Snowy 2.0 Transmission Connection

Critical State Significant Infrastructure Assessment

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Executive Summary

Background

Snowy Hydro Limited (Snowy Hydro) is expanding the existing Snowy Mountains Hydro-Electric Scheme by building a new underground pumped hydroelectric power station with associated infrastructure in the Kosciuszko National Park (National Park).

The Snowy 2.0 Project would generate up to 2,000 megawatts (MW) of electricity and provide up to 350 gigawatt hours (GWh) of energy storage for the National Electricity Market (NEM).

On 20 May 2020, Snowy Hydro received approval to construct and operate the Main Works project, which would connect the existing Talbingo and Tantangara reservoirs and develop a new underground pumped hydroelectric power station and ancillary infrastructure.

Project

Transgrid is now seeking approval for the Snowy 2.0 Transmission Connection (the project), which would connect the new Snowy 2.0 power station to the NEM. The project involves:

- constructing and operating two new 9 km long 330 kV double-circuit overhead transmission lines from the Snowy 2.0 cable yard in Lobs Hole in the National Park to a new substation;
- constructing and operating a new 500/330 kV substation at Maragle in the Bago State Forest (State Forest);
- 330 kV grid connection between the new substation and Transgrid's existing Line 64; and
- construction facilities, such as construction compounds and access tracks.

Engagement

The Department exhibited the application and Environmental Impact Statement (EIS) for the project from 23 February 2021 until 5 April 2021, worked closely with Snowy Valleys Council and government agencies including National Parks and Wildlife Services, consulted with key stakeholders, published all submissions, and required Transgrid to provide a formal response to the issues raised in submissions.

The Department received 24 individual public submissions and 5 submissions from special interest groups. Overall, 25 of the public submissions objected to the project. In addition, 10 government agencies provided advice and Snowy Valleys Council provided comments.

The key matters raised in submissions and agency advice, and identified in the Department's assessment of the project include the consideration of alternative options, energy security and reliability, biodiversity and park values.

Assessment

The Department has undertaken a comprehensive assessment of the merits of the project in accordance with the objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act), including the principles of ecologically sustainable development and the social and economic welfare of the community.

Energy Security and Reliability

The Department considered all the relevant Commonwealth and State energy policies, plans and reviews and concluded that timely completion of the project is critical for energy security and reliability across the NEM.

With electricity generators announcing the withdrawal of coal-based capacity, the project would improve security and reliability by dispatching electricity when needed most, diversifying the electricity supply and facilitating reduced reliance on traditional power generation derived from fossil fuels. Importantly, the timely completion of the project is critical for energy security and reliability across the NEM and provides an essential transmission connection for the full generating capacity of Snowy 2.0 allowing the benefits of the generation project to be realised.

Consideration of Alternatives

The consideration of alternative route alignments and underground options was a key issue raised in public and special interest group submissions.

Under the EP&A Act, the Department's statutory role is to consider the project (as proposed) on its merits. It is not the Department's role to consider all potential alternatives or redesign the project on behalf of the proponent. However, the EP&A Regulation requires the EIS to include "an analysis of any feasible alternatives to carrying out of the development … having regard to its objectives".

The EIS (and later documents) provided an analysis of 12 options against the project objectives including network and connectivity, constructability, design, cost, community, environment and safety.

The Department considered the options analysis in consultation with the NSW Office of Energy and Climate Change (OECC) and also engaged independent technical experts to assist. OECC and the independent technical experts considered the method to, and assumptions underpinning, the options analysis to be in line with standard practice and appropriate as a means to objectively compare options.

Based on the advice and the independent technical experts, the Department concluded that while other options are technically feasible and would reduce environmental impacts (e.g. biodiversity and visual), these options would significantly constrain Transgrid's ability to meet its other project objectives, including connecting Snowy 2.0 to the NEM in a timely manner, providing a connection reasonable in cost, increasing system reliability, and avoiding constraints on the export of energy.

Biodiversity

Transgrid has attempted to reduce biodiversity impacts by selecting the most direct route to the NEM at Line 64, locating the grid connection point outside of State conservation areas, reducing the transmission line easement width, utilising existing Snowy 2.0 infrastructure where possible and defining distinct clearing management zones that would have specific clearing requirements.

However, the project would still disturb 118 hectares (ha) of native vegetation (including 74 ha in National Park and 44 ha in State Forest), comprising 115 ha of vegetation in moderate to good condition, 1 ha of derived native grassland and 2 ha of derived shrubland. Of the 118 ha of native vegetation to be disturbed, around 71 ha would be fully cleared (37 ha in National Park and 34 ha in State Forest).

The Department has considered Transgrid's assessments of significance for the threatened species and communities that were identified as having a moderate or higher potential to occur on the site, and concluded that there would be no significant impact on any threatened species or ecological communities.

The Department, in consultation with BCS and NPWS, has applied the same offset approach for Snowy 2.0 Main Works to the elements of this project within Kosciuszko National Park. The costed management measures and actions required to achieve a net improvement in the biodiversity values of National Park is $10.59 million. This is on top of the $8.49 million already paid to NPWS for the Exploratory Works and up to $73.8 million to be paid to NPWS for the Main Works.

To address biodiversity impacts occurring outside of National Park, Transgrid is proposing a range of options, including securing land-based offsets and paying into the offset fund. As security, Transgrid would be required to provide a bank guarantee for $24.87 million, which is the equivalent to the amount calculated by the Biodiversity Offset Payment Calculator.

The Department recognises that the project would impact on biodiversity values, however considers that subject to the recommended conditions, including minimisation of impacts during the detailed design of the project, a range of flora and fauna management measures, and by offsetting the residual biodiversity impacts of the project, the impacts would not significantly impact the biodiversity values of the locality.

Visual Amenity and Park Values

The project area sits in a relatively undisturbed section of National Park and State Forest, and impacts to the landscape character and visual amenity in these areas would occur from both the introduction of new permanent infrastructure into the landscape and the clearing below the transmission lines.

Transgrid assessed the visual impact of the project from 13 representative viewpoints, of which six were assessed as experiencing nil to low impacts, three would experience low to moderate impacts and four would experience moderate to high impacts. Of the four, two are viewpoints taken from the local road network, and the remaining two are from campgrounds that have been closed for the construction of the Main Works project, and will subsequently be rehabilitated following construction.

To reduce visual impacts, the Department has recommended conditions requiring Transgrid to progressively rehabilitate work areas, and for permanent facilities and structures, the submission of final designs for approval, incorporating paints, textures and local materials to blend the infrastructure into the landscape. These would be further detailed and implemented in a Visual Impact Management Plan.

In addition, the Department recommends a condition requiring Transgrid to pay NPWS a total of $5 million, to be spent by NPWS on programs to improve park values. This is on top of the $4.96 million already paid for the Exploratory Works and up to $1.995 million to be paid for Main Works, to improve certain recreational facilities in the National Park surrounding the Snowy 2.0 site.

With these measures together with contributions to fund programs to improve park values, the Department considers it would assist in reducing impacts to park values.

Other issues

The Department has also undertaken a comprehensive assessment of the full range of other potential impacts, including heritage, transport, land use, hazards, water, noise, air quality, electric and magnetic fields, bushfire safety and emergency management, social, economic and cumulative impacts. The Department has recommended a range of detailed conditions, developed in conjunction with agencies and Council, to ensure all potential impacts are effectively minimised, managed or offset.

Evaluation

Snowy 2.0 is critical for energy security and reliability in NSW, is consistent with Australian Energy Market Operator's roadmap for the NEM, and the Transmission Connection is identified as a priority transmission project for the State. Importantly, the Department has concluded the project provides an essential transmission connection for the full generating capacity of Snowy 2.0, allowing the benefits of the generation project to be realised as one of the few already committed projects that would substantially contribute to the NEM's transition from fossil fuels to renewable energy sources.

The Department has carefully weighed the impacts of the project against the benefits and has considered all relevant issues raised by the community, special interest groups and agencies in submissions.

The key issue raised in community and special interest group submissions was the consideration of alternative options and impact of the proposed option on biodiversity. The Department has evaluated the information provided on alternative options in detail in consultation with independent experts and technical experts within government. The Department accepts the overhead line option achieves an appropriate balance between the need to minimise unavoidable impacts and the need to meet the project objectives including schedule, cost, system reliability and ability to export energy from Snowy 2.0 to the NEM.

Based on its assessment, the Department acknowledges that constructing a 9 km transmission line through largely undisturbed sections of National Park and Bago Stage Forest impacts biodiversity and park values. The Department has worked closely with key government agencies throughout the assessment process to reduce impacts as far as practicable, and has recommended conditions of approval to minimise and offset the impacts of the project. This includes requiring Transgrid to contribute a further $15.59 million (to add to the $89.25 million Snowy Hydro is already required to pay) to improve the biodiversity and recreational values of the National Park.

The Department has concluded that the residual impacts can be adequately minimised, managed, or offset, to an acceptable standard, subject to a comprehensive framework of recommended conditions of approval. Consequently, the development can be carried out in a manner that is consistent principles of ecologically sustainable development.

The Department considers the project is consistent with the relevant NSW and Commonwealth strategic policy framework regarding climate change and energy security.

On balance, the Department considers that the benefits of Snowy 2.0 Transmission Connection outweigh its costs, and the project is in the public interest and approvable, subject to strict conditions.

Contents

1 Introduction

Snowy 2.0 involves adding a new 2,000 megawatt (MW) underground pumped hydroelectric power station to the existing Snowy Mountains Hydro-Electric Scheme in the Kosciuszko National Park (National Park) with associated transmission infrastructure (see **Figure 1**).

Snowy Hydro Limited (Snowy Hydro) is responsible for, and has commenced works on, the electricity generating components, while Transgrid is delivering the transmission infrastructure. The program of works consists of the following key features:

- **Exploratory Works** – geotechnical investigations involving an exploratory tunnel to inform power station design and the development of supporting infrastructure, including a new substation in National Park;
- **Segment Factory** – development of a Segment Factory in the industrial area of Cooma, producing concrete segments to line the underground tunnels for Exploratory Works and Main Works;
- **Main Works** – development of the 2,000 MW hydroelectric power station in the National Park, including 27 km of tunnels linking the Talbingo and Tantangara Reservoirs;
- **Transmission Connection** – new 330 kV transmission lines that would connect the Main Works power station in National Park to a new substation in Bago State Forest (State Forest); and
- **HumeLink** – around 360 km of new 500 kV transmission lines connecting Wagga Wagga, Bannaby and the proposed Transmission Connection substation at Maragle.

The Transmission Connection is the subject of the current infrastructure application from Transgrid and this Assessment Report.

Transgrid would need to submit a separate infrastructure application for HumeLink, which was issued with the Planning Secretary's Environmental Assessment Requirements in March 2022.

2 Project

2.1 Overview

The Snowy 2.0 Transmission Connection (the project) involves:

- constructing and operating two new 9 km long 330 kV double-circuit overhead transmission lines from the Snowy 2.0 cable yard in Lobs Hole, National Park to a new substation;
- constructing and operating a new 500/330 kV substation at Maragle in the State Forest;
- 330 kV grid connection between the new substation and Transgrid's existing Line 64;
- construction facilities, such as construction compounds and access tracks.

The construction workforce would use the existing accommodation camp established in Lobs Hole as part of the Main Works project as well as accommodation as required in nearby townships of Tumbarumba, Talbingo, Tumut, Adaminaby, Providence Portal and Cooma.

