operational and licensing constraints, including the need to maintain downstream supply and environmental flows for the Murray-Darling Basin. As with the current Snowy Hydro generating assets Snowy 2.0 will be remotely operated, so there will be no permanent staff on-site except as required for inspection and maintenance activities. Access to the permanent infrastructure will be provided by upgraded and/or new roads established during the course of construction of Snowy 2.0 Exploratory Works and Main Works.

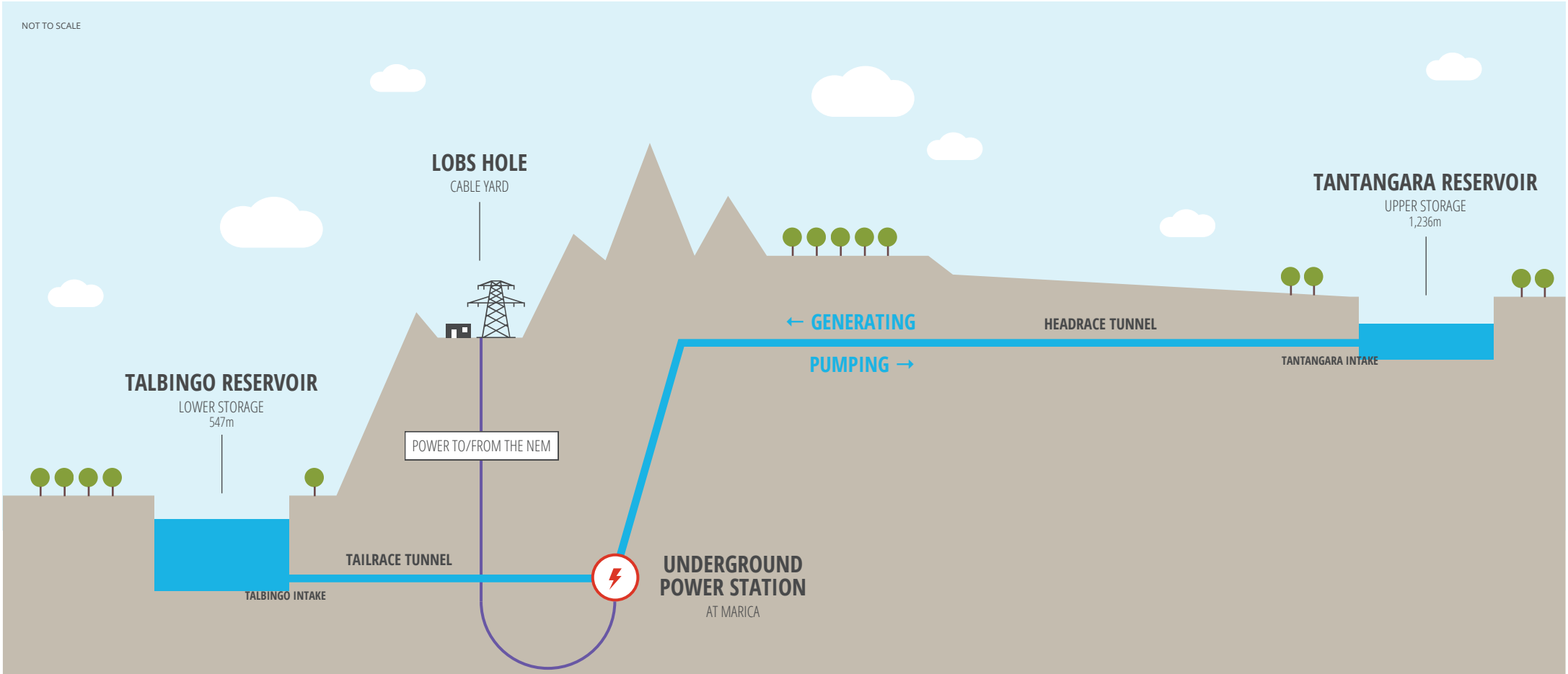
1.2.2 Guiding design principles and approach

Given the complexities of Snowy 2.0 Main Works, its scale and schedule, an iterative and risk-based design and assessment process was adopted in identifying and assessing potential environmental impacts (the DIAA process, as shown in Figure 1.2). This process was undertaken to develop the design and construction methods with the guiding principles of avoiding and minimising environmental impacts where possible and engaging with key stakeholders throughout the process. The EIS and PIR-RTS has been prepared with consideration of impacts commensurate with the levels of risk identified through the DIAA process.

The challenges for the design team included the need to develop solutions that balance the need for ensuring a safe working environment for the construction of Snowy 2.0 Main Works, including the safe movement of plant, equipment, materials and personnel across the sites, with the need to preserve and protect the values of the KNP and the environmental constraints of the location. Throughout the design process, the objective was to identify and avoid sensitive locations, to minimise the construction footprint and maintain as much of the existing natural environment as is reasonable and feasible.

As previously stated, Snowy Hydro has appointed a contractor for the design and construction of Snowy 2.0. The EIS and PIR-RTS are based on the design provided by the contractor during the tender process, noting that a detailed design process is now underway.

While project components are generally fixed, there may be some refinements to the physical layout or design of certain components of the project following further investigation and design. Consistent with the DIAA process, the objective for the detailed design process is to optimise the design to meet construction requirements while continuing to minimise environmental impacts.



Operation of Snowy 2.0 will involve the transfer of water through a series of newly established power waterway tunnels and the underground power station to provide for energy generation, as well as large scale energy storage that will be available as quick-start electricity generation at critical times of peak demand.

IN GENERATING MODE:

- The intake structure at Tantangara Reservoir allows water to flow into the headrace tunnel
- Water falls via gravity into the surge tank (the surge tank valves/gate are opened)
- Water flows through pressure tunnels and to the turbines in the machine hall, spinning the turbines and generators to create electricity
- Transformers located in the transformer hall of the underground power station convert the electricity to a higher-voltage current, and is then transmitted via cables to supply the NEM
- Water continues through the tailrace tunnel and is released into Talbingo Reservoir via the Talbingo gate shaft and intake structure

IN PUMPING MODE:

- Energy is sourced from the NEM which is transmitted into the Power station via the same electrical infrastructure used in generating mode
- Water from Talbingo Reservoir is drawn through the Talbingo intake and the tailrace tunnel toward the turbines
- The turbines in the machine hall, spinning in the reverse direction (as pumps), push the water up the inclined tunnel and through the headrace tunnel to Tantangara Reservoir where it can be stored and used again for energy generation when needed

snowy 2.0

EMM creating opportunities

Figure 1.1 **Principles of Snowy 2.0 Main Works**

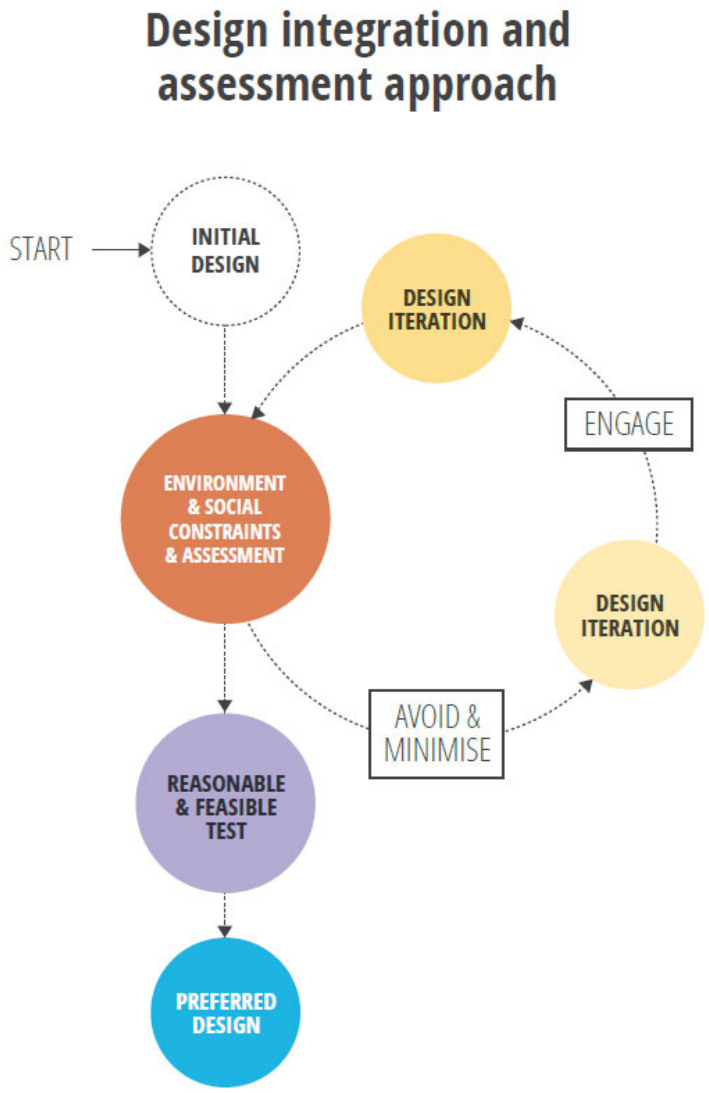


Figure 1.2 **Design integration and assessment approach**

1.2.3 Snowy 2.0 Main Works

The development of Snowy 2.0 within KNP will result in the creation of permanent infrastructure, mostly underground which is required to operate the project. The design of these infrastructure elements has been integrated into the KNP with careful consideration of its values, as well as maintaining public access to the KNP during construction where safe to do so, and in the long-term once construction has finished.

The following key design elements are proposed as part of Snowy 2.0 Main Works as they are needed for the operation of Snowy 2.0, and are referred to as operational infrastructure:

- an underground pumped hydro-electric power station complex;
- water intake structures at Tantangara and Talbingo reservoirs;
- power waterway tunnels, chambers and shafts;
- access tunnels;
- fish control structures in proximity to Tantangara Reservoir wall;
- new and upgraded roads to allow ongoing access and maintenance; and
- power, water and communication infrastructure, including:
    - a cable yard to facilitate connection between the NEM electricity transmission network and Snowy 2.0;
    - permanent auxiliary power connection;
    - permanent communication cables; and
    - permanent water supply to the underground power station.

Figure 1.3 shows the permanent infrastructure proposed to be built within the KNP as part of Snowy 2.0 Main Works, and Table 1.1 to Table 1.6 provides a summary of the proposed project elements needed to establish this infrastructure.

To build the permanent infrastructure required for Snowy 2.0, several construction elements are needed. The construction elements proposed as part of Snowy 2.0 Main Works include:

- construction compounds, portals, stockpile areas, yards, maintenance and laydown areas to provide areas for plant and equipment, and storage of construction materials, at Talbingo Reservoir, Lobs Hole, Marica, and Tantangara Reservoir;
- access tunnels and adits to support main tunnelling activities and construction of the underground power station complex;
- a construction logistics site and excavated material placement at Rock Forest;
- site-based accommodation camps to house the temporary workforce at Lobs Hole, Marica and Tantangara Reservoir;
- road establishment and other access improvements and upgrades to allow access to construction sites;

- management of excavated rock from tunnelling and excavation activities, including:
  - permanent storage of excavated rock within Talbingo and Tantangara reservoirs;
  - temporary and/or permanent on-land storage within the KNP and temporary and/or permanent storage outside of KNP;
- temporary water supply for water required by construction activities;
- temporary water and wastewater treatment facilities where needed to manage the above sites and construction activities;
- continued use of the Lobs Hole substation for construction power if required (note that this component is subject to a modification to the current Exploratory Works for Snowy 2.0 approval; requesting its construction and operation for the Exploratory Works phase of Snowy 2.0); and
- continued access to Talbingo Reservoir by barge (established during Exploratory Works for Snowy 2.0) and establishment of barge access at Tantangara Reservoir for construction of the intake.

Once Snowy 2.0 Main Works are completed, temporary construction elements (such as construction compounds and accommodation camps) will be removed and on-going rehabilitation and revegetation programs implemented.

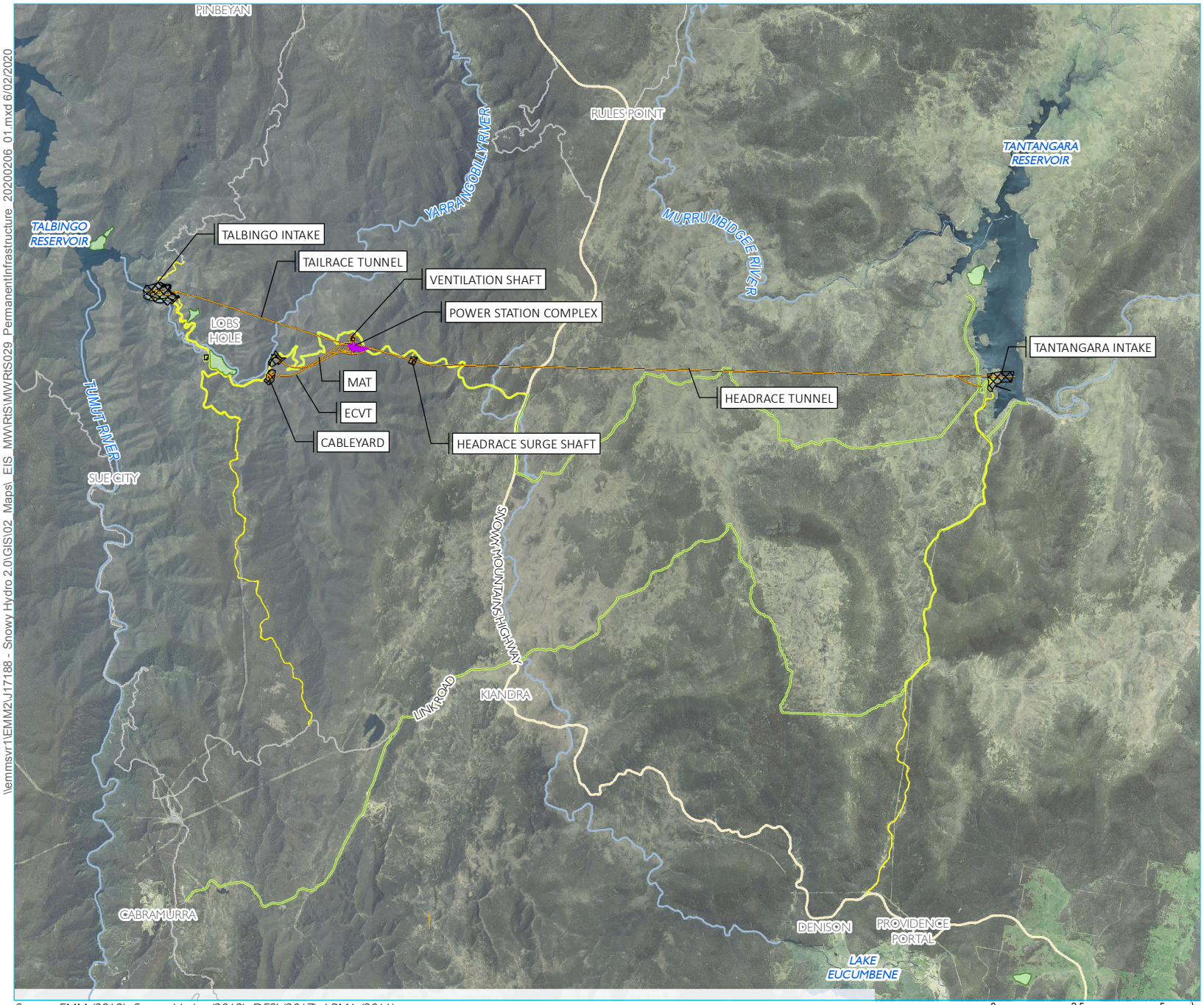
i Methods

The construction of Snowy 2.0 Main Works requires multiple techniques and methods to achieve safe, efficient and cost-effective delivery. Construction primarily involves temporary surface disturbance works through the creation of construction areas to build infrastructure as well as sites where deep excavation works (primarily utilising tunnel boring machines (TBMs)) can launch from.

The excavation of the underground tunnels and caverns (which will form the power station complex) represent most of the civil construction activities required. Two primary methods of excavation will be used for the underground works: TBM and drill and blast. Figure 1.4 shows the likely locations of where these two primary methods will be used.

Broadly, drill and blast will be initially used to excavate access adits to allow for excavation of the headrace and tailrace tunnels through use of TBM. Drill and blast will also be used for the initial section of the main access tunnel (MAT, approved under Snowy 2.0 Exploratory Works) and emergency egress, cabling and ventilation tunnel (ECVT) until there is competent rock to launch the TBMs to undertake the remainder of the excavation. Drill and blast will be used to excavate the underground caverns and attached small waterway tunnels as well as permanent access and construction adits around the power station complex, as well as to excavate some areas at the surface such as intakes and access roads. Drill and blast will also be used to enable the TBMs to be positioned for removal.

Other methods of excavation proposed during construction include, but are not limited to, open cut (intake construction, road works), and raise bore and blind sink (to excavate shafts and chambers). Further detailed information on construction method is provided in Appendix D of the EIS.



\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS029 PermanentInfrastructure 20200206 01.mxd 6/02/2020

KEY

- Operational footprint

Existing environment

- Main road
- Local road
- Watercourse

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Permanent road
- Emplacement area

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

0 2.5 5 km

GDA 1994 MGA Zone 55

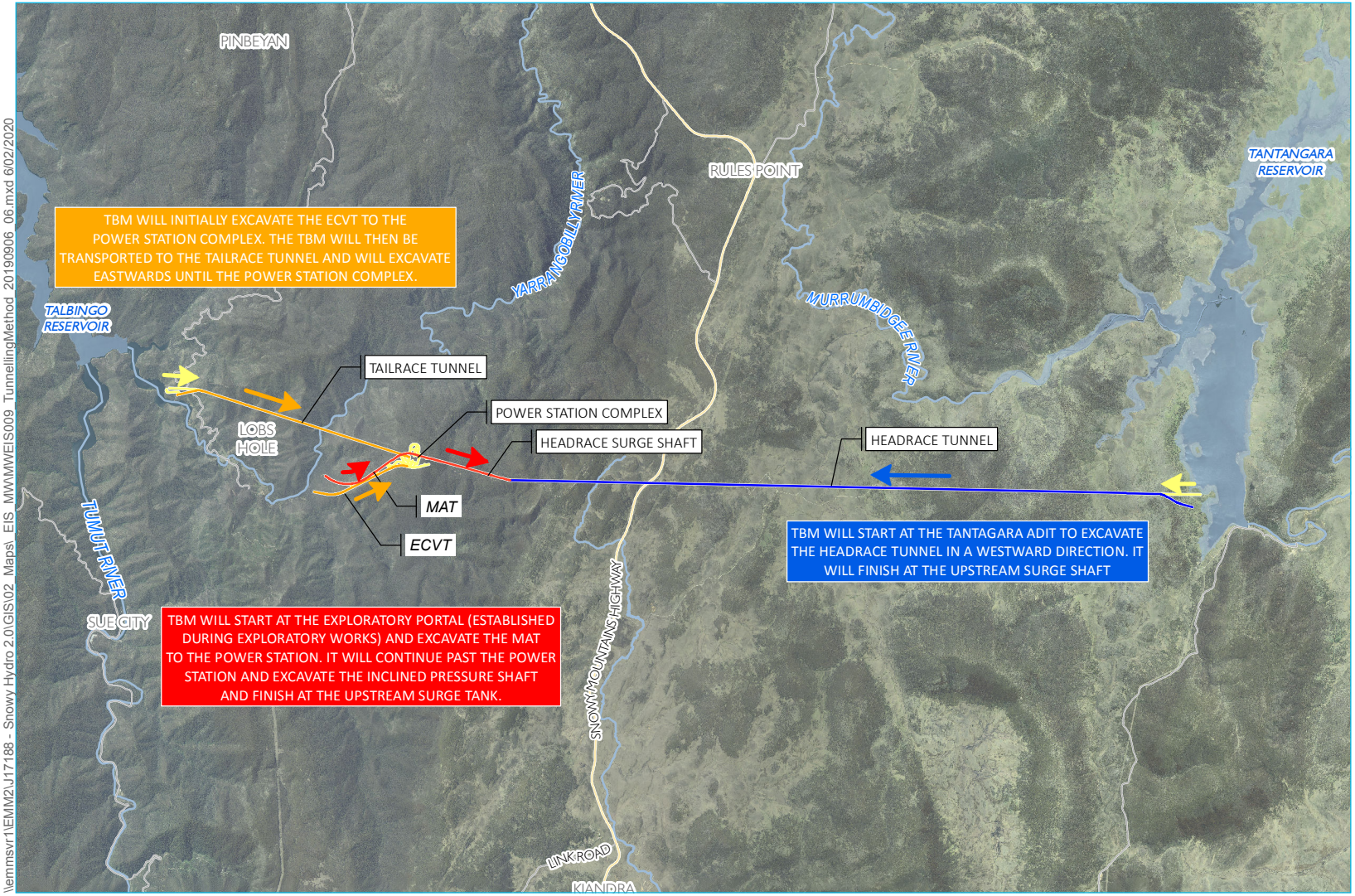
N

Snowy 2.0 Main Works - permanent infrastructure

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.3

snowy 2.0

EMM creating opportunities

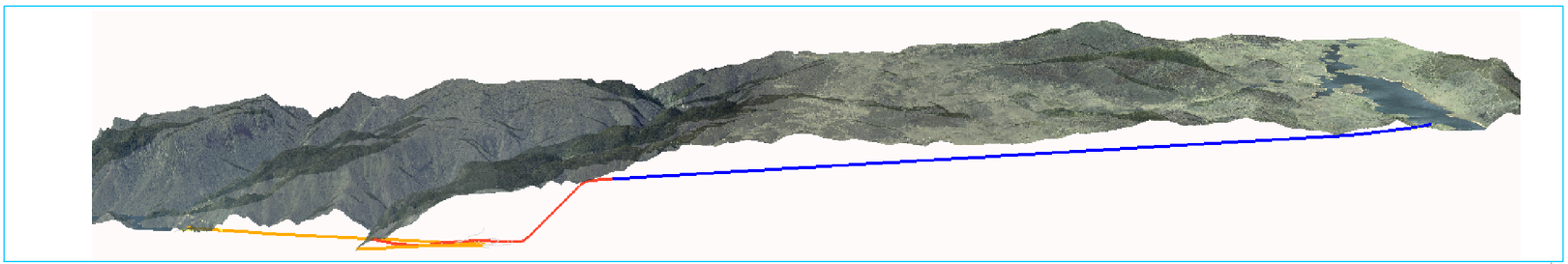


\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWWMWEIS009 TunnellingMethod 20190906 06.mxd 6/02/2020

KEY

Tunnelling method
- Drill and blast
- TBM 1
- TBM 2
- TBM 3
- Tunnelling direction

Existing environment
- Main road
- Local road
- Watercourse
- Waterbodies



Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

0 2.5 5 km

GDA 1994 MGA Zone 55

N

Primary excavation methods – drill and blast and tunnel boring machine

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.4

snowy 2.0

EMM creating opportunities

ii Construction areas

Due to the remoteness of the project area for Snowy 2.0 Main Works, construction sites are generally needed to:

- provide facilities such as concrete batching plants (CBPs), mixing plants and on-site manufacturing;
- store machinery, equipment and materials to be used in construction;
- stockpile material such as aggregate to be used in construction, or stockpile material extracted from tunnelling and road works;
- maintain construction plant and equipment;
- provide access to underground construction sites; and
- provide onsite accommodation for the construction workforce.

For the purposes of this chapter the project area is described by 'construction areas' as shown on Figure 1.4 to account for the nature of the proposed activities and the varying local environmental, amenity and recreational conditions. These geographic areas are:

- Talbingo Reservoir - at an FSL of about 546 m AHD, Talbingo Reservoir will be the lower reservoir for Snowy 2.0 and will include the tailrace tunnel and water intake structure. The site will also be used for temporary construction compounds and other temporary ancillary activities as well as an emplacement area for excavated rock and surplus cut materials;
- Lobs Hole - the area will be used primarily for construction but will also become the main entrance to the power station during operation. Lobs Hole will provide access to the Snowy 2.0 Exploratory Works tunnel, which will be refitted to become the MAT, as well as the location of the ECVT, portal, associated services and accommodation camp;
- Marica - the area will be used primarily for construction purposes including construction of vertical shafts to the underground power station (ventilation shaft) and headrace tunnel (surge shaft), and a small accommodation camp;
- Plateau – the area (predominantly within an existing track) will be used for construction and operation of buried communications and power supply cables to operational infrastructure between Talbingo and Tantangara reservoirs. At depth, the headrace tunnel will be excavated across the plateau;
- Tantangara Reservoir- at a full supply level (FSL) of about 1,229 metres (m) to Australian Height Datum (AHD), Tantangara Reservoir will be the upper reservoir for Snowy 2.0 and include the headrace tunnel and intake structure. The site will also be used for a temporary construction compound, accommodation camp and other temporary ancillary activities as well as an emplacement area for excavated rock and surplus cut materials; and
- Rock Forest – the area comprises private property under lease to Snowy Hydro for use as a logistics site during construction as well as an emplacement area for excavated rock and surplus cut materials.

Supporting infrastructure will include establishing or upgrading access tracks and roads and electricity connections to construction sites. Each construction site needed for Snowy 2.0 Main Works is shown on Figure 1.6 to Figure 1.11, and further described in Table 1.1 to Table 1.6. These tables provide a summary of the project elements to be built, their purpose, how they are to be built and the access arrangements in the short term (during construction) and long term at completion of construction (during operation).

iii Project footprint

As a consequence of the detailed design not yet being complete (as is normal for a major project at this stage of the process), the concept of a larger "construction envelope" has been introduced and used in this report. The construction envelope represents the limits of where disturbance may occur during construction of the Main Works.

For the purposes of predicting environmental impacts of the project, a disturbance area has also been defined. The disturbance area encompasses the extent of physical disturbance likely to be required to accommodate construction activities and infrastructure needed to build Snowy 2.0 Main Works, based on preliminary designs provided by FGJV. The maximum disturbance area is about 641 hectares (ha) of which 604 ha is within KNP which represents an area of less than 0.1% of the KNP.

The disturbance area is a smaller indicative corridor inside the construction envelope. As detailed design continues, final siting of the infrastructure (ie the disturbance footprint) can move within the assessed construction envelope subject to recommended environmental management measures and provided it does not exceed the limits defined by the construction envelope.

Progressively and at the end of construction, most of the disturbance area will be rehabilitated and returned to its previous use. The exception to this are areas required for permanent operation of Snowy 2.0 which would be retained (referred to as the operational footprint).

iv Timing

Snowy 2.0 Main Works will involve phases of works associated with its construction ensuring an efficient sequencing into operation where it will underpin the secure and reliable decarbonisation of the NEM at lowest cost to consumers. This is shown indicatively in Figure 1.5.

