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1 Summary

This chapter describes the scope and justification for Exploratory Works, including access roads and bridges, an exploratory tunnel, accommodation camp, barge access, related infrastructure and excavated rock management.

1.1 Introduction

The power station cavern will be one of the largest underground caverns for a hydroelectric power project in the world, and its design and excavation will be highly dependent on the rock properties and structural geology of the cavern location. To date, the geological investigation program has only drilled down vertically from the surface and at large intervals apart. Exploratory Works involves extensive horizontal drilling in situ, and at depth, so detailed geological data can be collected about the rock types, conditions, ground temperature and stress conditions.

The primary purpose of undertaking Exploratory Works is to gain a greater understanding of the rock conditions at the proposed location of the underground power station for the Project. An exploratory tunnel is the key element proposed to gain this critical information.

Exploratory tunnels are used as a subsurface investigation method and are common in hydroelectric projects internationally. Exploratory tunnels were excavated during the 1960s for both the Tumut 1 and Tumut 2 power stations in the Snowy Mountains Scheme (the ***Scheme***). Exploratory Works offer material

risk reduction opportunities for the design and construction of the power station cavern through improved geotechnical knowledge.

Additional vertical geotechnical holes may be drilled from above the cavern from the Marica Track area as an extension to the current Geotechnical Investigation Program. This additional work was not included in the EIS and would need a modification to the approval.

Exploratory Works will predominantly be in the Lobs Hole area of the Kosciuszko National Park (***KNP***) and Talbingo Reservoir and are entirely within NSW. Lobs Hole is between Talbingo Reservoir to the north-west and the Snowy Mountains Highway to the east.

Lobs Hole is currently used as a remote campground (known as Ravine campground) within KNP and provides space for recreational activities. The nearest towns to Exploratory Works are Cabramurra, Adaminaby, Cooma, Talbingo and Tumut. The area in which Exploratory Works will be undertaken is referred to as the project area. The project area is shown in Figure 1.

Note for interested parties: material for this chapter is largely derived from *Volume 1: Main report - Environmental Impact Statement (**EIS**) - Exploratory Works for Snowy 2.0* (the ***EIS Report***) as amended by *Response to Submissions - Exploratory Works for Snowy 2.0 - October 2018 (EMM).* The EIS Report is in the public domain and contains substantial additional information and graphics describing the works.[1]

[1] Available at https://v2.communityanalytics.com.au/snowy/ew/downloads.

Figure 1: Project area

1.2 Scope and exclusions

This chapter describes works the subject of the EIS Report as highlighted in Table 1 below.

These works will be let in two tranches:

1. Exploratory Works - Roads (***EWR***) as a standalone construct-only contract;

2. Balance of Exploratory Works - as an initial part of the main Civil Contract (see details below).

Package	Employer (Snowy Hydro)[2]	EWR	Exploratory Works	Civil Works
Approvals	x	x	x	x
Connection agreements	x			
Engineering (access roads)	x			
Engineering (balance)			x	x
Mobilisation		x	x	x
Project management	x	x	x	x
Site establishment		x	x	x
Camps			x	x
Construction facilities		x	x	x
Construction power			x	x
Testing and commissioning				x
Demobilisation		x	x	x
Marine works			x	x
Access roads		x		

Table 1: Division of responsibility

1.3 Activities undertaken

Exploratory Works are critical for the Project as the works will inform the design and construction of the cavern for the underground power station which is one of, if not the most, challenging areas for the design of the Project.

As at Final Investment Decision (***FID***), an EIS has been lodged, the public comments period has closed, and the Response to Submission has been submitted.

A contract to deliver the EWR has been negotiated with Leed Contractors.

The balance of the Exploratory Works scope will be undertaken within the scope of the Civil Contractor.

1.4 Justification for Exploratory Works

Exploratory Works are critical for the Project because of the information they will provide about the geology around the power station cavern location.

The power station cavern will be one of the largest underground caverns for a hydroelectric power project in the world, and its design and excavation will be highly dependent on the rock properties and structural geology of the cavern location. Little geotechnical information is currently available for the main geological unit that intersects the cavern location: the Ravine Beds. Surface drilling (as with the current program) is challenging and can only provide limited information for deep excavations.

[2] Includes owner's contractors and consultants.

Large hydroelectric projects commonly establish an exploratory tunnel to the top of the power station location and undertake numerous directional investigation probes.

The do nothing alternative is to proceed with the Project without obtaining this early and additional understanding of rock conditions. This creates an unacceptable risk of excavating unsuitable areas, with the related consequences of additional works, greater surface and underground disturbance and time delays.

The existing infrastructure (roads, construction pads, etc) is inadequate to support the Exploratory Works and must be upgraded.

1.5 Works Location

The Exploratory Works are predominantly in the Ravine region of the KNP. This region is between Talbingo Reservoir to the north-west and the Snowy Mountains Highway to the east.

The nearest large towns to the Exploratory Works are Cooma and Tumut. There are several communities and townships near the Project area including Talbingo, Tumbarumba, Batlow, Cabramurra and Adaminaby.

The Project area comprises:

1. Lobs Hole;
2. Talbingo Reservoir;
3. Mine Trail;
4. Lobs Hole Ravine Road; and
5. Spillway Road.

1.6 Scope

The Exploratory Works will involve the construction of an exploratory tunnel to enable exploratory drilling and provide a greater understanding of the underground conditions at the power station cavern. Several supporting elements will also be required to facilitate the construction of the exploratory tunnel.

The Exploratory Works elements include:

1. **Exploratory tunnel** - an exploratory tunnel about 3.1 km long to the site of the underground power station;
2. **Portal construction pad** - a portal construction pad for the exploratory tunnel. This will provide the entrance structure to the tunnel and an area for infrastructure and equipment needed to support tunnelling activities;
3. **Accommodation camp** - an accommodation camp for the Exploratory Works construction workforce;
4. **Access roads** - road works and upgrades to enable access and haulage routes during Exploratory Works. This includes upgrades to 22km of existing roads and creating about 2km of new roads;

5. **Barge access** - barge access infrastructure to enable access and transport by barge on Talbingo Reservoir. This includes one new barge ramp at Talbingo Spillway in the northern part of Talbingo Reservoir and one new barge ramp at Middle Bay near Lobs Hole at the southern part of Talbingo Reservoir;
6. **Supporting infrastructure** - services infrastructure such as diesel-generated power, water, wastewater treatment, storage/workshop facilities and communications.
7. **Excavated rock management** - including subaqueous placement within Talbingo Reservoir. Up to 750,000m^3 of excavated rock will need to be tested for its geochemical properties (ie whether the rock is reactive or nonreactive) before being managed by a combination of the following options:
    a. **Re-use** – suitable material can be used as construction materials for roads or similar. Some materials will be provided to National Parks and Wildlife Service (***NPWS***) for use in road maintenance and upgrades in other areas of KNP;
    b. **On-land placement** – material will be placed in one of two on-land emplacement areas. The eastern emplacement area has been designed to safely treat reactive material and to ultimately remain as a permanent landform suitable for recreational activities such as camping. The western emplacement area will be used for temporary storage of materials for re-use;
    c. **Subaqueous placement** within Talbingo Reservoir – suitable material will be placed at a suitable location within Talbingo Reservoir, subject to a number of water quality controls and monitoring; and
8. **Rehabilitation and revegetation** - if the Project is not approved or does not progress, then impacted areas will be rehabilitated, and project elements decommissioned in consultation with NPWS.

Horizontal and other test drilling, investigations and analysis are also proposed for the above elements to inform their detailed design.