Transgrid has defined a 170 m wide corridor to construct both 330 kV lines in parallel. Within this corridor, the final alignment of the lines (between 120 – 150 m wide) would be confirmed during detailed design.

The proposed transmission easement can be separated into two distinct areas: the infrastructure east of the Talbingo Reservoir (project area east) and west of the Talbingo Reservoir (project area west).

The main components of the project are summarised in **Table 1** and shown in **Figure 2** and **Figure 3**, described in further detail in **section 2.2** and **section 6.2** of this report, the EIS (see **Appendix B**), Amendment Report (see **Appendix E**), Submissions Report (see **Appendix D**), and additional information provided during the Department's assessment of the project (see **Appendix F**).

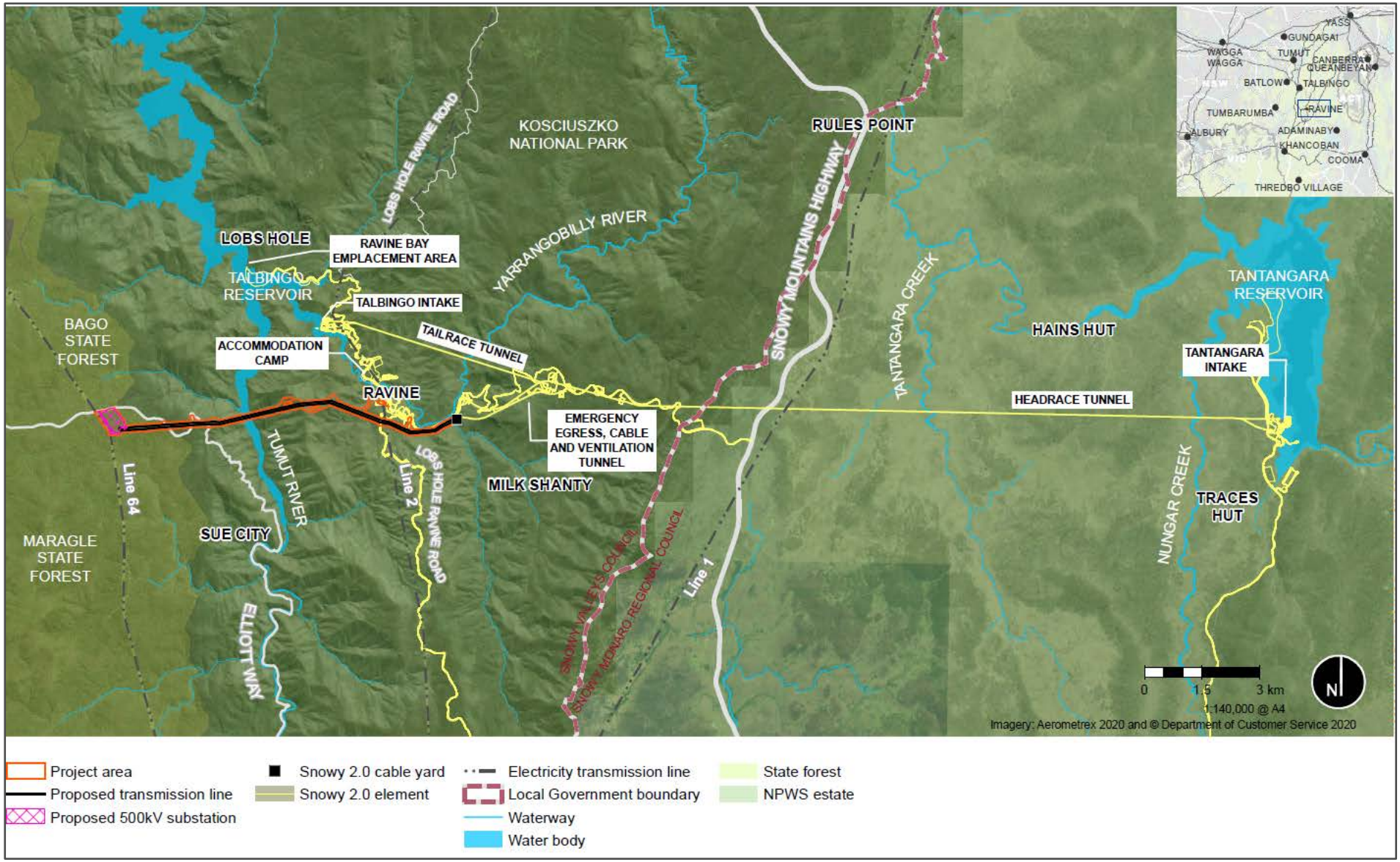


Figure 1 | Snowy 2.0 and Transmission Connection

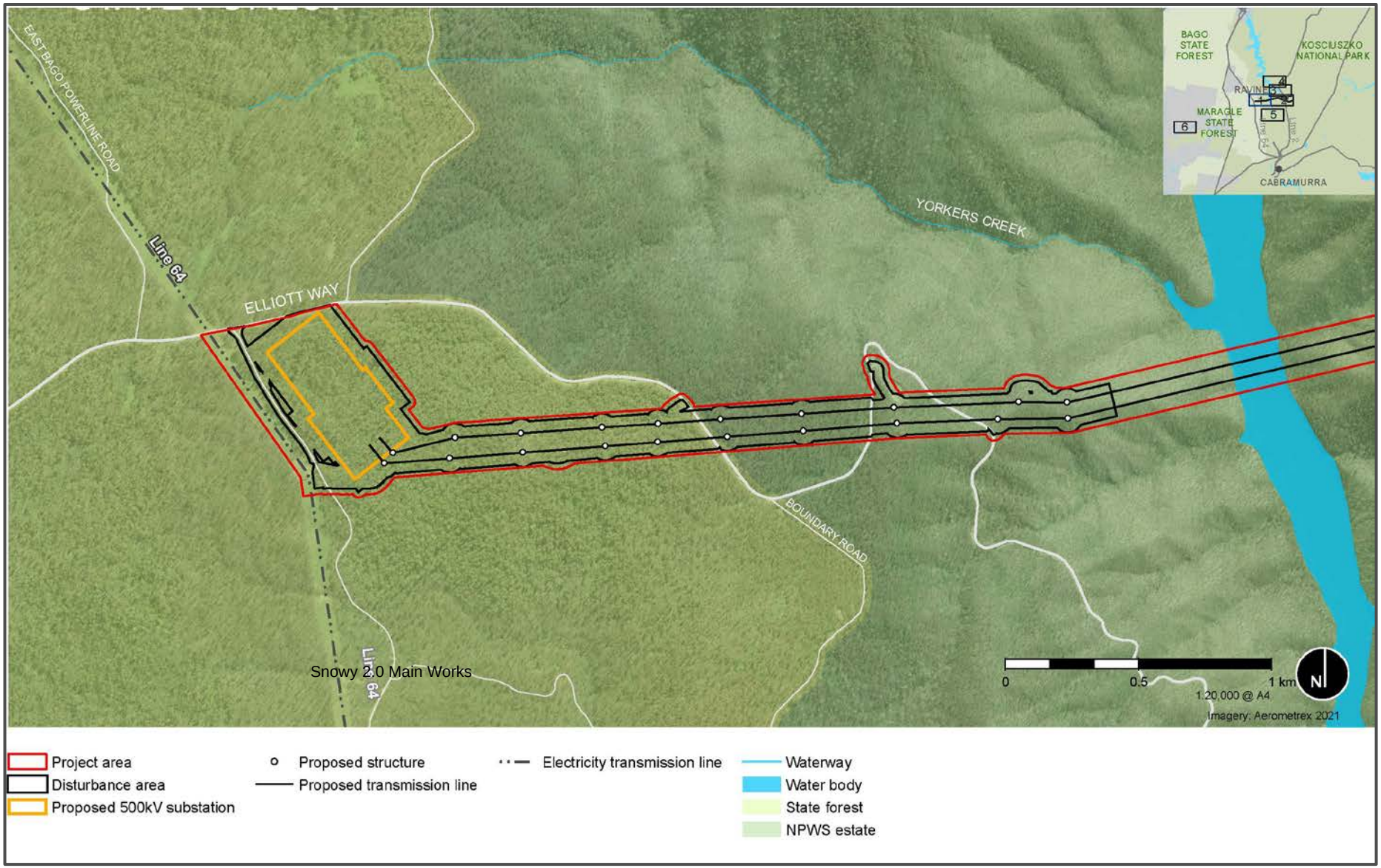


Figure 2 | Snowy 2.0 Transmission Connection – Project area west

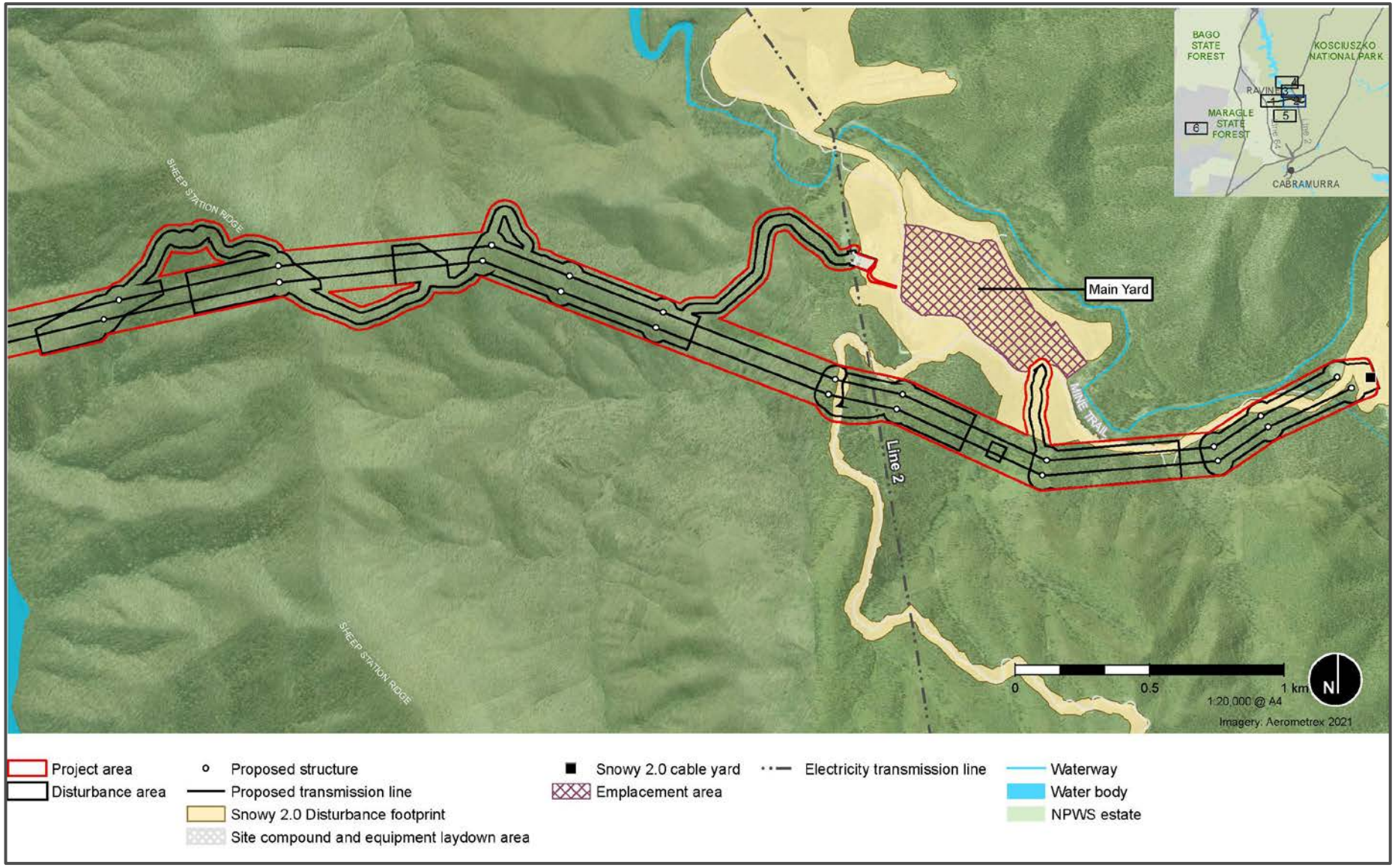


Figure 3 | Snowy 2.0 Transmission Connection – Project area east

Table 1 | Main Components of the Project

Aspect	Description
Project area	• Project site: 259 ha • Development footprint: 125 ha (81 ha in National Park and 44 ha in State Forest • Operational footprint 105.7 ha (65.3 ha in National Park and 40.4 ha in State Forest)
Two new 330 kV double circuit lines	• Length: approximately 9 km (7.7 km in National Park and 1.3 km in State Forest) • Easement width: 120 m to 150 m • 21 steel lattice towers per line (42 in total) with maximum tower height of 75 m • Spacing between towers: about 400 to 500 m, except for crossing Talbingo Reservoir
Maragle Substation	• A new 330kV/500 kV substation in the locality of Nurenmerenmong, within State Forest and adjacent to Transgrid's existing Transmission Line 64 (Line 64) • Approximately 22 ha of disturbance – 230 m wide by 530 m long surrounded by an 80 m to 100 m wide cleared asset protection zone • Maximum equipment height of 35 m (500 kV gantry) • 300 m double circuit 330 kV overhead line to connect the new switchyard to Line 64 • Upgrade of existing access track from Elliot Way adjacent to Line 64
Ancillary Infrastructure	• Up to 8 km of new access tracks outside easement corridor, up 6 m wide • Upgrading 0.7 km of existing access tracks
Access route	• **Project area east**: via the Snowy Mountains Highway, Link Road, Lobs Hole Ravine Road and Mine Trail Road, which were upgraded as part of Snowy Main Works • **Project area west**: via the Hume Highway, Snowy Mountains Highway, Batlow Road, Tooma Road, Elliott Way and a new access road; and • **Project area west (heavy vehicles requiring escort)**: Hume Highway, Little Billabong Road, Tumbarumba Road, Wagga Road, Masons Hill Road, Albury Street, The Parade, Bridge Street, Winton Street, Regent Street, William Street, Tooma Road, Elliott Way and enter site access road at Maragle substation
Construction timing	• Construction of the project would last for approximately 55 months, including a six month site rehabilitation period • Construction of the two lines would commence concurrently and may commence at multiple locations on each line (to be confirmed in detailed design) and would take approximately 30 months • Construction of the Maragle substation would take up to 55 months • Construction hours would be carried out 7 days per week between 6 am and 6 pm
Operation	• The operational life of the project is not limited
Decommissioning and rehabilitation	• The project includes progressively rehabilitating all construction works and decommissioning
Employment	• Up to 140 construction during the peak construction period and 1 operational job
Capital investment value	• $318 million

2.2 Project Design

Developing a new transmission line connecting Snowy 2.0 with the NEM would inevitably impact biodiversity and amenity values by establishing an additional and permanent easement in National Park and State Forest.