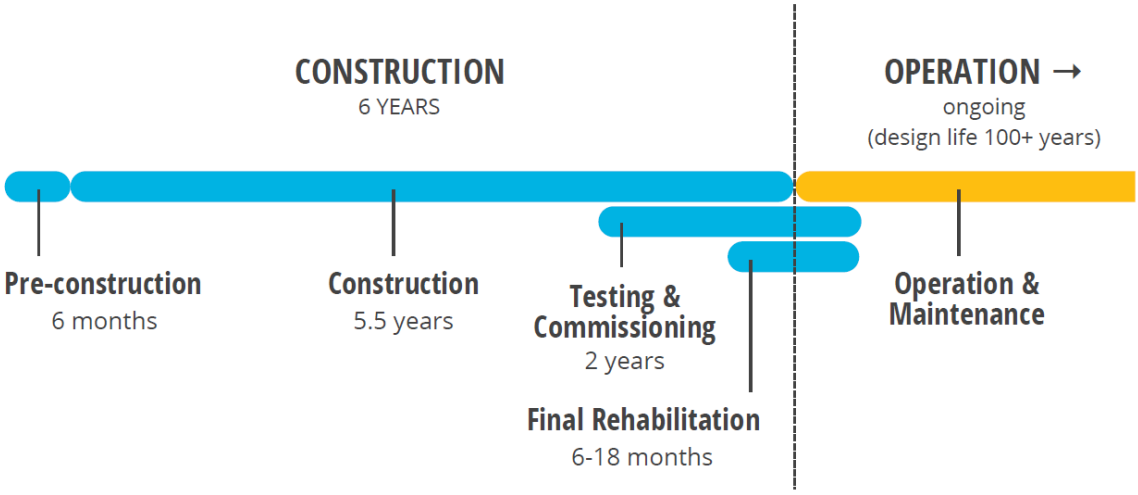


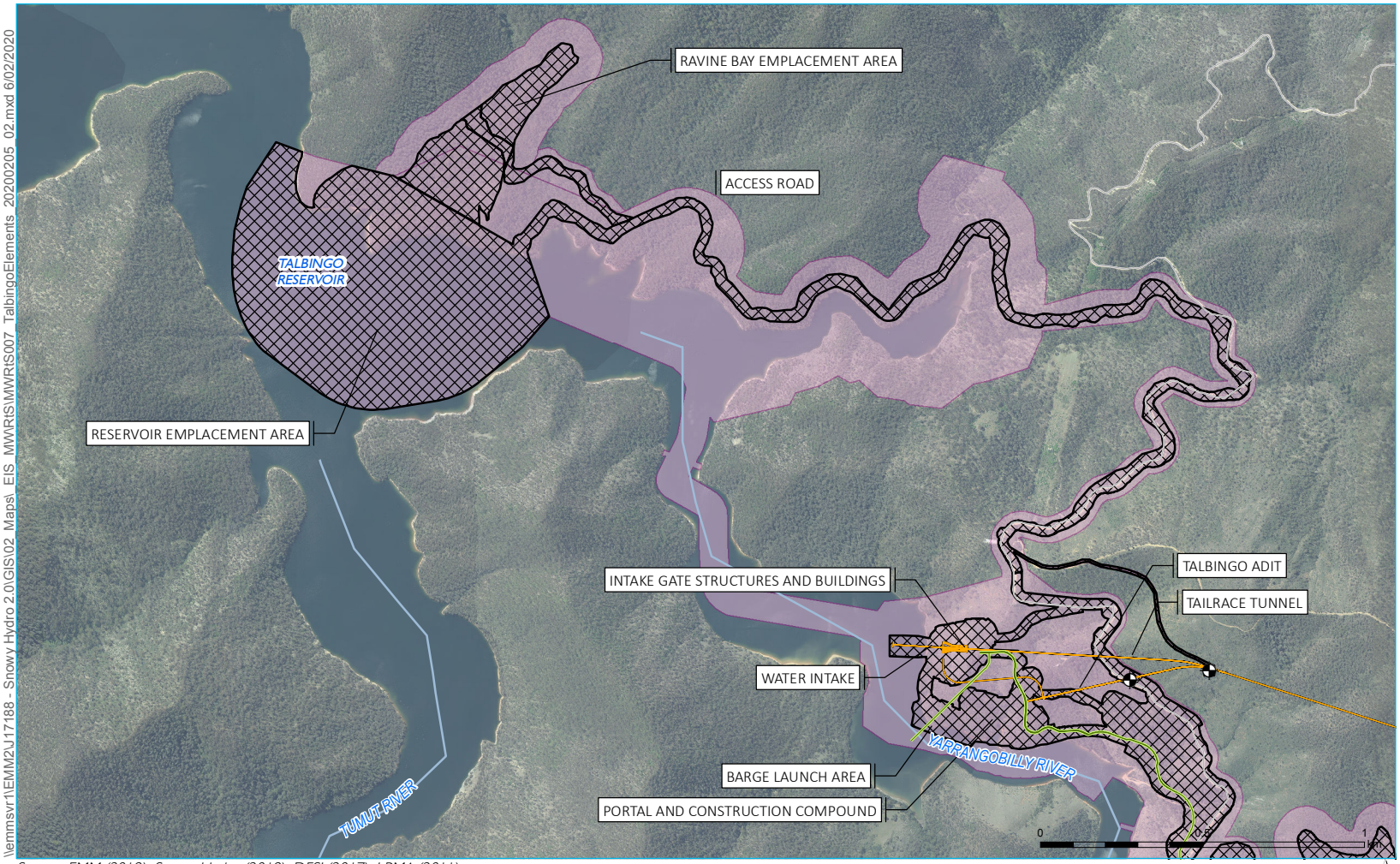
Figure 1.5 Snowy 2.0 Main Works timing and sequencing

Table 1.1 Talbingo Reservoir – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use during operation	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Portal and construction compound	Portal and tunnelling associated construction area for TBM launch/support and for removal of excavated material from the tailrace tunnel.	Primary method of drill and blast to create working areas for portals and tunnel access. Construction compounds will require level areas to be created and excess material will be stockpiled and reused where possible.	✓	Construction compound area will be rehabilitated except for hardstand areas remaining at the portal to enable SHL access for maintenance and long-term operations.	SHL access only
Reservoir emplacement areas	Cost-effective and safe management of excess construction materials.	Disposal of drill and blast excavated material into the reservoir with mobile plant and equipment. Finer TBM materials will be placed above FSL and shaped using geomorphic design principles to allow for a natural landform and rehabilitated.	✓	Material will be permanent from the shore out into the reservoir down to its bed, however surface water activities on the reservoir will return to pre-construction status. Appropriate signage/navigation hazard warnings will be in place identifying the subaqueous landform.	✓
Access roads and ancillary facilities for emplacement activities	Roads will provide access to the reservoir emplacement area and ancillary facilities.	Roads will be a combination of upgraded existing access roads and new access roads. A new access road will be required to the Talbingo intake structure and to the rock emplacement area.	✓	Existing access roads upgraded to facilitate these activities will be retained permanently. The new access road to Talbingo intake structure will be retained permanently. All other construction only roads will be rehabilitated.	✓
Intake structure	To draw water from the reservoir into the tunnels, and to release water from the tunnels to the reservoir – in pumping and generation modes respectively.	Primary construction method will be drill and blast from shore-based plant and equipment, as well as conventional excavation using earthmoving equipment.	Permanent infrastructure	Cast in-situ concrete structure retained within the reservoir. While the extent is yet to be determined, public access around the intake will need to be restricted for safety reasons.	SHL access only
Intake gate structures (underground) and buildings (at surface)	To isolate the tunnels from the reservoir for maintenance and if required during operation.	Primary construction method will be drill and blast from shore-based plant and equipment. The connection between the intake and reservoir (rock plug) will be removed via water-based equipment, with some underwater blasting and/or dredging, launched from the barge launch area.	Permanent infrastructure	Gate structures within the intake, immediately east of the trashracks and diffuser structure. Access will be restricted to Snowy Hydro.	SHL access only

Table 1.1 Talbingo Reservoir – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use during operation	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Tailrace tunnel	During generation mode: to transfer water from the underground power station to Talbingo Reservoir. During pumping mode: to transfer water from Talbingo Reservoir to the underground power station.	Constructed from the Talbingo adit via a TBM heading east towards the power station complex. Excavated material will be transported from the tunnel to Lobs Hole for management or directly to the permanent placement location. The majority of the tunnel will be line with precast concrete segments.	**N/A** (underground)	Underground and restricted access for Snowy Hydro via the underground power station and Talbingo intake structure for maintenance. The tunnel will be inaccessible to the public.	SHL access only
Talbingo adit	The adit provides access for the TBM to excavate the tailrace tunnel.	Initial excavation will be by drill and blast (from the Talbingo adit to the intake), with the remainder of the tunnel excavation by TBM. The TBM will excavate eastwards to the tailrace surge shaft. This TBM will be the same TBM used for the ECVT tunnel.	✓	The adit will be sealed once excavation of the tailrace tunnel is complete. Rehabilitated land returned to NPWS.	✓
Tailrace surge tank	An underground shaft structure off the tailrace tunnel west of the power station complex at the start of the tailrace tunnel. The shaft will absorb the rise in pressure through the tailrace tunnel during load change conditions in operation.	It will likely be excavated with a blind sink method. Raise boring construction will be utilised initially, with some components constructed by conventional drill and blast practises. Excavated material will be transported from the tunnel to Lobs Hole for management.	**N/A** (underground)	Underground and restricted access for Snowy Hydro via the underground power station and Talbingo intake structure for maintenance. The tunnel will be inaccessible to the public.	SHL access only
Barge launch area (Exploratory Works)	Boat and barge launching facilities to allow for water access to intakes during construction and for removal of the rock plug, and for assembling and launching of barges.	The launch area will be available for the duration of construction.	Permanent infrastructure	Rehabilitated land returned to NPWS. The launch area will be retained in some form for use during operation for maintenance access. Opportunity for use by NPWS and the public at other times subject to agreement with NPWS.	✓



KEY

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Geotechnical investigation
- Indicative disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS007 TalbingoElements 20200205 02.mxd 6/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

Talbingo Reservoir - project elements

Snowy 2.0
Preferred infrastructure report and response to submissions
Main Works
Figure 1.6

snowy 2.0

EMM creating opportunities

Table 1.2 Lobs Hole – project elements, purpose and description

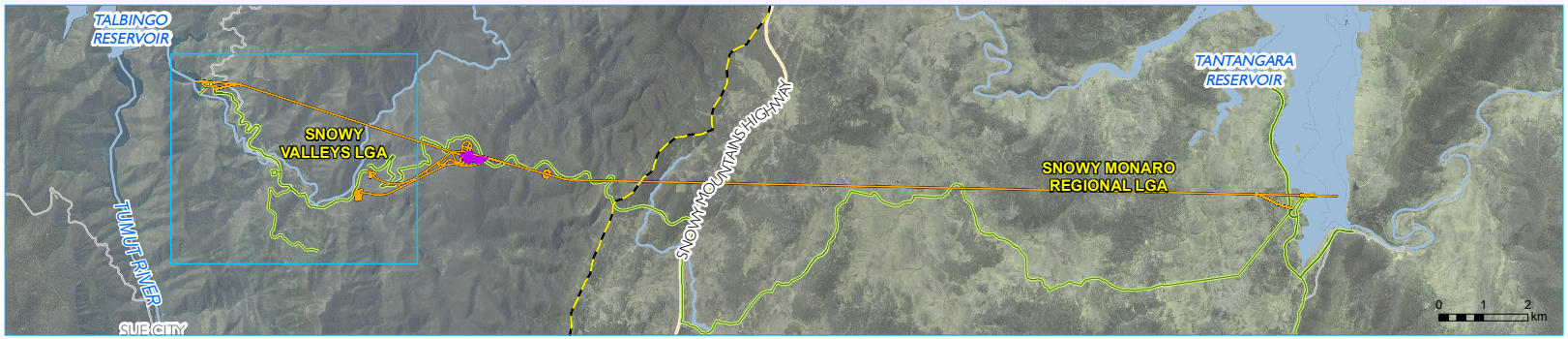
		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Exploratory camp	Approved as part of the Snowy 2.0 Exploratory Works, and provides accommodation for around 150 workers at any one time during construction. Note that approval for an increase to about 250 beds will be sought under a modification to the Exploratory Works approval.	Already constructed as part of Exploratory Works and will be used during construction of Snowy 2.0 Main Works. Rehabilitation will include landforming using excavated rock material.	✓	Rehabilitated land returned to NPWS.	✓
Main Works camp	Provides accommodation for around 1250 workers at any one time during construction.	Constructed using standard techniques. Rehabilitation will include landforming of the site using excavated rock material.	✓	Rehabilitated land returned to NPWS.	✓
On land excavated rock stockpiles and management	Dedicated areas to manage excavated rock material in the short and long term. Some of the long term placement will provide improved areas for recreational activities within KNP.	Excavated rock from the tunnels will be placed and compacted with earthmoving plant and equipment. Appropriate batters, drainage and landforming will be carried out to create a safe, non-polluting landforms.	✓	Rehabilitated land returned to NPWS. Landform at Lobs Hole will comprise excavated materials to establish the infrastructure pads required during construction. An area north of the Main Works camp, known as GF01 will comprise emplaced excavated rock material. Both landforms will be re-shaped using geomorphic methodology to establish a natural landform commensurate with the surrounding environment and future recreational plan for the area, to be carried out in consultation with NPWS.	✓
Main yard	This is the main laydown and construction area for Snowy 2.0 Main Works.	Earth works will be carried out to create stable and flat landforms. Additional materials, in the form of excess cut materials, will be used to create these landforms to enable construction pads to be established and used. Appropriate drainage and erosion and sediment controls will be installed.	✓	Rehabilitated land returned to NPWS.	✓

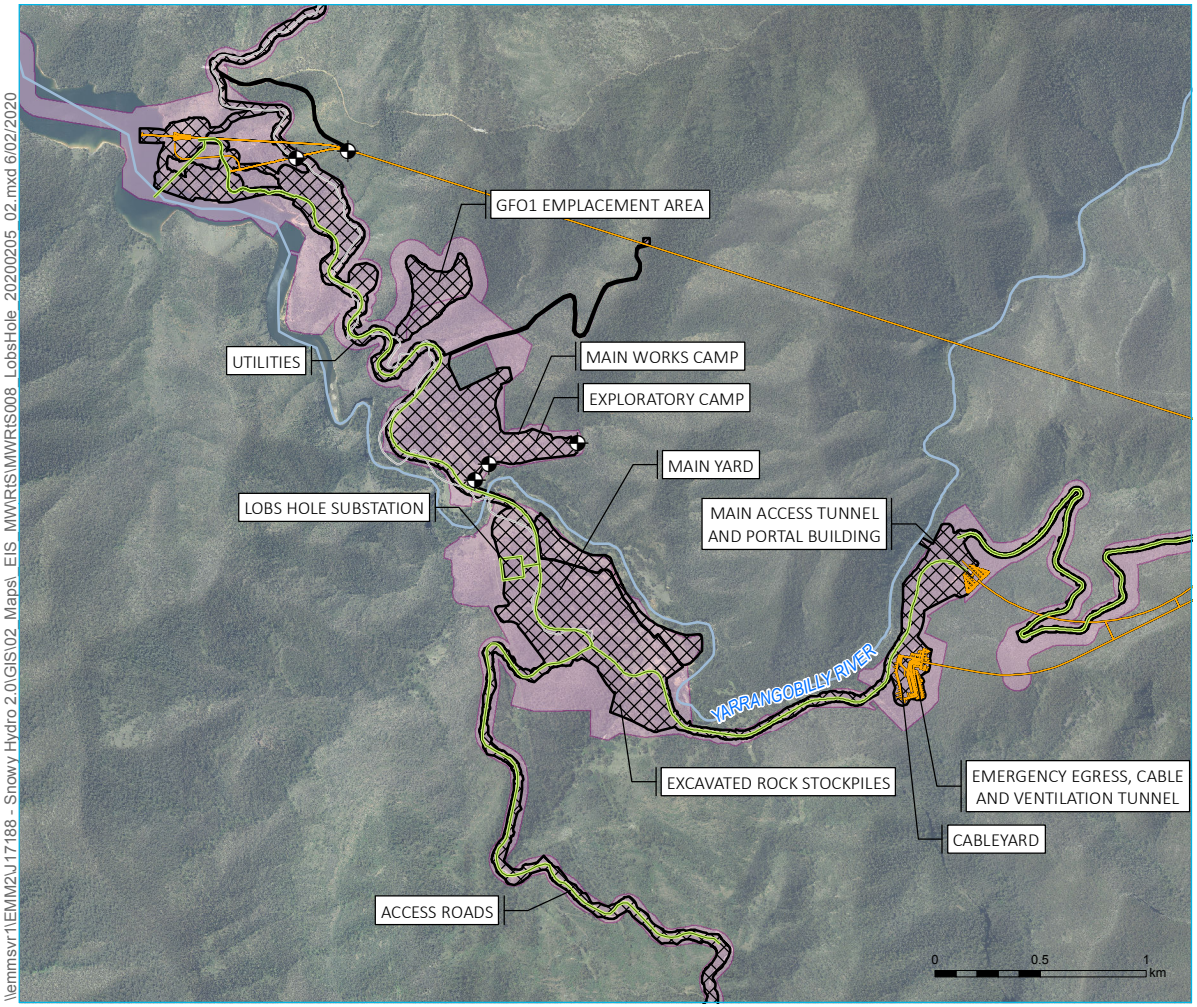
Table 1.2 Lobs Hole – project elements, purpose and description

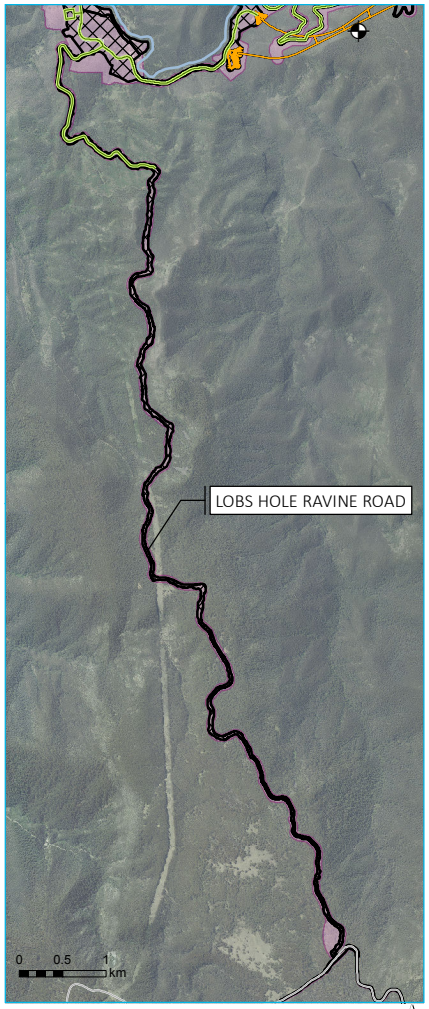
		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
MAT and portal building	The exploratory tunnel approved under Snowy 2.0 Exploratory Works will become the MAT to the underground power station from the surface. It will provide access for staff and equipment during operations and for maintenance of the power station. The portal building and attached facilities accommodate several operational services such as fire protection systems, potable water supply storage and staff facilities.	Already constructed as part of Exploratory Works and will be used during construction of Snowy 2.0 Main Works. The portal building works will be constructed during Snowy 2.0 Main Works and include water treatment facilities.	Permanent infrastructure	Portal will provide access to the power station complex for maintenance and operations. The portal, building and facilities will be retained permanently. Access road will be restricted from Wallaces Creek to MAT portal.	SHL access only
Emergency egress, cable and ventilation tunnel and portal	To provide the route for the high voltage cables to exit from the transformer hall to the above ground cable yard. It also provides a means for emergency evacuation.	This will be excavated by a TBM launching from the ECVT portal. Drill and blast will be carried out for the last section connecting the tunnel to the transformer hall	Permanent infrastructure	The ECVT is parallel to the MAT with its portal adjacent to the MAT portal.	SHL access only
Lobs Hole substation	The primary supply to be used during construction. It will be retained during operations to provide power supply to the power station complex, intake structures and control buildings.	Already constructed as part of Exploratory Works and will be used for construction and operation of Snowy 2.0 Main Works.	Permanent infrastructure	The substation will be fenced and inaccessible to the public.	SHL access only
Cable yard	Connects the power station to the transmission network (NEM).	The construction pad will be levelled, civil and mechanical works to erect and fit-out the gas insulated switchgear (GIS) building and cable yard infrastructure.	Permanent infrastructure	The cable yard will be fenced and inaccessible to the public.	SHL access only

Table 1.2 Lobs Hole – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Utilities	To provide for the efficient working of construction areas through provision of water and electricity. Discharge of process and waste waters will also be needed.	Wherever possible, electricity and water pipelines will be placed along roads (or adjacent to) and reticulate to the relevant locations within the construction area. Construction methods will comprise a combination of overhead, trenching and underboring, depending on the identified constraints (such as geology and watercourse crossings) or where there are opportunities to minimise disturbance of new areas.	✓	Utilities required for operation will be retained and maintained. Utilities to facilitate construction areas only will be decommissioned and areas rehabilitated. Rehabilitated land returned to NPWS.	✓
Access roads	Roads will provide access to the reservoir emplacement area and ancillary facilities, accommodation camps and MAT and ECVT portals.	Roads will be a combination of upgraded existing access roads and new access roads.	✓	Roads established during construction that are not required for operation will be rehabilitated. Existing access roads upgraded to facilitate these activities will be retained permanently. Lobs Hole Ravine Road and Lobs Hole Road will be publicly accessible, however access on Mines Trail Road east past Wallaces Creek will be restricted to Snowy Hydro and NPWS access only.	✓







KEY

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Geotechnical investigation
- Indicative disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

GDA 1994 MGA Zone 55

N

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS008 LobsHole 20200205 02.mxd 6/02/2020

Lobs Hole - project elements

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.7

snowy 2.0

EMM creating opportunities

Table 1.3 Marica – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use during operation	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Headrace surge shaft	The shaft ensures safe hydraulic operation of the power station by reducing transient pressures in particular during load change conditions. The upstream surge shaft will absorb sudden rises of pressure on top of the headrace tunnel extension. Available design information provides for two options for its layout at the surface; either a structure above the surface level or a fenced surge pond which would hold the required amount of water during an extreme event. Both these options are within the disturbance boundary.	A shaft structure constructed from the surface and breaking through to the headrace tunnel, most likely using a combination of raise boring and drill and blast construction methods. Should a structure be required at the surface, it would be about 15 m high. Excavated material will be transported from the shaft to surface at Marica and then to Rock Forest for management.	Permanent infrastructure	The shaft structure or surge pond at the surface will be fenced and inaccessible to the public.	SHL access only
Surge shaft yard	To provide an area to excavate the surge shaft, including storage of equipment, explosives and stockpiles for excavated rock. The area will also allow for site office, first aid and worker facilities.	Construction will involve clearing and levelling of the site, a crane bridge to support blind sinking excavation downward excavation to the headrace tunnel, rock support, concrete works and steel works.	✓	Most of the construction compound area will be rehabilitated, with only the shaft structure remaining at surface. Rehabilitated land returned to NPWS	✓

Table 1.3 Marica – project elements, purpose and description

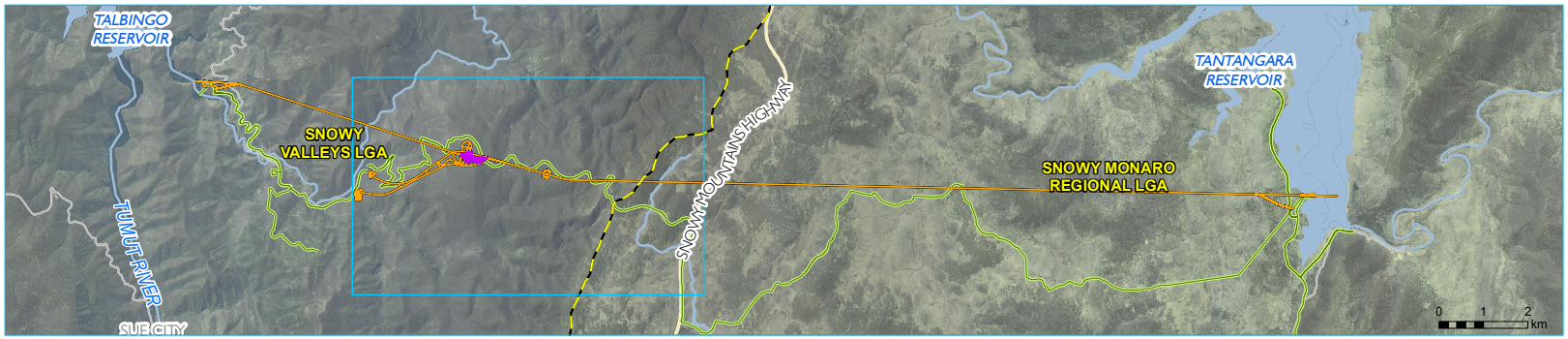
		Temporary use during construction		Permanent/long-term use during operation	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Pressure tunnels	To transfer water from the headrace tunnel to the power station complex. This includes a single inclined pressure tunnel, branching into three high pressure tunnels and then into six penstock tunnels.	The high pressure tunnels will be constructed using drill and blast. The single-inclined pressure shaft will be excavated by utilising the TBM that excavates the MAT, by continuing past (east) the powerhouse complex and up to the upstream end of the high pressure tunnel manifolds. Excavated material will be transported from the tunnel to Lobs Hole for management.	**N/A** (underground)	The underground tunnels will be inaccessible to the public.	SHL access only
Power station complex (including machine hall and transformer hall)	The power station will generate electricity from water transfer and pump water in reverse between Tantangara and Talbingo reservoirs. The machine hall will house the six pump-turbine and motor-generator units. The transformer hall will house the six, three-phase transformers and six draft tube gates.	The complex location will be accessed initially by TBM from the exploratory tunnel. From there, the primary construction method will be conventional drill and blast and/or using surface miner machines. The complex will be oriented using the results of the geotechnical drilling carried out following completion of the exploratory tunnel. Excavated material will be transported from the complex to Lobs Hole for management.	**N/A** (underground)	Underground and accessed from the MAT via the Lobs Hole portal. The power station complex will be inaccessible to the public.	SHL access only
Draft tube and collector tunnels	Underground tunnels to transfer water from the power station draft tube gates to the tailrace surge tank. This includes six draft tube tunnels, converging into three collector tunnels.	These draft tube and collectors tunnels will be constructed via drill and blast method.	**N/A** (underground)	The underground tunnels will be inaccessible to the public.	SHL access only

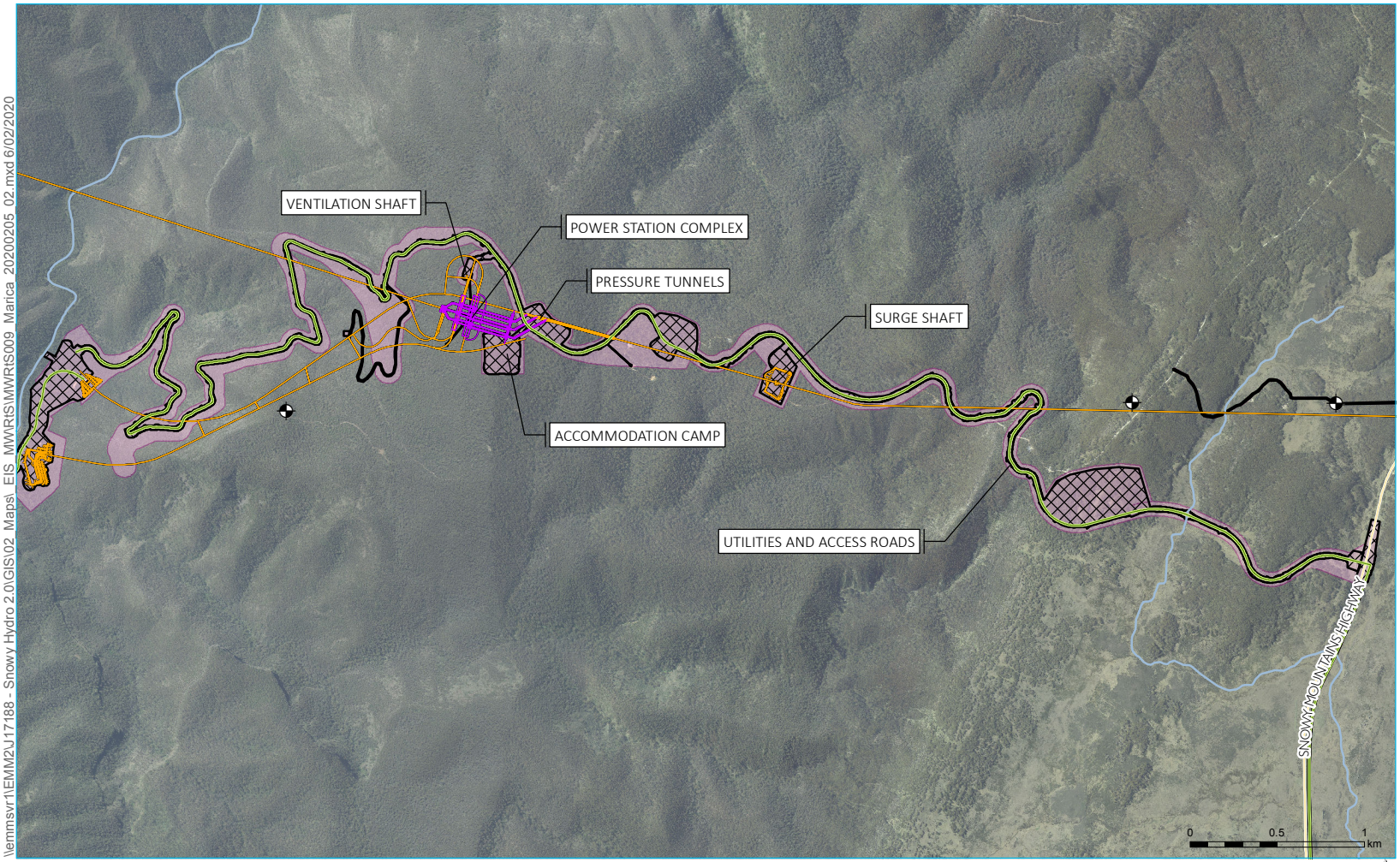
Table 1.3 Marica – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use during operation	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Ventilation shaft	To provide ventilation to the underground power station during excavation of the caverns, and during operation if required.	The shaft will likely be constructed by raise bore or blind sink method. It will be accessed by the Marica Trail off the Snowy Mountains Highway.	Permanent infrastructure	The shaft will have a permanent building at the surface about 6 m in height. It will be fenced and inaccessible to the public.	SHL access only
Marica accommodation camp	Provides accommodation for up to 100 workers at any one time during construction.	Constructed during standard techniques. Rehabilitation will include landforming using excavated rock material. A smaller fly camp may also be installed initially to assist with the construction of the Main Marica camp.	✓	Rehabilitated land returned to NPWS.	✓
Utilities	To provide for the efficient working of construction areas through provision of water and electricity. Discharge of process and waste waters will also be needed.	Wherever possible, electricity and water pipelines will be placed in roads (or adjacent to) and reticulate to the relevant locations within the construction area. Construction methods will comprise a combination of overhead, trenching and underboring, depending on the constraints identified (such as geology and watercourse crossings) or where there are opportunities to minimise disturbance of new areas. Options to source water locally (eg via groundwater supply wells) or transported to site (eg water carts) will be investigated during detailed design.	✓	Utilities to facilitate construction areas will be decommissioned and areas rehabilitated. Rehabilitated land returned to NPWS.	✓