All Exploratory Works align with components of the proposed main works for the Project. However, if the Project is not approved or does not progress, then impacted areas will be rehabilitated, and project elements decommissioned in consultation with NPWS.

1.7 Construction staging and timing

Construction of the Project is anticipated to commence at the end of 2018 with substantive works commencing in early 2019 and to continue for an estimated 34 months, with the exploratory tunnel expected to be completed by late 2021. It is expected that the construction works will be completed largely in parallel. However, road and access works are expected to be completed within the first six months from commencement.

1.8 Construction method

Snowy Hydro anticipates awarding separate contracts for:

1. Exploratory Works - Roads (***EWR Contract***);
2. The design and construction of the balance of the civil works requirements for the Project, including the balance of the Exploratory Works and construction of roads, wharves and tunnels (***Civil Contract***); and
3. The design and construction of electrical and mechanical works requirements for the Project, including the supply of transformers and turbines (Electrical / Mechanical (***E&M Contract***).

Typical construction methods for the various elements of the Exploratory Works are described below:

1. **Surface geotechnical investigation** - continuing geotechnical investigation, test pit excavation, bulk sampling, borehole drilling, geophysical and geotechnical surveys;
2. **Site establishment** - identification of avoidance areas, survey, erosion and sedimentation control measures, vegetation clearance, civil earthworks, construction of surface layers, infrastructure setup;
3. **Track upgrade** - track upgrade and extension and widening of existing tracks;
4. **Bridge works** - establishment and removal of temporary bridges and diversions, construction of permanent bridges;
5. **Barge access works** - establishment of barge access infrastructure;
6. **Exploratory tunnel construction** - drill and blast excavation;
7. **Ancillary facilities and laydown** - laydown, storage and ancillary use areas;
8. **Traffic movements** - vehicle movements to and from the external road network will be required throughout the Exploratory Works;
9. **Construction resources** - sources of construction materials are yet to be determined. Power will be provided by diesel generators. Construction waste will be removed from the project area by truck and disposed of to a licensed facility;
10. **Workforce** - about 200 people will be needed at peak construction. Workers will stay at Cabramurra until the accommodation camp is operational. Surface construction work will be conducted on a 12 hour day seven day week basis, with tunnel excavation and barge movement operating 24/7;
11. **Rehabilitation and revegetation** - rehabilitation of the project area in consultation with NPWS (if the Project does not proceed);
12. **Decommissioning** - decommissioning of constructed elements not intended to be permanent (if the Project does not proceed); and
13. **Post-construction** - ongoing maintenance and management of permanent infrastructure (if the Project proceeds).

2 Activities undertaken

The execution of the Civil Works requires prior execution of certain works. These include the construction of access roads, drilling and sampling works, the construction of bridges and execution of geotechnical drilling for their foundations, and the establishment of laydown areas.

In August 2018, Snowy Hydro sought tender submissions from civil engineering and road contractors with the capability and experience to carry and complete the EWR.

Tenders have been evaluated and a recommendation for award for the EWR Contract has been submitted for approval. Exploratory Works - Roads Contract is expected to be be fully negotiated and ready for execution subject to approval by the time of FID.

Subject to FID approval, when Snowy Hydro contracts with the Civil Works contractor (currently planned for March/April 2019), the EWR Contract will be novated to the Civil Works Contractor.

As noted above, an EIS was required and submitted for the Exploratory Works (including the EWR), in July 2018. See *Supporting Chapter Eleven - Environment, permits and approvals* for a detailed discussion of the content of the EIS submission and its status as at FID.

See *Supporting Chapter Two - Procurement* for further details of the overarching contracting strategy for the Project.

3 Justification for Exploratory Works

3.1 Overview

Exploratory Works are critical for the Project as the works will inform the design and construction of the cavern for the underground power station which is one of, if not the most, challenging areas for the design of the Project.

Exploratory Works will confirm and build on the geological data already collected and confirm the orientation of the cavern and its construction method almost 850 m below ground level. To date, the geological investigation program has only drilled down vertically from the surface and at large intervals apart. Exploratory Works involves extensive horizontal drilling in situ, and at depth, so detailed geological data can be collected about the rock types, conditions, ground temperature and stress conditions. It is common practice internationally for hydroelectric power projects, particularly with large caverns, to establish an exploratory tunnel to the top of the underground power station cavern and drill numerous horizontal investigation probes.

3.2 Limitations of existing information

The underground power station is one of the most challenging aspects of the final design of the Project. Design and construction of excavations of this size and complexity are highly dependent on the rock properties and structural geology at the potential locations. The underground power station for the Project consists of large caverns, approximately 750 m below ground level. The machine hall, the largest component of the underground power station, is likely to be contained in a cavern about 240m long, over 30m wide and approximately 50 m high. This would be one of the largest underground caverns for a hydroelectric power project in the world.

The Ravine Beds geological unit is the main underlying stratum to be intersected by a large portion of the underground components of the Project, primarily the caverns and tunnels. No existing Scheme tunnel or excavation currently intersects the Ravine Beds geological unit, and therefore it is extremely important to understand excavation conditions, water seepage, rock bedding and faulting conditions, particularly in the area of the power station cavern. See Supporting *Chapter Ten - Site and Ground Conditions* for further discussion of regional geology and geotechnical considerations, and Supporting *Chapter Twelve - Facilities* for geotechnical design considerations.

The existing geotechnical investigation program is largely a surface-based program that utilises deep drill holes to access the depths of the proposed underground caverns. This approach has provided useful information to the design process but has some limitations. For example when the targets are deep, such as for the Project, the drilling process is long and measurements for geotechnical design parameters such as in situ stress are complicated and sometimes have low reliability or are not possible at all. Other limitations include the orientation of drill holes that are typically vertical with a possible variation angle of plus or minus 30˚ from vertical. The lack of horizontal holes limits the level of detail possible to define the predominantly horizontal excavation conditions.

3.3 Exploratory tunnel

It is common practice internationally for hydroelectric power projects, particularly with large caverns, to establish an exploratory tunnel to the top of the underground power station cavern and drill numerous investigation probes. Tumut 2 Power Station was commenced in this fashion. The associated testing includes in situ stress testing to confirm the precise cavern location for the underground power station complex and suitable orientation for the stress conditions at depth as well as its construction method.

An added advantage of excavating an exploratory tunnel to reach the underground power station is the significant amount of underground condition information that will be documented during the excavation of the tunnel itself. This will further inform design for the main construction works.

3.4 Do nothing alternative

To achieve the objectives of the Project in a timely manner, the do nothing alternative to Exploratory Works is to proceed with the application and approval for the Project without a better understanding of the site conditions (rock conditions, groundwater conditions, temperature and stress conditions) for the largest proposed cavern housing the underground power station.

Without Exploratory Works, there will be a significant lack of detailed geological condition information, which is vital to feed into the design of the underground cavern for the Project, and would be subject to a further assessment and approvals process. Should Exploratory Works not proceed there is a risk that a lack of information on rock conditions could lead to unsuitable areas being excavated which would, in turn, have several additional negative impacts including the potential for additional works, greater surface and underground disturbance and time delays.

The do nothing alternative has therefore been discounted to ensure the design and construction of the Project meets high standards for quality, safety, efficiency and the environment to meet the objectives of providing timely security and reliability to the National Energy Market.

3.5 Limitations of existing infrastructure

In order to construct the exploratory tunnel, existing roads and local infrastructure must be upgraded and new infrastructure constructed.

The desired end state is to be able to start tunnelling as soon as possible (subject to approvals). This requires infrastructure capable to move large/heavy equipment, materials and people to the portal, and capacity to remove excavated material to surface stockpile or subaqueous disposal.