Transgrid evaluated 12 options (shown in **Figure 4**), shortlisting five for further analysis in its Submissions Report (see **Appendix D**) against environmental, social, and economic criteria. This included network resilience, constructability, cost, timing, safety and impacts on National Park and State Forest. Transgrid's analysis of feasible alternatives considered different grid connection points, circuit configurations, transmission line design (overhead and underground) and routes. Transgrid's preferred option (Option 4) is the project as described in **section 2.1** and shown in **Figure 2** and **Figure 3**. The options analysis is discussed further in **section 6.2**.

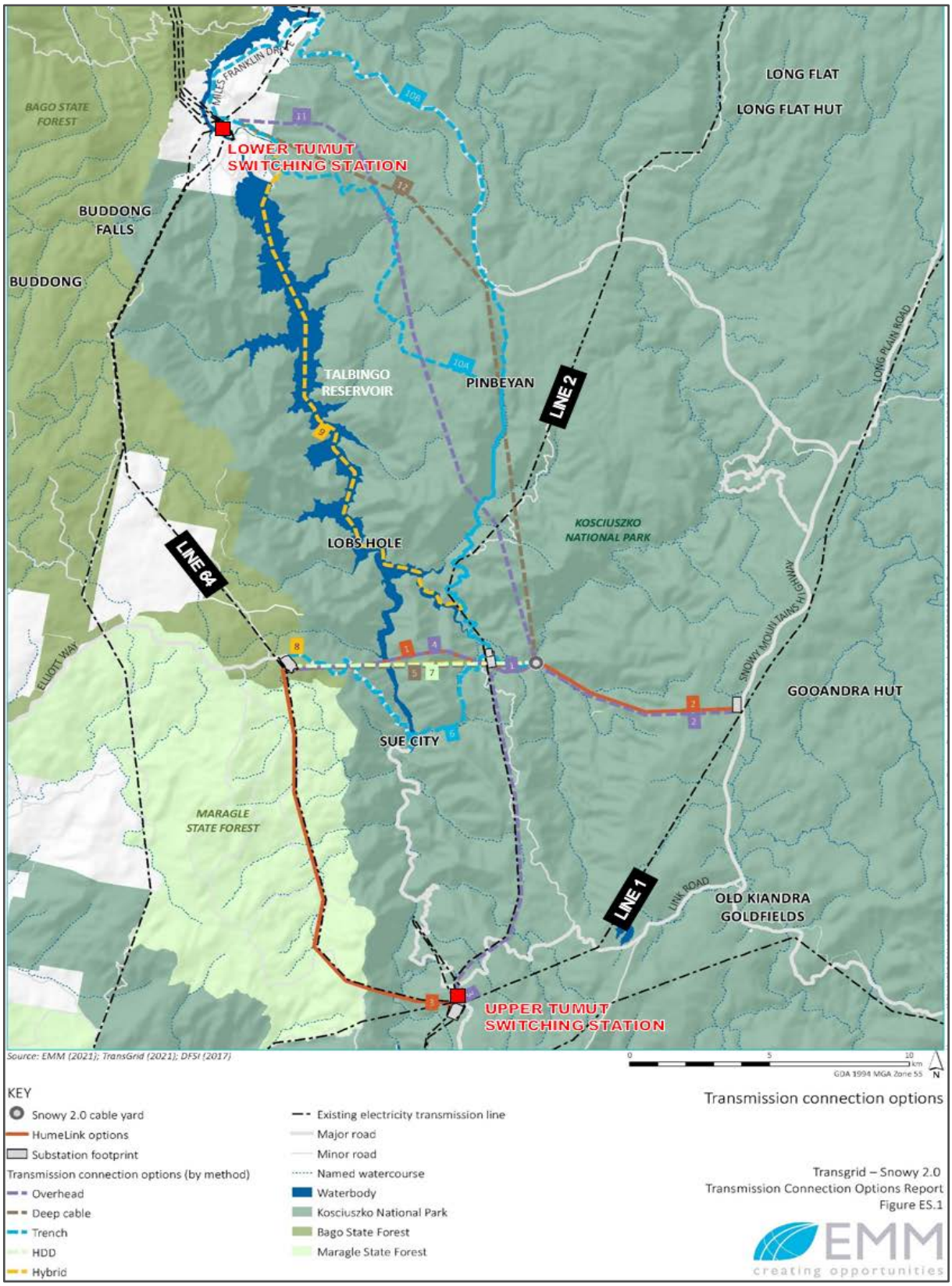


Figure 4 | Transmission Connection – Options considered

3 Strategic Context

3.1 Energy Context

As NSW and the broader National Electricity Market (NEM) transitions from fossil fuels to renewables, the State requires additional firm supply, such as batteries and pumped hydro for dispatchable energy.

This is set out in several Commonwealth and State policies and strategies, as summarised in **Table 2**. The project's alignment with existing Commonwealth and State policies are considered in **section 6.1**.

Table 2 | Summary of Energy Policy

Policy / Year	Summary
***Australia's Long Term Emissions Reduction Plan* (2021) and *Nationally Determined Contribution* (2022)**	Sets a pathway to net zero emissions by 2050, and affirms Australia's net zero emissions by 2050, and its commitment to meeting its revised 2030 target (43% below 2005 levels).
Australian Energy Market Operator's (AEMO) *2022 Integrated System Plan (ISP)*	Updated in 2022, the ISP is a whole-of-system plan providing an integrated roadmap for the development of the National Electricity Market (NEM) over the next 20 years and beyond. Under the 'Step Change' scenario, AEMO forecasts that the NEM will need up to 59 gigawatts (GW) of new, dispatchable resources to firm renewables by 2050.
NSW: ***Climate Change Policy Framework (2016)*** ***Transmission Infrastructure Strategy (2018)*** ***Electricity Strategy (2019)*** ***Electricity Infrastructure Roadmap (2020)*** ***Net Zero Plan Stage 1: 2020 – 2030* (2020) *and Implementation update (2021)***	Relevant aspects of these policy documents include: • Aims to achieve net zero emissions in NSW by 2050 and reduce emissions by 50% below 2005 levels by 2030. • Sets out how the NSW Government will deliver on this objective and fast-track emissions reduction. • Outlines the NSW Government's plan to unlock private sector investment in priority transmission infrastructure projects, which can deliver the least-cost energy to customers to 2040 and beyond. The first of three key aims involves unlocking more power from the existing Snowy Hydro Scheme and Snowy 2.0. • Notes that all other coal power stations in NSW are scheduled for closure within the next twenty years. • Notes that firmed renewables are the cheapest option to replace ageing coal power stations. • Notes that without additional private investment in firming technologies, NSW faces a risk of not meeting its Energy Security Target following the planned closure of the Liddell Power Station in 2023 and the Eraring Power Station in 2025.
Australian Government Clean Energy Finance Corporation (CEFC)	Invests on behalf of the Australian government in clean energy projects to accelerate Australia's transition to a low emissions economy. In its first major grid infrastructure investment, the CEFC has committed up to $125 million to facilitate the project.

3.2 Kosciuszko National Park

Kosciuszko National Park covers 690,000 hectares in the alpine region of southern NSW. The park contains Australia's ski resorts and is used recreationally for fishing, mountain biking, skiing, horse riding and camping. The park has numerous reservoirs and infrastructure associated with the existing Snowy Mountains Hydro-Electric Scheme and the Snowy 2.0 Main Works project, which is currently under construction.

About 65% of the project would be located within the western section of the park, between Ravine and the eastern extent of the State Forest, traversing the Talbingo Reservoir. This section of National Park is relatively undisturbed alpine terrain with steep river valleys of the Talbingo Reservoir and Yarrangobilly River, with elevations across the project area ranging from 544 m to 1,190 m Australian Height Datum (AHD).

Some transmission infrastructure already exists in the project area, including Transgrid's transmission line 2, which travels north-south and connects to the Lower Tumut Substation south of the project area.