Table 1.3 Marica – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use during operation	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Access roads	To provide for safe access for materials, equipment and workforce during the construction period.	A new intersection with Snowy Mountains Highway will be built, enabling access directly to the existing Marica Trail. From the intersection to the surge tank, the road will be gravel and two lanes. A new track (single lane) will be created extending Marica Trail down to the MAT portal to provide an alternate access to Lobs Hole. Prior to this track being completed, access will be via Coppermine Trail and Wallaces Creek track from the Snowy Mountains. Roads and tracks will be built using standard construction techniques.	Permanent infrastructure	From its intersection with the Snowy Mountains Highway, Marica Trail will be retained permanently for use during operation by Snowy Hydro and NPWS.	SHL access only





KEY

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Geotechnical investigation
- Indicative disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

Marica - project elements

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.8

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS009 Marica 20200205 02.mxd 6/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

GDA 1994 MGA Zone 55

N

snowy 2.0

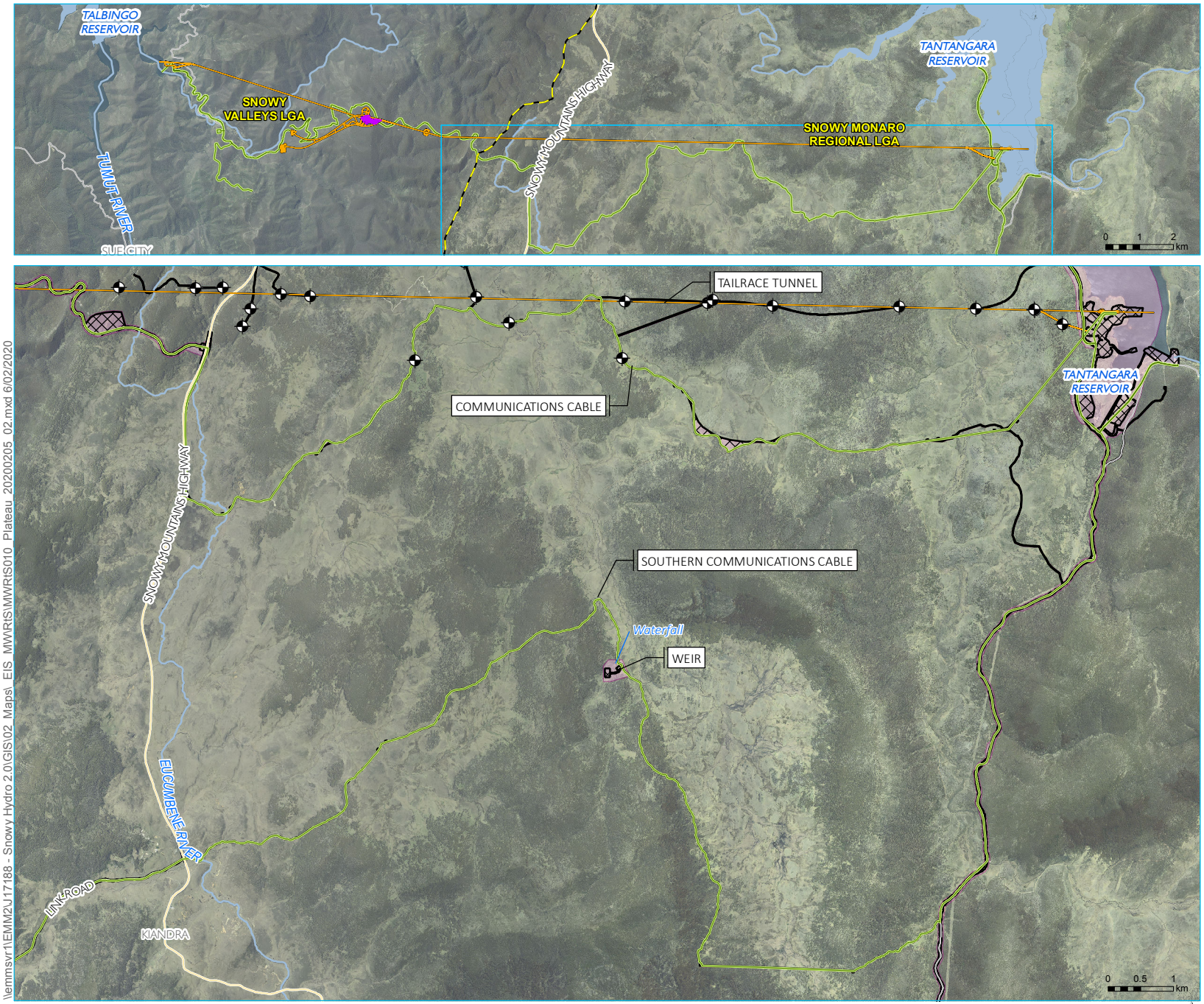
EMM creating opportunities

Table 1.4 Plateau- project elements, purpose and description

		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Headrace tunnel	During generation mode: to transfer water from Tantangara Reservoir to the underground power station. During pumping mode: to transfer water from the underground power station to Tantangara Reservoir.	Constructed via a TBM launched from Tantangara adit heading westwards to the surge shaft at Marica. Excavated material will be transported from the tunnel to Tantangara for management.	**N/A** (underground)	During generation mode: to transfer water from the Tantangara intake to the underground power station. During pumping mode: to transfer water from the underground power station to Tantangara Reservoir. Underground and restricted access for Snowy Hydro via the surge tank and Tantangara intake structure for maintenance. The tunnel will inaccessible to the public.	SHL access only
Communications cable	To provide secure and redundant communications between Talbingo intake, power station and Tantangara intake and the main control centre in Cooma.	Two communications cables will be installed. One will be within sections of the Snowy Mountains Highway and Gooandra track corridors between the power station and Tantangara Reservoir. A more southern route will also be built connecting to Cabramurra (Upper Tumut Swithcyard) This route is mainly within the Snowy Mountains Highway and Tantangara Road corridors. These cables will be laid in a trench with some sections also underbored or bridged where suitable. Temporary passing bays enabling vehicles to safely manoeuvrer and pass will be established where required.	✓	It will provide a communication system that connects the Snowy 2.0 assets for operations. The cable will be buried and the existing KNP tracks and public roads will be accessible the public.	✓
Weir	To prevent the potential upstream migration of Climbing galaxias	A weir structure will be built on Tantangara Creek. The construction method will be determined during detailed design.	Permanent structure	Rehabilitated land returned to NPWS.	✓

Table 1.4 Plateau- project elements, purpose and description

		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Access roads	To provide for safe access for materials, equipment and workforce during the construction period.	Minor excavation works to widen small sections of the Snowy Mountains Highway to ensure that infrequent oversize and overmass loads access the site safely.	Permanent structure	It will provide for an improved outcome for road safety in this section of Snowy Mountains Highway.	✓



KEY

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Geotechnical investigation
- Indicative disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS010 Plateau 20200205 02.mxd 6/02/2020

Plateau - project elements

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.9

snowy 2.0

EMM creating opportunities

Table 1.5 Tantangara Reservoir – project elements, purpose and description

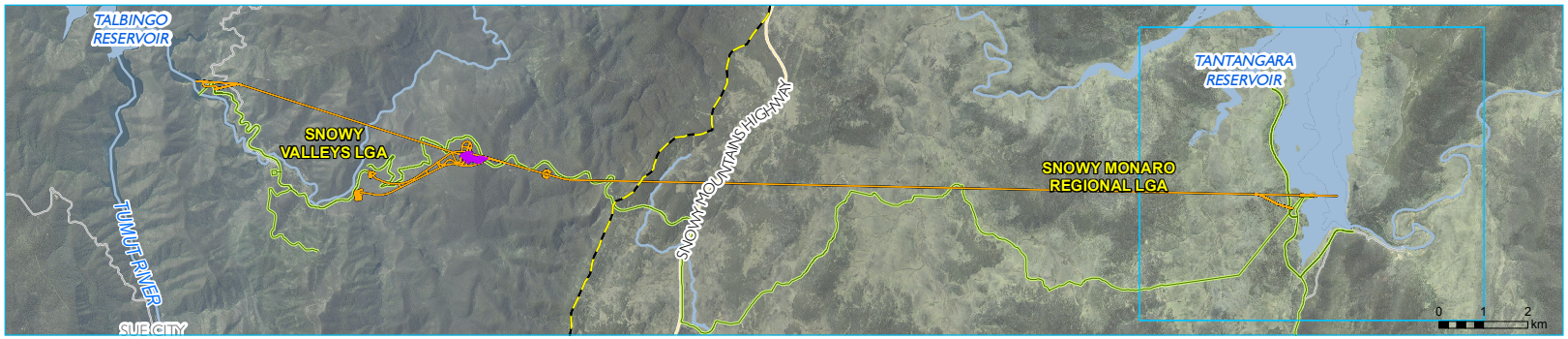
		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Portal and construction compound	Portal and tunnelling associated construction area or TBM support and for removal of excavated material from the tailrace tunnel.	The portal will be excavated using drill and blast techniques. Excavated material will be transported to Tantangara for management. The compound will be created using earthworks to create stable and flat areas for use.	✓	Construction compound area will be rehabilitated with small hard-standing areas remaining at the portal to enable Snowy Hydro access for maintenance and long-term operations.	SHL access only
Tantangara adit	To provide an alternate access for a TBM into the headrace tunnel.	One TBM may be launched from the Tantangara construction adit.	✓	The adit will be appropriately capped and closed off preventing access.	SHL access only
Tantangara laydown area	An area for laydown and maintenance of construction plant, equipment and materials storage.	Earthworks will be carried out to create stable and flat areas for use. Appropriate drainage and erosion and sediment controls will be installed.	✓	Rehabilitated land returned to NPWS.	✓
Reservoir emplacement areas	Excavated rock will be emplaced at this location as a cost-effective solution with minimal long-term environmental impacts.	Disposal of excavated material with mobile plant and equipment placing drill & blast material below FSL and TBM material above FSL shaped using geomorphic design principles to allow for a natural landform and rehabilitated.	✓	Material will be permanently placed within the reservoir. This area will be accessible to the public, however may be inundated more often than existing Snowy Scheme operations. Appropriate signage/navigation hazard warnings will be in place identifying the subaqueous landform.	✓

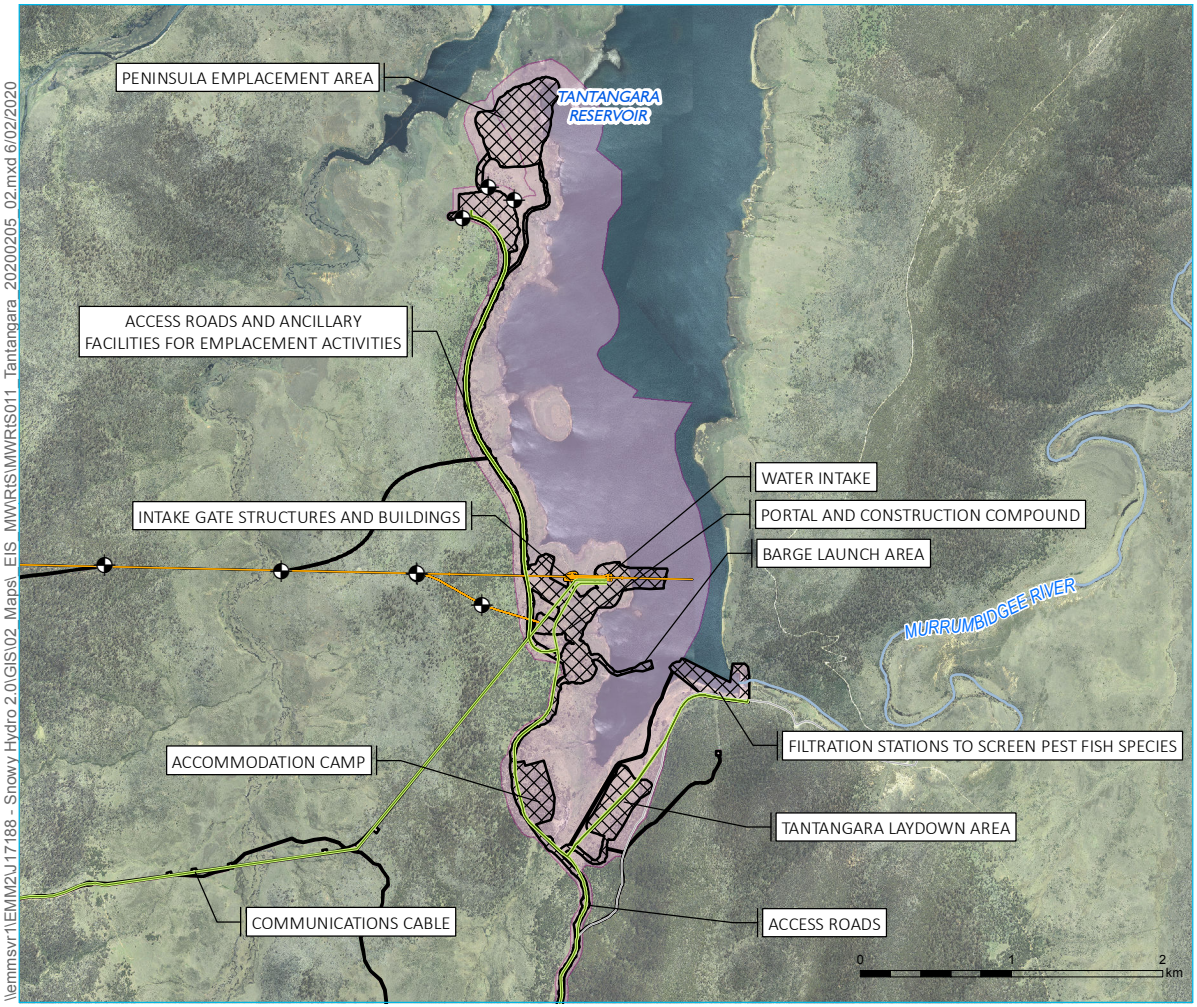
Table 1.5 Tantangara Reservoir – project elements, purpose and description

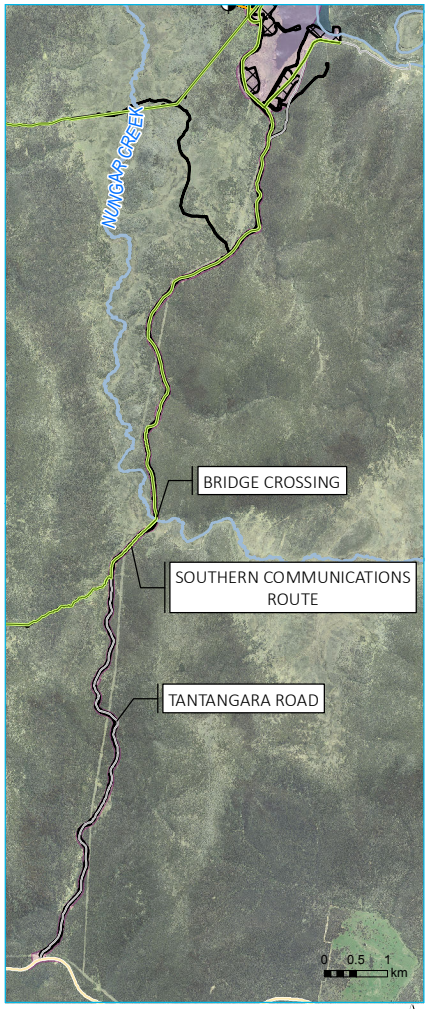
		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Access roads and ancillary facilities for emplacement activities	Roads will provide access to the reservoir emplacement area and ancillary facilities.	Roads will be a combination of upgraded existing access roads and new access roads. New access road to the Tantangara intake structure will be permanent. Other access roads will be temporary and rehabilitated. Improvements to the intersection at Tantangara Road and Snowy Mountains Highway will be built to facilitate access for construction traffic. A bridge over Nungar Creek on Tantangara Road will be built.	✓	Existing access roads upgraded to facilitate these activities will be retained permanently. New access road to the Tantangara intake structure will be restricted to SHL access only. Rehabilitated land returned to NPWS.	✓
Intake structure	To draw water from the reservoir into the tunnels, and to release water from the tunnels to the reservoir – in both generation and pumping modes.	Primary construction method will be drill and blast from shore-based plant and equipment.	Permanent infrastructure	Intake structure retained within the reservoir. A floating boom across the end of the approach channel will be placed to restrict public access for safety reasons.	SHL access only
Intake gate structures (underground) and buildings (at surface)	To isolate the tunnels from the reservoir for maintenance and if required during operation.	Primary construction method will be drill and blast from shore-based plant and equipment. The connection between the intake and reservoir (rock plug) will be removed via water-based equipment, launched from the barge launch area.	Permanent infrastructure	Gate structures within the intake, approximately 250 m west of the trashracks and diffuser structure. Access will be restricted to use by Snowy Hydro.	SHL access only
Barge launch area	Boat and barge launching facilities to allow for water access to intakes during construction and for removal of the rock plug, and for assembling and launching of barges.	The launch area will be available for the duration of construction.	Permanent infrastructure	Rehabilitated land returned to NPWS. The launch area will be retained in some form for use during operation for maintenance access. Opportunity for use by NPWS and the public at other times subject to agreement with NPWS.	✓

Table 1.5 Tantangara Reservoir – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Tantangara accommodation camp	Provides accommodation for around 500 people to facilitate construction of the headrace tunnel, intake and excavated rock emplacement.	Earthworks will be carried out to create stable and flat areas for use. Appropriate drainage and erosion and sediment controls will be installed. A fly camp will be installed initially to assist with the construction of the Main Tantangara camp.	✓	Rehabilitated land returned to NPWS.	✓
Utilities	To provide for the efficient working of construction areas through provision of water and electricity. Discharge of process and waste waters will also be needed.	Wherever possible, electricity and water pipelines will be placed in roads (or adjacent to) and reticulate to the relevant locations within the construction area. Construction methods will comprise a combination of overhead, trenching and underboring, depending on the identified constraints (such as geology and watercourse crossings) or where there are opportunities to minimise disturbance of new areas.	✓	Utilities to facilitate construction areas will be decommissioned and areas rehabilitated. Rehabilitated land returned to NPWS.	✓
Fish control structures	To limit the potential range expansion of any fish species of concern that may be potentially transferred to Tantangara Reservoir as a result of the project.	A filtration station/s to screen pest fish species from being discharged through the Murrumbidgee-Eucumbene Tunnel will be installed upstream of Tantangara Reservoir wall.	Permanent infrastructure	Permanent infrastructure to be maintained by Snowy Hydro.	SHL access only







KEY

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Geotechnical investigation
- Indicative disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

GDA 1994 MGA Zone 55

N

Tantangara Reservoir - project elements

Snowy 2.0
Preferred infrastructure report and response to submissions
Main Works
Figure 1.10

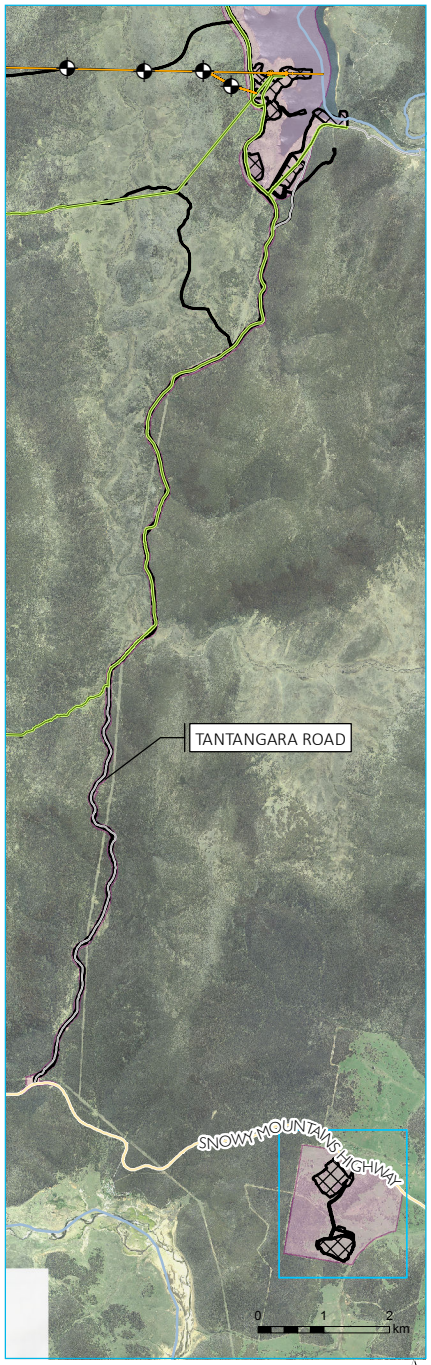
snowy 2.0

EMM creating opportunities

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS011 Tantangara 20200205 02.mxd 6/02/2020

Table 1.6 Rock Forest – project elements, purpose and description

		Temporary use during construction		Permanent/long-term use	
Element	**Purpose**	**Method summary**	**Rehabilitated to previous use**	**Long-term use**	**Public access**
Logistics yard	Laydown, stockpile and staging area for materials and heavy vehicles. This is a private landholding under lease to Snowy Hydro.	Earthworks will be carried out to create stable and flat areas for use. Appropriate drainage and erosion and sediment controls will be installed.	✓	Rehabilitated landform returned to landowner.	N/A
On land emplacement area	Dedicated area to manage excavated rock material in the short and long term.	Excavated rock generated from the Marica zone will be placed and compacted with earthmoving plant and equipment. Appropriate batters, drainage and landforming will be carried out to create a safe, non-polluting landform.	✓	Rehabilitated landform returned to landowner. Approximately 400,000 m^3 of excavated rock material will be landformed using geomorphic methodology, and then rehabilitated in a similar fashion to other on-land emplacements.	N/A
Access	Provide safe access to and from the logistics yard via the Snowy Mountains Highway.	A new intersection from the Snowy Mountains Highway will be built.	✓	The access will be able to be used by the landowner.	N/A



KEY

Existing environment

- Main road
- Local road
- Watercourse

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Utilities
- Geotechnical investigation
- Indicative disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

Rock Forest - project elements

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.11

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

GDA 1994 MGA Zone 55

N

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS012 RockForest 20200205 02.mxd 6/02/2020

1.2.4 Summary of project elements

A summary of the key elements that form Snowy 2.0 Main Works is provided in Table 1.7.

Table 1.7 Snowy 2.0 Main Works summary

Project element	Summary of the project
Project area	The project area is the broader region within which Snowy 2.0 will be built and operated, and the extent within which direct impacts from Snowy 2.0 Main Works are anticipated.
Permanent infrastructure	Snowy 2.0 infrastructure to be built and operated for the life of the assets include the: • intake and gate structures and surface buildings at Tantangara and Talbingo reservoirs; • power waterway tunnels primarily comprising the headrace tunnel, headrace surge structure, inclined pressure tunnel, pressure pipelines, tailrace surge tank and tailrace tunnel; • underground power station complex comprising the machine hall, transformer hall, ventilation shaft and minor connecting tunnels; • access tunnels (and tunnel portals) to the underground power station comprising the MAT and ECVT; • fish control structures in proximity to Tantangara Reservoir wall; • establishment of a portal building and helipad at the MAT portal; • communication, water and power supply including the continued use of the Lobs Hole substation; • cable yard adjacent to the ECVT portal to facilitate the connection of Snowy 2.0 to the NEM; and • access roads, permanent bridge structures and barge launch ramps needed for the operation and maintenance of Snowy 2.0 infrastructure.
Temporary infrastructure	Temporary infrastructure required during the construction phase of Snowy 2.0 Main Works are: • construction compounds, laydown, ancillary facilities and helipads; • accommodation camps for construction workforce; • construction portals and adits to facilitate tunnelling activities; • barge launch ramps; • water and wastewater management infrastructure (treatment plants and pipelines); • communication and power supply; and • temporary access roads.
Disturbance area	The disturbance area is the indicative corridor inside the larger construction envelope, where construction works required to build Snowy 2.0 can be carried out. The disturbance area is 641 ha of which 604 ha is within KNP which represents less than 0.1% of the KNP. The construction envelope is shown on Figures 1.6 to 1.11. Most of the disturbance area will be rehabilitated and landformed and other parts will be retained permanently for operation (operational footprint).
Operational footprint	The operational footprint is the area required for permanent infrastructure to operate Snowy 2.0. The maximum operational footprint is about 99 ha which is approximately 0.01% of the KNP.
Tunnelling and excavation method	The primary tunnelling method for the power waterway is by TBM, with portals and adits using drill and blast methods. Excavation for other underground caverns, chambers and shafts will be via combinations of drill and blast, blind sink, or raise bore techniques.
Excavated rock management	Excavated rock will be generated as a result of tunnelling activities and earthworks. The material produced through these activities will be stockpiled and either reused by the contractor (or NPWS), placed permanently within Tantangara or Talbingo reservoirs, used in final land forming and rehabilitation of construction pads in Lobs Hole, or transported to Rock Forest outside KNP.

Table 1.7 Snowy 2.0 Main Works summary

Project element	Summary of the project
Construction water and wastewater management	Water supply for construction will be from the two existing reservoirs (Talbingo and Tantangara) and reticulated via buried pipelines (along access roads). Raw water will be treated as necessary wherever potable water is required (eg at accommodation camps). Water to be discharged (comprising process water, wastewater and stormwater) will be treated before discharge to the two existing reservoirs (Talbingo and Tantangara) as follows: treated process water will be reused onsite where possible to reduce the amount of discharge to reservoirs, however excess treated water will be discharged to the reservoirs; collected sewage will be treated at sewage treatment plants to meet the specified discharge limits before discharge and/or disposal; and stormwater will be captured and reused as much as possible.
Rehabilitation	Rehabilitation of areas disturbed during construction including reshaping to natural appearing landforms or returning to pre-disturbance condition, as agreed with NPWS and determined by the Rehabilitation Strategy (see Appendix F of the EIS). This includes construction areas at Lobs Hole which comprise surplus cut materials. Areas to be used by Snowy Hydro in the long-term may be re-shaped and rehabilitated to maintain access and operational capabilities (eg intakes and portal entrances)
Construction workforce	The construction workforce for the project is expected to peak at around 2,000 personnel.
Operational life	The operational life of the project is estimated to be 100 years.
Operational workforce	The operational workforce is expected to be 8-16 staff, with fluctuations of additional workforce required during major maintenance activities.
Hours of operation	Construction of Snowy 2.0 will be 24/7 and 365 days per year. Operation of Snowy 2.0 will be 24/7 and 365 days per year.
Capital investment value	Estimated to be $4.6 billion.

1.3 Construction of Snowy 2.0 Main Works

1.3.1 Construction phases and activities

The construction of Snowy 2.0 Main Works has different and overlapping phases during the approximate six year period. This is shown in Figure 1.12, with each of the different phases described in the following sections.

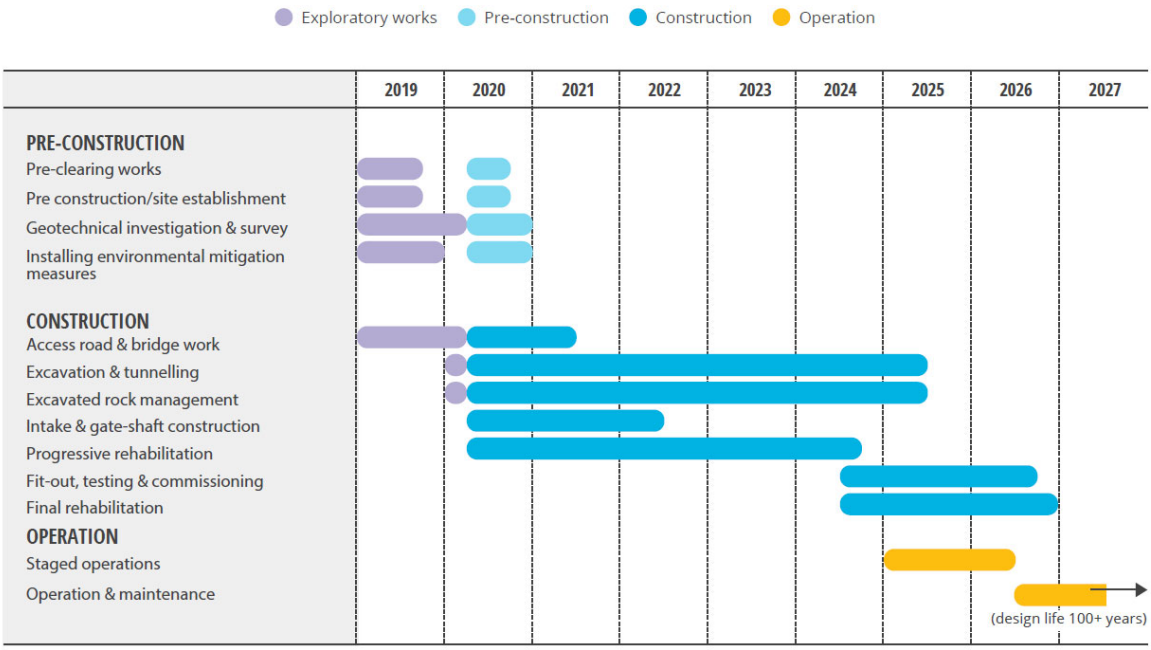


Figure 1.12 Indicative construction sequencing

i Pre-construction works

Pre-construction works will follow well-established practices with the following indicative steps carried out:

- prior to the commencement of work, all sites will be surveyed and clearly marked;
- site fencing will be erected to provide security and safety;
- erection of a temporary site compound at each site to support pre-construction activities;
- erosion and sediment control measures will be installed on site. This includes mitigation around stockpile areas. Topsoil and general fill material will be stockpiled in clearly separated areas;
- trees and shrubs will be cleared only within the demarcated disturbance boundary (clearing works includes removing tree stumps and roots up to 600 millimetres (mm) below ground);
- hazardous tree assessment of trees that are outside the disturbance boundary but within close proximity, and removal of any trees deemed to be hazardous or at-risk to ensure the safety of workers; and
- expansion of the initial site compound to provide facilities for the main construction activities.