Current access tracks do not go the whole way to the portal site and are of inadequate quality for forecast movements. The existing track:

1. Is too narrow to pass material delivery vehicles;
2. Has many hazardous drop-offs and adverse crossfalls;
3. Has a poor running surface (rutted, badly shaped, slippery/boggy due to poor drainage); and
4. Would require constant maintenance with the associated disruption, cost, and hazard.

Therefore it is necessary to:

1. Widen the track (to take the design vehicle);
2. Improve adverse crossfalls (to reduce hazards);
3. Provide edge protection (and other safety measures) (to reduce hazards); and
4. Strengthen the pavement and provide better drainage (to provide durability and reduce maintenance).

4 Works location

The Exploratory Works are predominantly in the Ravine region of the KNP. This region is between Talbingo Reservoir to the north-west and the Snowy Mountains Highway to the east The Snowy Mountains Highway connects Adaminaby and Cooma in the south-east to Talbingo and Tumut to the north-west of the KNP.

Talbingo Reservoir is an existing reservoir that forms part of the Scheme. The reservoir, approximately 50 km north-west of Adaminaby and approximately 30 km east-north-east of Tumbarumba, is popular for recreational activities such as boating, fishing, water skiing and canoeing.

The nearest large towns to the Exploratory Works are Cooma and Tumut. Cooma is approximately one hour and 45 minutes drive (95 km) south-east of Lobs Hole. Tumut is approximately one hour and 45 minutes drive (81 km) north of Lobs Hole.

There are several communities and townships near the Project area including Talbingo, Tumbarumba, Batlow, Cabramurra and Adaminaby. Talbingo and Cabramurra were built for the original Snowy Scheme workers and their families. Adaminaby was relocated to alongside the Snowy Mountains Highway from its original location (now known as Old Adaminaby) in 1957 due to the construction of Lake Eucumbene. Talbingo and Adaminaby provide a base for users of the Selwyn Snow Resort in winter. Cabramurra was modernised and rebuilt in the early 1970s and is owned and operated by Snowy Hydro. It is still used to accommodate Snowy Scheme employees and contractors. Properties within Talbingo are now predominantly privately owned. Snowy Hydro now only owns 21 properties within the town.

Other attractions and places of interest in the vicinity of the project area include Selwyn Snow Resort, the Yarrangobilly Caves complex and Kiandra. Kiandra has special significance as the first place in Australia where recreational skiing was undertaken and is also an old gold rush town.

The project area is shown in Figure 2 and comprises:

1. **Lobs Hole** - Lobs Hole will accommodate the excavated rock emplacement areas, an accommodation camp as well as associated infrastructure, roads and laydown areas close to the portal of the exploratory tunnel and portal construction pad at a site east of the Yarrangobilly River;
2. **Talbingo Reservoir** - installation of barge access infrastructure near the existing Talbingo Spillway, at the northern end of the Talbingo Reservoir, and also at Middle Bay, at the southern end of the reservoir, near the Lobs Hole facilities, and installation of a submarine communications cable from the Tumut 3 power station to Middle Bay, providing communications to the portal construction pad and accommodation camp. A program of subaqueous rock placement is also proposed;

3. **Mine Trail** - will be upgraded and extended to allow the transport of excavated rock from the exploratory tunnel to sites at Lobs Hole that will be used to manage excavated material, as well as for the transport of machinery and construction equipment and for the use of general construction traffic;
4. **Lobs Hole Ravine Road** - several sections of Lobs Hole Ravine Road will be upgraded in a manner that protects the identified environmental constraints present near the current alignment; and
5. **Spillway Road** - sections of Spillway Road from Tumut 3 Power Station to the Talbingo Dam spillway will be upgraded to allow barge infrastructure to be constructed at the northern end of Talbingo Reservoir.