The project is located within the Murrumbidgee catchment and contains several dams, including the Talbingo Reservoir and Blowering Dam. Key tributaries include the Tumut River, Wallaces Creek, Yarrangobilly River, Sheep Station Creek, Cave Gully, and Lick Hole Gully.

The Ravine Karst system is in the area surrounding Lobs Hole Ravine Road. Its tufa deposits are considered to have national and regional significance under the National Park Plan of Management (PoM).

3.3 Bago State Forest

Bago State Forest is a diverse native alpine ash forest of the Bago Plateau. About 35% of the project is on land maintained and implemented as a General Management Zone (FMZ 4) by Forestry Corporation of NSW, which are areas designed for various uses and are primarily managed for sustainable wood production.

There is existing transmission infrastructure within this section of the forest, including Transgrid's transmission line 64 which travels north-south along the eastern boundary of the state forest. The western extent of the project would be located within State Forest and terminate at the proposed 330/500 kV substation at Maragle adjacent to transmission line 64 (see **Figure 2**).

4 Statutory context

4.1 Critical State significant infrastructure

The project is classified as Critical State Significant Infrastructure (CSSI) under section 5.13 of the EP&A Act because it forms part of the Snowy 2.0 and Transmission Project, which is listed as CSSI under section 9 of Schedule 5 of *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP). Consequently, the Minister for Planning (the Minister) is the approval authority. The project is permissible without development consent under section 2.15 of the Planning Systems SEPP.

4.2 Administrative and Procedural Requirements

Under the EP&A Act and *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), several administrative and procedural requirements must be met before the Minister may determine the application, including Transgrid applying to the Minister for approval, preparing an Environmental Impact Statement (EIS) and responding to submissions, and the Department publicly exhibiting the EIS and making key documents available on its website. The Department is satisfied that all requirements have been met and that the Minister may now determine the application.

4.3 Amended Application

Transgrid has sought to amend its application (see **section 5.4**), in accordance with section 179(2) of the EP&A Regulation.

The Director, Energy Assessments accepted Transgrid's amended application for the following reasons:

- the project amendments have reduced the impacts of the development as a whole;
- the amended application directly responds to the key issues raised in submissions received by the Department during the exhibition of the original application;
- Transgrid assessed the impacts of the amended project (see **Appendix E**); and
- the Department made the additional information available online and sent it to the relevant agencies for comment.

4.4 Application of the Biodiversity Conservation Act 2016

The EIS was accompanied by a biodiversity development assessment report (BDAR) in accordance with section 7.9 of the *Biodiversity Conservation Act 2016* (BC Act). The Minister must consider the likely impact of the project on biodiversity values as assessed under the BDAR in accordance with section 7.14 of the BC Act.

The EIS for the project included a BDAR, which Transgrid revised in response to BCS comments, was prepared in accordance with the Biodiversity Assessment Methodology.

The Department has considered the findings of the updated BDAR, advice from the Biodiversity, Conservation and Science Directorate (BCS), as well as the independent expert advice from Alex Cockerill of WSP (see **Appendix I**) in its assessment (see **section 6.3**).

4.5 Exempt Approvals

Under section 5.23 of the EP&A Act, the following approvals are not required for CSSI projects:

- a permit under sections 201, 205 or 219 of the *Fisheries Management Act 1994*;
- various heritage approvals under the *National Parks and Wildlife Act 1974* and *Heritage Act 1977*;
- a bushfire safety authority under Section 100B of the *Rural Fires Act 1997*; and
- various water-related approvals under Sections 89-91 of the *Water Management Act 2000*.

However, the assessment of these matters has been integrated with the assessment of all other matters under the EP&A Act. The Department has considered all the relevant matters associated with these authorisations in its detailed assessment (see **Section 6**), consulted with the agencies responsible for administering these authorisations (see **Section 5**), and included conditions in the recommended instrument of approval (see **Appendix H**) to ensure Transgrid minimises the biodiversity, heritage, bushfire and water impacts of the project.

4.6 Environmental Planning Instruments

Although environmental planning instruments do not apply to CSSI projects under section 5.22 of the EP&A Act, the Department has assessed the project against the provisions of several instruments and concluded that the land is suitable for the project, and that the project is not potentially hazardous or offensive development under *SEPP (Resilience and Hazards) 2021*.

4.7 Mandatory Matters for Consideration

When deciding whether or not to approve the carrying out of the development under section 5.19 of the EP&A Act, the Minister is required to consider the reports, advice and recommendations contained in this report, which includes the EIS, public submissions, agency advice, the Department's whole-of-government assessment, and the recommended conditions of approval. The Department has considered these matters in its assessment, as summarised in **Section 6** of this report.

4.8 Other NSW Approvals

National Parks and Wildlife Act 1974

Following its corporatisation in 2002, Snowy Hydro was granted a lease under the *NSW National Parks and Wildlife Act 1974* (NP&W Act) for the existing hydroelectric scheme within the National Park.

As the project is partially within the National Park, Transgrid will need to obtain an agreement for an easement for the proposed transmission corridor under the NP&W Act before it may proceed.

Section 39A of the *Snowy Hydro Corporatisation Act 1997* (SHC Act) enables the Minister for Environment and Heritage to grant leases/licences/easements over the National Park for the project. Any such grant will expire on 31 May 2077.

Transgrid has an existing Protocol with NPWS on land reserved and acquired under the NP&W Act for the ongoing operation and maintenance of its assets. Transgrid proposes to conduct and operate the transmission connection as per the requirements set out in the Protocol and the infrastructure approval.

The proposed *National Park Plan of Management* (PoM) amendment is being reviewed by the Minister for Environment and Heritage to allow for Snowy 2.0 operations to continue, consistent with the NP&W Act, including the proposed overhead transmission line (subject of this application).

Integrated Assessment

Under section 5.23 of the EP&A Act, a number of other approvals are integrated into the SSI approval process, and consequently are not required to be separately obtained for the project. These include:

- approvals and permits relating to heritage under the EP&A Act, *Heritage Act 1977* and NP&W Act; and
- certain water approvals under the *Water Management Act 2000*.

Under section 5.24 of the EP&A Act, a number of further approvals are required, but must be substantially consistent with any planning approval for the project. This includes approvals for works on public roads under the *Roads Act 1993* (Roads Act). This only applies to classified roads and Crown roads for this project, as Transgrid is an Authorised Network Operator under the *Electricity Supply Act 1995*. Consequently, Transgrid will generally not require consent from the relevant Councils for works in unclassified (local) roads for the project.

The Department has consulted with the agencies responsible for these approvals in its assessment of the project.

4.9 Objects of the EP&A Act

The Department has assessed the project against the objects in section 1.3 of the EP&A Act, including incorporating ecologically sustainable development principles and promoting the social and economic welfare of the community and a better environment (see **Appendix K**).

4.10 Commonwealth matters

On 5 April 2019, the project was declared (EPBC 2018/8363) to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This declaration was made because the project could have a significant impact on several Matters of National Environment Significance, including:

- two National Heritage Places (sections 15B and 15C): the Australian Alps National Parks and Reserves (Place ID 05891) and the existing Snowy Mountains Scheme (ID 5919);
- listed threatened species and communities (sections 18 and 18 A); and
- listed migratory species (sections 20 and 20A);

Consequently, the project requires the approval of the Commonwealth Minister for the Environment and Water in addition to any State approvals before the project may proceed. The Commonwealth has accredited the NSW assessment process under EP&A Act for the assessment of all Commonwealth matters under the EPBC Act.

Accordingly, the NSW Government has undertaken the assessment on behalf of the Commonwealth and has assessed matters of national environmental significance (see **section 6.3** and **Appendix J** of this Report).

5 Engagement

5.1 Department's engagement

The Department publicly exhibited the EIS from 23 February 2021 until 5 April 2021 and advertised the exhibition in several local and national newspapers. The Department consulted with Snowy Valleys Council and relevant government agencies throughout the assessment and held meetings with the National Parks Association of NSW.

5.2 Transgrid Engagement

Transgrid engagement with the community included a dedicated website, phone number and email address, an online engagement tool for stakeholders to provide comments, community information sessions and stakeholder briefings. Transgrid also undertook consultation with the Department, relevant government agencies and Aboriginal stakeholders.

5.3 Submissions and Submissions Report

During the exhibition period of the EIS, the Department received 24 public submissions (two comments and 22 objections). In addition to the public submissions, five submissions were received from special interest groups (two comments and three objections). Comment was received from Snowy Valleys Council and advice from 10 government agencies. Full copies of the agency advice and submissions are attached in **Appendix C** and **Appendix G**. Transgrid responded to all matters raised in submissions on the project (see **Appendix D**) and provided additional information during the Department's assessment (see **Appendix F**).

5.4 Amended Application

Following consideration of submissions on the development, Transgrid amended its application, primarily to avoid environmental impacts, as detailed in the Amendment Report (see **Appendix E**). This includes:

- reducing the disturbance footprint by 18 ha by refining access tracks and by reducing the width of the transmission easement;
- defining five distinct vegetation clearing management zones within the disturbance area;
- amendments to the access track layout;
- extending the Asset Protection Zone (APZ) around the substation by approximately 50 m in all directions;
- including the option to dispose of spoil generated at project area east to additional spoil emplacement areas approved as part of Snowy 2.0 Main Works;
- adding Talbingo Reservoir and Paddy's River as the preferred water source; and
- removal of the proposed helipad.

The Department provided the Amendment Report to Council and government agencies for review and comments and made it available on the Department's website. As the development amendments would not increase the impacts of the project as a whole, the Department did not exhibit the Amendment Report.

5.5 Key Issues – Agency Advice

None of the government agencies objected to the project. However, they provided comments on the key aspects of the project and recommended conditions of approval. A summary of the key matters raised in the government agency submissions is provided in **Table 3** and subsequent advice on information provided in Transgrid's response to submissions is provided in the relevant assessment section.

Table 3 | Summary of Agency Advice

Agency	Key Issues	Section in Assessment Report
Environment and Heritage Group National Parks, including NPWS and the Biodiversity Conservation Division (BCS)	• Noted the preferred overhead alignment impacts a largely pristine area of National Park. Requested a detailed analysis of alternative options, comparing all relevant environmental parameters and costs. • Recommended inclusion of specific management, mitigation and monitoring conditions, including weed and erosion control, soil and water, waste, rehabilitation and bushfire. • Requested Transgrid discuss all options available to reduce impacts. Considered compensation is warranted when impacts inside National Park are unavoidable (e.g. visual amenity and biodiversity). • Expressed concern about potential impacts on the Booroolong Frog population in the Yarrangobilly River and the need to strengthen safeguards to guide detailed design and manage impacts to other listed threatened species are required. • Requested Biodiversity Management Plan to consider construction and operational matters.	6.2, 6.3, 6.5
Forestry Corporation of NSW (FCNSW)	• Noted compensation for the sterilisation of productive State Forests is required. • Requested road access from Elliot Way to State Forests be maintained. • Noted *Forest Practices Codes* should apply for bushfire management at State Forest. • Requested consultation during design of biodiversity monitoring programs.	6.3, 6.5
NSW Office of Energy and Climate Change (OECC)	• Confirmed the timely delivery of Snowy 2.0, along with the associated transmission projects, would help reduce system security issues and renewable energy curtailment. • Noted that connecting Snowy 2.0 to Upper Tumut Switching Station (UTSS) or Lower Tumut Switching Station (LTSS) would place five key energy system assets close together, creating significant vulnerability in system resilience. • Accepted that connecting at Maragle would improve system resilience. • Advised that undergrounding the transmission connection could lower the likelihood of a major outage when compared to overhead but recognised would take longer to fix if a fault arises and require longer to construct. • Requested a clear comparison of the potential benefits of the undergrounding options against the potential costs, including operation and maintenance costs and construction delays.	6.1, 6.2
Heritage NSW – Aboriginal Cultural Heritage	• Requested test excavations for all Potential Archaeological Deposits (PADs) be undertaken before determination. • Confirmed the Aboriginal Cultural Heritage Assessment Report (ACHAR) was prepared in consultation with Registered Aboriginal Parties (RAPs). • Recommended the inclusion of a Cultural Heritage Management Plan.	6.5