Table 1.8 provides a summary of the activities to be carried out during the pre-construction phase of the works.

Table 1.8 Overview of pre-construction activities and methods

Component/stage	Construction area	Typical activities
Site establishment	• All	• Site boundary delineation and establishment of survey control network • Clearing and grubbing • Hazardous tree assessment within and adjacent to disturbance boundary and removal/trimming of hazardous trees as per assessment recommendations • Drainage and environmental controls • Earthworks and levelling • Establish construction ancillary facilities and access • Construct water and wastewater treatment facilities • Continued use of construction power substation
Construction – geotechnical investigation and survey	• All	• Clearing and levelling of drill pads including temporary access tracks and support infrastructure such as water supply and waste management systems • Drilling and in situ testing and characterisation within the construction envelope
Archaeological and heritage salvage and test excavations	• All	• Carry out archaeological and heritage surveys of project area as required • Record sites as required • Salvage items as required and carry out reporting as documented in Aboriginal Cultural Heritage Assessment (ACHA) and Historic Heritage Assessment
Pre-clearance surveys	• All	• Carry out ecological surveys in accordance with requirements of the Biodiversity Development Assessment Report (BDAR) and relevant species
Building and road dilapidation studies	• Lobs Hole • Tantangara • Relevant public roads	• Identify buildings and/or roads to be subject to dilapidation studies • Carry out dilapidation surveys and report • Execute relevant recommendations of dilapidation studies
Environmental management, monitoring and mitigation	• All	• Establish committed environmental management, monitoring and management measures inclusive of groundwater monitoring locations
Groundwater monitoring bores	• All	• Clearing and levelling of drill pads including temporary access tracks and support infrastructure such as water supply and waste management systems • Drilling and bore establishment • Rehabilitation of drill pad with access maintained

Management plans will be prepared as required by the conditions of approval and submitted to the relevant authority.

ii Construction and progressive rehabilitation

A detailed schedule will be prepared for the construction of Snowy 2.0 Main Works. It is anticipated the schedule will further detail the sequencing of construction and is expected to include the following discrete but overlapping activities:

Construction works: Once relevant designs are completed and approved, construction works will commence. The timing of the construction works is shown in Figure 1.12.

- Construction activities will occur concurrently at several sites across the project area.

- Progressive revegetation and rehabilitation, management and monitoring: Rehabilitation will be carried out progressively during the construction works where practicable. All non-permanent infrastructure will be decommissioned, and the disturbance area rehabilitated in accordance with a rehabilitation plan.

Table 1.9 Overview of construction activities and sequencing

Component/stage	Construction area	Typical activities
Construction - access road and bridge work	• All	• Site preparation of all roads (new or upgraded), including: – Clearing boundary is surveyed and pegged out – Removal/trimming of any hazardous trees following pre-construction survey if required as per assessment recommendations – Any pre-clearing activities are completed, such as facilitating the egress of fauna – Erosion and sediment control measures will be installed prior to works commencing, or as early as practicable • Construct retaining walls where needed • Excavate road level • Lay road base, pavement and drainage • Construct bridges and culverts • Install road furniture such as signs and safety barriers
Construction - excavation and tunnelling	• Talbingo Reservoir • Lobs Hole • Marica • Tantangara Reservoir	• Construct portals and adits • Mobilisation and site setup of TBMs (where required) • Excavate power waterways, power station cavern, and associated tunnel infrastructure • Install ground support where required • Receipt and use of precast segments for tunnels where required • Excavated rock management and haulage
Construction - excavated rock management	• Talbingo Reservoir • Lobs Hole • Marica • Tantangara Reservoir • Rock Forest	• Transport of excavated rock from tunnels, adits, portals and surge shaft to stockpile areas • Testing of excavated rock for suitability of placement (where required) • Transport to and filling of placement areas within the reservoirs and on-land placement for construction pads and/or permanent landforming
Construction - intake and gate shaft construction	• Talbingo Reservoir • Tantangara Reservoir	• Clearing and grubbing • Cut excavation and benching to required depth, retaining a temporary rock plug to allow dry works zone • Install permanent rock anchors where required • Concrete works • Removal of rock plug
Construction – progressive rehabilitation	• All	• Collection and storage of indigenous/native seed and alpine sods • Progressive rehabilitation comprising: – Stabilisation of slopes and preparation of sites for revegetation – Mitigation of sediment runoff – Hydroseeding/hydro mulching/planting of slopes – Decommissioning of infrastructure by removal of all temporary facilities – Reinstatement of topsoil and seeding and planting of vegetation – Protection of revegetation and weed management

iii Testing and commissioning

Commissioning activities will be carried out over approximately a two-year period and will involve:

- operation and testing of all plant in both generating and pumping modes, at all required power output and input ranges for operations;
- the associated transfer of water between Tantangara and Talbingo reservoirs at various reservoir levels; and
- the testing of operating and protection systems for the plant and equipment.

Table 1.10 Overview of testing and commissioning activities and methods

Component/stage	Construction area	Typical activities
Commissioning - fit-out, testing and commissioning	• Talbingo Reservoir • Lobs Hole • Marica • Tantangara Reservoir	• For all permanent structures: – Concrete works – Install electrical and mechanical – Test and commission plant equipment

iv Final rehabilitation

Most disturbed areas, not retained for operations, will be returned to land uses generally consistent with their pre-disturbance use, subject to ongoing consultation with NPWS. Snowy Hydro will liaise closely with NPWS to determine the extent of decommissioning of temporary construction facilities and rehabilitation activities to be carried out during and following the construction of Snowy 2.0 of Main Works.

This approach will be taken to ensure that decommissioning allows for integration with future planned recreational uses of these areas and to maintain the values of KNP and be consistent with the KNP Plan of Management (PoM) (NPWS 2006). An overview of final rehabilitation activities and methods is provided in Table 1.11. Further engagement with NPWS will be carried out to understand the opportunities to allow for recreational uses where appropriate and practical to do so within the rehabilitation activities implemented post-construction. This is discussed further in Section 1.3.8.

Table 1.11 Overview of final rehabilitation activities and methods

Component/stage	Construction area	Typical activities
Completion of rehabilitation	• All	• Detailed completion criteria, performance measures and associated indicators will be used to demonstrate success of rehabilitation. These include: – Phase 1: Active – Phase 2: Decommissioning – Phase 3 – Landform establishment – Phase 4 – Growth medium development – Phase 5 – Ecosystem and Land use establishment – Phase 6 – Ecosystem and Land use development – Phase 7 – Rehabilitation complete
Rehabilitation monitoring	• All	• Ongoing monitoring will be carried out as required using analogue/references sites for a comparison of the development and success of rehabilitation

1.3.2 Permanent infrastructure

i Intake structures and gate shafts

Intake structures are required at the Tantangara and Talbingo reservoirs to convey water in and out of the power waterway and ultimately to and from the Snowy 2.0 power station. Both intake structures are designed to operate in either generating or pumping mode with minimum head losses and optimised to reduce impacts on the environmental setting of the structures within KNP where possible. Each intake will comprise:

- a permanently submerged approach channel; and
- an integrated gate tower and diffuser structure.

The construction of intake structures will be divided into two stages. Firstly, the intake structures will be constructed on-land by excavating the intake pit, creating a natural rock plug to prevent reservoir water flowing into the tunnel and flooding the underground works. The rock plug will be removed in the second stage once the permanent approach channel has been excavated and all underground and tunnelling works are completed. Detailed description of the construction process for each intake is provided in Appendix D, with a snapshot provided in Figure 1.13 and Figure 1.14.

ii Power waterway tunnels, chambers and shafts

The main power waterway comprises the headrace tunnel and the tailrace tunnel. However, there are several other underground tunnels, chambers and shafts that enable the transfer of water between the two reservoirs and through the underground power station. Most of the power waterway infrastructure will be established underground, with access to the surface provided via several access tunnels and portals.

For the headrace and tailrace tunnels in particular, two single shielded TBMs will be utilised (refer to Figure 1.4). A dual mode TBM will be used to excavate the headrace tunnel, capable of operating as a single shield TBM or operating in slurry mode to manage naturally occurring asbestos (NOA) material expected along the way. The choice of the shielded TBM has been driven by safety considerations during construction and a higher rate of advance. When compared with drill and blast, shielded TBM excavation provides almost no exposure of workers to an unsupported rock mass.

The TBMs will be fully equipped to perform the excavation, ventilation, lining, removal of excavated material. Geotechnical drilling or ‘probing’ as well as seismic reflection and geo-electrical surveys will also be conducted ahead of the TBMs to identify potentially critical areas with poor rock conditions, high fracturing or the presence of an aquifer. Application, where required, of pre-grouting and secondary grouting from the TBM to prevent excessive leakage and aquifer drainage during tunnel construction, as well as to consolidate the rock mass and reduce the risk of jamming the TBM, will be undertaken.

iii Power station complex

Central to the operation of Snowy 2.0 is the underground power station, at a site to be optimised as a result of the further geotechnical investigations to be undertaken as part of Exploratory Works. While the location of the power station is the subject of further refinement as a result of the underground geotechnical drilling program (as described in the Exploratory Works EIS), the design and features of the power station are predominantly fixed.

The power station comprises two main caverns; the machine hall and the transformer hall. The machine hall will house six 340 MW pump-turbine generating units and associated plant facilities required for operating the power station. The transformer hall will house the power station's six transformers, power transmission equipment and the draft tube valves. The two caverns will be connected through Isolated Phase Busduct (IPB) galleries, which contain electrical equipment needed between the generating units and transformers.

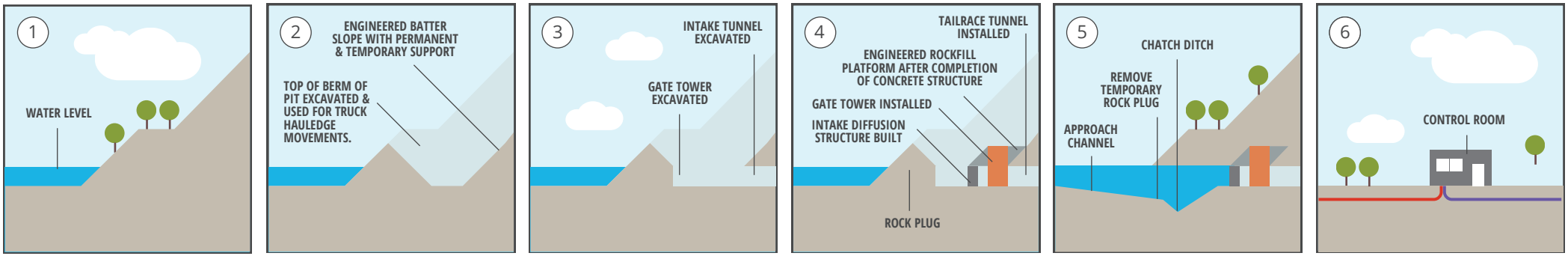
The cavern complex is deep underground and will be accessible from the MAT and from the ECVT (described in the next section). The construction methods for the key components of the underground power station are shown in Table 1.12. The drill and blast method has been considered most suitable for the deep underground excavation works involving short length and changing geometries. Surface miner excavation methods may also be utilised in the excavation of the Machine hall and Transformer hall.

Table 1.12 Snowy 2.0 power station complex summary

Primary component	Description/location	Construction method	Approximate size
Machine hall	Houses the six turbines	Drill and blast and/or surface miner	About 240 m long, 34 m wide and 55 m high
Transformer hall	Houses the six transformers	Drill and blast and/or surface miner	About 204 m long, 20 m wide and 34 m high
IPB galleries	Houses electrical equipment between generating units and transformers	Drill and blast	About 50 m long, 10 m wide, and 16 m high
Ventilation shaft and air intake structure	From the power station to the surface. The shaft and air intake structure (at the surface) will provide air to the cavern during construction and operation of the power station	Raise bore or blind sink	About 4 m in diameter below surface and about 680 m in height from the power station to the surface Air intake structure at the surface is 7.5 m long, 7.5 m wide and about 6 m high

Figure 1.13 **Talbingo intake construction snapshot**

NOT TO SCALE



TEMPORARY WORKS AND PRECONSTRUCTION ACTIVITIES

Temporary works and significant pre-construction activities to prepare for commencement of the main works include installation of:

- Setting out of the construction battery limits
- Temporary erosion and sediment control measures
- Clearing and grubbing within the battery limit
- Temporary bench access road from the Quarry Trail
- Security fence, entrance gate and safety signs around the construction and stockpile area battery limit
- Temporary stormwater drainage channel for work area and stockpile area.

EXCAVATION OF THE INTAKE

Future Gen will construct this intake using the open cut method. Drilling, blasting and mass
excavation will be carried out to reach the bottom of the intake structure with design batter slope for corresponding rock materials.

As the excavation progress downwards, permanent rock anchors will be installed to stabilise the cut surface depending on the rock materials found on site.

A temporary pit will be fitted with a pump to remove any possible surface water and rain water that accumulates during construction.

EXCAVATION OF THE GATE SHAFT

To gain access at the bottom area of the Intake Structure, Future Gen will excavate an additional tunnel from the Tailrace Adit tunnel. This tunnel will then be connected to the benching platform via a shaft done in Raise Boring method.

The remaining excavation from the FSL level will be carried out from the surface, with spoil mucking through the shaft and out of the access tunnel. Figure 2 shows the sequence of excavation and how to gain access in to the invert level of intake structure.

INSTALLATION OF INTAKE INFRASTRUCTURE & CONCRETE WORKS

The unique design at Talbingo intake requires the gate tower to be constructed as a freestanding tower from ground up. Once the concrete works of each lift of the intake structure have been completed and obtained sufficient design strength, backfilling works will commence to form the ground for construction of the next lift of the gate tower. Suitable site-won materials or materials improved with a mix of other materials and compacted to earthworks specification will be used for backfilling. A concrete face wall will be designed and constructed parallel to the mouth of intake opening to retain the base of this backfill work. The estimated backfill volume is 110,000m3.

The finished, backfilled batter slope will be rehabilitated with landscaping features as detailed in the contract landscaping reference design drawings.

Significant concrete works are required to construct both intake structures, specifically the diffusion structure and gate shaft.

The exposed portion of the diffusion structure will be constructed using conventional reinforced concrete, which will commence once excavation reaches the intake invert levels.

REMOVAL OF ROCK PLUG

The rock plug will be removed from the front of the intake structure. Due to the large volume of rock to be excavated and discarded, various excavation options are being considered.

The rock plugs will be removed using a combination of the following construction methods:

• Drill and blast to remove a portion of the rock plugs (to be confirmed with during the project execution phase) from the dry side in the excavated pit area. The amount of rock excavation to be completed to remove the plugs at Tantangara intake site is significant however, the majority may be able to be removed by blasting during dry conditions while the reservoir water level is low.

• Underwater blasting to break down the remaining rock material in the plug and remove by dredging machine or barge-mounted excavator.

• Long-arm excavator on a barge to remove bigger boulders, which are then crushed into smaller sizes before being transported to the dumping site, if required.

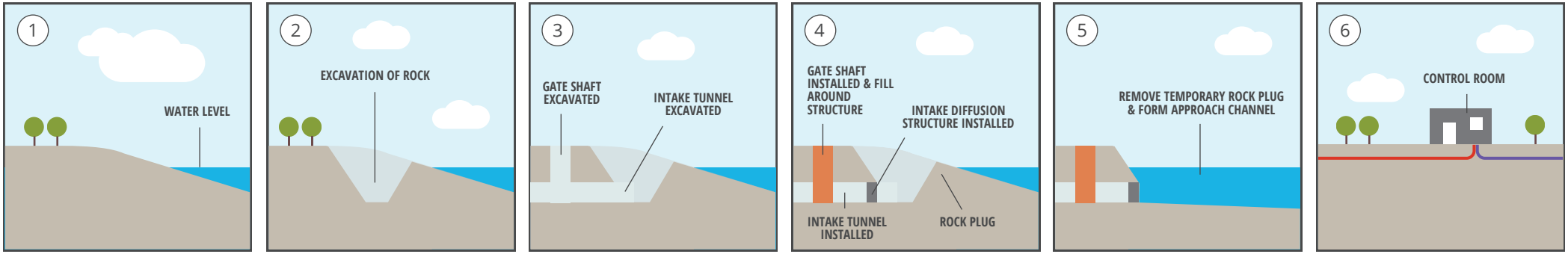
CONTROL ROOM/ CABLES & CONDUITS

The control room will house all equipment such as the hydro mechanical components, hoist, control instrumentation, sensors, DC Systems, transformers, switchboards and emergency diesel generator.

This building will be pre-fabricated with all components fitted and tested in factory before transporting it to site for connection, testing and commissioning. The trenches will be formed for laying the cables and conduits.

Figure 1.14 Tantangara intake construction snapshot

NOT TO SCALE



TEMPORARY WORKS & PRECONSTRUCTION ACTIVITIES

Temporary works and significant pre-construction activities to prepare for commencement of the main works include installation of:

- Setting out of the construction battery limits
- Temporary erosion and sediment control measures
- Clearing and grubbing within the battery limit
- Temporary bench access road from the Quarry Trail
- Security fence, entrance gate and safety signs around the construction and stockpile area battery limit
- Temporary stormwater drainage channel for work area and stockpile area.

EXCAVATION OF THE INTAKE

The intake pit excavation incorporates an open-cut trench into the various excavation levels as the works progress down below the natural surface level.

There will be drilling, blasting and mass excavation to be carried out to reach to the bottom of the intake structure.

As the excavation progress downwards, permanent rock anchors will be installed to stabilise the cut surface.

The temporary pit will be fitted with a pump to remove any water that accumulates during construction.

EXCAVATION OF THE GATE SHAFT

The shaft for the gate tower will be bored at the highest ground along the wet tunnel alignment, approximately 200m away from the intake mouth and will be completely hidden underground. Therefore, the intake transition piece will be connected to the gate tower transition piece with a stretch of wet tunnel.

The gate tower in Tantangara intake will be formed by a blind sink shaft boring method and the gate tower will be constructed from the bottom up with concrete filling in the void between the tower and shaft.

INSTALLATION OF INTAKE INFRASTRUCTURE & CONCRETE WORKS

Significant concrete works are required to construct both intake structures, specifically the diffusion structure and gate shaft.

The exposed portion of the diffusion structure will be constructed using conventional reinforced concrete, which will commence once excavation reaches the intake invert levels.

The diffusion structure at the opening of the Tantangara intake site will be open excavated from the top down and the concrete works will be constructed from the bottom up. Once completed concrete works, it shall be backfilled with local site-won material, which will be crushed to a consistent size to meet design backfill requirements.

REMOVAL OF ROCK PLUG

The rock plug will be removed from the front of the intake structure. Due to the large volume of rock to be excavated and discarded, various excavation options are being considered.

The rock plugs will be removed using a combination of the following construction methods:

- Drill and blast to remove a portion of the rock plugs from the dry side in the excavated pit area.
- Underwater blasting to break down the remaining rock material in the plug and remove by dredging machine or barge-mounted excavator.
- Long-arm excavator on a barge to remove bigger boulders, which are then crushed into smaller sizes before being transported to the disposal area.
- Personnel will use of depth silt curtain around the dredging and underwater blasting work zone during the construction phase to contain water pollution away from the rest of the reservoir.

CONTROL ROOM, CABLES AND CONDUITS

The control room will house all equipment such as the hydromechanical components, hoist, control instrumentation, sensors, DC Systems, transformers, switchboards and emergency diesel generator.

This building will be pre-fabricated with all components fitted and tested in factory before transporting it to site for connection, testing and commissioning.

The trenches will be formed for laying the cables and conduits.

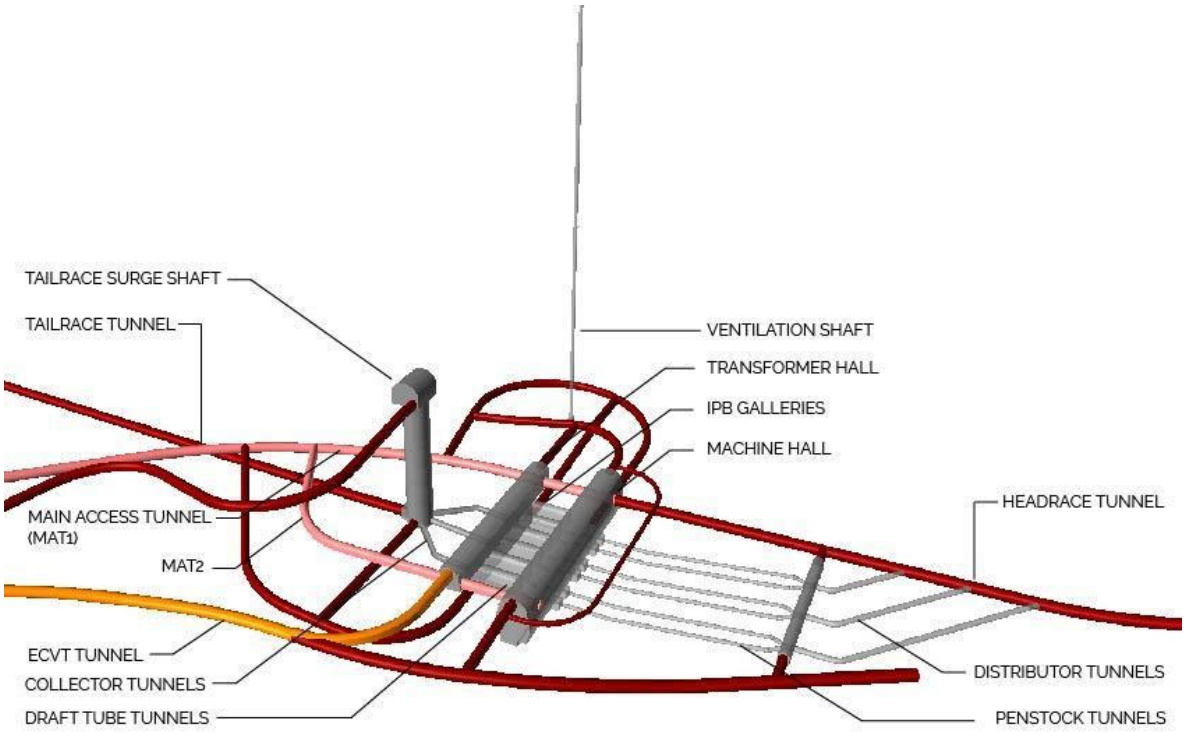


Figure 1.15 Powerhouse complex indicative general layout (3D)

iv Power station main access tunnel and the ECVT

Access tunnels are needed to provide efficient and safe access to permanent infrastructure. Access tunnels are considered to be permanent tunnels, which may also be used during construction of operational infrastructure.

All access tunnels will have portals and surface infrastructure established to facilitate entry. Portal positions for the permanent tunnels have been defined based on the topography, geological environment and spatial dimensions of the tunnel. Tunnels requiring surface infrastructure (ie portals) are the MAT and ECVT (adjacent to the MAT).

The MAT is the Exploratory Works tunnel, refitted and redesigned, as required, to provide the permanent main entry to the underground power station, power waterway tunnels, chambers and shafts.

i Substations and power connection

One substation is required to provide permanent power to Snowy 2.0, at Lobs Hole. This substation will be built for use as part of Snowy 2.0 Exploratory Works (approval currently being sought under Modification 1) with a capacity of 80 megavolt amps (MVA). It will continue to be used for Snowy 2.0 Main Works, however requires the establishment of additional power supply cables to provide power to the work sites, in particular to power the TBMs via the MAT, ECVT, Talbingo and Tantangara portals, as well as construction and accommodation camps at Talbingo, Marica and Tantangara. The supporting high voltage cable route therefore follows access roads to these locations (refer to utilities alignment shown on Figure 1.6 to Figure 1.11).

The cables will be overhead or underground (buried in a trench) from Lobs Hole to Marica and then on to Tantangara, along existing or proposed access roads. The cable trenches will be excavated to the required depth and in some areas direct drilled (such as for crossing sensitive environments such as watercourses). Bedding sand will be laid, and the conduit placed. Trenches will be backfilled and compacted with the excavated material.

The Lobs Hole substation will become a permanent feature of Snowy 2.0, with power to be reticulated to the power station and other operational facilities at Lobs Hole including the Talbingo intake control buildings and gates.

v Communication system

In addition to communications and construction power links established for Snowy 2.0 Exploratory Works, communications infrastructure will be established for Snowy 2.0 Main Works. The links will connect infrastructure at Tantangara and Talbingo reservoirs to the existing communications system at the Tumut 3 power station (via the submarine communications cable in Talbingo Reservoir established during Exploratory Works) and to Snowy Hydro's communications infrastructure at Cabramurra. This system will include fibre-optic cables, and will serve all fixed construction communication needs, as well as providing the permanent communication network. Buried fibre-optic cable will connect the Talbingo intake, the underground power station, headrace tunnel surge shaft and Tantangara intake.

The fibre-optic cable will be buried in conduits generally within access roads and established tracks. This involves excavating a trench, laying the conduits, pulling the cables through, and backfilling and restoring the surface. Communication pits will be required along the route to join lengths of cable. Watercourse crossings will be carried out in a manner that minimises environmental impacts where possible, and may include some trenching of ephemeral creeks (during dry periods only), bridging of creeks, temporary creek diversion and burying conduits below watercourse beds and some horizontal drilling or underbore methods, to minimise impacts to the watercourse and adjacent riparian zone. Horizontal drilling methods will also be considered to minimise impacts to other sensitive areas where possible.

vi Secondary containment controls

An instream barrier is proposed to prevent the potential upstream migration of Climbing galaxias (*Galaxias brevipinnus*), a native but translocated species, into the habitat of the critically endangered Stocky galaxias (*Galaxias tantangara*). The Climbing galaxias has the potential ability to climb out of the water up moist to wet vertical surfaces. While the potential transfer of this species between reservoirs is considered possible to unlikely, detailed scientific investigations have not been able to categorically rule out this potential upstream migration of Climbing galaxias through the power waterways connecting the two reservoirs.

Currently, Climbing galaxias have not yet been recorded in Tantangara Reservoir, however the pumping mode of Snowy 2.0 has the potential to transfer the species from Talbingo Reservoir as individuals have been detected in the hydrologically connected Yarrangobilly River. The upper reaches of Tantangara Creek contains habitat for the critically endangered Stocky galaxias (*Galaxias tantangara*). The existing waterfall is a barrier to other non-indigenous species such as Trout, however there is the potential risk this natural barrier may not be as effective for the Climbing galaxias. The construction of this instream weir in the upper reaches of Tantangara Creek is a secondary control to avoid its potential upstream migration and establishment and resultant potential impact upon Stocky galaxias.

Concept designs have been developed for a section of Tantangara Creek about 15 km upstream of the reservoir, above an existing waterfall just upstream of the Alpine Creek Firetrail. An indicative area is shown in Figure 1.9.

In addition, a filtration station/s to screen pest fish species from being discharged through the Murrumbidgee-Eucumbene Tunnel from Tantangara Reservoir is proposed. Detailed scientific investigations have not been able to categorically rule out potential transfer of pest species through the tunnels connecting the two reservoirs. Given the residual risk of potential transfer, it is proposed to avoid the potential secondary transfer of any pest fish species that may establish in Tantangara Reservoir as a result of Snowy 2.0.

Concept designs have been developed that would aim to prevent the potential transfer of all life stages of pest fish through the River Outlet Works of Tantangara Reservoir to the Upper Murrumbidgee River and through the Murrumbidgee-Eucumbene tunnel to Lake Eucumbene. This control is designed to limit the potential range expansion of any fish species of concern that may be potentially transferred to Tantangara Reservoir as a result of the project. The location of the station will be upstream of the existing reservoir wall, near the intake of the Murrumbidgee-Eucumbene tunnel within the disturbance footprint indicated in Figure 1.10.

1.3.3 Supporting construction sites and infrastructure

i Construction portals, tunnels and adits

Numerous construction adits are needed to provide access and facilitate the construction of the power station complex, tailrace tunnel and headrace tunnel. The adits will be excavated and accessed from portals established at Tantangara and Talbingo reservoirs, as well as the MAT and ECVT portals.

A level site area (a construction pad) may be needed for launching TBMs from the portals and / or from the intake structures. Therefore, construction of these sites will involve clearing and levelling of the site (which may include placement of surplus cut materials at Lobs Hole), with hardstand areas established. The portals and adits will be excavated using drill and blast techniques, with rock support and concrete works as needed. These areas are shown in Figure 1.16.