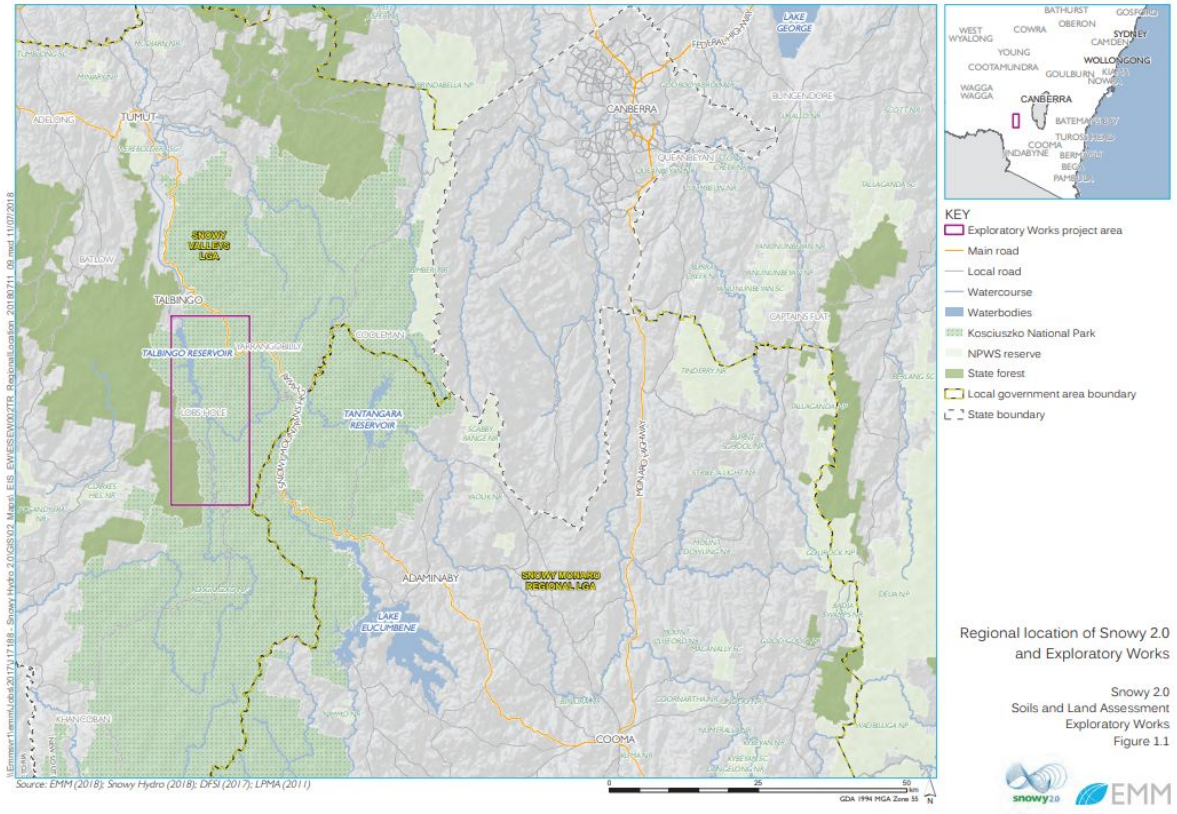

Figure 2: Location of works in the region

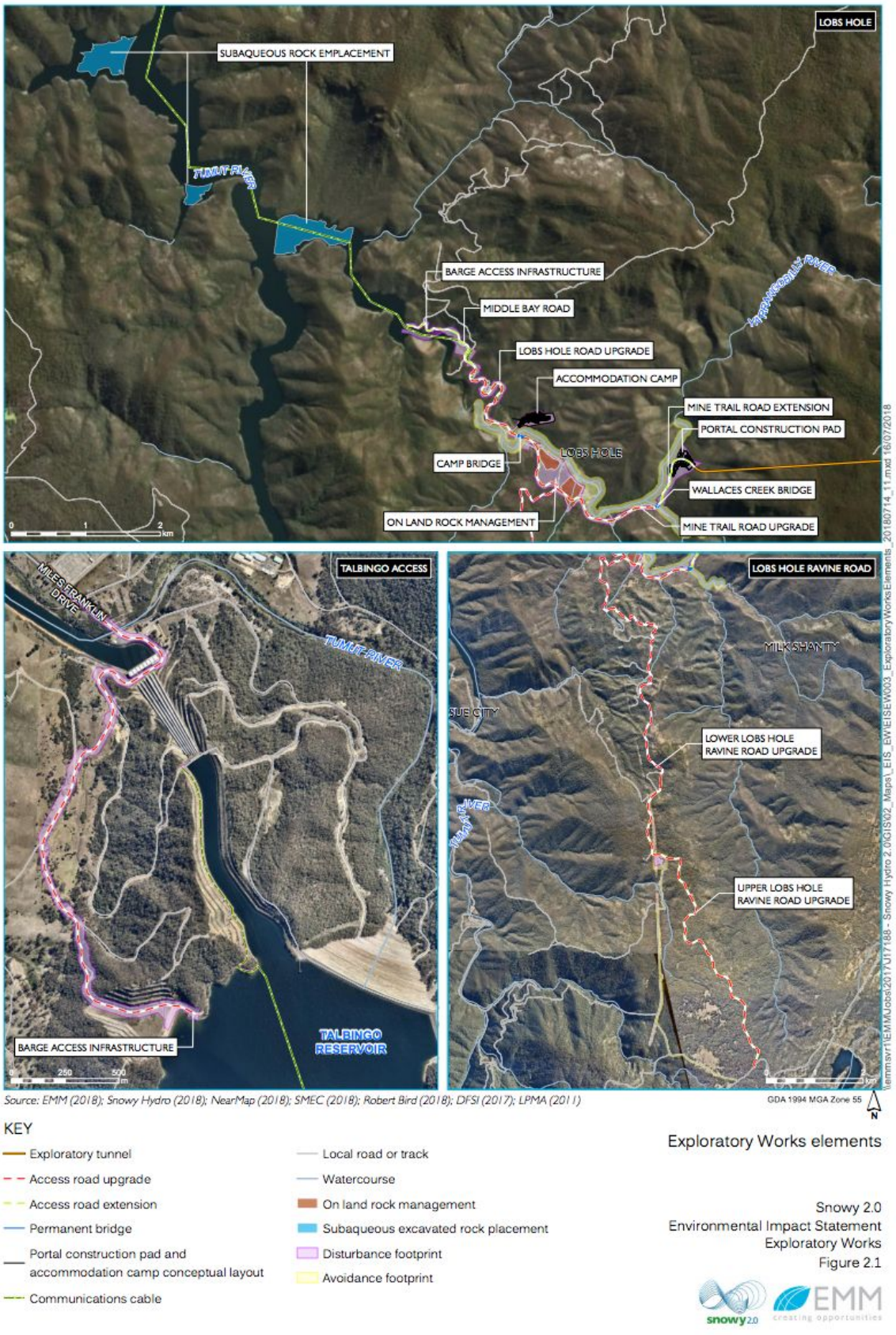

Figure 3: EW elements

5 Scope

5.1 Overview

The Exploratory Works will involve the construction of an exploratory tunnel to enable exploratory drilling and provide a greater understanding of the underground conditions at the power station cavern. Several supporting elements will also be required to facilitate the construction of the exploratory tunnel.

The Exploratory Works elements are shown in Figure 3 and include:

1. **Exploratory tunnel** - an exploratory tunnel about 3.1 km long to the site of the underground power station;
2. **Portal construction pad** - a portal construction pad for the exploratory tunnel. This will provide the entrance structure to the tunnel and an area for infrastructure and equipment needed to support tunnelling activities;
3. **Accommodation camp** - an accommodation camp for the Exploratory Works construction workforce;
4. **Access roads** - road works and upgrades to enable access and haulage routes during Exploratory Works. This includes upgrades to 22 km of existing roads and creating about 2 km of new roads;
5. **Barge access** - barge access infrastructure to enable access and transport by barge on Talbingo Reservoir. This includes one new barge ramp at Talbingo Spillway in the northern part of Talbingo Reservoir and one new barge ramp at Middle Bay near Lobs Hole at the southern part of Talbingo Reservoir;
6. **Supporting infrastructure** - services infrastructure such as diesel-generated power, water, wastewater treatment, storage/workshop facilities and communications;
7. **Excavated rock management** - including subaqueous placement within Talbingo Reservoir. Up to 750,000 m^3 of excavated rock will need to be tested for its geochemical properties (ie whether the rock is reactive or nonreactive) before being managed by a combination of the following options:
    a. **Re-use** – suitable material can be used as construction materials for roads or similar. Some materials will be provided to NPWS for use in road maintenance and upgrades in other areas of KNP;
    b. **On-land placement** – material will be placed in one of two on-land emplacement areas. The eastern emplacement area has been designed to safely treat reactive material and to ultimately remain as a permanent landform suitable for recreational activities such as camping. The western emplacement area will be used for temporary storage of materials for re-use;
    c. **Subaqueous placement** within Talbingo Reservoir – suitable material will be placed at a suitable location within Talbingo Reservoir, subject to a number of water quality controls and monitoring; and

8. **Rehabilitation and revegetation** - if the Project is not approved or does not progress, then impacted areas will be rehabilitated, and project elements decommissioned in consultation with NPWS.

Horizontal and other test drilling, investigations and analysis are also proposed for the above elements to inform their detailed design.

Exploratory Works are anticipated to start at the end of 2018, with road works the first construction activity to be carried out. Once safe access is established, the rest of the Exploratory Works construction will progress subject to approval. Exploratory Works is estimated to take around 34 months to complete.

All Exploratory Works align with components of the proposed main works for the Project. However, if the Project is not approved or does not progress, then impacted areas will be rehabilitated, and project elements decommissioned in consultation with NPWS.

5.2 Exploratory tunnel

An exploratory tunnel of approximately 3.1 km is proposed to provide early access to the location of the largest cavern for the underground power station. This will enable exploratory drilling and help optimise the location of the cavern which, in turn, will optimise the design of the Project.

The exploratory tunnel is proposed in the north-east section of Lobs Hole and will extend in an east-west direction with the portal construction pad to be outside the western end of the tunnel at a site east of the Yarrangobilly River.

The exploratory tunnel will be excavated by drill and blast methods and have an 8 m x 8 m D-Shaped cross-section, as shown in Figure 4.

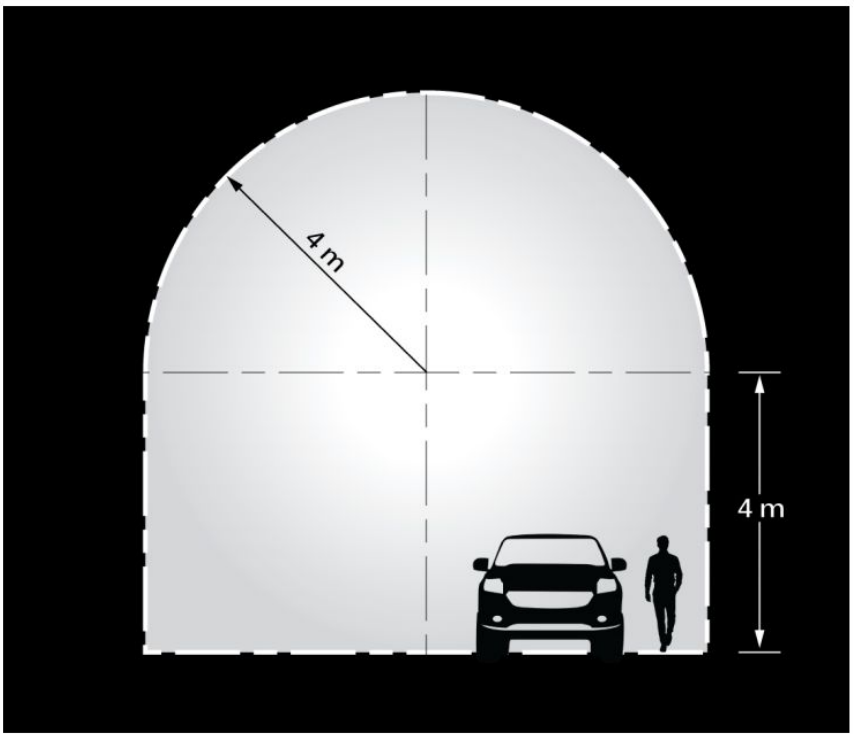

Figure 4: Exploratory tunnel cross-section

The drill and blast excavation process will be repeated cyclically throughout the tunnelling works, involving:

1. Marking up and drilling blast holes in a predetermined pattern in the working face of the tunnel;
2. Loading the blast holes with explosives, attaching detonators and connecting the holes into a blast sequence, and detonating the blast;
3. Ventilating the tunnel to remove blast fumes and dust; removing blasted rock;
4. Scaling and wash down of the tunnel roof and walls to remove loosened pieces of rock;
5. Geological mapping of the exposed rock faces and classification of the conditions to determine suitable ground support systems for installation;
6. Installing ground support; and
7. Advancing construction ventilation ducting and other utilities including power, water, compressed air and communications.

The exploratory tunnel will be shotcrete-lined with permanent anchor support, and incorporate a groundwater management system. The exploratory tunnel shape and dimensions are designed to allow two-lane traffic for the removal of excavated material, along with additional space for ventilation and drainage of groundwater inflows. Groundwater intersected during tunnelling will be contained and transferred to the portal for treatment and management. Areas identified during forward probing with the potential for high groundwater flows may require management through a detailed grouting program or similar.

The tunnel portal will be established at the western end of the exploratory tunnel and provide access and utilities to the exploratory tunnel during construction. The portal will house power, communications, ventilation and water infrastructure. The portal will also provide a safe and stable entrance to the exploratory tunnel.

It is anticipated that the exploratory tunnel will be adapted for multiple functions during construction of the subsequent stages of the Project. The exploratory tunnel will also eventually be utilised to form the main access tunnel (***MAT***) to the underground power station during the operational phase of the Project.

5.3 Portal construction pad

A portal construction pad for the exploratory tunnel will provide a secure area for construction activities. Infrastructure at the portal construction pad will primarily support tunnelling activities and include a concrete batching plant and associated stockpiles, site offices, maintenance workshops, construction support infrastructure, car parking, and equipment laydown areas.

Stockpile areas will allow for around two to three months' supply of concrete aggregate and sand for the concrete batching plant, to ensure that the construction schedule for the proposed access road works does not interfere with the exploratory tunnel excavation schedule. A temporary excavated rock stockpile area is also required to stockpile material excavated during tunnel construction prior to its transfer to the larger excavated material emplacement areas.

The portal construction pad will be at the western end of the exploratory tunnel. The portal construction pad will be excavated to provide a level construction area with a near vertical face for the construction of the portal and tunnelling. The area required for the portal construction pad is approximately 100,000 m^2.

5.4 Excavated rock management

It is estimated that approximately 750,000 m^3 of bulked materials will be excavated, mostly from the exploratory tunnel and portal construction pad with additional quantities from road upgrade works. Subject to geochemical testing of the rock material, the excavated rock will be placed either on-land or sub-aqueously within Talbingo Reservoir.

5.4.1 on-land placement

Excavated materials will be placed in one of two rock emplacement areas at Lobs Hole.

The eastern emplacement area has a capacity of up to 600,000 m^3 of material. It will be of an approximately 25 m maximum depth and will be benched down to the northern edge of the emplacement setback 50 m from the Yarrangobilly River. All remaining materials within the eastern emplacement area at the end of Exploratory Works will be either subaqueously placed within Talbingo Reservoir

or removed to a suitable location outside KNP within five years of completion (should Main Works not proceed).

The western emplacement area will be used to store excavated material should it not be able to be placed within the eastern emplacement area. It is envisaged this emplacement area will be used to store excavated materials suitable for re-use within the construction of Exploratory Works or for use by NPWS in KNP maintenance activities. All remaining material placed in this emplacement area will be removed following the completion of Exploratory Works.

The guiding principles for the design, construction method and management of emplacement areas undertaken for Exploratory Works have been as follows:

1. Reduce potential for acid rock drainage from the excavated rock emplacement area entering the Yarrangobilly River or forming groundwater recharge;
2. Avoid known environmental constraints; and
3. Manage existing surface water flows from Lick Hole Gully.

The design and management of the emplacement areas have not yet been finalised due to the need for further investigations to determine the likely geochemical characteristics of the excavated material. Following further investigation and prior to the construction of Exploratory Works a management plan will be prepared and implemented.

5.4.2 Subaqueous placement

An initial program for the placement of excavated rock within Talbingo Reservoir also forms part of Exploratory Works. The program will be implemented in an appropriate section of Talbingo Reservoir in accordance with a detailed management plan based on an engineering method informed through the materials' geochemistry and reservoir characteristics.

The purpose of the program is to confirm the suitability of the emplacement method for future excavated rock material from the construction of the Project, should it proceed. The rock for subaqueous placement will be taken from the excavated rock emplacement areas as described above. Testing of the rock would be conducted during excavation to assess geochemical properties. Any rock assessed as unsuitable for subaqueous placement based on the prior geochemical and leachability testing would be separately stockpiled and not used in the program.

Suitable (ie non-reactive material) would be transported and loaded to a barge, for placement at the deposition area. Suitable placement locations have been identified for the Exploratory Works.

All placement within the reservoir would occur within silt curtains and would be subject to a detailed monitoring regime including survey monitoring of pre-placement and post-placement bathymetry, local and remote background water quality monitoring during placement with a structured management response to monitoring results in the event of an exceedance of established

triggers. The management, mitigation and monitoring measures would be refined following the ongoing investigations.

See *Supporting Chapter Eleven - Environment, permits and approvals* for a broader discussion of excavated rock placement options for the Main Works.

5.5 Accommodation camp

An accommodation camp is proposed to provide accommodation and supporting services for workers in close proximity to the exploratory tunnel. The accommodation camp layout includes ensuite rooms surrounding central facilities including a kitchen,, gym, admin office, laundry, maintenance building, sewage and water treatment plants and parking that will service the Exploratory Works workforce. The accommodation camp access road will connect to the north side of Lobs Hole Road at Lobs Hole. The camp will have a capacity of approximately 150 beds.

5.6 Access roads

5.6.1 Roads

Overview

Existing roads and access will need to be upgraded to a suitable standard to:

1. Provide for the transport of excavated rock material between the exploratory tunnel and the excavated rock emplacement areas;
2. Accommodate the transport of oversized loads as required; and
3. Facilitate the safe movement of plant, equipment, materials and construction staff to the portal construction pad.

Given the topographic constraints of the area, the standard of the existing roads, and the environmental values associated with KNP, the option of barging larger and oversized loads to the site is available.

The access road upgrades will be designed based on access for a 19 m semi-trailer. It is expected that the majority of materials and equipment will travel along the Snowy Mountains Highway, Link Road and Lobs Hole Ravine Road, with some required to travel on Miles Franklin Drive via Talbingo to Talbingo Dam Wall and be transferred via a barge to site. Where existing roads are replaced by new access roads or road upgrades, the existing roads will be removed and rehabilitated in line with the rehabilitation strategy for Exploratory Works (see Supporting *Chapter Eleven*).