Agency	Key Issues	Section in Assessment Report
Environment Protection Authority	• Advised that while the project would not require an Environment Protection Licence, the EPA is the Appropriate Regulatory Authority for activities carried on by an authorised network operator as per Section 6 of the POEO Act. • Recommended the implementation of a surface water monitoring program to confirm the appropriate level of protection for waterways is met. • Requested further detail on spoil characteristics and consideration of all reasonable and practical measures to avoid subaqueous emplacement of spoil in Ravine Bay.	6.5
Heritage Council of NSW	• Initially raised concerns on the proposed text excavation methodology and areas of archaeological significance identified. • Recommended that Transgrid undertake further assessment of potential significance, develop the excavation methodology and prepare a final archaeological excavation report.	6.5
DPE Water	• Advised water access licensing arrangements must be in place prior to water take. • Works on waterfront land to be undertaken in line with *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018) • Requested a Water Management Plan to include erosion and sediment management, metering of water take, site water balance, monitoring, reporting and a contingency response plan.	6.5
Transport for NSW	• Recommended a fatigue and weather condition management plan be prepared prior to commencement of construction.	6.5
Snowy Valleys Council	• Did not raise concerns regarding the proposed works and traffic volumes. • Expressed concerns about cumulative impacts on Council's infrastructure network with the proposed HumeLink project.	6.5
The Department of Primary Industries – Fisheries, Regional NSW – Minerals Exploration and Geoscience, Fire and Rescue NSW and Crown Lands did not raise any concerns with the project.		

5.6 Key Issues - Community

Of the 24 submissions received from the public, 22 objected to the project and two provided comments. The key matters raised in community submissions are categorised in **Figure 5**, and the Department's consideration of these matters are summarised in **Section 6**.

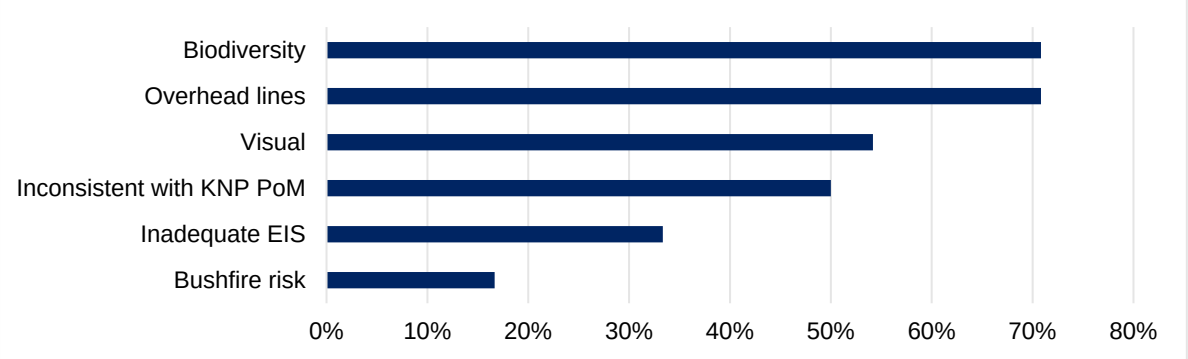


Figure 5 | Key matter raised in public submissions

Other issues raised in community submissions include impacts on Aboriginal cultural heritage items, criticism of the biodiversity offset scheme, concerns over the cumulative impacts of Snowy 2.0, and the lack of community consultation by Transgrid.

5.7 Key Issues – Special Interest Groups

The Department received submissions from five special interest groups, three of which objected to the project (**National Parks Association of NSW (NPA)**, **Bushwalking NSW Inc** and **Canberra Bushwalking Club**) and two provided comments on the project (**NSW Nature Conservation Council** and **Dubbo Environment Group**).

The submissions main concerns relate to the adequacy of the options analysis and the environmental impacts to a pristine area of the National Park, including:

- the visual impacts of the steel lattice towers and easement;
- increased bushfire and lightning risk may impact on the reliability and maintenance cost of overhead transmission lines;
- fragility of the Park due to the impacts of bushfire, feral horses and climate change;
- proposed changes to the National Park Plan of Management to allow the transmission lines to be located above ground; and
- fragmentation of the Park and the impact to threatened species that clearing the transmission corridor may have.

The NPA's detailed objection, including advice from industry and technical experts (see **Appendix C**), provided an analysis on the following matters:

- environmental impacts linked with an overhead line design;
- comparative benefits with underground transmission;
- alternative potential route alignments and grid connection points; and
- the number of cable circuits.

The NPA considers there are better alternative undergrounding options and configurations that are feasible, which would greatly reduce the impacts to National Park.

Section 6 of this report summarises the Department's consideration of these matters and recommended conditions.

6 Assessment

The Department has undertaken a comprehensive assessment of the merits of the development. This report provides a detailed discussion of the key issues, including energy security and reliability, the analysis of project alternatives, biodiversity impacts, and visual amenity and park values. The Department's assessment of other relevant issues is summarised in **section 6.5**.

The assessment was informed by the detailed submissions and representations from key stakeholders, advice from experts within Government and independent expert advice on network and transmission line design, and ecology.

6.1 Energy Security and Reliability

Once operational, Snowy 2.0 aligns with a range of national and state policies (see **Table 2**), which identify the need to diversify the energy generation mix and reduce the carbon emissions intensity of the grid, while providing energy security and reliability.

The project would connect 2,000 MW of additional dispatchable capacity to the electricity network and up to a week's worth of energy storage potential. The project would:

- improve security and reliability by dispatching electricity in peak periods or at times when generation from variable renewable energy is low; and
- diversify the electricity supply and contribute significantly to NSW's transition to renewable energy, facilitating reduced reliance on traditional power generation derived from fossil fuels.

Snowy 2.0 is one of few already committed projects that would substantially contribute to the NEM, providing both peaking supply of up to 2,000 MW of dispatchable energy and "deep" storage of up to 350 GWh. In addition, it would support the continued growth of renewable energy in NSW by providing essential storage for any excess electricity generated by wind and solar farms.

These attributes will be critical with the currently announced closure timings suggesting at least 8,400 MW of the current 23,000 MW of coal capacity will withdraw by 2030. In NSW, this includes Liddell in 2023 and Eraring in 2025, while Vales Point has a nominal closure date of 2029.

The ISP states that Snowy 2.0 is required to provide firming capacity and to support intra-day energy shifting and is an integral part of the forecasting in the ISP to 2050. In the Step Change scenario, assessed by stakeholders as most likely in AEMO's 2022 ISP, modelling suggests that up to 14,000 MW or 60% of capacity could be withdrawn by 2030. The ISP recognises the significant deep storage that Snowy 2.0 provides through to 2030 and beyond, with additional medium and deeper storages required in addition to Snowy 2.0 from 2030.

The Department considers the project is consistent with the relevant strategic policy framework (refer to **section 3**), which identifies the timely delivery of Snowy 2.0, along with other strategic storage initiatives is essential to the Optimal Development Path in AEMO's 2022 ISP, to firm up intermittent generation in NSW, Victoria, and, indirectly, South Australia.

Consequently, the Department considers that the timely completion of the project is critical for energy security and reliability across the NEM. Importantly, it provides an essential transmission connection for the full generating capacity of Snowy 2.0 allowing the benefits of the generation project to be realised.

6.2 Consideration of Alternatives

The majority of public and special interest group submissions were critical of the consideration of alternatives to the project. They questioned whether the analysis presented in the EIS met the requirements of the EP&A Regulation and suggested that Transgrid pursue alternative route alignments and underground options with less environmental impacts (see **section 5.6** and **section 5.7**).

Transgrid responded in its Submissions Report, analysing 12 options (including underground options) that were then shortlisted to five. Transgrid assessed these options against their primary objectives, which included:

- providing a connection for the full generating capacity of Snowy 2.0 to the NEM via a high voltage connection from the project to Transgrid's transmission network that can be constructed and operational by the time renewable electricity is being generated by Snowy 2.0;
- establishing a point of connection to the NEM which increases the reliability, resilience and security of the future renewable power supply network to deliver affordable, safe and secure renewable energy across the NEM and to ACT and NSW electricity consumers including meeting requirements for system redundancy (N-1);
- meeting Transgrid's operational requirements, and commitments to Snowy Hydro to construct and operate the transmission connection in a manner that is safe, reliable and secure;
- providing a connection that minimises additional infrastructure within National Park;
- providing a connection that minimises environmental and social impacts, particularly to the National Park; and
- designing, constructing and operating the connection in a manner that is practicable, feasible and balances environmental and social impacts with safety impacts, costs and schedule including maximising cost efficiency and minimising project economic risk, construction duration and risk.

Transgrid evaluated the options against the objectives by using criterion including network and connectivity, constructability, design, cost, community and environment, and safety (see **Table 4**).

The Department is required to consider the project on its merits in accordance with the relevant Commonwealth and NSW legislation, policy and guidelines. While an EIS must include "an analysis of any feasible alternatives to carrying out of the development, activity or infrastructure, having regard to its objectives" under the EP&A Regulation, it is not the role of the Department in its assessment of the project to consider all potential alternatives.

Notwithstanding, the Department engaged independent experts Nalin Pahalawatta of Hatch, Nic Candotti of MBB Group (see **Appendix I**) and sought advice from the OECC to review the network and transmission line design assumptions in Transgrid's options analysis. The reviews considered the method Transgrid employed to compare the alternative options, which were found to be in line with standard practice to determine quantum and as an order of magnitude difference between the options, within typical comparative benchmarks. The advice concluded that:

- feasible undergrounding options would take substantially (several years) longer to both construct and to undertake repair works than the preferred option, which would delay the ability for Snowy 2.0 to provide the necessary deep energy storage required to mitigate the loss of generation from retiring coal generators, and potentially introduced greater risk for extended outages while repair works are undertaken;
- the preferred option (shown in **Figure 6**) is the most direct connection route and would satisfy Transgrid's various technical and environmental criterion, including reasonable in cost, limiting vegetation clearing and spoil generation, operational maintenance and meeting timeframes to

ensure electricity generated by Snowy 2.0 contributes to NSW meeting its Energy Security Target following the planned closure of both Liddell and Eraring Power Stations;

- the geographic separation created by connecting at Maragle rather than UTSS/LTSS would increase voltage stability of the existing network and benefits Snowy 2.0 generation and pumping capacity; and
- connection via one 500 kV double circuit transmission line may need imposition of operational constraints on the generating plant under some operating conditions which constrain export of energy from Snowy 2.0.

The Department notes that while the public that made submissions and special interest groups may not agree with the outcomes of Transgrid's evaluation, it considers that the EIS and subsequent Amendment Report and additional information has provided sufficient analysis of the alternatives, including consideration of underground transmission line options. Overall, the Department recognises that other options, either to different connection points and / or by using underground transmission lines via various methods may be feasible and further reduce environmental impacts, such as vegetation clearing or have lower visual impact, but considers these options are significantly constrained in meeting other project objectives.