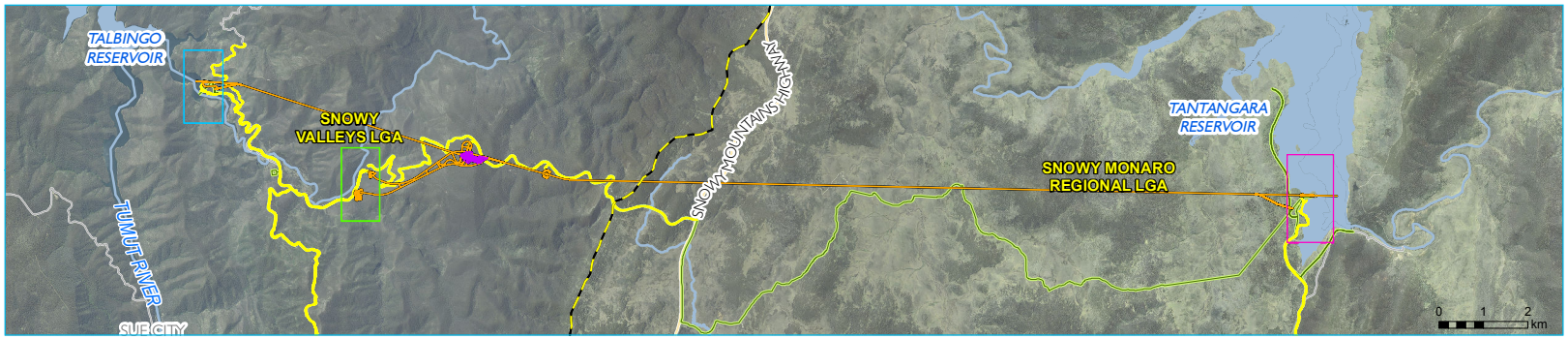
ii Primary construction compounds and laydown areas

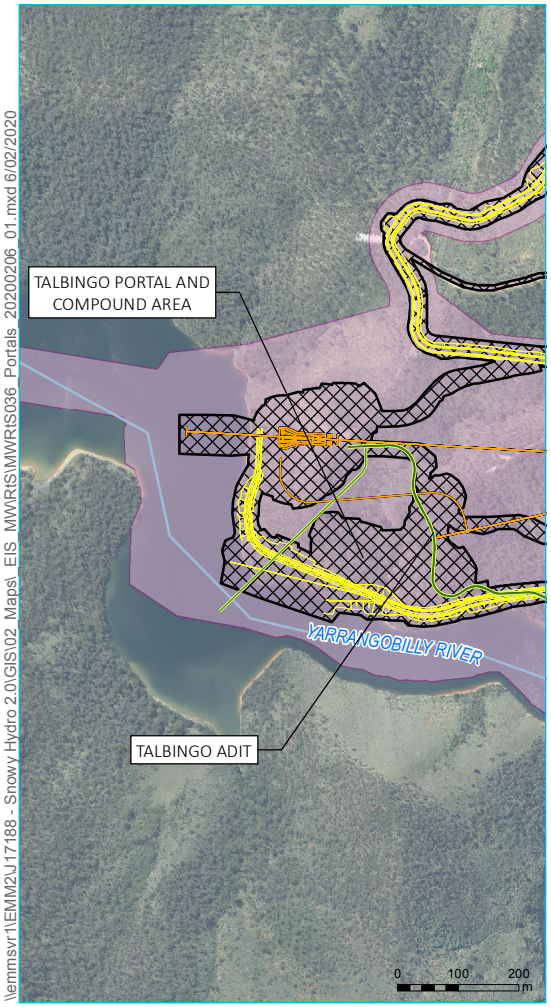
Within each of the construction areas, temporary construction compounds will be required (as previously listed in Table 1.1 to Table 1.6) to provide construction support facilities, such as CBPs, water and wastewater treatment facilities, material storage, material testing and laboratory facilities, lay down areas, stockpiles and hardstand areas. Construction will require the areas to be cleared of vegetation and earthworks involving cut and fill to ensure a level site area. Once these areas are no longer required for the construction of Snowy 2.0, they will be rehabilitated in line with the requirements of the Rehabilitation Strategy (see Appendix F).

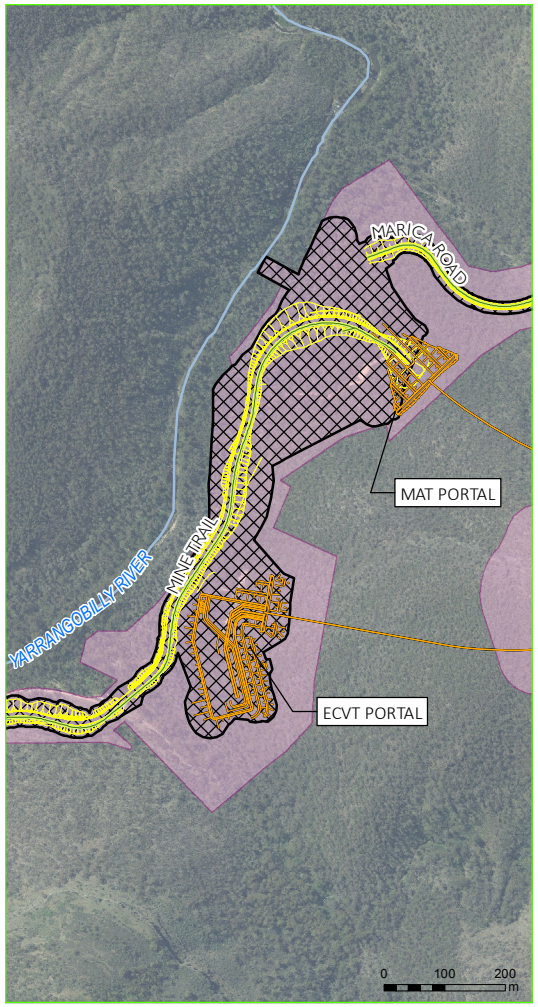
Compound areas associated with portals for the TBMs will contain the necessary facilities to support TBM operation. This includes storage of power plant, site offices, medical facilities, warehouse and workshops, TBM parts and tools storage, grouting system, water storage and storage of segments.

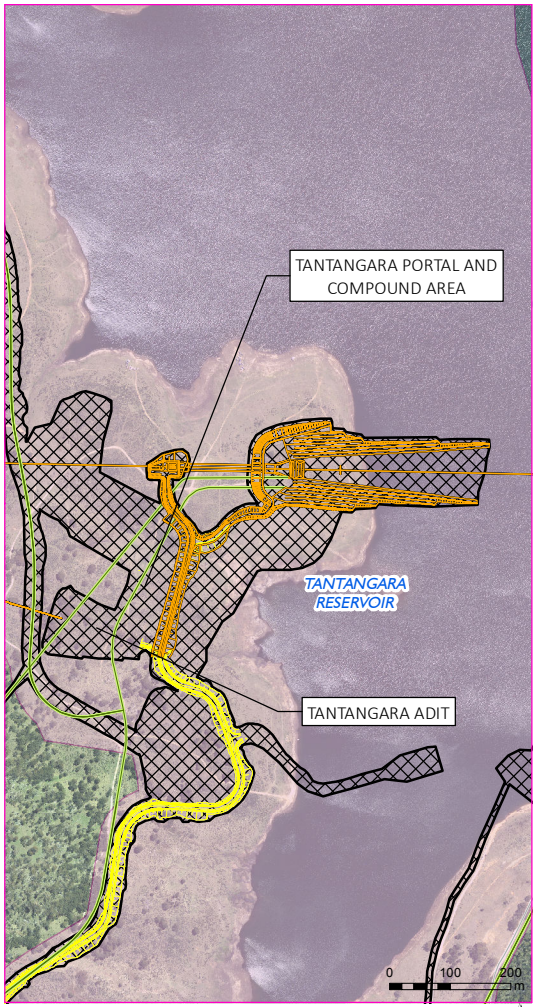
The Main Yard (Lobs Hole) will be the largest construction compound, providing most of the ancillary construction facilities and areas for laydown. It is likely to include ancillary construction facilities, warehouses, maintenance sheds, first aid buildings, medical facilities, helipad, explosive storage magazine, stockpiles (aggregate, and other materials), truck and vehicle parking, workshops and stores, offices, site worker facilities, site laboratory for testing of materials including concrete, aggregate, excavated rock and water quality, wood carpentry workshop and a steel fabrication yard.

Rock Forest, outside KNP, will be used as a storage and staging/logistics area for the delivery of materials to site as well as an emplacement area for excavated rock materials generated from the Marica area. During adverse weather or unsafe conditions, the site would be used to hold deliveries and staff for a short timeframe. Facilities likely to be established at the site include storage yards (for segments and other goods), turn around and parking yard for trailer/trucks and portable toilet facilities.









KEY

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Permanent road
- Disturbance area
- Construction envelope

GDA 1994 MGA Zone 55

N

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS036 Portals 20200206 01.mxd 6/02/2020

Portals to underground works

Snowy 2.0
Preferred instrastructure report
and response to submissions
Main Works
Figure 1.16

snowy 2.0

EMM creating opportunities

iii Ancillary construction facilities

Several supporting facilities are required to support construction activities within the construction areas. These are provided in Table 1.13.

Table 1.13 Ancillary construction facilities

Item	Description
Concrete batching plants (CBPs)	To ensure supply of concrete products (eg for grout), particularly during critical, large scale pours.
Crushing plants	To receive excavated material directly from the intakes and other sources such as cuts from road works.
Laydown areas	To host temporary installation such as machinery, formwork and oversize deliveries, as well as use for storage, equipment maintenance or work areas. Laydown areas will be provided at each of the main construction yards, providing space to store all plant, equipment and materials required for all construction activities.
Stockpile areas	To support both excavated rock from tunnelling and clearing activities, as well as aggregate and other building materials imported for construction.
Accommodation camps	To provide on-site accommodation for workers to deliver Snowy 2.0 Main Works. Snowy 2.0 Main Works will also utilise existing accommodation at Snowy Hydro's Cabramurra township where possible.
Helipads	Helipads will be near each accommodation camp where medical facilities are based, to provide emergency egress.
Water supply infrastructure	Raw water will be primarily sourced from Talbingo and Tantangara reservoirs for use in concrete mixing and supply to CBPs, tunnelling activities and supply to TBM (TBM cooling) and drill and blast sites as well as dust suppression and firefighting supply. Potable water will require the commissioning of water treatment plants within construction areas. Potable water will be reticulated to facilities in each accommodation camp site (ie Lobs Hole, Marica and Tantangara) via a reticulated system or via truck mounted water bowser.
Wastewater	A separate collection and treatment system is proposed to manage the tunnel seepage and construction wastewater (referred to as process water). The treated seepage water will be prioritised for reuse to supply construction demands. Treated water will be reused onsite where possible to reduce the amount of discharge to reservoirs, however excess treated water will be discharged to the reservoirs. Sewage will be generated at accommodation camps from showers, kitchens, laundries and toilet facilities. Collected sewage will be treated at sewage treatment plants to meet the specified discharge limits before effluent is discharged. To minimise raw water intake and runoff, stormwater will be captured and reused as much as possible. Sedimentation basins and stormwater diversions would be installed as part of erosion and sediment control measures. Higher order erosion and sediment controls such as clean and dirty water separation and minimisation of disturbed areas will significantly reduce the quantity and improve the quality of sediment-laden water required to be treated.

1.3.4 Temporary and permanent access roads

i Construction access

Access works are required to:

- provide for the transport of excavated material between the tunnel portals and the excavated rock emplacement areas;
- accommodate the transport of oversized loads as required; and
- facilitate the safe movement of plant, equipment, materials and construction workers into and out of construction sites.

Construction of Snowy 2.0 Main Works will require use of existing roads and tracks within KNP, some of which will need to be restricted from the public for the entire construction period for safety reasons. Once construction has finished, Snowy Hydro will either return the existing road to a standard agreed to with NPWS or rehabilitate constructed roads and return access to NPWS and the public. Some new roads will be constructed to provide access to permanent infrastructure with these roads maintained in the long term and some public access restrictions signposted.

The primary access roads to the construction areas are listed below.

- Talbingo Reservoir and Lobs Hole – accessed by Lobs Hole Ravine Road;
- Marica – accessed by Marica Trail;
- Plateau – accessed by Gooandra Trail;
- Tantangara Reservoir – accessed by Tantangara Road; and
- Rock Forest – accessed by Snowy Mountains Highway.

Road conditions will be impacted by the heavily loaded construction traffic and the climatic conditions of the region, including snow, rain, heat and dry weather. To adequately maintain safe access and use of roads through to completion, maintenance crews will be employed, undertaking maintenance activities such as using snow ploughs and blowers, grade, patch, fill pot holes, water and re-mark roads as necessary.

Section 1.5 of this chapter provides a summary of works required for these roads and the access arrangements for both the construction period and long-term once construction has finished.

ii Road works

Snowy Hydro has been liaising with NSW Roads and Maritime Services (RMS) to understand the existing program of works within the region to be carried out during the planned construction of Snowy 2.0 Main Works and the requirements of the project. Road works required for the Snowy 2.0 Main Works are as follows:

- widening of the intersection with Snowy Mountains Highway and Tantangara Road – to allow safe passage for light and heavy vehicles through this intersection;
- new intersection with Snowy Mountains Highway and the Marica Trail – to allow direct access to construction areas for project-related traffic;

- new access from Rock Forest with Snowy Mountains Highway – to allow ingress and egress from the Rock Forest property to the Snowy Mountains Highway for light and heavy vehicles; and
- widening of the intersection with Link Road and Lobs Hole Ravine Road - to allow direct access to construction areas for project-related traffic.

1.3.5 Management of excavated rock

i Management strategy

The strategy for the management of excavated rock will aim to maximise beneficial reuse of materials for construction activities. Beneficial re-use of excavated material may include use for road base, pad establishment, selected fill and tunnel backfill and rock armour as part of site establishment for construction areas. Excess excavated material that cannot be re-used during construction will be placed in emplacement areas at Talbingo and Tantangara reservoirs and Rock Forest, outside KNP. During the construction phase, surplus cut materials used to establish construction pads within Lobs Hole may be used to assist with landforming and rehabilitation.

This section provides an overview of the proposed strategy for excavated material management including the methods proposed for placement within the reservoirs.

ii Sources of excavated rock

Approximately 11 million m^3 (bulked) of excavated material will be generated by Snowy 2.0 Main Works. Excavated material will be generated by the activities listed below:

- intake construction at both reservoirs;
- tunnelling for power waterways, access tunnels and adits;
- excavation of underground caverns, chambers and shafts;
- road establishment and upgrades; and
- site establishment for construction areas and accommodation camps.

The management of excavated material generation and disposal has been divided into three zones systems based on Tantangara, Marica and Talbingo. The predicted excavated material is categorised according to the main methods of tunnel excavation, TBM and drill and blast.

iii Re-use of excavated material

Several sections along road alignments and construction sites will have large cut and fill quantities. It is also considered much of this material will be suitable for reuse as embankment material. Suitable material will be crushed and screened on site as necessary at stockpile locations, minimising the need to import material and reducing road traffic. Material reuse is expected for:

- compound and camp locations to level the site as part of construction (construction pads);
- fill at the MAT, ECVT, Talbingo and Tantangara portal (permanent operational pads and structures); and
- road works in the project area.

Estimated reuse volumes are shown in Table 1.14.

Table 1.14 Estimated excavated material volumes reused or permanently placed

Zone	Total estimate	Emplacement areas	Re-used for permanent operational structures (eg roads and operational pads and portals)	Construction pads
Talbingo	7,150,000 m^3	4,100,000 m^3	1,100,000 m^3	1,950,000 m^3
Marica	650,000 m^3	410,000 m^3	200,000 m^3	40,000 m^3
Tantangara	3,300,000 m^3	2,900,000 m^3	340,000 m^3	120,000 m^3

iv Placement

Excavated material not used for beneficial re-use will be permanently emplaced within nominated areas at Talbingo (Ravine Bay, GF01 and Main Yard), Rock Forest and Tantangara (Peninsula). Placement of excavated material will be carried out 24 hours a day, seven days a week and 365 days a year. The locations of these emplacement areas are shown in Figures 1.17 to 1.20.

At Ravine Bay, only the drill and blast material will be placed from the reservoir bed up to FSL to construct the pad. On top of the drill and blast pad, and on existing land above FSL, placement of predominately finer TBM material will occur using the geomorphic method. The capacity of the design above the FSL is approximately 2.7 million m^3.

At Tantangara (Peninsula), the proposed location would involve constructing a geomorphic method connecting to the existing ridgeline that runs along the western shoreline of Tantangara Reservoir. Similar to Ravine Bay at Talbingo, drill and blast material would be placed below FSL, with a capacity for approximately 1 million m^3, whilst the TBM material would be placed above FSL allowing for an additional 1.9 million m^3.

The final elevation of the emplacement areas above FSL will be designed using a geomorphic method to ensure that the final landform integrates into the existing topography around the landform minimising impacts to park users in the long term. These emplacement activities would be constructed above water levels as Snowy Hydro is able to manage the operational water levels within Tantangara Reservoir through operation of the existing Snowy Scheme. Further engagement with NPWS will be carried out regarding the end use of these areas, such as recreational areas.

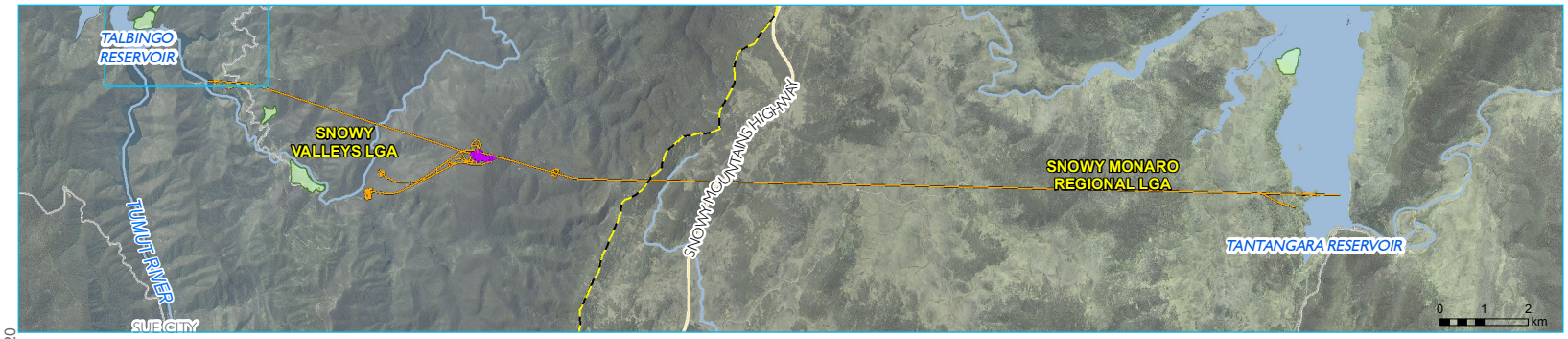
Excavated rock generated from the Marica zone will be transported to Rock Forest which is outside KNP. Once placed at Rock Forest, the excavated rock will be geomorphically landformed, and then rehabilitated consistent with the other on-land emplacements.

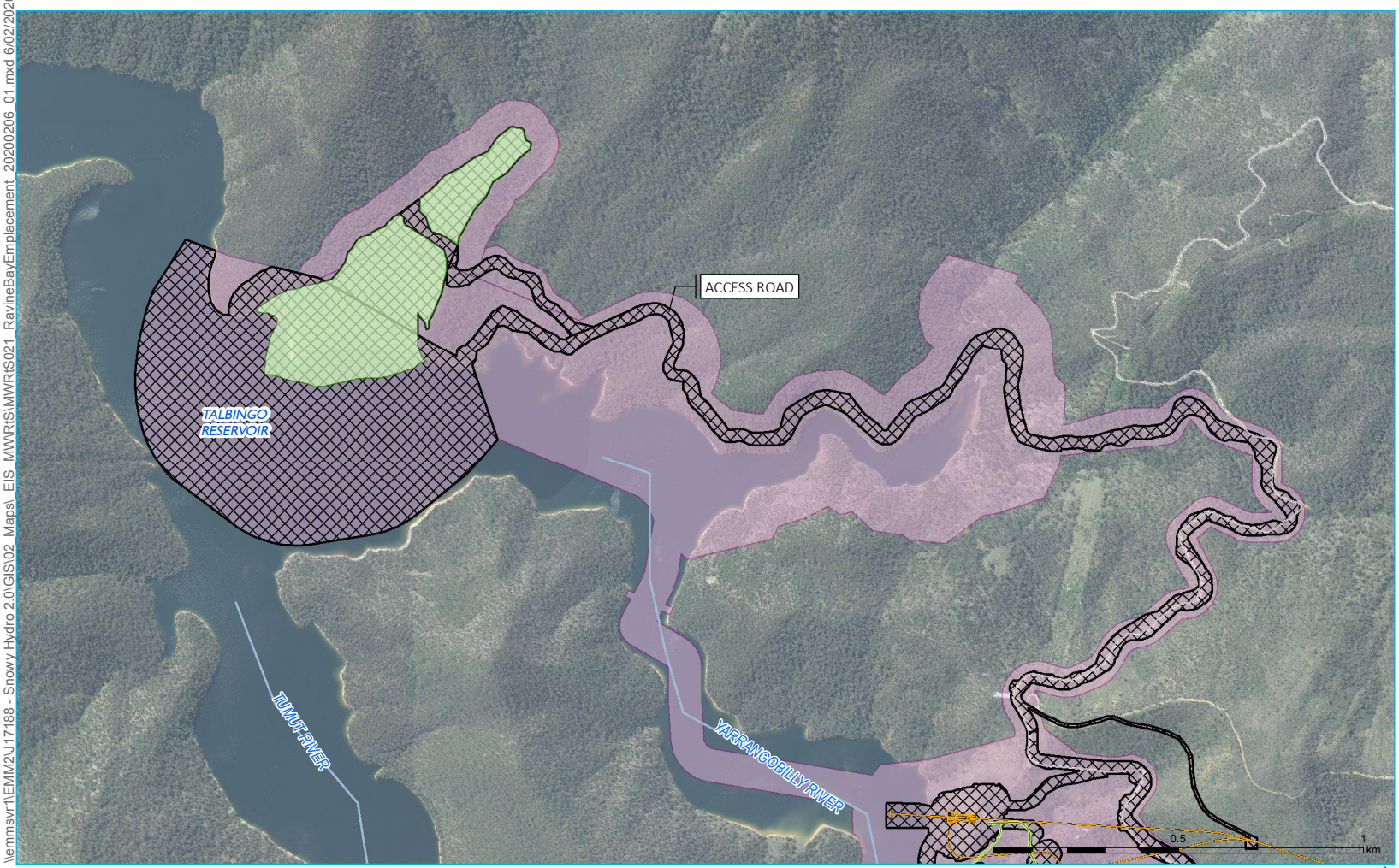
a Transport and placement at Talbingo Reservoir and Lobs Hole

Placement of excavated rock within Talbingo Reservoir involves placing materials from the northern edge of Ravine Bay into the Talbingo Reservoir by conventional earth-moving plant, such as trucks and excavators, and installing a rock armour layer formed by large size excavated rock on the emplacement slope batter by barges.

A new access road will be constructed from Lobs Hole Ravine Road North along the shoreline of Ravine Bay for about 5.8 km. This access road will be used to transport materials suitable for placement within Ravine Bay.

Figure 1.22 provides an indicative rehabilitated landform at the Ravine Bay emplacement area.





KEY

- Emplacement area

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Disturbance area
- Construction envelope

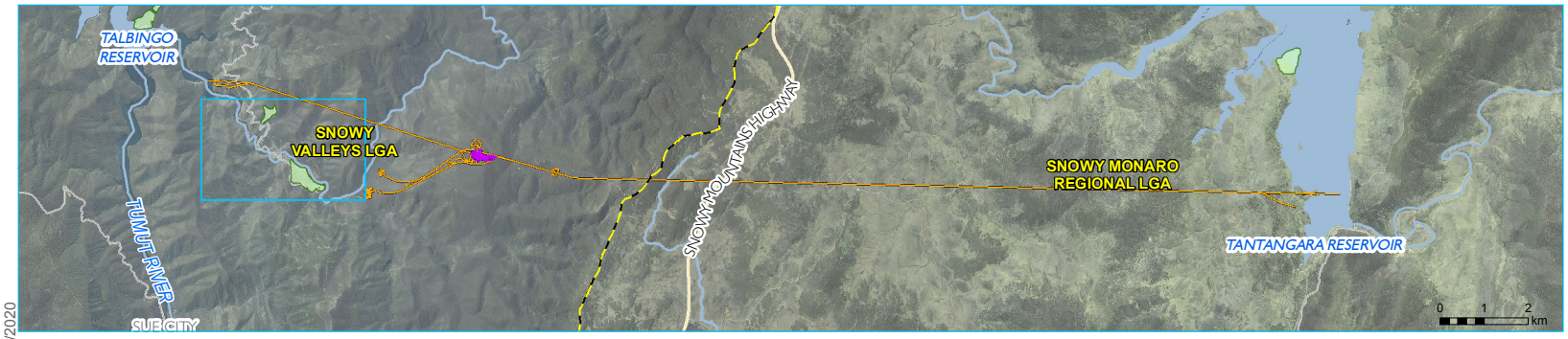
The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

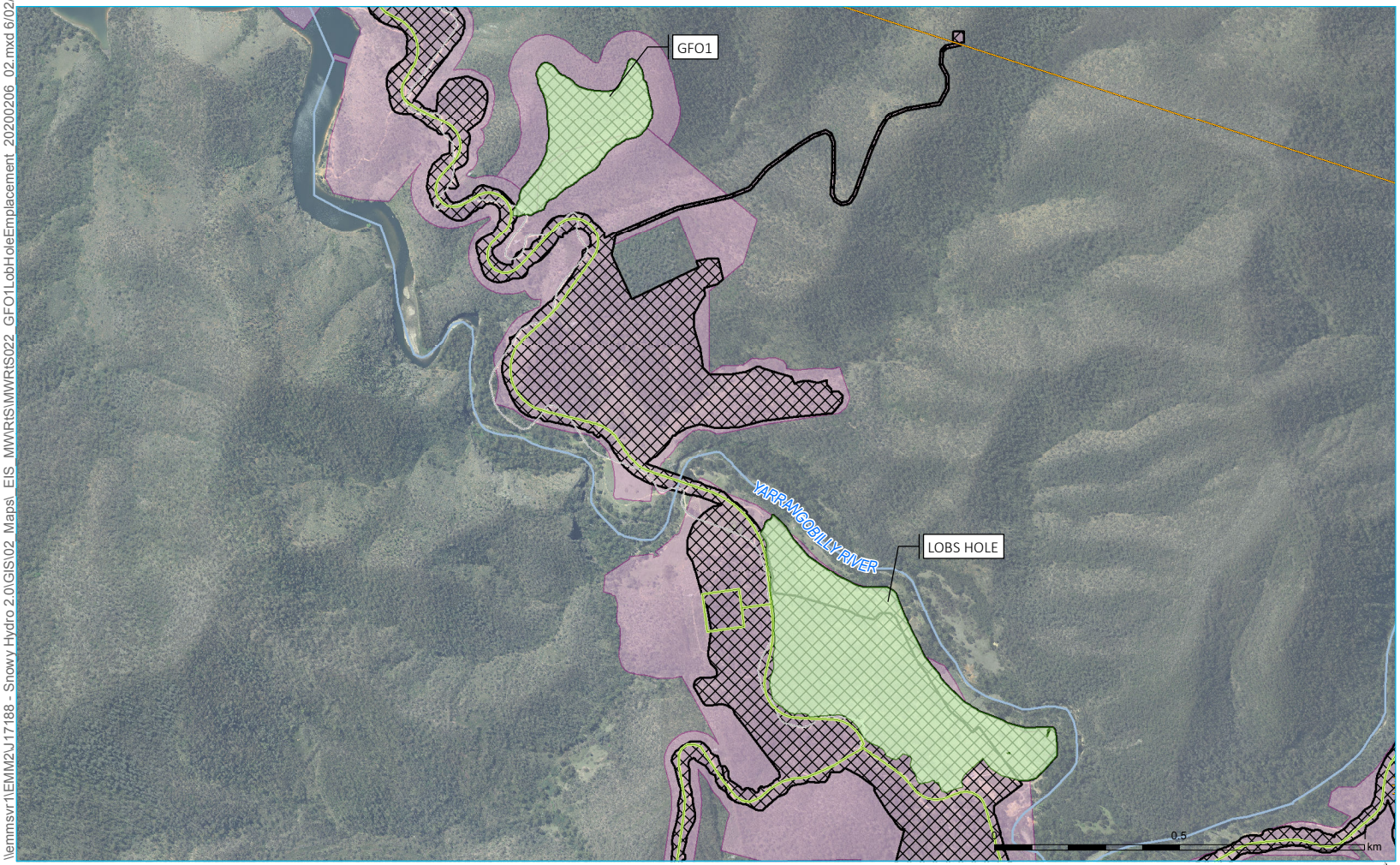
Ravine Bay emplacement area

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.17

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS021 RavineBayEmplacement 20200206 01.mxd 6/02/2020