Roadwork area	Overview
Upper Lobs Hole Ravine Road upgrade	Minor upgrades to 7.5 km section of existing road. Only single lane access will be provided. No cut and fill earthworks or vegetation clearing will be undertaken.
Lower Lobs Hole Ravine Road upgrade	Upgrades to a 7.5 km section of existing road involving cut and fill earthworks in some sections. Only single lane access will be provided.
Lobs Hole Road upgrade	Upgrade to a 3.2 km section of existing road providing two-way access.
Mine Trail Road upgrade	Upgrade to a 1.5 km section of existing track to two-way access and 1 km of new construction to extend to the MAT portal.
Mine Trail Road extension	Establishment of a new two-way road providing access to the exploratory tunnel portal.
Wharf Road / Middle Bay Road	Establishment of a new two-way road to the proposed Middle Bay barge ramp.
Spillway Road	Upgrade of a 3 km section of existing road to provide two-way access to the proposed Spillway barge ramp.

Table 2: Access roads

While no cut and fill earthworks or vegetation clearing is proposed along Upper Lobs Hole Ravine Road, a laydown area is proposed within and adjacent to the existing transmission line easement. This area will be used to store materials required for the roadworks to the lower section of Lobs Hole Ravine Road.

EWR Contract scope

The Work under this Contract will provide the early access to the tunnel portal located to the east of the Talbingo Reservoir, and to Talbingo Reservoir itself, for the Civil Contractor. It includes upgrades to and/or construction of the following roads:

1. **Ravine Road** - between Link Road and the intersection with Mine Trail and Lobs Hole Road;
2. **Mine Trail** - from Ravine Road to the MAT Portal;
3. **Lobs Hole Road** - from the intersection with Mine Trail and Ravine Road, to the intersection with Wharf Road;
4. **Wharf Road** - from Lobs Hole Road to the Top Water Level of Talbingo Reservoir; and
5. **Spillway Road** - from Tumut 3 Power Station to the Top Water Level of Talbingo Reservoir. The upgrade to Spillway Road (MC61) at the northern end of Talbingo reservoir will provide the Civil Contractor early access to construct a wharf as part of the main Project.

The Exploratory Works Road Works have been designed to permit the Civil Contractor to perform exploratory works under the Civil Works contract to start as early as possible.

The design places the Works within the approved EIS boundary and maximises the design speed while minimising the amount of earthworks.

The design is based on limited geotechnical investigations and as such a range of options are contained in the Drawings which will allow slopes to be quickly altered during construction based on the geotechnical conditions encountered.

The pavements will be mostly unsealed. While this will entail higher maintenance for the Civil Contractor, this is offset in two ways:

1. In the event that the Project does not proceed past the Exploratory Works stage, up-front capital investment is reduced;
2. By avoiding the need to undertake extensive repair and remediation to repair the damage caused by several years of construction traffic.

Bridge construction will be required at two locations as described in Table 3.

Bridge works area	Overview
Camp bridge	An existing ford on Yarrangobilly River will be used as a temporary crossing while a new permanent bridge is built as part of the Lobs Hole Road upgrade. The existing crossing will be replaced with a temporary one. The rocks used to raise the crossing level will be removed and the crossing no longer used once the permanent bridge has been constructed. The new bridge (Camp Bridge) will be a permanent crossing and used for both Exploratory Works and Main Works.
Wallaces Creek bridge	Establishment of a new permanent bridge at Wallace Creek as part of the Mine Trail Road extension. Establishment of this bridge will require an initial temporary prefabricated Bailey bridge to be constructed, which will be removed before the end of Exploratory Works.

Table 3: Bridges

The design for permanent bridges at both crossings will consist of steel girders with a composite deck. This is the most common type of permanent bridge constructed in and around the existing Snowy Scheme. Lightweight steel girders are easy to transport and will, therefore, allow for efficiencies in the construction schedule and permit the use of smaller-scale lifting equipment at the construction site. The two bridges to be constructed have been designed such that the girders can be transported to the site and can be erected in components as early access for large cranes is difficult.

5.7 Barge access

To provide an alternative to road access, a barge option is proposed, not only for bulky and heavy equipment but also for materials and in case of emergency.

During the Exploratory Works, barges will be loaded at the northern barge ramp (Talbingo barge ramp), travel about 18 km along Talbingo Reservoir and be unloaded at the southern barge ramp (Middle Bay barge ramp) before returning to the north. Some loads may also be transported in the reverse direction.

Barge access infrastructure will comprise two dedicated barge ramps at Middle Bay and Talbingo Spillway, with a slope of approximately one vertical to 10 horizontal (1V: 10H) at each location. A navigation channel is also required adjacent to the Middle Bay barge ramp.

Construction will involve:

1. Geophysical and geotechnical investigation of the barge access area to inform detailed design;
2. Site establishment and excavation of barge access area;
3. Installation of precast concrete panels at the ramp location;
4. Installation of bollards for mooring lines;
5. Removal of trees and debris to establish a navigation channel allowing barge access; and
6. Minor dredging to allow barge access at the reservoir minimum operating level.

To facilitate construction, laydown areas are proposed adjacent to the Middle Bay barge ramp and adjacent to the water inlet pipeline. Laydown will also be used within the footprint of the Talbingo barge ramp. Dredged material will be placed as part of the subaqueous placement program or within one of the designated on-land rock emplacement areas.

5.8 Supporting infrastructure

Exploratory Works will require additional power and communication infrastructure. Water services are also needed and include a water services pipeline and water and wastewater (sewage) treatment facilities. A summary of services required is provided in Table 4.

Services infrastructure	Description
Power	Power will be provided at the portal construction pad and accommodation camp by diesel generators, with fuel storage provided at the portal construction pad.
Communication	Communication will be provided by a fibre-optic link. The fibre optic service has been designed to incorporate a submarine cable from Tumut 3 power station across Talbingo Reservoir to Middle Bay, and then via a buried conduit within the access roads to the accommodation camp
Water and wastewater (sewage)	A water services pipeline is proposed for the supply and discharge of water for Exploratory Works which will pump water between Talbingo Reservoir and the exploratory tunnel portal, portal construction pad and accommodation camp.
	A package water treatment plant is proposed at the accommodation camp to provide potable water to the accommodation camp and portal construction pad facilities and will be treated to a standard that complies with the Australian Drinking Water Guidelines. The accommodation camp water supply will be pumped via the water pipeline from Talbingo Reservoir at Middle Bay.
	A package wastewater (sewage) treatment plant (***STP***) is proposed at the accommodation camp for Exploratory Works wastewater. The STP will produce effluent quality comparable to standard for inland treatment facilities in the region (eg Cabramurra). Following treatment wastewater will be discharged to Talbingo Reservoir via the water services pipeline connecting the accommodation camp to Talbingo Reservoir. Wastewater from the exploratory tunnel and concrete batching plant will be either reused on site or sent to the wastewater treatment plant for treatment prior to discharge.

Table 4: Services and infrastructure

6 Construction staging and timing

Construction of the project is anticipated to commence at the end of 2018 with substantive works commencing in early 2019 and to continue for an estimated 34 months, with the exploratory tunnel expected to be completed by late 2021. It is expected that the construction works will be completed largely in parallel.

However, road and access works are expected to be completed within the first six months from commencement.

7 Construction method

7.1 Overview

Snowy Hydro anticipates awarding separate contracts for:

1. EWR Contract;
2. Civil Contract, and
3. E&M Contract.

A contract to deliver the EWR has been negotiated with Leed Contractors.