Other alternative connections would not provide the timely connection of Snowy 2.0 generation to support the NEM and would be up to 2 years longer between the preferred option and those with the lowest vegetation clearing and have potential to create vulnerability in system resilience by collocating near existing assets such as UTSS and LTSS. Other alternatives also require larger quantities of spoil for disposal, estimated at between 400,000 cubic metres and 3.9 million cubic metres more spoil for those with lower vegetation clearance and lower visual impact, or estimated to cost up to $1 billion more for those with the lowest vegetation clearance and lower visual impact, than the preferred option.

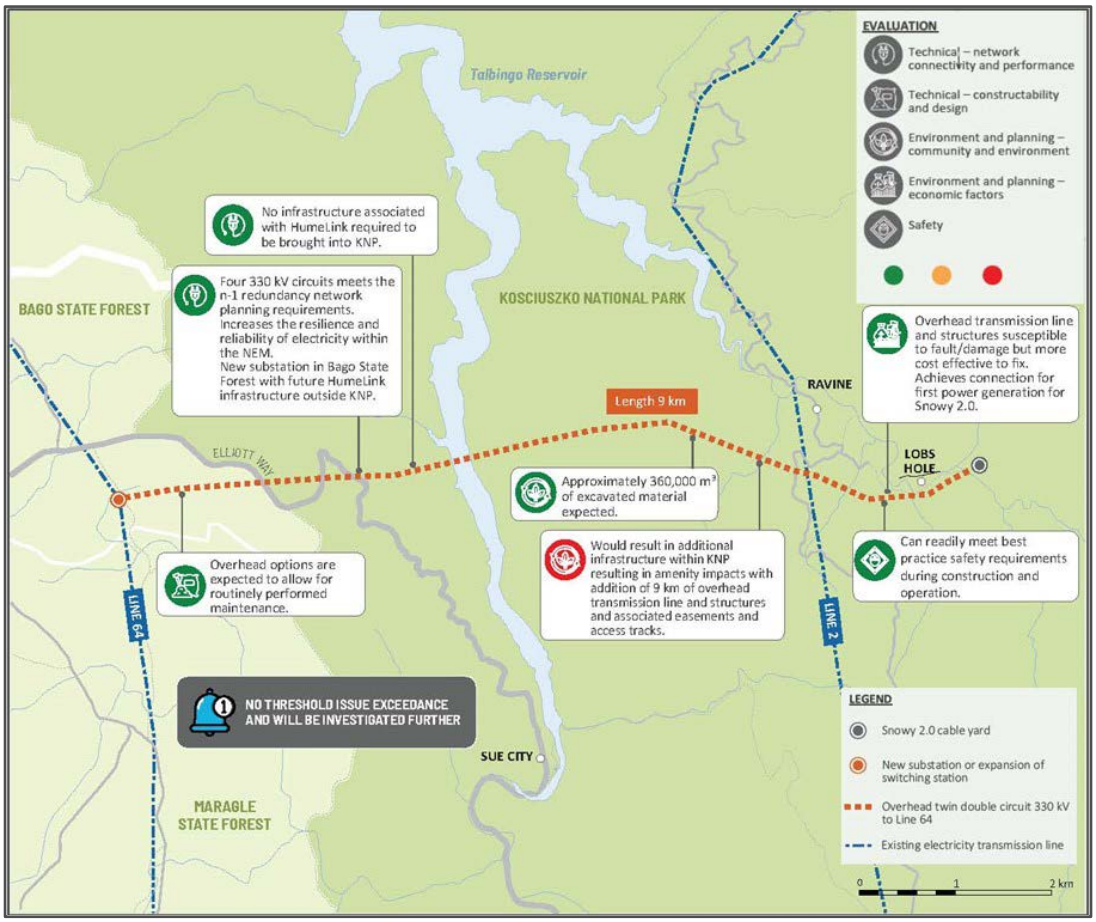


Figure 6 | Transgrid's evaluation of Option 4

Table 4 | Short listed Options Analysis

Aspect	Option 3	Option 4 (preferred)	Option 5	Option 6	Option 8
Option	Overhead line to UTSS	Overhead line to Line 64	Deep cable tunnel to Line 64	Trench to Line 64	Hybrid trench/deep cable tunnel to Line 64
Connection	UTSS + 17 km 500 kV line to connect to HumeLink	Maragle substation	Maragle substation	Maragle substation	Maragle substation
Transmission line	• 2 x 16 km double circuit 330 kV lines (approx. 106 towers) • Permanent easement width of 120 to 140 m • Expand UTSS by 22 ha	• 2 x 9 km double circuit 330 kV lines • Permanent easement width of 120 to 150 m	• 9 km tunnel with 5 m internal diameter • Tunnel minimum depth of 20 m • Deep shafts at Lobs Hole and Maragle, multiple along the tunnel for ventilation and emergency	• 16 km trench (2 m minimum depth) • 25 m wide on flat terrain, up to 90 m wide on steep terrain • 4 laydown areas • 36 m long x 5.2 m wide x 2 m cable joint bays every 1 km • Bridge / tunnel to cross Talbingo Reservoir	• Combination of options 5 and 6. • 4km trench for flat terrain at the eastern and western extent • 6km tunnel for steeper terrain
Spoil generated	~500,000 m^3	~364,800 m^3	~770,000 m^3	~4,228,527 m^3	~1,750,000 m^3
Failure rate	Every 10 years	Every 10 years	Every 32 years	Every 22 years	Trench: see Option 6
Repair time	Less than 2 weeks	Less than 2 weeks	Four to 16 weeks	Four to 26 weeks	Tunnel: see Option 5
Native Vegetation Impacts	185 ha +118 ha for HumeLink	118 ha (71 ha full, 47 ha partial)	35 ha	110 ha	40 ha
Predicted visual amenity impacts	Low to high visual impact at various locations. UTSS expansion & HumeLink would add further impacts	Low to high visual impact at various locations	Low impact due to minimal above ground infrastructure	Low to moderate impact, from excavation works, maintenance of easement and potential reservoir bridge crossing	Low to moderate impact
Construction period	57 months	55 months	82 months	74 months	78 months
Cost	Construction: $450m Operation: ~$588,000 annually	Construction: $290m Operation: ~$496,000 annually	Construction: ~$1,393m Operation: ~$515,000 annually	Construction: ~$1,087m Operation: ~$400,000 annually	Construction: ~$1,304m Operation: ~$469,000 annually

6.3 Biodiversity

The project has the potential to impact biodiversity values through clearing native vegetation and direct and indirect impacts to listed threatened flora and fauna species, and vegetation communities during the construction of infrastructure and ongoing management of vegetation within easements.

The project area sits within the South Eastern Highlands and the Australian Alps bioregions, in a relatively undisturbed alpine terrain with steep river valleys within National Park, and a section of State Forest designed for various uses including being managed for sustainable wood production. There is existing transmission infrastructure in both National Park (line 2 near Lobs Hole cable yard) and State Forest (Line 64 near the proposed substation at Maragle). The project area is otherwise largely covered with native woodland vegetation in moderate to good condition.

Most submissions expressed concerns about the biodiversity impacts on the vegetation communities and threatened species habitat present at the site, impacts to the conservation values of the National Park, the proposed biodiversity offset strategy and the cumulative impacts of all components of Snowy 2.0 (including Exploratory Works and Main Works). These issues are discussed further below.

A BDAR was prepared for the project in accordance with the BC Act and Biodiversity Assessment Method, with a BDAR Addendum prepared in response to issues raised by BCS. The Department consulted extensively with BCS and NPWS throughout the assessment and engaged technical ecology expert, Alex Cockerill of WSP, to provide an independent expert review (see **Appendix I**).

Avoidance and Mitigation

Transgrid has designed the development to avoid and minimise impacts on high quality vegetation and habitat, including:

- selecting the most direct route to Line 64;
- locating the grid connection point at Maragle to enable HumeLink infrastructure to remain outside of conservation areas;
- reducing the maximum width of the transmission line easement, as identified in the Amendment Report;
- utilising existing infrastructure including the Snowy 2.0 accommodation camp at Lobs Hole and existing access routes; and
- defining distinct clearing management zones, which would each be subject to specific clearing requirements during construction and ongoing maintenance during operation – the zones are defined as either full or partial vegetation clearing (see **Figure 7** and **Table 5**):
    - full clearing zones (37 ha in National Park and 34 ha in State Forest); and
    - partial clearing zones (37 ha in National Park and 10 ha State Forest): easement clearing zone, hazard tree zone and hand clearing zone.

Native Vegetation

The indicative development footprint (125 ha total area) would disturb around 118 ha of native vegetation (74 ha in National Park and 44 ha in State Forest), comprising 115 ha of vegetation in moderate to good condition, 1 ha of derived native grassland and 2 ha of derived shrubland.

Of the 118 ha of native vegetation to be disturbed, around 71 ha would be fully cleared (37 ha in National Park, 34 ha in State Forest). The 47 ha of native vegetation clearing within the partial clearing zones would be limited to tall growing species, mature trees that encroach on safe electrical clearances and slashing areas directly below the transmission line (the conductor zone) to mitigate flashover and bushfire risks. An example of a typical operational easement is shown in **Figure 8** below.