KEY

- Emplacement area

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

GDA 1994 MGA Zone 55

N

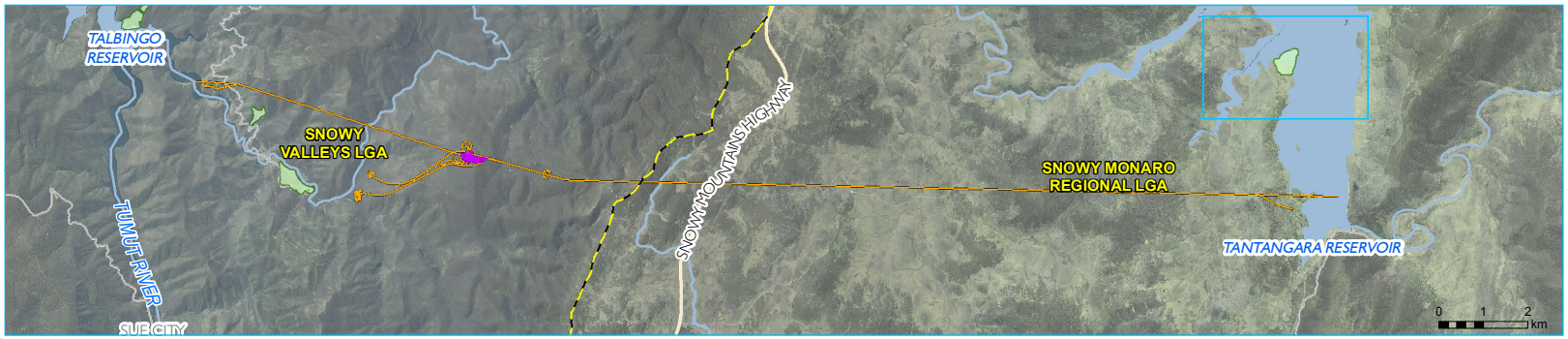
\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS022 GFO1LobHoleEmplacement 20200206 02.mxd 6/02/2020

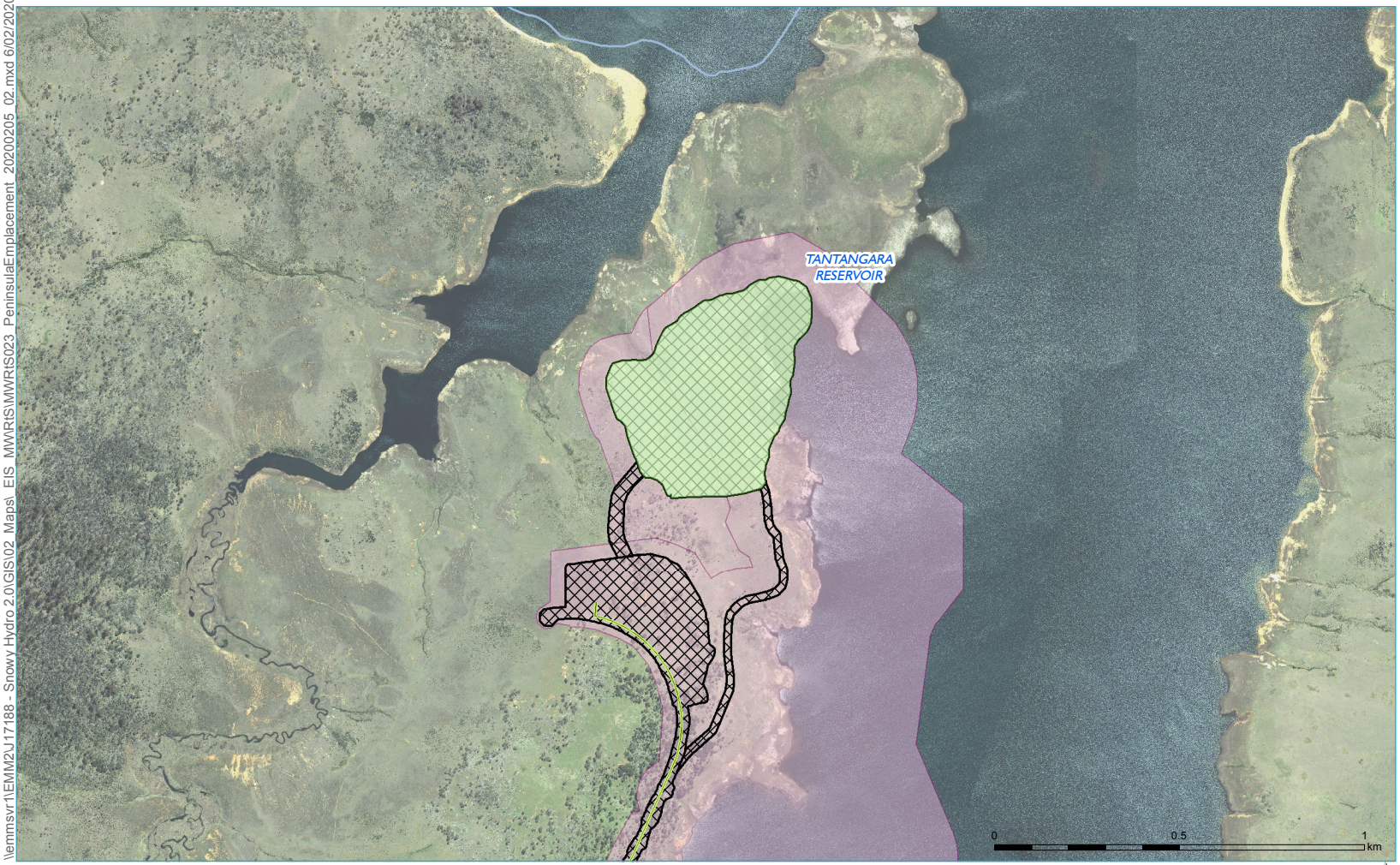
GF01 and main yard emplacement areas

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.18

snowy 2.0

EMM creating opportunities





KEY

- Emplacement area

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Disturbance area
- Construction envelope

The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that the precise location of the disturbance area may move within the broader construction envelope and consequently there will be some further refinements to the disturbance area.

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS023 PeninsulaEmplacement 20200205 02.mxd 6/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

GDA 1994 MGA Zone 55

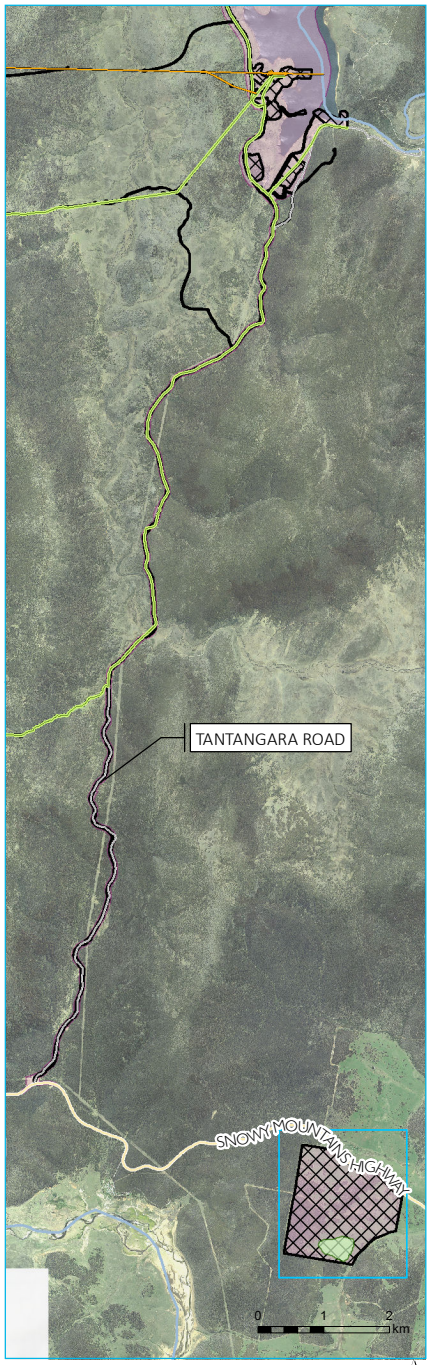
N

Peninsula emplacement area

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.19

snowy 2.0

EMM creating opportunities



KEY

- Emplacement area

Existing environment

- Main road
- Local road
- Watercourse

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Utilities
- Disturbance area
- Construction envelope

The disturbance area is the extent of construction works required to build Snowy 2.0. The disturbance area is an estimation of the area required for construction works based on the current level of project design. Detailed design is still required to be completed, therefore it is expected that there will be some minor amendments to the disturbance area.

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

GDA 1994 MGA Zone 55

N

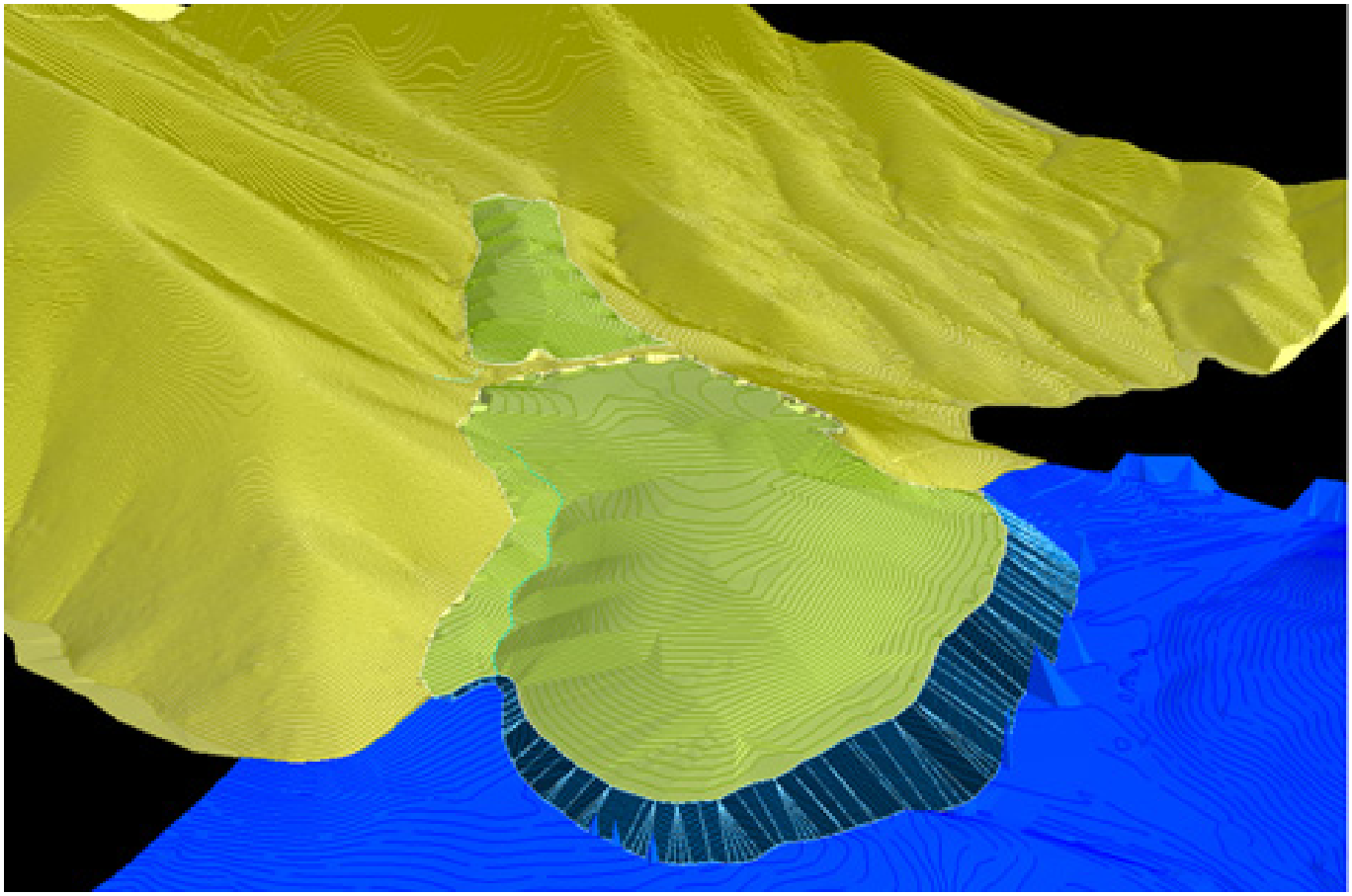
Rock Forest emplacement area

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.20

snowy 2.0

EMM creating opportunities

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS024 RockForestEmplacement 20200130 01.mxd 7/02/2020



Ravine Bay emplacement area visualisation and geomorphic method
Snowy 2.0
Preferred infrastructure report and response to submissions
Main Works
Figure 1.21

b Transport and placement at Tantangara Reservoir

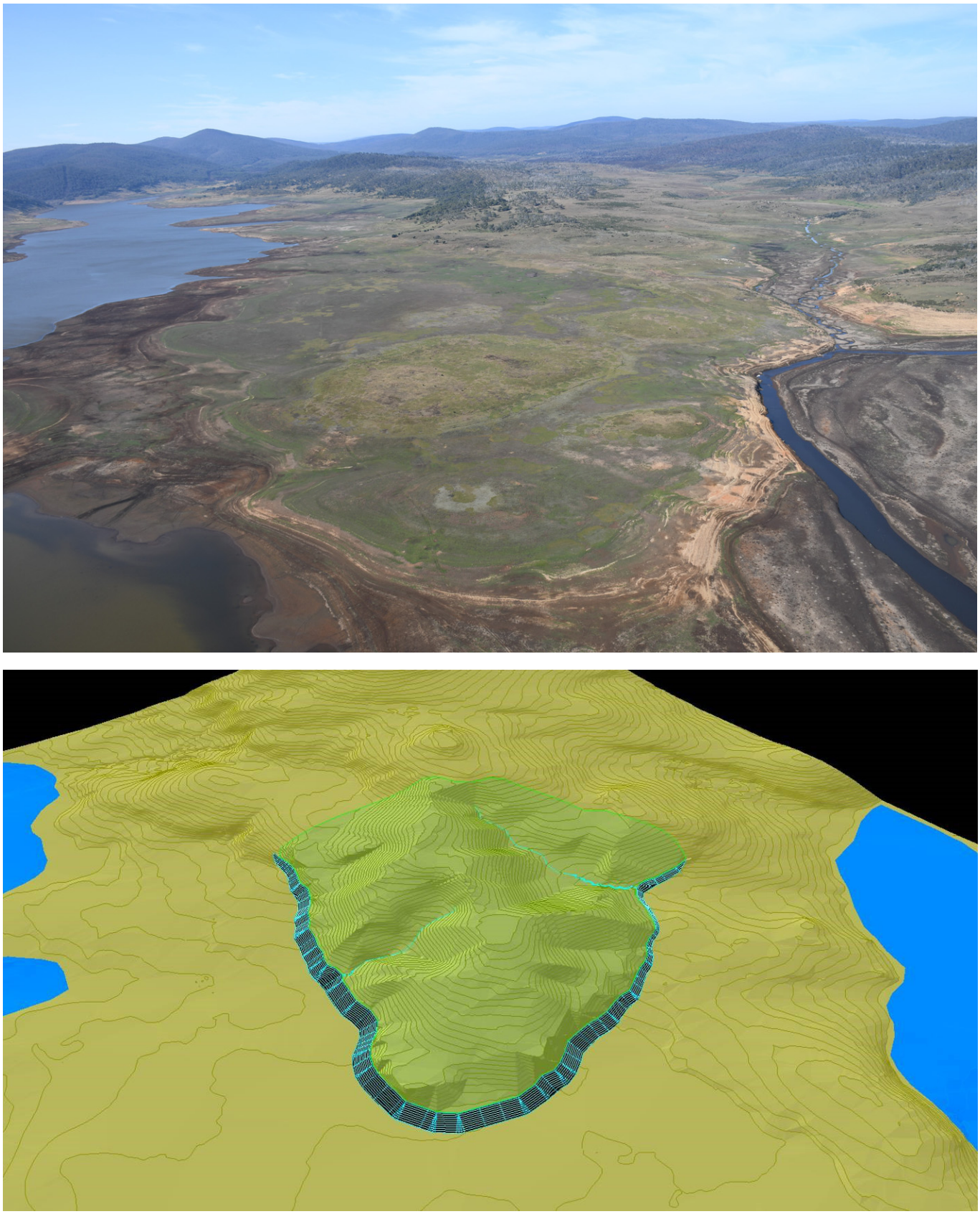
Placement of materials within Tantangara Reservoir partially utilises an area within the active storage of the reservoir, between MOL and FSL. During the placement of materials, Snowy Hydro is able to manage the water levels within the reservoir through existing approved operating practices for the Snowy Scheme. This will provide for efficient conditions for effective placement within the reservoir using conventional earth-moving equipment and techniques.

Like the Ravine Bay placement, appropriate erosion and sediment control measures, such as temporary diversion drains will be installed prior to the commencement of placement activities. As placement activities will be carried out on land (albeit within active storage of the reservoir), materials will be placed in cells to minimise potential for impacts. Finer materials will be placed within the cells whilst the batters of these cells will be covered by larger sized materials. As a cell is nearing completion, the next cell is prepared to commence receiving materials. The placement area is progressively filled over an anticipated three year placement program.

A nominal 1 m thick rock armour will be installed for protection of the placement surface as it will be submerged for periods of time given the variation in water levels between MOL and FSL, similar to the currently approved practices of Snowy Hydro. The placement area will be rehabilitated to about 1 m above FSL to allow for revegetation. Figure 1.22 provides an indicative rehabilitated landform at the Tantangara Peninsula emplacement area. The future use, including recreational, of this area will be subject to ongoing engagement with NPWS.

v On-land placement and rehabilitation

The continued use of the Main Yard at Lobs Hole requires considerable materials in the form of surplus cut to create safe and stable areas for construction. Following completion of construction activities for Snowy 2.0 Main Works, these surplus materials and areas will be landformed, reshaped and rehabilitated to their pre-construction condition. The Lobs Hole area is a remote area of KNP and is used by recreational users for these values. Snowy Hydro will continue to engage with NPWS regarding the opportunities for future recreational use of these areas at Lobs Hole.



Tantangara Peninsula emplacement area (aerial view) and geomorphic method

Snowy 2.0

Preferred infrastructure report and response to submissions

Main Works

Figure 1.22

1.3.6 Traffic and transport requirements

i Traffic generating activities and volumes

Throughout the construction period there will be several traffic generating activities, including:

- deliveries of materials, plant and equipment to and from site, including materials such as aggregate and cement as well as delivery of segments;
- transport of personnel to designated airports;
- busing of personnel to and from shifts on site;
- servicing of accommodation camps (eg waste collection, food delivery, etc); and
- haulage of excavated rock and materials from surface works and tunnelling activities.

The regular types and volumes of vehicles estimated over the life of the construction works will range from semi-trailers delivering concrete and segments for the tunnels, triple trailer Performance-Based Standards (PBS) vehicles for segment delivery, truck and dogs bringing in road-base and other construction materials, agitators for the concrete pours to smaller vehicles such as mini-busses and coaches for the workforce and light vehicles for internal movements by personnel. These movements will occur on both the external and internal site road network.

In June 2019, Snowy Hydro lodged an application seeking planning approval from the NSW Minister for Planning and Public Spaces for an ancillary facility to Snowy 2.0, being a segment factory in Polo Flat (SSI-10034). Should the factory be approved and constructed, segments would be manufactured and delivered to site from Polo Flat.

ii Transport routes

The bulk of the deliveries and transport requirements for Snowy 2.0 Main Works are expected to approach the project from the east, travelling through Cooma, due to likely availability and source of materials required for the construction of Snowy 2.0 Main Works. Roads from the east are predominantly established designated transport routes. The primary transport routes for delivery of materials and equipment to site are shown on Figure 1.23, and comprise:

- route to Talbingo Reservoir and Lobs Hole:
  - main access: Snowy Mountains Highway > Link Road > Lobs Hole Ravine Road; and
  - alternative access/egress: Snowy Mountains Highway > Marica Trail > Marica Road West > Lobs Hole Road;
- route to Marica:
  - Snowy Mountains Highway > Marica Trail > Marica Road West;
- route to Tantangara Reservoir:
  - Snowy Mountains Highway > Tantangara Road > Quarry Trail.

Transport routes outside of the ones described above and shown in Figure 1.23 will also be used, but are likely to be used for minor supplies of materials or services. These include approaching the project from the west (using Elliot Way) or from the north (using Snowy Mountains Highway). It should be noted that excavated rock materials generated from Marica will be transported to Rock Forest for emplacement.

iii Marine access

Barge launch facilities on Talbingo will have already been established during Snowy 2.0 Exploratory Works for the placement of the submarine communications cable, and will continue to be used for Snowy 2.0 Main Works for construction works associated with the Talbingo intake structure. Snowy 2.0 Main Works will require the establishment of launch facilities on Tantangara Reservoir to enable these similar works (removal of the intake plug).

iv Movement of personnel and shifts

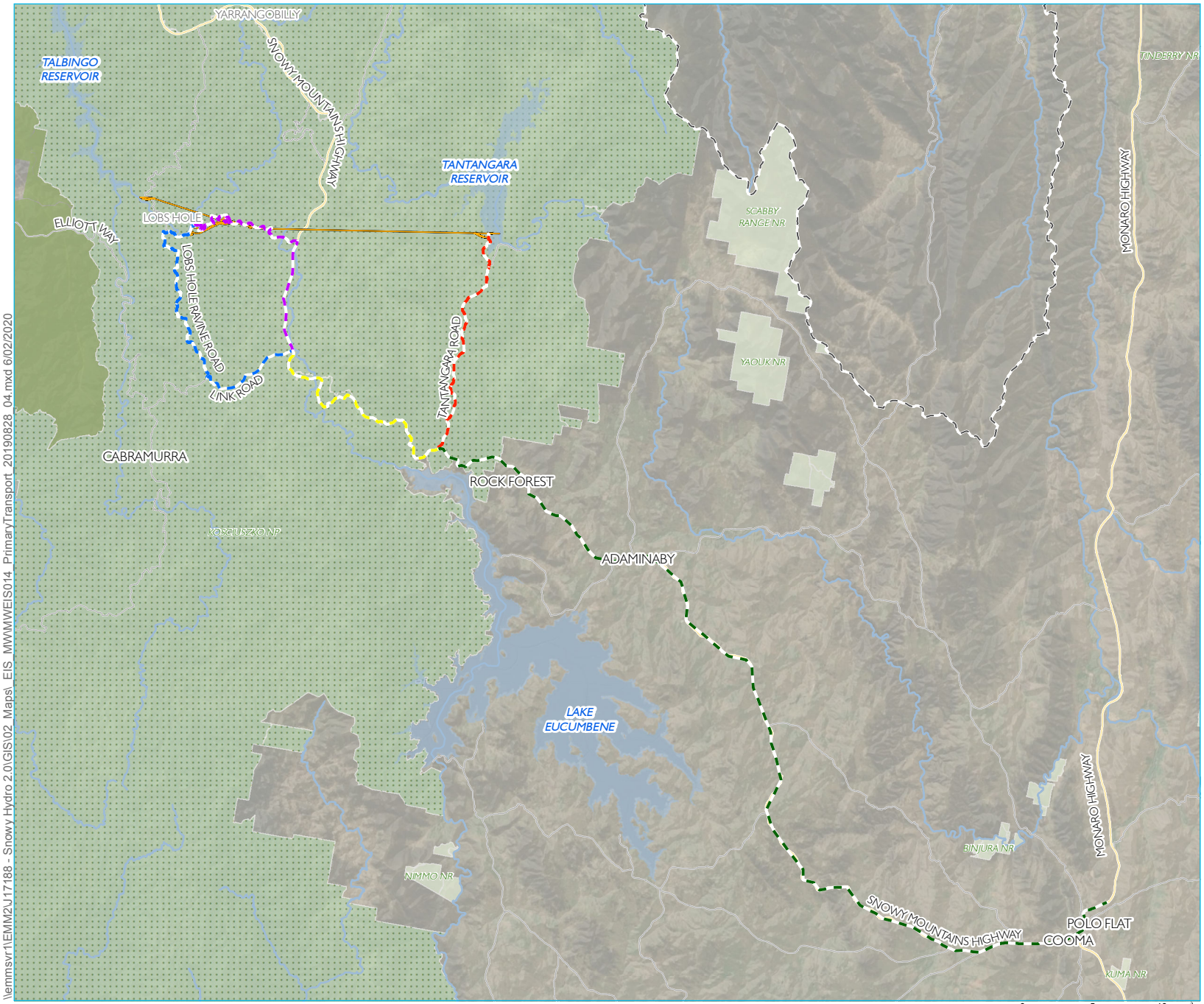
Personnel working on the project will generally not be permitted to drive to the camps, in order to reduce the volume of traffic on the roads and reduce travel time and improve safety outcomes for the workforce. This also has the benefit of reducing parking requirements at the accommodation camps. They will be transported from designated towns and airports to the accommodation camps by project-supplied buses.

When on site, buses will collect workers and transport them between accommodation camps to various worksites before and after shifts. Bus pick-up and drop-off points will be marked at accommodation camps and at worksites, along with safe pedestrian routes. Sufficient buses will be allocated to each camp to ferry the workforce back and forth at the start and end of each shift. Exceptions will apply for superintendents and engineers or for personnel who require flexibility of movement as a result of the nature of their role.

The site roster for personnel will be developed as part of FGJV's human resources and recruitment initiatives. However, it is expected to be 20 days on, 10 days off, with two shifts of 12 hours each, or similar arrangement.

The use of Lobs Hole Ravine Road North for an alternative light vehicle access to Lobs Hole, which is currently part of a proposed modification to the Snowy 2.0 Exploratory Works approval, will be continued under Snowy 2.0 Main Works.

.



KEY

Primary transport route

- All site access from Cooma to KNP and Rock Forest
- Route to Tantangara Reservoir
- Route to Talbingo Reservoir and Lobs Hole
- Route to Marica and Lobs Hole
- Route to Marica, and alternative access to Lobs Hole

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Kosciuszko National Park
- NPWS reserve
- State forest
- State boundary

\\emmsvr1\EMM2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWMWEIS014 PrimaryTransport 20190828 04.mxd 6/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

Primary transport routes

Snowy 2.0
Preferred infrastructure report and response to submissions
Main Works
Figure 1.23

snowy 2.0

EMM creating opportunities

1.3.7 Workforce requirements

i Workforce

The workforce is expected to reach about 2,000 workers at peak construction, based on current labour requirements forecast by the contractor. The indicative distribution of the workforce over the construction program is shown below in Figure 1.24.

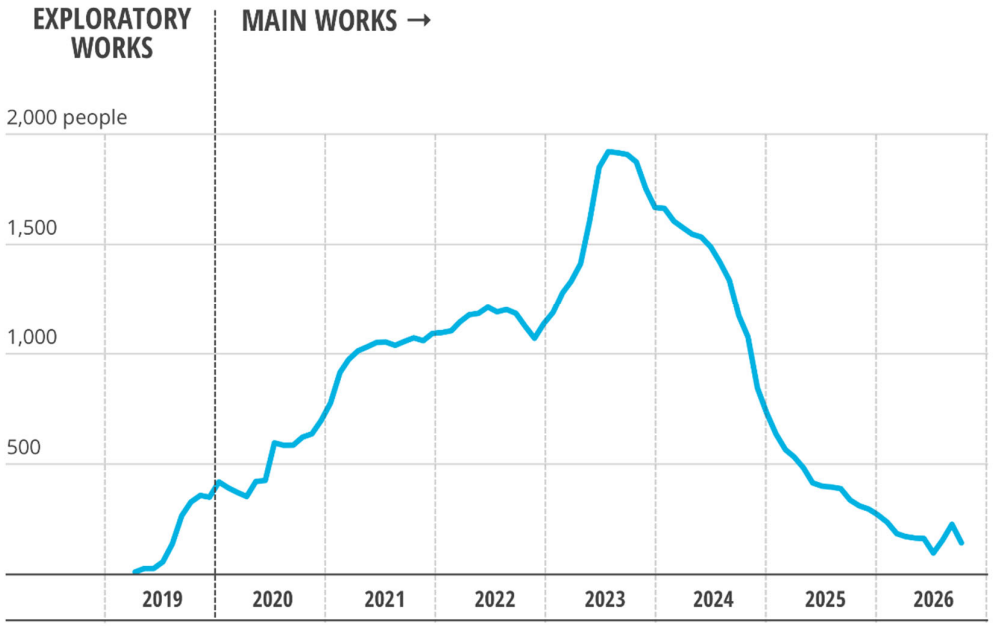


Figure 1.24 Indicative workforce histogram

The segment factory (subject to a separate application) is likely to require a workforce of about 125 people during its operation. The construction workforce for the Transmission Connection Project (subject to a separate application) is likely to require an average workforce of about 75 people.

ii Construction hours

Construction works will be undertaken 24 hours a day, seven days a week and 365 days a year. This includes all activities needed to support tunnelling and construction (eg segment production and receipt, use of batching plants and mixer trucks, and haulage of excavated material), as well as operation of accommodation camps.

1.3.8 Progressive rehabilitation

Snowy Hydro has established key principles to restore disturbed land within KNP following disturbance from the project. These include:

- preserve KNP's natural assets and values;
- agree on future land use and consider long-term site management;
- establish processes prior to construction works to engage organic matter to be used in revegetation and ongoing rehabilitation during the construction works phase;
- establish appropriate treatments for minimisation of runoff into waterways;
- protect existing native fauna and their habitats;
- rehabilitate disturbed areas to their pre-existing or improved state at completion of construction activities in consultation with NPWS; and
- minimise visual impact of construction works from significant public viewpoints.