7.2 Delivery method

7.1.1 EWR Contract

Critical success factors

Snowy Hydro (as the Principal) has identified the following factors as being critical to the successful delivery of the Work under the EWR Contract (***WUC***) as part of the broader objectives of the Project:

1. The WUC are delivered safely;
2. The Contractor fulfils its environmental obligations, particularly the protection of the Smoky Mouse habitat on Ravine Road;
3. The Principal and the Contractor obtain the necessary approvals to commence work;
4. The Contractor mobilises rapidly and achieves a fast start-up of construction works upon commencement;
5. The WUC will progressively improve safe access through the site for the Project;
6. The WUC will provide early access for the Civil Contractor to the MAT portal and barge launch area at Talbingo Reservoir spillway;
7. The Contractor will need to be flexible to deal with unknown geotechnical conditions and can adapt to these changes while maintaining program and providing value;
8. The Contractor must progressively achieve the Principal's milestones;
9. The Contractor must allow access to the Site and the WUC for the Principal, the Principal's contractors including Civil and E&M Contractors, NPWS and Transgrid.

7.2 Typical construction methods

7.2.1 Disturbance footprint

A disturbance footprint has been identified for Exploratory Works. The extent of the disturbance footprint includes the buildings and structures, portal

construction pad, road widening and bridges, laydown areas, and rock emplacement areas.

7.2.2 Surface geotechnical investigation

To assist the design development for the portal construction pad, accommodation camp, Wharf Road, Spillway Road, and Lobs Hole Ravine Road, a further survey of ground conditions is required. A program of geotechnical investigations including geophysical survey, construction of test pits, and borehole drilling within the disturbance footprint, was initiated prior to FID and will continue as part of construction activities. Excavation of test pits in areas where information on relatively shallow subsurface profiles is required, or where bulk sampling is required for laboratory testing. Borehole drilling is required to facilitate the detailed design of cuttings, bridge foundations, retaining wall foundations, and drainage structures.

Geophysical surveys will generally involve:

1. Laying a geophone cable at the required location and establishing seismic holes;
2. Blasting of explosives within seismic holes; and
3. In-reservoir geophysics surveys using an air gun as the seismic source.

Geotechnical surveys will generally involve:

1. Establishing a drill pad including clearing and setup of environmental controls where required; and
2. Drilling a borehole to required depth using a tracked or truck mounted drill rig; installing piezometers where required for the future monitoring program. Geophysical and geotechnical investigation within Talbingo Reservoir will be carried out using barges and subject to environmental controls.

7.2.3 Site establishment

Site establishment will generally involve:

1. Identifying and flagging areas that are to be avoided during the Exploratory Works period;
2. Installation of survey controls;
3. Installation of temporary erosion and sedimentation controls;
4. Heritage item recovery works;
5. Clearing of vegetation within the disturbance footprint, typically using chainsaws, bulldozers and excavators;
6. Civil earthworks to create a stable and level foundation. This will involve a cut and fill approach where required to minimise the requirement for imported material;
7. Installing site drainage, soil erosion and other permanent environmental controls where required;
8. Construction of the surface layers. Where suitable, this material will be sourced locally (eg from upgrade works to Lobs Hole Ravine Road); and

9. Set up and commissioning of supporting infrastructure, including survey marks.

7.2.4 Roadworks

Upgrades of existing tracks (no widening) will generally involve:

1. Identifying and flagging areas that are to be avoided during the Exploratory Works period; and
2. Removing high points, infilling scours, levelling of rutting, and compacting surfaces; and
3. Construction of road pavement layers where required.

Extension or widening of existing tracks will generally involve:

1. Identifying and flagging areas that are to be avoided during the Exploratory Works period;
2. Installing environmental protection measures including erosion and sedimentation controls
3. Clearing existing vegetation within the disturbance footprint;
4. Installing site drainage;
5. Construction of soil retention structures such as shotcrete, rock bolts, gabion walls and soil nails to retain newly excavated slopes;
6. Clearing and earthworks within the disturbance footprint; and placing road pavement material on the roadway; and
7. Installation of road furniture including signs and safety barriers.

7.2.5 Bridge works

Establishment of permanent bridges will generally involve:

1. Installing erosion and sedimentation controls around watercourses and installing scour protection as required;
2. Establishing temporary diversions within the watercourse where required, including work to maintain fish passage;
3. Establishing temporary bridges to facilitate permanent bridge construction;
4. Constructing permanent bridges including piling, the establishment of abutments and piers, construction of bridge superstructure and parapets; and
5. Removal and rehabilitation of temporary bridges and diversions.

7.2.6 Barge access works

Establishment of barge access infrastructure will generally involve:

1. Installing sediment controls;
2. Excavating and dredging of barge ramp area and navigation channel;
3. Installing precast concrete planks and bollards; and
4. Set up and commissioning of supporting infrastructure.

7.2.7 Exploratory tunnel construction

The drill and blast excavation process will be repeated cyclically throughout the tunnelling works, involving:

1. Marking up and drilling blast holes in a predetermined pattern in the working face of the tunnel;
2. Loading the blast holes with explosives, attaching detonators and connecting the holes into a blast sequence, and detonating the blast;
3. Ventilating the tunnel to remove blast fumes and dust;
4. Installing first stage roof support;
5. Removing blasted rock;
6. Geological mapping of the exposed rock faces and classification of the conditions to determine suitable ground support systems for installation;
7. Installing further additional ground support as required;
8. Probing ahead by drilling to ascertain rock conditions; and
9. Advancing construction ventilation ducting and other utilities including power, water, compressed air and communications.

7.2.8 Ancillary facilities and laydown

Ancillary facilities and laydown areas have been identified within the conceptual layout for the portal construction pad and accommodation camp. A number of other indicative construction and laydown areas have also been identified to support Exploratory Works. A summary of these sites are:

1. Upper Lobs Hole Ravine Road laydown area;
2. Rock emplacement area laydown, storage and ancillary uses;
3. Barge access infrastructure laydown areas at Talbingo and Middle Bay; and
4. Other minor laydown areas as needed during site establishment.

All laydown areas are within the disturbance footprint identified for Exploratory Works. In addition, an area near Camp Bridge has been identified to be used for a plant nursery and organic stockpile area.

7.3 Plant and equipment

The indicative plant and equipment for each Exploratory Works element are provided in Table 5 below.

Exploratory Works element	Types of equipment
Exploratory tunnel	Excavator, dump truck, bulldozer, roller, grader, truck and dog, drilling rigs, grout pumps, agitator truck, shotcrete pump, semi-trailer, water cart, light vehicles, compressor, generator, drills, jumbo, boomer, hydraulic breakers, air track, explosives transport vehicle, water bowser, 4WD Telesco, Stihl saw, forklift, light tower, compressor, gas monitor, rescue equipment, battery, ventilation fans, fuel truck, cement tanker, shotcrete robot, shotcrete pump, boom lift and water pump.
Portal construction pad	Excavator, dump truck, bulldozer, grader, truck and dog, crane, water cart, light vehicle, compressor, fuel vehicle, piling rig, agitator truck, concrete truck, semi-trailer and roller.
Accommodation camp	Excavator, dump truck, bulldozer, grader, truck and dog, crane, water cart, light vehicle, compressor, fuel vehicle, piling rig, agitator truck, concrete truck, semi-trailer and roller.
Access roads	Excavator, dump truck, bulldozer, grader, truck and dog, crane, water cart, light vehicle, compressor, fuel vehicle, piling rig, drilling rig, agitator truck, concrete truck, semi-trailer and roller.
Barge access infrastructure	Bulldozer, excavator, roller, barge and skip truck.
Excavated rock management	Bulldozer, excavator, roller, barge and skip truck.