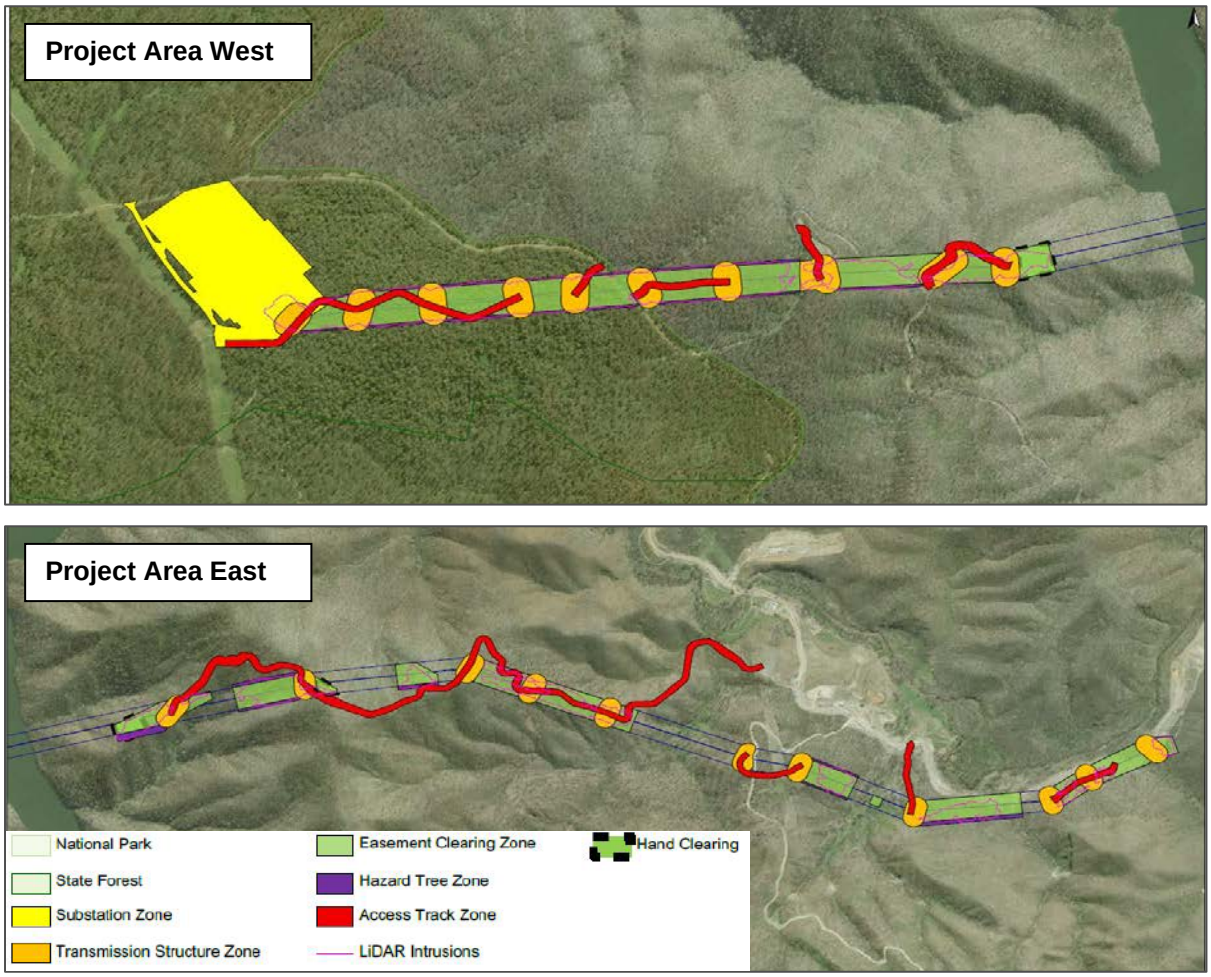


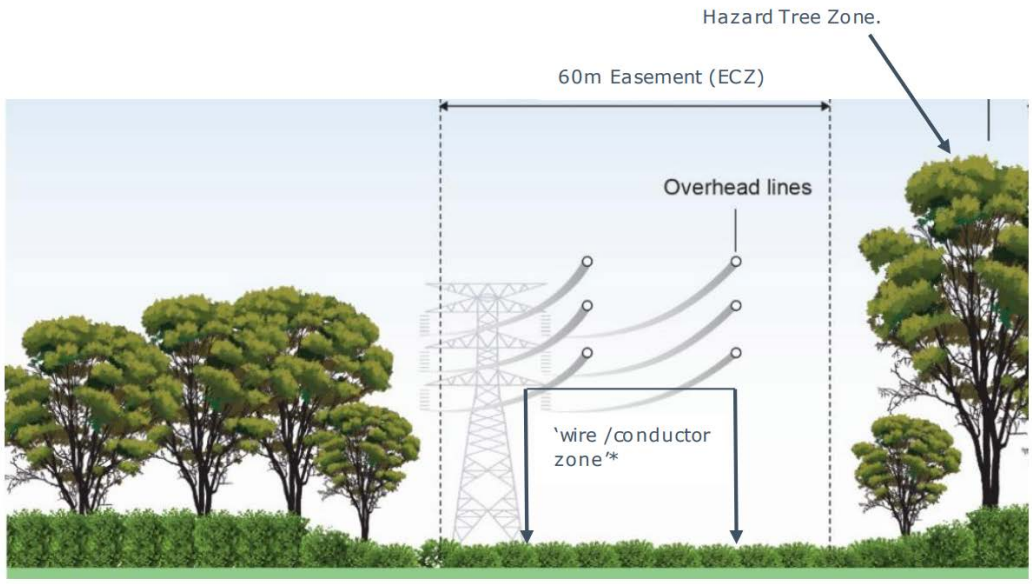
Figure 7 | Clearing management zones

Table 5 | Partial clearing management zones

Management Zone	Impact	Impact area (ha)
Easement clearing zone	• Trees / shrubs continually removed as part of ongoing easement management • Ground growth forms (grass, forb, ferns etc) would not be removed and any potential disturbances resulting from the construction period is expected to regenerate	38.73
Hand clearing zone	• Trees continually removed (via hand clearing) as part of long-term easement management • Shrubs and ground growth forms would not be removed and any potential disturbances resulting from the construction period is expected to regenerate	2.95
Hazard tree zone (off-easement)	• Large trees considered hazardous would require removal • All other growth-forms remain in-situ, including non-hazard trees, shrubs, and ground growth forms	5.77
Partial Clearing subtotal		**47.45**

Vegetation Clearing Plan

Transgrid has developed a vegetation clearing plan, which would be part of the Biodiversity Management Plan (BMP), defining the clearing methodology for vegetation and habitat clearing within each disturbance management zone during construction and operation.. **Table 5** provides a summary of the clearing management zones.



*Note that the 'wire / conductor zone' (within the ECZ) refers to the area directly below the transmission line conductors.
This 'zone' presents the highest risks in terms of flashover and bushfire risks posed by tall and/or dense growing and mid-story vegetation, especially in areas of low conductor to ground clearance. Where clearance and/or bushfire risks are identified in this area slashing and/or mulching is the safest, most preferred method of management.

Figure 8 | Operational Vegetation Management of a Typical Single Easement

Table 6 summarises the seven vegetation communities that would be impacted by the indicative development footprint, the extent of the impact (full or partial clearing) and the ecosystem credit liability under the NSW Biodiversity Offset Scheme. None of the seven vegetation communities corresponds with a threatened ecological community listed under the NSW BC Act or EPBC Act. Further, no potential serious and irreversible impact (SAII) candidate species were identified in the project area, or broader study area, and therefore serious and irreversible impacts are considered unlikely. The credit liability was supported by BCS and the independent technical expert.

Of the plant community types (PCTs) identified and assessed within the project area, none are listed as being SAII entities, or considered to meet SAII principles.

Table 6 | Native vegetation impacts

Vegetation Community	Disturbance Area (ha)			Ecosystem Credit Liability
	Full Clearing	Partial Clearing	Total	
PCT 285: Broad-leaved Sally grass – sedge woodland on valley flats and swamps in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	2.2	-	2.2	87
PCT 296: Brittle Gum – peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	8.13	10.89	19.02	392
PCT 300: Ribbon Gum – Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	14.86	17.14	32	849
PCT 302: Riparian Blakely's Red Gum – Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	0.58	1.75	2.33	39
PCT 729: Broad-leaved Peppermint – Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	14.06	12.89	26.95	531
PCT 999: Norton's Box – Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	6.13	2.46	8.59	166
PCT1196: Snow Gum – Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion	24.93	2.31	27.24	825
TOTAL	**70.90**	**47.45**	**118.33**	**2,889**

Threatened Flora and Fauna Impacts

The development has the potential to affect flora and fauna species listed in the BC Act and EPBC Act through direct habitat loss from vegetation clearing, and from indirect impacts.

Although most of the study area was affected by the catastrophic bushfires of 2019- 2020, the majority of the fieldwork and survey effort was undertaken before the Dunns Road bushfire.

Direct Impacts

Direct impacts resulting from the indicative development footprint include loss of habitat for 20 threatened fauna species identified or predicted to occur as ecosystem credit species. Potential impacts on these species would be offset via the ecosystem credit offsets detailed in **Table 6** above.

A total of 32 candidate species credit species were identified as having the potential to occur within the project area. Of these, five were removed from the assessment based on absence of suitable habitat within the project area and a further five were added based on potential suitable habitat.

Ten candidate threatened flora species were identified as having potential to occur within the project area and were the subject of targeted surveys. Of these, one (*Caladenia montana*) was identified within the development site, which is listed as vulnerable under the BC Act.

Twenty candidate threatened fauna species listed under the BC Act were considered to have potential habitat within the project area and were the subject of targeted surveys. Of these, four were identified

and a further one (Booroolong Frog) was assumed to be present based on existing data from the Snowy 2.0 Exploratory Works and Main Works projects, where the species was recorded in Yarrangobilly River.

Of the five threatened fauna species identified, the Gang-gang Cockatoo and Booroolong Frog, are also listed as endangered under the EPBC Act. However, the Gang-gang Cockatoo was only recently listed as endangered under the EPBC Act (2 March 2022) and with the support of BCS, impacts to this species have been assessed under the BC Act.

Of the threatened species identified and assessed within the project area, none are listed as being SAII entities, or considered to meet SAII principles.

Table 7 details the direct impacts and species credit liability for threatened flora and fauna species. The credit liability was supported by BCS and the independent technical expert.

Table 7 | Threatened flora and fauna species impacts

Species	Type	Conservation Significance		Impact (ha)	Species Credit Liability
		BC Act	EPBC Act		
Caladenia montana	Flora	Vulnerable	-	9.32	192
Callocephalon fimbriatum (Gang-gang Cockatoo)	Fauna	Vulnerable	Endangered*	89.02	3,024
Cercartetus nanus (Eastern Pygmy possum)	Fauna	Vulnerable	-	104.61	3,812
Litoria booroolongensis (Booroolong Frog)	Fauna	Endangered	Endangered	1.71	38
Petaurus australis (Yellow bellied Glider population on the Bago Plateau)	Fauna	Endangered	-	59.1	3,837
Tyto novaehollandiae (Masked Owl)	Fauna	Vulnerable	-	10.87	418
TOTAL					**11,321**

* Gang-gang Cockatoo was listed as Endangered under the EPBC Act on 2 March 2022

Indirect and Prescribed Impacts

Potential indirect and prescribed impacts could occur including impacts on water quality for aquatic species, fragmentation caused by the clearing of the easement, biodiversity connectivity and movement for gliding mammals and avifauna to collide with the transmission lines and from electric and magnetic fields (EMF) for birds nesting in the transmission towers.

In response to concerns raised by BCS, Transgrid revised its BDAR to include offsets and additional mitigation measures to monitor and minimise the potential impacts associated with the Booroolong Frog and the Yellow-bellied Glider. This includes limiting activities within known Booroolong Frog breeding habitat within 50 m of the Yarrangobilly River, and tributaries that flow downhill into the Yarrangobilly River, throughout construction and operation.

In addition to these mitigation measures, Transgrid has committed to implement an adaptive management strategy, which will verify the extent of indirect impacts and identify where additional mitigation of indirect impacts is required.

To address potential impacts on the Yellow-bellied Glider caused by security fencing installed around the substation, Transgrid has committed to several mitigation measures, including a targeted connectivity strategy, the provision for arboreal crossing structures, a nest box strategy and a comprehensive monitoring program.

Significance of Impacts on EPBC Threatened Species and Communities

Transgrid identified and addressed all threatened species and communities included in the Commonwealth declaration.

Assessments of significance were undertaken for the threatened species and communities that were identified as having a moderate or higher potential to occur on the site, including four threatened flora species, seven threatened fauna species and four migratory species.

Transgrid's assessment of significance concluded that there would be no significant impact after mitigation on any threatened species, ecological communities or migratory species. The Department acknowledges that there would be potential impacts on the Booroolong Frog, with the residual impacts requiring offsets. BCS advised that biodiversity offsets for direct impacts, in conjunction with the implementation of mitigation measures including adopting enhanced erosion and sediment controls taking into consideration the best available information from the Snowy 2.0 Main Works project and an adaptive monitoring program, would be critical to manage risks to the Booroolong Frog.

The Department has undertaken a detailed consideration of Commonwealth matters in consultation with DCCEEW, including consideration of Transgrid's assessment of significance and the relevant approved conservation advice, recovery plans and threat abatement plans.

The conclusions of this assessment are supported by BCS, and a summary of this assessment is provided in **Appendix J**.