Rehabilitation will be carried out in several phases through the construction period to achieve the desired outcome for KNP and also for Rock Forest which is outside KNP. Activities during (or prior to) construction to enhance rehabilitation will be performed, such as salvaging habitat resources and native seed collection. Other progressive rehabilitation techniques will be carried out including temporary stabilisation of batters and construction of appropriate erosion and sediment control devices, collection of seeds, sods or cuttings from appropriate plant community types (PCTs) for use in final rehabilitation.

A Rehabilitation Strategy for Snowy 2.0 Main Works has been prepared and is provided in Appendix F. This document provides information on the objectives and desired outcomes for rehabilitation activities from Snowy 2.0 Main Works.

1.4 Operation of Snowy 2.0

1.4.1 Scheme operation and reservoir management

The existing Snowy Scheme reservoir operating principles essentially aim to deliver the following:

- continue meeting the drought proofing objective of the Snowy Scheme through the required water releases for downstream water users, including the environment, of the Murray and Murrumbidgee valleys, and complying with the Snowy Water Licence;
- minimise spill from the Snowy Scheme; and
- maximise value through utilising the scheme's flexibility.

These will not change during the operation of Snowy 2.0.

Following the commencement of the operation of Snowy 2.0, both Tantangara and Talbingo reservoirs will have increased operational functions. Tantangara Reservoir will have the additional operational functions of acting as a head storage for generation from the Snowy 2.0 power station and also acting as a storage for water pumped up from Talbingo Reservoir. Talbingo Reservoir will have the additional operational function of acting as a tail storage from Snowy 2.0 generation.

Due to these additional operational functions proposed for Tantangara and Talbingo reservoirs, the short and longer term water levels in both reservoirs, as well as the rates of water level rise and fall, are expected to experience some degree of change compared to the historical operations. However:

- the water levels in both reservoirs will remain within the MOL and FSL approved for the existing Snowy Scheme;
- there will be no more water in the Snowy-Tumut Development as a whole. The flexible storage of that water across the storages within the Snowy-Tumut Development below FSL is currently approved under the EP&A Act (by virtue of the deeming provisions within the SHC Act); and
- no additional land will be affected by virtue of the inundation of the reservoirs through Snowy 2.0 operations. Water storages will continue to be held wholly within the footprint of the existing FSLs.

The factors for change and the degree of noticeability of change are detailed further in the following sections.

The inundation of land below the FSL and the variability in storage levels has existed within the existing Snowy Scheme since the scheme was implemented and is deemed to have been approved under the EP&A Act. This will continue under Snowy 2.0. The deemed approval is explained in more detail in Chapter 4 of the Main Works EIS.

1.4.2 Water storages and their continued use under Snowy 2.0

i Tantangara Reservoir

Tantangara Reservoir currently has the following operational functions within the Snowy Scheme:

- collects inflows from the Murrumbidgee River and the Goodradigbee River Aqueduct;
- provides a means for storage and diversion of water to Lake Eucumbene via the Murrumbidgee-Eucumbene Tunnel; and
- provides environmental releases through the Tantangara Dam river outlet gates to the Murrumbidgee River.

Tantangara Reservoir is a straight concrete gravity dam with active storage of 238.8 GL and gross storage of 254.1 GL, meaning the active storage (ie the amount of water available for use in the Snowy Scheme) is approximately 93.9% of the gross storage. Tantangara Reservoir has a MOL of 1,205.83 m AHD and FSL of 1,228.69 m AHD, an operating range of 22.86 m.

Due to the bathymetry of Tantangara Reservoir (which can be visualised as a cone – wide at the top and narrow at the bottom), the maximum rate of change in water levels is dependent on the water level, meaning that for the same volume of water flowing into or out of Tantangara Reservoir, the maximum rate of change in water level is more rapid when the reservoir is emptier (ie near MOL) compared to when it is at FSL.

ii Talbingo Reservoir

Talbingo Reservoir currently has the following operational functions:

- collects releases from Tumut 2 power station;
- collects inflows from the Yarrangobilly and Tumut rivers;
- acts as head storage for water pumped up from Jounama Pondage; and
- acts as head storage for generation at Tumut 3 power station.

Due to its historic relationship to both the upstream Tumut 2 power station and downstream Tumut 3 power station, Talbingo Reservoir has had more operational functions than Tantangara Reservoir in the current Snowy Scheme.

The bathymetry and storage characteristics of Talbingo Reservoir are different from Tantangara Reservoir. Talbingo Reservoir has a rated MOL of 534.35 m AHD, an FSL of 543.19 m AHD, an operating range of 8.84 m. The historic, long term average level for Talbingo Reservoir is 541.47 m AHD, which just under the FSL.

Talbingo Reservoir has an active storage of 160 GL and a gross storage of 921 GL, meaning the active storage is approximately 17.3% of the gross storage. The active storage, or operating range, is a small range of levels near the top of the reservoir, and as a result, throughout its rated operating range, Talbingo Reservoir levels have a largely linear relationship with flows, and therefore unlike Tantangara Reservoir, the maximum rate of change in water level is less dependent on where the water level is relative to MOL and FSL.

iii Continued water storage variability as part of Snowy 2.0

Under the current approved operations of the existing Snowy Scheme, the levels within the various reservoirs are subject to significant variability over both the short and long terms due to the interplay of a number of factors relating to the design and construction of reservoirs, the environmental releases required by the Snowy Water Licence as well as variations of annual flows into the existing scheme.

In operating the Snowy 2.0 power station, Snowy Hydro will move water directly (in both directions) between Tantangara and Talbingo reservoirs (rather than in only one direction via Lake Eucumbene, Tumut Pond and Tumut 2 Pondage), and as a consequence will store water at different locations in the Snowy-Tumut Development. For example, more water is likely to be held for longer (whilst still meeting existing obligations) in Tantangara than was previously diverted from Tantangara Reservoir to Lake Eucumbene.

However, there will be no more water in the Snowy-Tumut Development as a whole, and the flexible storage of that water across the storages within the Snowy-Tumut Development below FSL is currently part of the approved operation of the existing Snowy Scheme.

As a result of the operation of Snowy 2.0, the water level in Tantangara Reservoir will be more variable than historically. Notwithstanding this, operations will not affect release obligations under the Snowy Water Licence, nor will it involve any change to the currently imposed FSLs. No additional land will be affected by virtue of the inundation of the reservoirs through Snowy 2.0 operations. Water storages will continue to be held wholly within the footprint of the existing FSLs.

Accordingly, no further impact assessment of any variations in storage levels in the Snowy-Tumut Development below FSL has been carried out for the purposes of this EIS.

1.4.3 Scheme infrastructure and maintenance

i Infrastructure servicing

The operation of Snowy 2.0 infrastructure requires ongoing servicing by power, communications and water. These requirements will be met by retaining select utility infrastructure established during construction, such as buried power and communication cables, as well as relevant water treatment plants and pipelines. A summary of infrastructure services provided during operation is provided in Table 1.15.

Table 1.15 Permanent infrastructure servicing requirements during operation

Servicing requirement	Purpose	Source/infrastructure provided
Electrical supply	To provide ongoing power for MAT and ECVT tunnel services (such as lighting, ventilation, groundwater pumps and surge shaft), control buildings (intake gates, MAT and cable yard) and raw water pumping infrastructure.	Permanent electrical supply will continue to be provided from Lobs Hole substation.
Communication supply	To provide communications between power station and access tunnels (MAT and ECVT), MAT control building, cable yard and control building, intake gates and control buildings.	Communication to be provided via cables installed during construction.
Raw water supply	To provide water for fire fighting at the power station, MAT and portal and the ECVT, and water source for treatment to potable standard.	Raw water will be sourced from Talbingo Reservoir via buried pipelines and water inlet established during construction.
Potable water supply	To provide potable water to the MAT portal building and the underground power station for staff facilities.	Water treatment plant at the MAT portal (established during Snowy 2.0 Exploratory Works). The plant receives water from the raw water supply system.

ii Maintenance requirements

Maintenance activities required for Snowy 2.0 will be integrated with the maintenance of the existing Snowy Scheme. Maintenance activities that will be required include:

- maintenance of equipment and systems within the power station complex, intake structures, gates and control buildings;
- maintenance of access roads (vegetation clearing, pavement works, snow clearing);
- dewatering the headrace and tailrace tunnel (estimated once every 15 to 50 years, or as required); and
- maintenance of electricity and communications infrastructure (cables, cable yard, cable tunnel).

iii Permanent access for operation and maintenance

Permanent access to Snowy 2.0 infrastructure is required. During operation, a number of service roads established during construction will be used to access surface infrastructure including the power station's ventilation shaft, the water intake structures, and the headrace tunnel surge shaft. Permanent access tunnels (the MAT and ECVT) will be used to enter and exit the power station. For some roads, permanent access by Snowy Hydro will require restricted public access arrangements. These arrangements are described in Section 1.5.

1.5 Interactions with Kosciuszko National Park

1.5.1 Final rehabilitation of disturbed areas within KNP

i Final land uses

The Rehabilitation Strategy developed for Snowy 2.0 has developed indicative final land use domains characterised by similar final land use objectives. Each final land use domain will require site-specific decommissioning and rehabilitation methods. Following detailed design, final land use domains will be confirmed. Table 1.16 provides a summary of the final land use domains with these shown on Figure 1.25 to Figure 1.30.

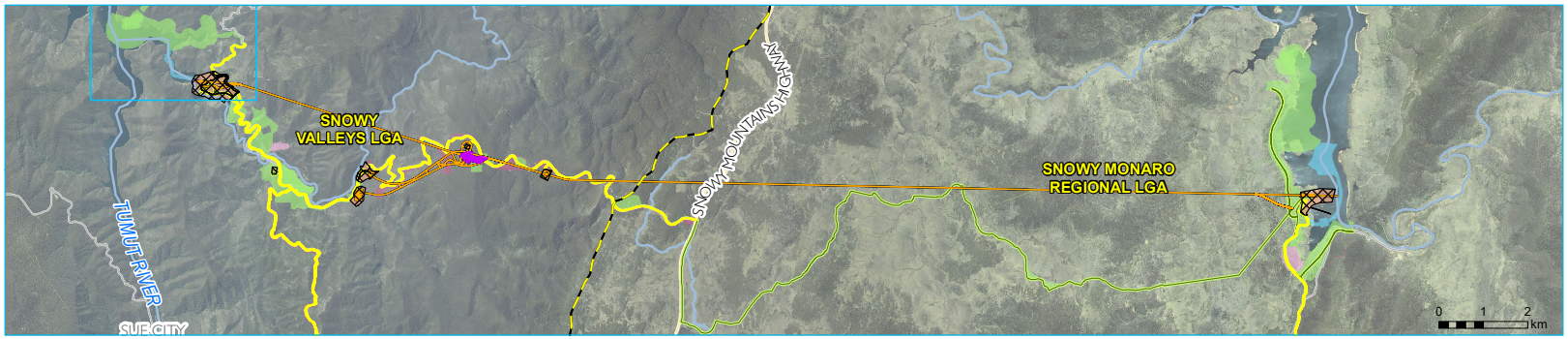
Table 1.16 Final land use domains

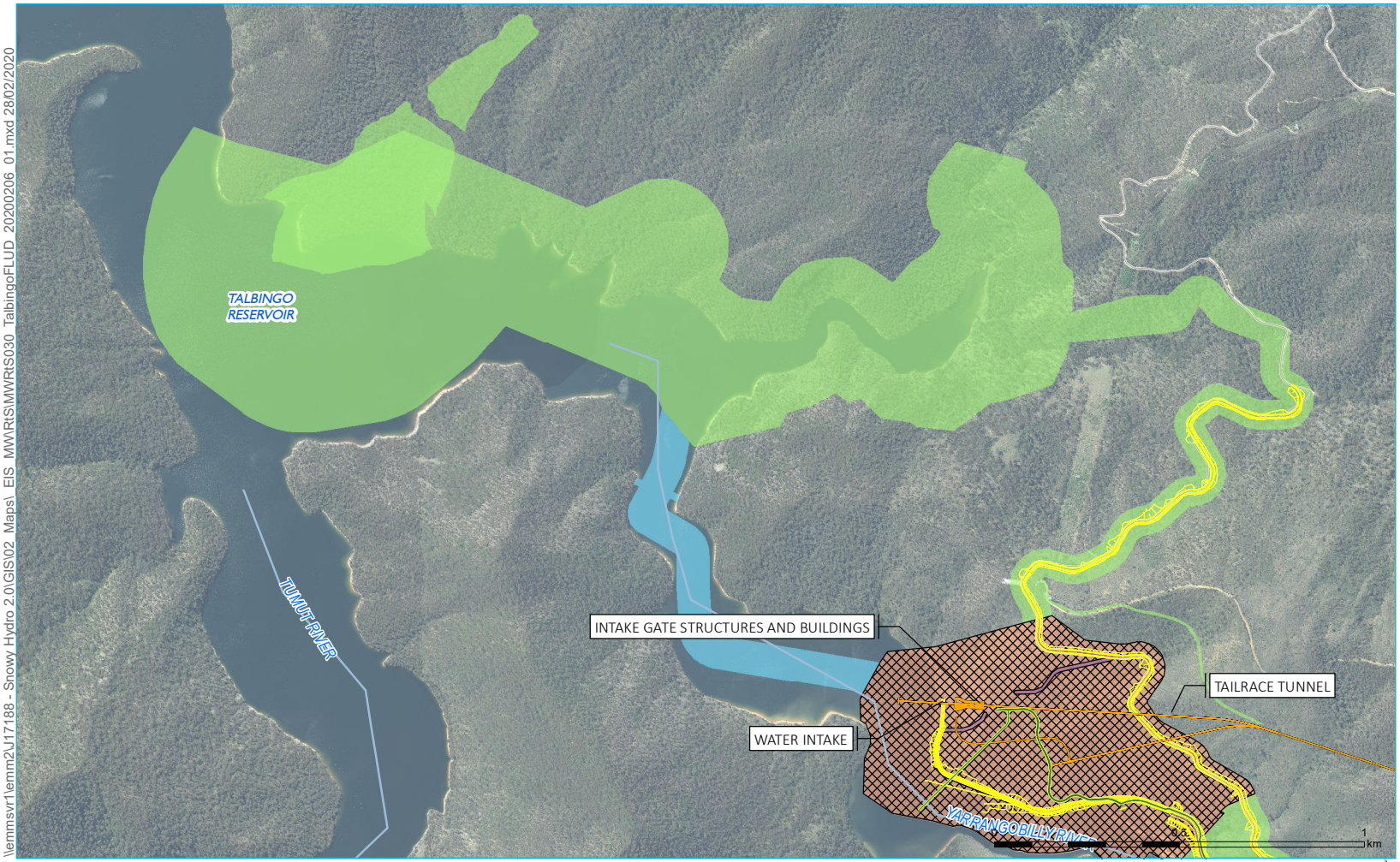
Domain	Description
Retained infrastructure	• Water intake structures at Talbingo and Tantangara reservoirs. • Permanent access tunnel portals and associated infrastructure including the MAT and ECVT. • Ventilation shaft and headrace tunnel surge shaft at Marica. • Transmission cableyard at the ECVT portal. • Lobs Hole substation and associated power and communication cables between operational infrastructure.
Roads	New access roads or those which are upgraded, widened and sealed will be retained with agreement from NPWS. These roads will remain open to the public post-construction and will enable access to locations previously accessible by four-wheel drive.
Recreation sites	It is intended, and agreed with NPWS, that Lobs Hole and Tantangara areas will be retained as remote campsites.
Native vegetation	Areas will be revegetated and returned to a native vegetation final land use. The species used for each area will be commensurate with that present prior to disturbance as per the PCTs mapped for the area. Areas to be rehabilitated to native vegetation will include rehabilitated access roads.
Water management	The Talbingo and Tantangara reservoirs will remain as water storages that will continue to allow fishing and boating. Appropriate safety exclusion zones will be put in place in the vicinity of the intake structures.

ii Landform design

Final landform design using the geomorphic methodology will be carried out to identify opportunities for the reuse of excavated material in rehabilitation and in construction of final landforms which complement the surrounding landscape of KNP and provide recreational opportunities for users of KNP where appropriate. This will be done in consultation with NPWS.

Reuse of excavated material in the final landform will be subject to geochemical testing to confirm it is suitable to remain in situ. Any unsuitable materials will be remediated and removed from the areas to be rehabilitated.





KEY

Operational footprint

Final land use domain

- A - Retained infrastructure
- B - Upgraded roads
- C - Recreation sites
- D - Native vegetation
- E - Water management

Existing environment

- Main road
- Local road
- Watercourse
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Permanent road

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS030 TalbingoFLUD 20200206 01.mxd 28/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011); SLR (2019)

GDA 1994 MGA Zone 55

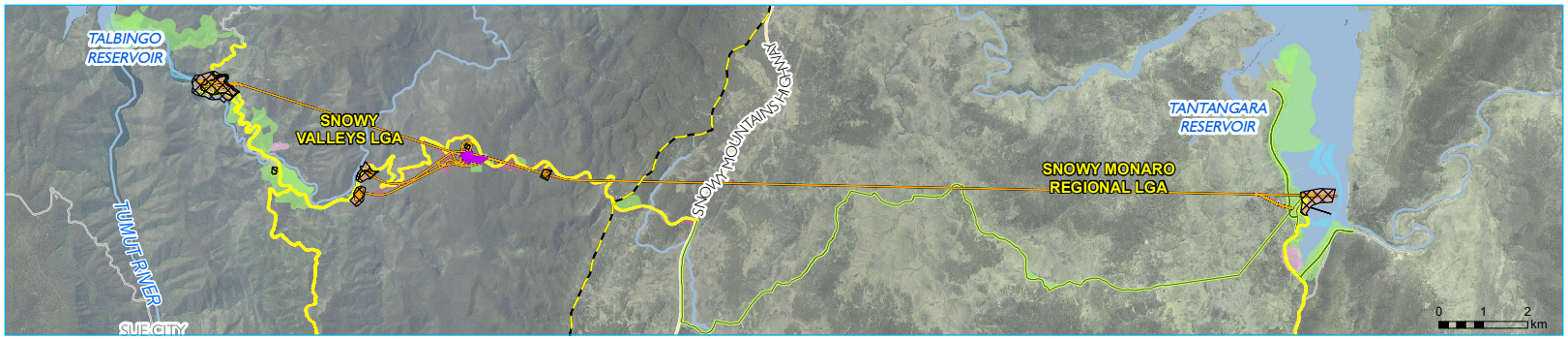
N

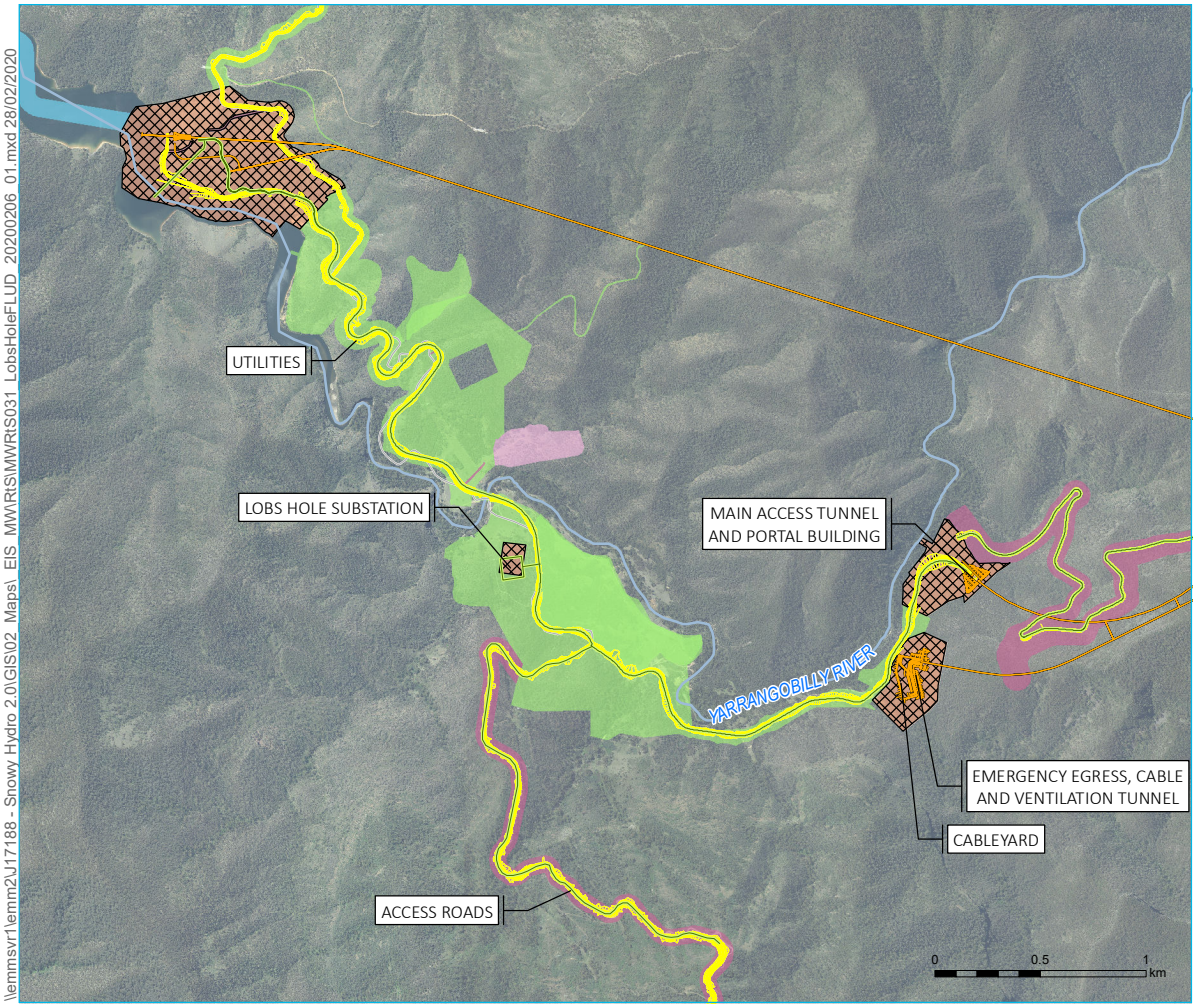
Talbingo Reservoir - indicative final land use domains

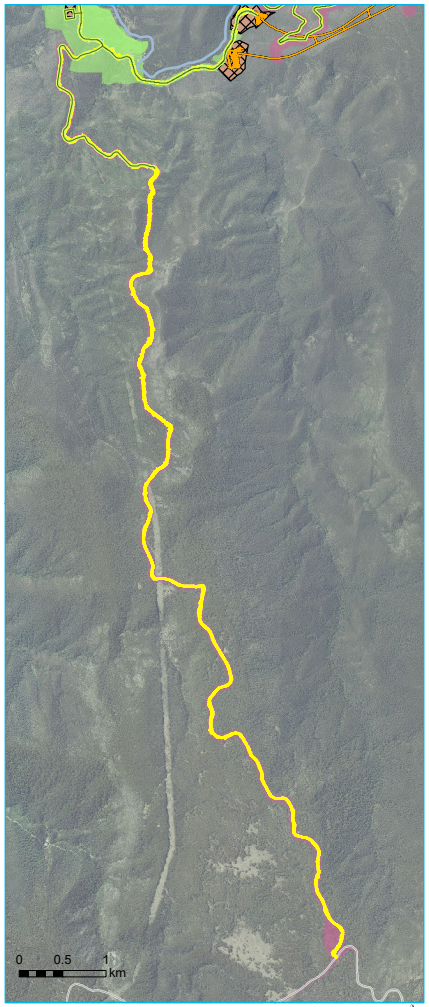
Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.25

snowy 2.0

EMM creating opportunities







KEY

Operational footprint

Final land use domain

- A - Retained infrastructure
- B - Upgraded roads
- C - Recreation sites
- D - Native vegetation
- E - Water management

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Permanent road

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS031 LobsHoleFLUD 20200206 01.mxd 28/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011); SLR (2019)

GDA 1994 MGA Zone 55

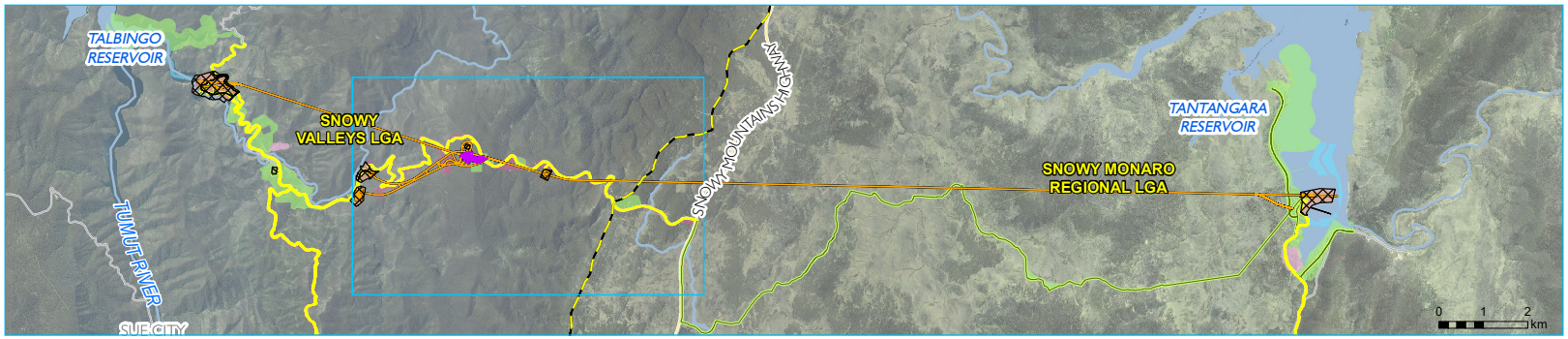
N

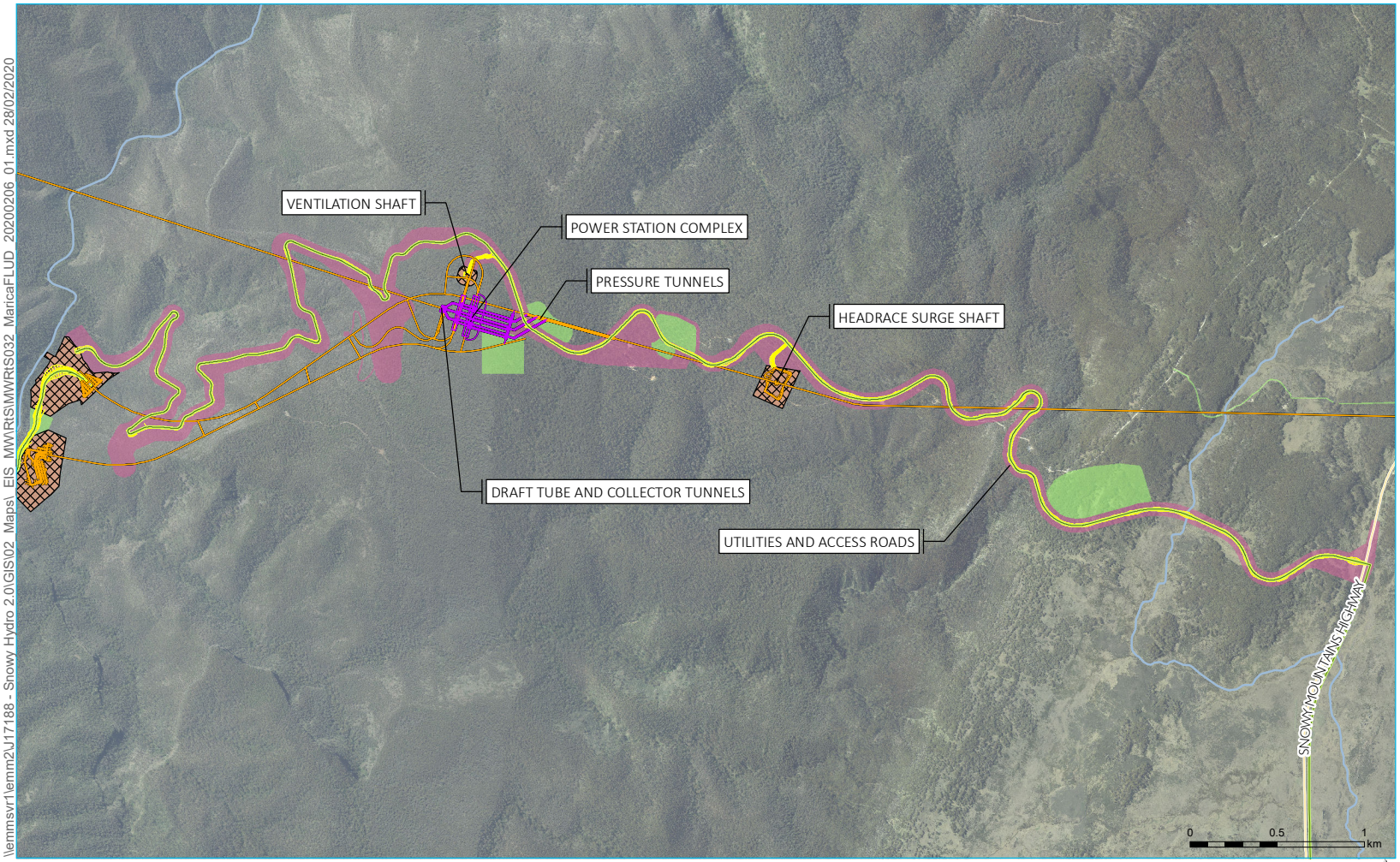
Lobs Hole - indicative final land use domains