Table 5: Plant and equipment

7.4 Traffic movements

7.4.1 General

Throughout the duration of Exploratory Works, vehicle movements to and from the external road network will be required. The peak month for external traffic movements is predicted to occur in the sixth month of Exploratory Works with about 423 external traffic movements in this month. The peak hourly traffic generation has been estimated at 44 vehicle movements, which is expected to occur between 9–10 am on a day during month six of Exploratory Works.

7.4.2 Primary transport routes

It is expected that the majority of materials and equipment will travel along the Snowy Mountains Highway, Link Road and Lobs Hole Ravine Road, with some travelling via Talbingo to Talbingo Reservoir and transfer via a barge to site. It is expected that all heavy transport will be limited to daylight hours to limit noise impacts.

7.4.3 Excavated rock haul route

Excavated material from the exploratory tunnel will be transported by truck from the portal construction pad to the excavated material emplacement area at Lobs Hole. Excavated material haulage between the exploratory tunnel and the emplacement area will be undertaken 24 hours per day, seven days per week.

7.5 Construction resources

7.5.1 Material quantities and sources

Construction materials required for Exploratory Works will indicatively include fuel, timber, building materials, scaffolding, explosives, reinforcing steel, wire and cable, tunnelling equipment, rock bolts, precast concrete, electrical equipment, steel bridge girders, geotextiles, aggregate, cement, coated stone, concrete and guard rails. The sources of construction materials are yet to be determined. It is expected that construction materials will be sourced from several different locations including nearby towns such as Cooma and Tumut, with some items and equipment being sourced from nearby cities such as Canberra, Sydney and Melbourne.

7.5.2 Water use

Total water consumption is estimated to be approximately 226 megalitres (ML) annually for the duration of Exploratory Works with the main quantities being used in the accommodation camp, CBP and site dust suppression.

7.5.3 Energy use

The Exploratory Works power supply will be provided by diesel generators at the portal construction pad and the accommodation camp.

7.5.4 Waste management

The management and disposal of wastewater and excavated rock are described above. Construction waste such as used materials and packaging will be placed in dedicated waste containers at the accommodation camp or portal construction pad. Construction waste will be removed from the project area by truck and disposed of to a licensed facility.

Any hazardous materials will be disposed of to an appropriately licensed facility.

7.5.5 Ancillary construction areas

Ancillary facilities and laydown areas have been identified within the conceptual layout for the portal construction pad and accommodation camp. A number of other indicative construction and laydown areas have also been identified to support Exploratory Works.

Ancillary construction areas may also include temporary site offices and fuel storage areas. All ancillary construction areas are within the project area and clearance footprint identified for Exploratory Works. In addition, an area near Camp Bridge has been identified to be used for a plant nursery and organic stockpile area. No clearing of vegetation is required in this area.

7.6 Workforce

7.6.1 Staffing levels

Exploratory Works is likely to take 34 months from initial mobilisation to completion of the exploratory tunnel. The estimated time to complete construction of the accommodation camp is up to 10 months. Workers constructing the accommodation camp will be accommodated within Cabramurra (existing Snowy Hydro town) until the accommodation camp is constructed and operational, and Cabramurra may continue to be used for overflow accommodation. Some workers may also be accommodated at Snowy Hydro owned units at Talbingo during construction of the Talbingo barge ramp.

It is currently expected that the workforce for Exploratory Works will be approximately 200 people in total, at peak construction. Workers are anticipated to work a 'swing' shift, for example, two weeks on and one week off. These workers will be accommodated within the accommodation camp at Lobs Hole when rostered on. The majority of the workforce will work on a fly-in fly-out and drive-in drive-out basis. It is expected that the majority of workers will fly in and out of either Cooma Airport or Canberra Airport and then travel to the site via bus.

During construction of the accommodation camp, workers will be accommodated at Cabramurra. Some workers may also be accommodated at Talbingo during construction of the Talbingo barge ramp. No accommodation will be required outside of Cabramurra, the construction accommodation camp or Talbingo for the Exploratory Works workforce.

7.6.2 Hours of operation

It is expected that construction of the exploratory tunnel and haulage of rock material between the tunnel and excavated rock stockpile locations at Lobs Hole will be 24 hours a day, seven days a week for the duration of the tunnel drilling and blasting operation. Other construction activities, including the establishment works, road and infrastructure works, will normally work a 12 hour day, seven days a week. The transport of materials along the haul route from Snowy Mountains Highway, Link Road and Upper Lobs Hole Ravine Road will only occur during daytime hours (except during emergency), to avoid impacts to threatened species (Smoky Mouse). Transport by barge will be 24 hours a day, seven days a week.

7.7 Rehabilitation and revegetation

All Exploratory Works align with components of the main works for the Project. However, should the Project not be approved or not progress, the project area will need to be rehabilitated, and project elements decommissioned in consultation with NPWS. Anticipated rehabilitation activities are summarised in Table 6.

Exploratory Works element	Indicative rehabilitation activities
Exploratory tunnel	Tunnel to remain open, and allow to flood in the lower portion provided groundwater impacts are negated.
Exploratory tunnel portal area	Permanent portal facade to be constructed, the portal to be sealed from entry.
Portal construction pad and associated infrastructure	To be demobilised and all infrastructure removed. Site to be revegetated and returned to 'original state'.
Excavated rock emplacement areas	Emplace excavated rock in the western emplacement area to be removed off-site and areas to be revegetated and returned to 'original state'.
Accommodation camp	To be demobilised and all infrastructure removed. Site to be revegetated and returned to 'original state'.
Road access works	No remediation required as works are designed to be permanent.
Barge access infrastructure	No remediation works required as wharf and loading ramps are designed to be permanent.
Services and infrastructure	To be demobilised and all infrastructure removed. Site to be revegetated and returned to 'original state'.

Table 6: Rehabilitation and revegetation

7.8 Decommissioning

Exploratory Works is construction works associated with further investigations to gather technical and environmental information for the Project. Should the Project not proceed following the commencement or completion of Exploratory Works, elements constructed are able to be decommissioned and areas rehabilitated as noted above. Given works are within KNP, Snow Hydro will liaise closely with NPWS to determine the extent of decommissioning and types of rehabilitation to be undertaken. This approach will be taken to ensure that decommissioning allows for integration with a future planned recreational use of these areas and to maintain the values of KNP.

These activities would be documented in a Decommissioning Plan, prepared in consultation with NPWS, and be implemented should the Project not proceed.

During construction of Exploratory Works, the maintenance and management of the project area will be the responsibility of the construction contractors. Throughout construction, the Exploratory Works will be carried out in accordance with a Construction Environmental Management Plan.

7.9 Post-construction

Following the construction of Exploratory Works, all ongoing maintenance and management of permanent infrastructure will be the responsibility of the Civil Contractor up to the point of practical completion. After the handover, responsibility will fall to Snowy Hydro. The Snowy Management Plan (***SMP***): Environmental Management Plan (***EMP***) outlines Snowy Hydro's obligations with regard to the protection of the environment and public health and will be updated to include the ongoing management and maintenance of permanent infrastructure developed through Exploratory Works. The SMP EMP will also be

updated to include any additional permits, approvals or plans required for Exploratory Works.

8 Definitions and abbreviations

EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EWR	Exploratory Works - Roads
FID	Final Investment Decision
KNP	Kosciuszko National Park
MAT	Main access tunnel
NPWS	National Parks and Wildlife Service
SMP	Snowy Management Plan
WUC	Work under the EWR Contract

9 Bibliography

There is no bibliography for this chapter.