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.26

snowy 2.0

EMM creating opportunities





KEY

Operational footprint

Final land use domain
- A - Retained infrastructure
- B - Upgraded roads
- C - Recreation sites
- D - Native vegetation
- E - Water management

Existing environment
- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements
- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Permanent road

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS032 MaricaFLUD 20200206 01.mxd 28/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011); SLR (2019)

GDA 1994 MGA Zone 55

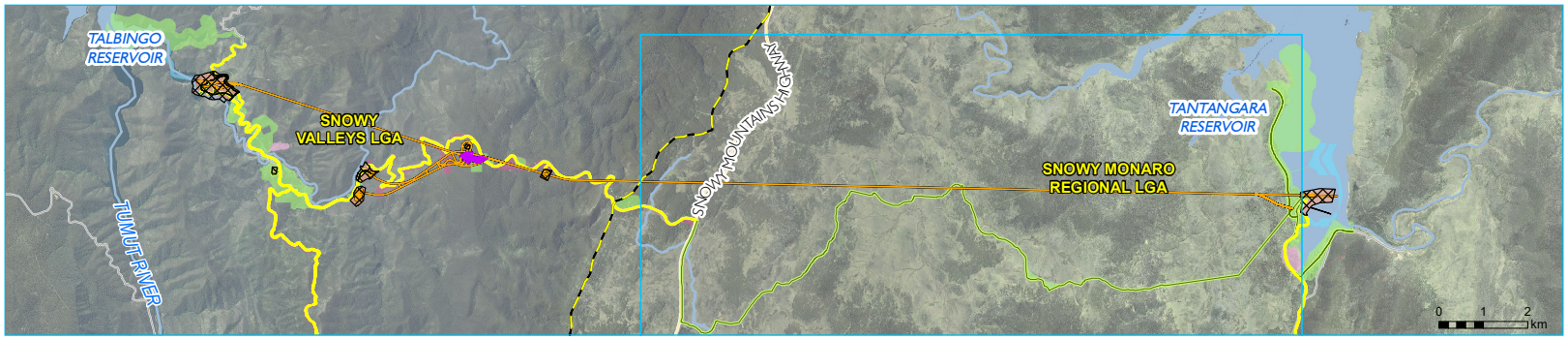
N

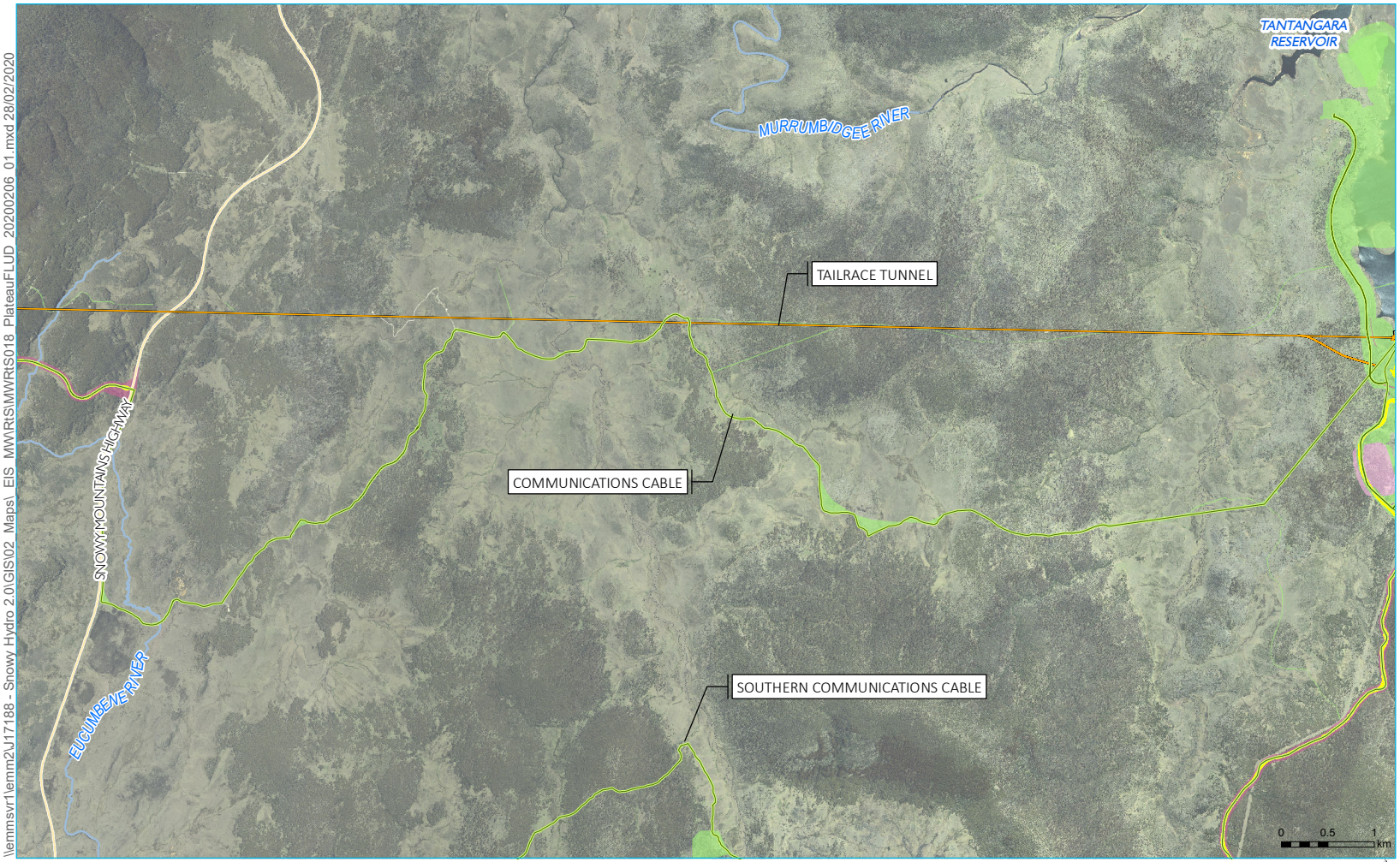
Marica - indicative final land use domains

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.27

snowy 2.0

EMM creating opportunities





KEY

Operational footprint

Final land use domain

- A - Retained infrastructure
- B - Upgraded roads
- C - Recreation sites
- D - Native vegetation
- E - Water management

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Permanent road

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS018 PlateauFLUD 20200206 01.mxd 28/02/2020

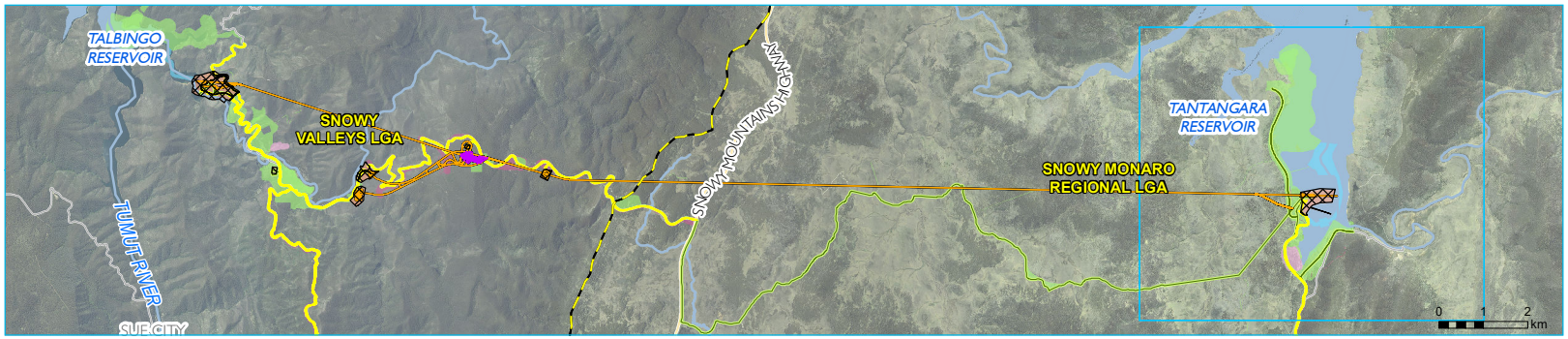
Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011); SLR (2019)

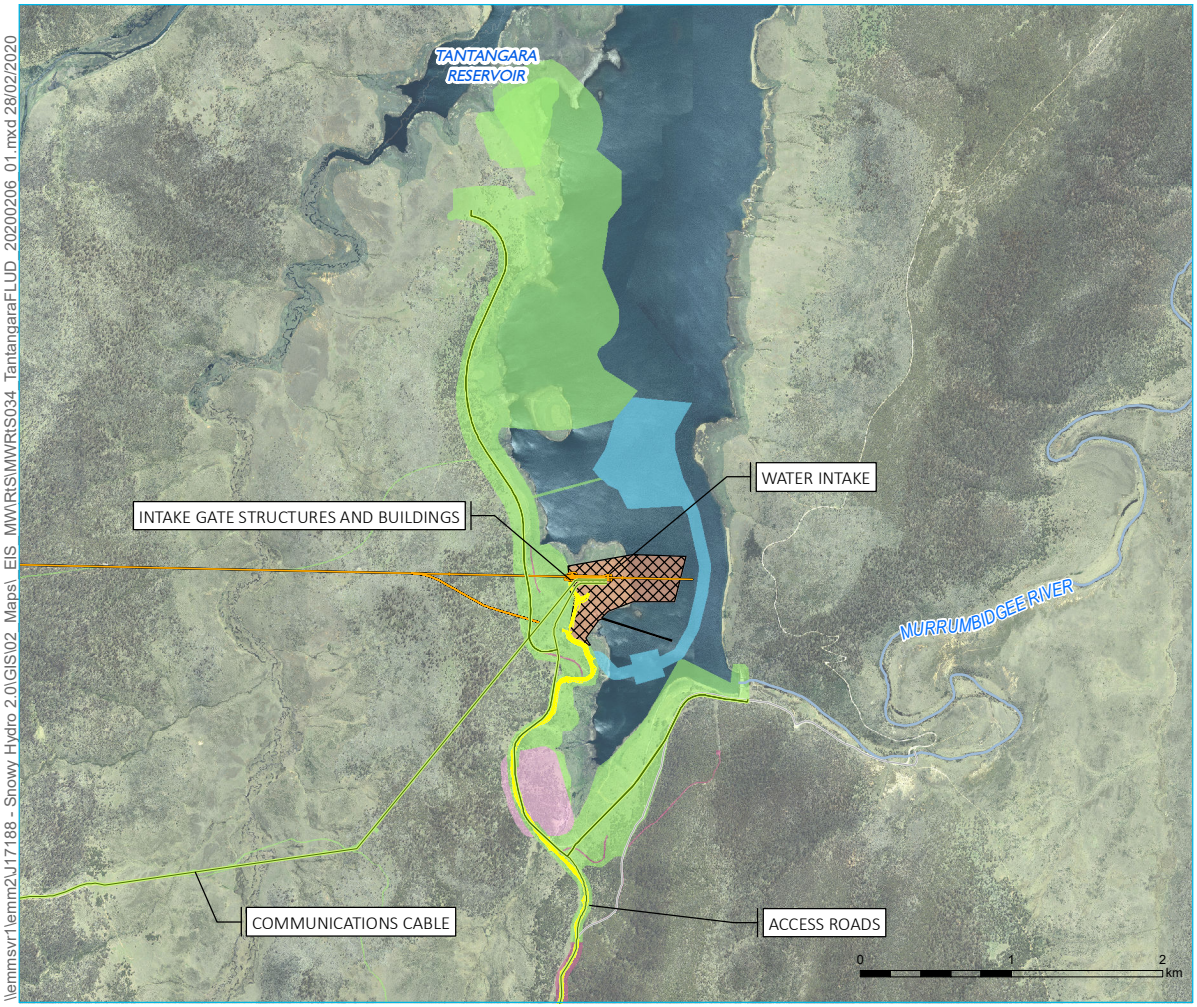
Plateau - indicative final land use domains

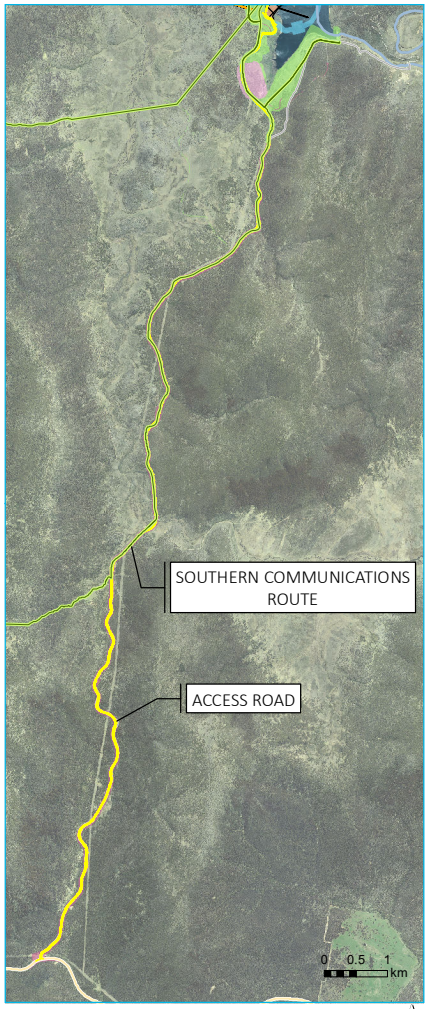
Snowy 2.0
Preferred infrastructure report and response to submissions
Main Works
Figure 1.28

snowy 2.0

EMM creating opportunities







KEY

Operational footprint

Final land use domain

- A - Retained infrastructure
- B - Upgraded roads
- C - Recreation sites
- D - Native vegetation
- E - Water management

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies
- Local government area boundary

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Power station
- Utilities
- Permanent road

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWRtS\MWRtS034 TantangaraFLUD 20200206 01.mxd 28/02/2020

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011); SLR (2019)

GDA 1994 MGA Zone 55

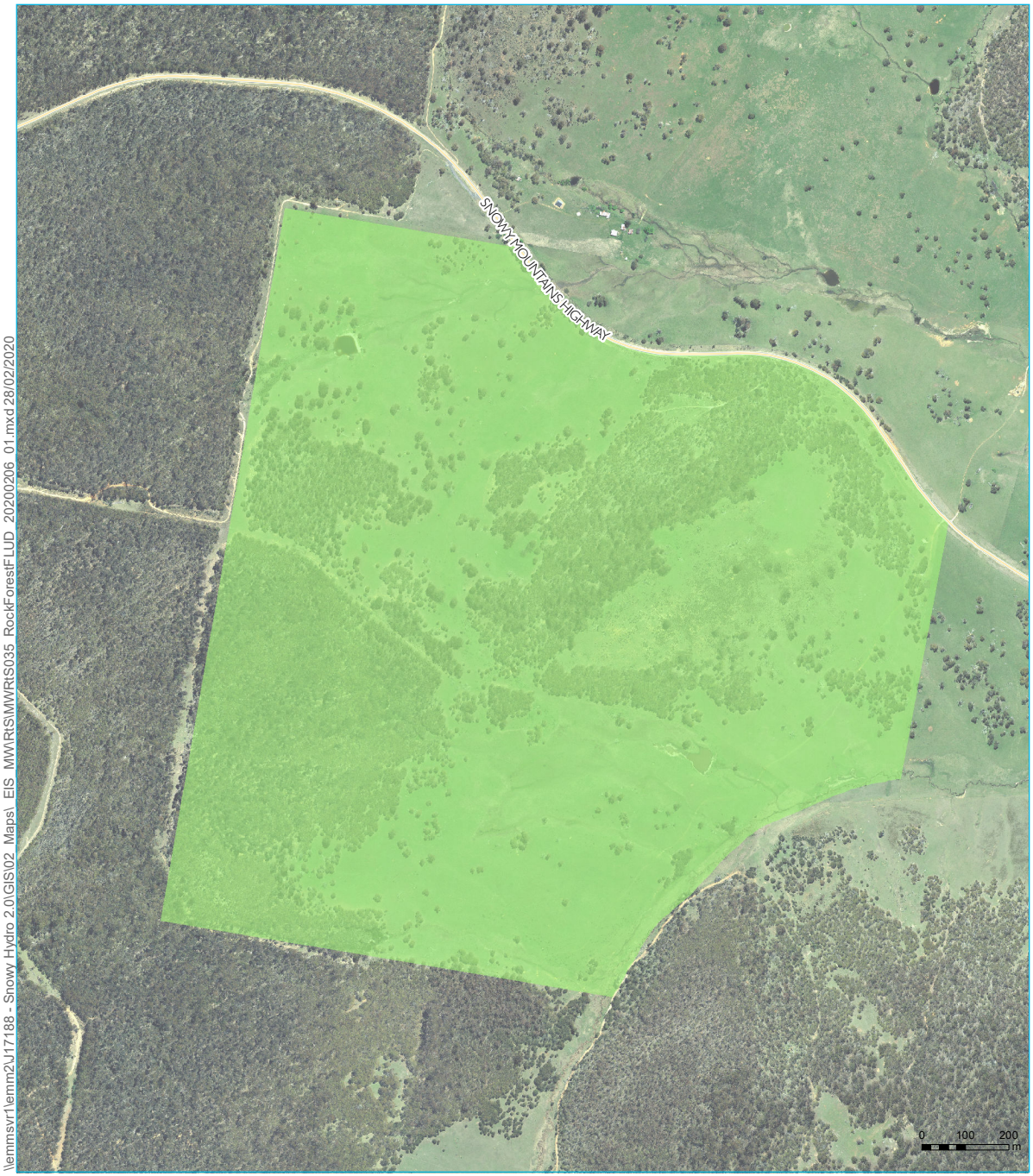
N

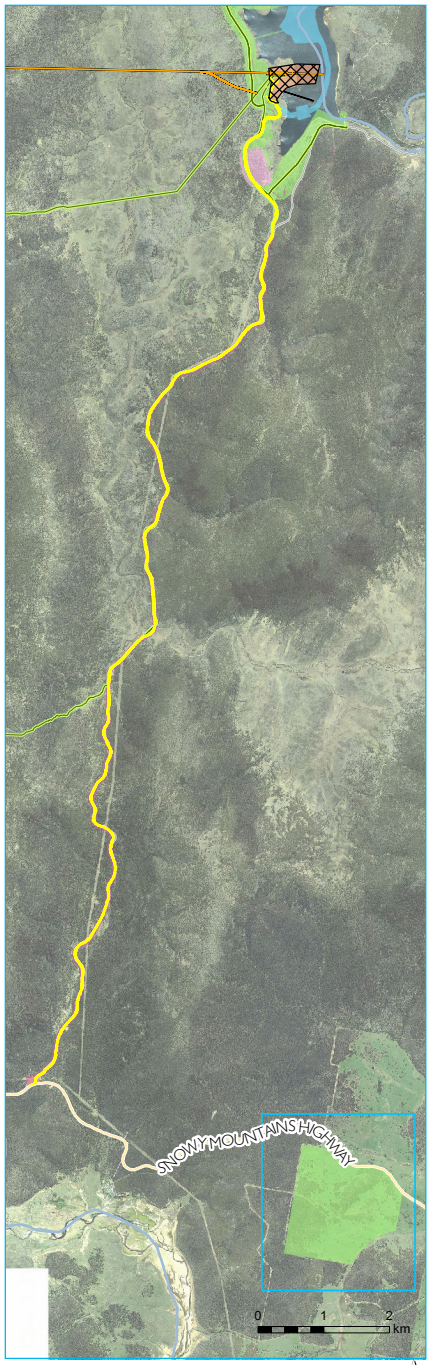
Tantangara Reservoir - indicative final land use domains

Snowy 2.0
Preferred infrastructure report and response to submissions
Main Works
Figure 1.29

snowy 2.0

EMM creating opportunities





KEY

Operational footprint

Final land use domain

- A - Retained infrastructure
- B - Upgraded roads
- C - Recreation sites
- D - Native vegetation
- E - Water management

Existing environment

- Main road
- Local road
- Watercourse

Snowy 2.0 Main Works operational elements

- Tunnels, portals, intakes, shafts
- Utilities
- Permanent road

GDA 1994 MGA Zone 55

N

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MW\RtS\MWRtS035 RockForestFLUD 20200206 01.mxd 28/02/2020

Rock Forest - indicative final land use domains

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.30

snowy 2.0

EMM
creating opportunities

iii Completion criteria

Following completion of construction of Snowy 2.0 Main Works, rehabilitation of disturbed areas will continue and be measured against established completion criteria as outlined in the Rehabilitation Strategy. Completion criteria are objective target levels or values assigned to a variety of indicators (eg slope, species diversity, groundcover) which can be measured against to demonstrate progress and the ultimate success of rehabilitation. As such, they provide a useful and defined end point at which time rehabilitation can be deemed successful.

Indicative completion criteria, performance measures and associated indicators have been developed for Snowy 2.0 Main Works by rehabilitation specialists with experience in alpine environments and are provided in the Rehabilitation Strategy in Appendix F. These criteria have been developed for each phase of the rehabilitation so that the rehabilitation success can be quantitatively tracked throughout the life of the project. The performance measures and associated indicators will be designed to provide an appropriate benchmark or guide against which to assess the management of project lands and the resulting improvements.

iv Recreational areas

Snowy Hydro will liaise closely with NPWS to determine the final end land use and the extent of decommissioning of temporary construction facilities and rehabilitation activities to be undertaken following the construction of Snowy 2.0 Main Works. This approach will be taken to ensure that decommissioning allows for integration with future planned recreational uses of these areas and to maintain the values of KNP and be consistent with the KNP PoM (NPWS 2006).

Following Snowy 2.0 Main Works, the Talbingo and Tantangara reservoirs will continue to be used for boating and fishing, however safety exclusion zones will be put in place in the vicinity of the intakes. The extent of safety exclusion zones is unknown at this stage and will be determined during the detailed design. Remote camping areas will be retained in the Lobs Hole and Tantangara areas for recreational use. These areas will either be retained or they will be recreated during rehabilitation if they are disturbed during construction activities. Following the construction of Snowy 2.0, temporary construction pads, accommodation camps, rock emplacements and some access roads, will be rehabilitated to land uses generally consistent with their pre-construction use, subject to ongoing consultation with NPWS.

Detailed design will follow the principles and concepts in this strategy to achieve stable non-polluting landforms and recreational areas consistent with the final land use domains.

1.5.2 Public access and recreational activities

i Water access

During construction of Snowy 2.0, public access to some areas of Talbingo and Tantangara reservoirs will be restricted. In Talbingo Reservoir, areas near the construction of the intake and excavated rock emplacement, including the Yarrangobilly Arm will be restricted from the public for safety reasons. Public access will be maintained in all other areas of the reservoir. Public access will also be restricted in areas near the construction of the intake and excavated rock emplacement for safety reasons.

Boat access at Tantangara Reservoir is from a public boat launching area in the south of the reservoir, accessed from Tantangara Road. However, this area will be closed to the public during construction. The barge launch area to be constructed for Snowy 2.0 Main Works will be retained and, subject to consultation with NPWS, available for public use. Boats are also currently free launched by recreational users in northern areas of Tantangara Reservoir, subject to operating water levels. It is anticipated that boat launching from these areas will continue to be available to the public during construction of Snowy 2.0 Main Works.

The operation of Snowy 2.0, either through generating or pumping mode, will result in higher velocities of water and conditions generally in the vicinity of the intakes in Talbingo and Tantangara reservoir. Public safety exclusion zones will be implemented near the intakes which will be identified by markers and/or signage.

Post-construction of Snowy 2.0 Main Works, public boat access will be maintained at both Talbingo Reservoir (at the public boat ramp in the northern end of the reservoir and at Sue City to the south) and Tantangara Reservoir (at the southern end).

ii Road access

To facilitate construction, some new roads will be constructed and existing tracks will be upgraded to provide permanent access to the new facilities such as Tantangara and Talbingo intake structures and the underground power station complex.

During construction, some existing roads will need to be closed to the public for safety reasons. During construction, Tantangara Road will be closed while it is upgraded and when any high risk activities are being undertaken (eg transport of oversized equipment and heavy periods of activity). Access along Tantangara Road will be maintained at other times with measures in place (such as vehicle escort and traffic controls) to achieve the required level of safety.

Once Snowy 2.0 is commissioned, some roads may need to remain restricted or closed to public access. Table 1.17 and Figure 1.31 and Figure 1.32 provide a summary of public access during the construction of Snowy 2.0 Main Works and once it has been finished.

Table 1.17 KNP road infrastructure changes and access arrangements summary

Road name	Project use	Current condition	Construction upgrade	Public access during construction	Final condition	Long term public access (post-construction)
Lobs Hole Ravine Road (south)	Provide suitable and permanent access to the main construction area (Lobs Hole) and the portals to access the power station complex	Single lane, gravel track	Dual lane, gravel road with new alignment	SHL access only	Dual lane, sealed road	✓
Mines Trail Road	Provide suitable and permanent access to the portals and power station complex	Dual lane, gravel road and bridge over Wallaces Creek to access MAT portal (as approved under Snowy 2.0 Exploratory Works)	No further upgrade	SHL access only	Dual lane, sealed road	✓ (SHL only for MAT and ECVT access)
Lobs Hole Road	Provide suitable and permanent access to the main construction area (Lobs Hole)	Dual lane, gravel road and bridge over Yarrangobilly Road (as approved under Snowy 2.0 Exploratory Works)	No further upgrade	SHL access only	Dual lane, gravel road	✓
Lobs Hole Ravine Road (north)	Provide suitable and permanent secondary access and emergency egress from main construction area (Lobs Hole)	Single lane, 4WD track	Single lane, 4WD track with minor work to providing turning areas at some locations	✓ (first 5 km)	Single lane, 4WD track	✓
Marica Trail/Marica Trail west	Provide suitable and permanent access to headrace surge structure and ventilation shaft building	Dead end, single lane, 4WD track	Single lane, gravel road extended to Mines Trail Road at MAT portal	SHL access only	Dual lane, gravel road	✓ (SHL only section between MAT and surge)
Wharf Road/ Pipeline Road	Provides suitable and permanent access to Talbingo intake, gate structure and wharf	-	New road, dual lane, gravel road	SHL access only	Dual lane, gravel road	SHL access only

Table 1.17 KNP road infrastructure changes and access arrangements summary

Road name	Project use	Current condition	Construction upgrade	Public access during construction	Final condition	Long term public access (post-construction)
Talbingo Excavated Rock Emplacement Access Road	Provides suitable access to the excavated rock emplacement area	-	Dual lane, gravel road	SHL access only	Rehabilitated	NA
Tantangara Road	Provide suitable access to the construction area at Tantangara	Single lane, gravel road	Dual lane, gravel road	✓ (limited, facilitated access)	Dual lane, gravel road	✓
Tantangara Camp Road	Provide suitable access to the construction area, excavated rock emplacement area and accommodation camp at Tantangara	Undefined 4WD tracks	Dual lane, gravel road	SHL access only	Rehabilitated	NA
Tantangara Excavated Rock Emplacement Access Road	Provide suitable access to excavated rock emplacement area	Undefined 4WD tracks	Dual lane, gravel road	SHL access only	Rehabilitated	NA
Quarry Trail	Provide suitable and permanent access to Tantangara intake	Single lane, gravel track	Dual lane, gravel road	SHL access only	Dual lane, gravel road	✓ (SHL only access to intake)
Gooandra/Bullock/Tantangara Dam fire trails	Provide suitable access for installation of communications cables	Single lane, gravel track	Single lane, gravel track with some minor works to allow for passing bays	SHL access only	Single lane, gravel track	✓
Link Road	Provide suitable and permanent access to the main construction area (Lobs Hole)	Dual lane, sealed	Dual lane, sealed with widening to 6 m in some areas	✓	Dual lane, sealed road	✓
Snowy Mountains Highway	Provide suitable and permanent access to all construction areas	Dual lane, sealed	No work anticipated as part of Snowy 2.0 Main Works	✓	Dual lane, sealed road	✓

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWMWEIS010 PublicAccessibilityConstruction 20190828 04.mxd 7/02/2020

KEY

Restricted access

- No access during construction
- Temporary/short-term closure during construction
- Facilitated access during construction

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

Public accessibility during construction

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.31

snowy 2.0

EMM
creating opportunities

\\emmsvr1\emm2\J17188 - Snowy Hydro 2.0\GIS\02 Maps\ EIS MWMWEIS011 PublicAccessibilityOperation 20190828 04.mxd 7/02/2020

KEY

Restricted access post-construction

- Access tracks rehabilitated on project completion
- Full access reinstated
- Partial access - no public access to infrastructure areas
- No public access

Existing environment

- Main road
- Local road
- Watercourse
- Waterbodies

Source: EMM (2019); Snowy Hydro (2019); DFSI (2017); LPMA (2011)

Public accessibility during operations

Snowy 2.0
Preferred infrastructure report
and response to submissions
Main Works
Figure 1.32

snowy 2.0

EMM creating opportunities

EMM
creating opportunities

OFFICE LOCATIONS

SYDNEY
Ground floor, 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3, 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 10, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

ADELAIDE
Level 1, 70 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
187 Coventry Street
South Melbourne VIC 3205

PERTH
PO Box 8155
Fremantle WA 6160

CANBERRA
PO Box 9148
Deakin ACT 2600