Rehabilitation

The Transmission Connection would add to the 495 ha of native vegetation within National Park approved to be cleared as part of the overarching Snowy 2.0 project. Development of this scale inside an established National Park is unprecedented in recent times. As such, the Department will require the completion of rehabilitation to the highest standard as per the Main Works infrastructure approval.

The Department has included ecological rehabilitation objectives, completion criteria and performance indicators in the recommended conditions that require Transgrid to re-establish PCTs with recognisable vegetation composition, structure and ecosystem function.

Consistent with Main Works, this would be managed in accordance with a Rehabilitation Management Plan to be prepared in consultation with key agencies including the NPWS, BCS, EPA and NSW DPI.

The Department notes that permanent infrastructure for this project will occupy around 65.3 ha inside National Park and 40.4 ha inside State Forest.

Biodiversity Offset inside the National Park

Under the BC Act, the impact on native vegetation and listed species would generate 2,889 ecosystem credits and 11,321 species credits.

Table 6 and **Table 7** summarise the estimated biodiversity credit requirements under the NSW Biodiversity Offset Scheme.

The independent technical expert provided a review (see **Appendix I**) of the Biodiversity Offset Strategy and concluded the approach presented is consistent with Main Works.

The Department, in consultation with BCS and NPWS, has applied the same approach for Main Works to the elements of this project within National Park. The costed management measures and actions required to achieve a net improvement in the biodiversity values of National Park is $10.59 million and is supported by BCS and the independent technical expert.

This comprises $4.61 million for ecosystem management and $5.97 million for species management and would augment the $82.29 million already required to be paid to the NPWS to offset the residual impacts of the Exploratory Works and Main Works.

Because Transgrid would be required to rehabilitate areas directly disturbed by the project, the management actions in the Offset Strategy would be implemented in areas beyond the immediate disturbance footprint of Main Works and this project.

Biodiversity Offset outside National Park

The Department notes that Transgrid has proposed a range of options including securing land based offsets and paying into the offset fund for the residual credits that cannot secured using this approach for areas of impact outside National Park.

The Department has recommended conditions requiring Transgrid to develop a Biodiversity Offset Package in consultation with BCS prior to carrying out any development that could impact biodiversity values. The Biodiversity Offset Package would include:

- details of the specific biodiversity offset measures to be implemented and delivered; and
- the timing and responsibilities for the implementation of the actions.

As security that the impacts would be offset, prior to impacting biodiversity values Transgrid would provide a bank guarantee for $24.87 million, which is equivalent to the amount calculated by the Biodiversity Offset Payment Calculator (as at 9 August 2022) for the credit liability identified in the EIS. If Transgrid fails to implement the Biodiversity Offset Package, this security would be used to make an equivalent payment into the Biodiversity Conservation Fund.

This approach also provides an incentive to Transgrid to avoid and minimise impacts on biodiversity values through the detailed design process to limit the offset liability for the development. Subject to the recommended conditions, the Department is satisfied that the project could be undertaken in a manner that improves, or at least maintains, the biodiversity values of the locality over the medium to long term.

Recommended Conditions

The Department has recommended conditions requiring Transgrid to:

- minimise the clearing of native vegetation and key fauna habitat, including hollow bearing trees, within the development footprint and protect native vegetation and key fauna habitat outside the approved disturbance area in accordance with limits in the recommended conditions;
- prepare and implement the Biodiversity Management Plan which should include the description of the measures to:
    - implement pre-clearing protocols, including measures to record actual clearing within the easements and compare this with predicted clearing impacts, to inform and develop future partial impact reductions;
    - minimise the potential indirect impacts on threatened flora and fauna species, migratory species and ‘at risk’ species;
    - rehabilitate and revegetate temporary disturbance areas and maximise the salvage of resources within the approved disturbance area for beneficial reuse (such as fauna habitat enhancement) during the rehabilitation and revegetation of the site;

- prepare trigger, action, response, plan for the Booroolong Frog to monitor and verify the extent of indirect impacts to identify where additional mitigation of indirect impacts is required;
- specify the ongoing maintenance requirements for sedimentation controls; and
- control weeds and feral pests;

- provide a detailed program to monitor and report on the effectiveness of these measures;
- prepare and implement a Biodiversity Offset Package; and
- submit final layout plans to the Department showing the comparison to the approved layout and approved vegetation clearing.

Summary

The Department acknowledges that biodiversity impacts are unavoidable when constructing a transmission line through National Park and State Forest, and notes that the project would disturb up to 118.35 ha of native vegetation in good condition.

However, the Department considers that the project has been designed to avoid and minimise impacts on high quality vegetation and habitat as far as practicable, particularly through selecting the most direct route to Line 64, reducing the maximum width of the transmission line easement and utilising existing infrastructure including the Snowy 2.0 accommodation camp at Lobs Hole and existing access routes.

In addition, the project involves various other mitigation measures to reduce biodiversity impacts, including implementing pre-clearing protocols for the defined clearing management zones, an exclusion zone and adaptive management program to mitigate and managed potential indirect impacts on the Booroolong Frog, and rehabilitation and revegetation of temporary disturbance areas to the highest standard as per the Main Works infrastructure approval.

The Department and BCS consider that subject to the recommended conditions, the project would not significantly impact the biodiversity values of the locality.

6.4 Visual Amenity and Park Values

Most public submissions raised concerns about visual impacts and park values, particularly regarding the proposal to use overhead transmission towers instead of underground options in a location relatively undisturbed and highly valued for its largely natural landscape.

Impacts to the landscape character and visual amenity in this section of National Park and the State Forest would occur from both the introduction of new permanent infrastructure into the landscape and the clearing below the transmission lines.

Visual Context and Landscape Character

The project area sits in a relatively pristine section of National Park and an undisturbed part of the State Forest, with very few large natural areas such as National Park remaining in temperate Australia. The landscape consists of heavily vegetated mountainous terrain incised by the steep river valleys of the Talbingo Reservoir and Yarrangobilly River. The park holds significant natural and cultural heritage value to the community and possesses high scenic quality.

Limited human disturbance is visible within the project area, however existing transmission line easements, access tracks and infrastructure associated with the Snowy Mountains Hydro-electric Scheme and Snowy 2.0 are located within and surrounding the project area.

Transient project views would be available to visitors travelling through the National Park along the road network and 4WD trails which are heavily forested.

Sensitive receivers in the vicinity of the project area consist of visitors to National Park, with three campgrounds (Ravine, O'Hares and Coonara Point) located within four kilometres.

Avoidance and Mitigation

The Department acknowledges that other project alternatives such as undergrounding the transmission lines may have lower visual impact but as discussed in **section 6.2**, these options have other environmental impacts or result in the project not meeting the project objectives. Transgrid considered further options for the proposed route to reduce the visual impact of the cleared areas by positioning structures on hilltops and ridgelines to reduce the prominence of cleared easements from high viewpoints.

The Department also requested Transgrid investigate additional visual mitigation measures for the transmission towers. Transgrid investigated the use of monopole structures instead of steel lattice towers to reduce visual impact but it considered that the potential benefits to visual impact from more streamlined transmission towers were outweighed by the increased biodiversity impact from the additional vegetation clearing required for construction due to larger footings, construction areas and access tracks. Some spans would require multiple monopoles to replace an individual steel lattice tower, resulting in an increase in the overall number of tower structures required, further increasing the area of clearing required. The Department accepts that the monopoles are not a feasible alternative to steel lattice structures for the project.

Transgrid has committed to treat the finishes of transmission towers to reduce visual impact. Elevated towers would be treated with a pre-dulled galvanised steel finish, and structures that are lower in the landscape would be painted olive green to better blend into the surrounding landscape and the Department has recommended a condition including this requirement.

Impact Assessment

Whilst Kosciusko National Park is a well-known recreational destination, most viewpoints where transmission infrastructure is visible have low visitor numbers or are inaccessible due to construction of Snowy 2.0, bushfire or landslide damage. The Landscape Character and Visual Impact Assessment considered 13 representative viewpoints from public areas such as roads, campgrounds and vantage points (see **Table 8** and **Figure 9**) and the overall visual impact was assessed as nil to low impact at six viewpoints including:

- VP5 (O'Hares Campground) assessed as nil visual impact due to intervening vegetation and topography, in combination with its distance (3.5 km) from the nearest structure; and
- VP6 (Wallace's Creek Lookout) assessed as nil visual impact due to its distance (8.6 km) from the nearest structure, the viewing platform looking away from the project primarily in an easterly direction, and intervening vegetation and topography.

Three viewpoints rated as low-moderate impact are located along the road network where views of the project would be fleeting.

The four remaining viewpoints assessed as experiencing moderate to high visual impacts include two campground sites (VP 10 Mine Trail Campground and VP11 Ravine Campground) and two viewpoints on the local road network (VP 3 Elliot Way and VP 12 Mine Trail Clearing). Photomontages and the assessment at these four locations are summarised in **Table 9** below. While views of the project from Mine Trail Campground would be of the lines passing overhead, the Department notes that the campground is currently closed to the public and likely to be re-established in an area away from permanent infrastructure as part of the Main Works. Views of the project from Lobs Hole Ravine

Campground would be to the transmission line in an elevated position. While this campground is also closed during construction of Main Works it would be reopened following construction.

Following the construction of Snowy 2.0, the temporary construction areas in Lobs Hole Ravine area would be rehabilitated in accordance with a Recreation Management Plan required as part of the Snowy 2.0 Main Works Infrastructure Approval. This includes a requirement to prepare detailed plans for the provision of recreational facilities at, and future recreational use of, the Lobs Hole and Talbingo Reservoir sites. The presence of the additional transmission line easement would influence the design and location of these recreational facilities in terms of layout and screening considerations.

In addition to the above viewpoints, the transmission line would also be visible to recreational water users on Talbingo Reservoir and campers staying at Coonara Point campground, which is only accessible via the water. The visual impact would be low at Coonara Point as it is less frequented than the other nearby campgrounds due to this restriction.

The new substation would be set-back from Elliott Way by around 70 m but would be visible from this public roadway due to the need to establish and maintain an asset protection zone. The visual impact would be low as views would be fleeting and the site already adjoins the line 64 easement.

Table 8 | Representative Viewpoints

Viewpoint	Category	Distance to nearest structure	Sensitivity	Transgrid Impact rating
Project Area West				
VP1 – Elliott Way transmission corridor	Road	300 m	Low	Low
VP2 – Elliott Way/Boundary Road	Road	340 m	High	Low – moderate
VP3 – Elliott Way	Road	140 m	High	Moderate - high
VP4 – Elliott Way	Road, rest area	760 m	High	Negligible
Project Area East				
VP5a – O'Hare's Campground	Campers, rest area	3.5 km	High	Nil
VP5b – O'Hares Campground boat ramp	Boat users	3.4 km	High	Nil
VP6 – Wallace's Creek Lookout	Vantage point	8.6 km	High	Nil
VP7 – Lobs Hole Ravine Road	Road	2.9 km	High	Low – negligible
VP8 – Lobs Hole Ravine Road	Road	2.1 km	High	Low
VP9 – Lobs Hole Ravine Road	Road	840 m	High	Low – moderate
VP 10a – Mine Trail Campground	Campers	Inside corridor, 170 m	High	High
VP 10b – Near Mine Trail Campground	Campers	As above	High	High
VP11 – Ravine Road Campground	Campers	800 m	High	Moderate
VP12 – Mine Trail Clearing	Road, rest area	400 m	High	High
VP 13 – Lobs Hole-Powerline Road	Road	2.2 km	High	Low - moderate

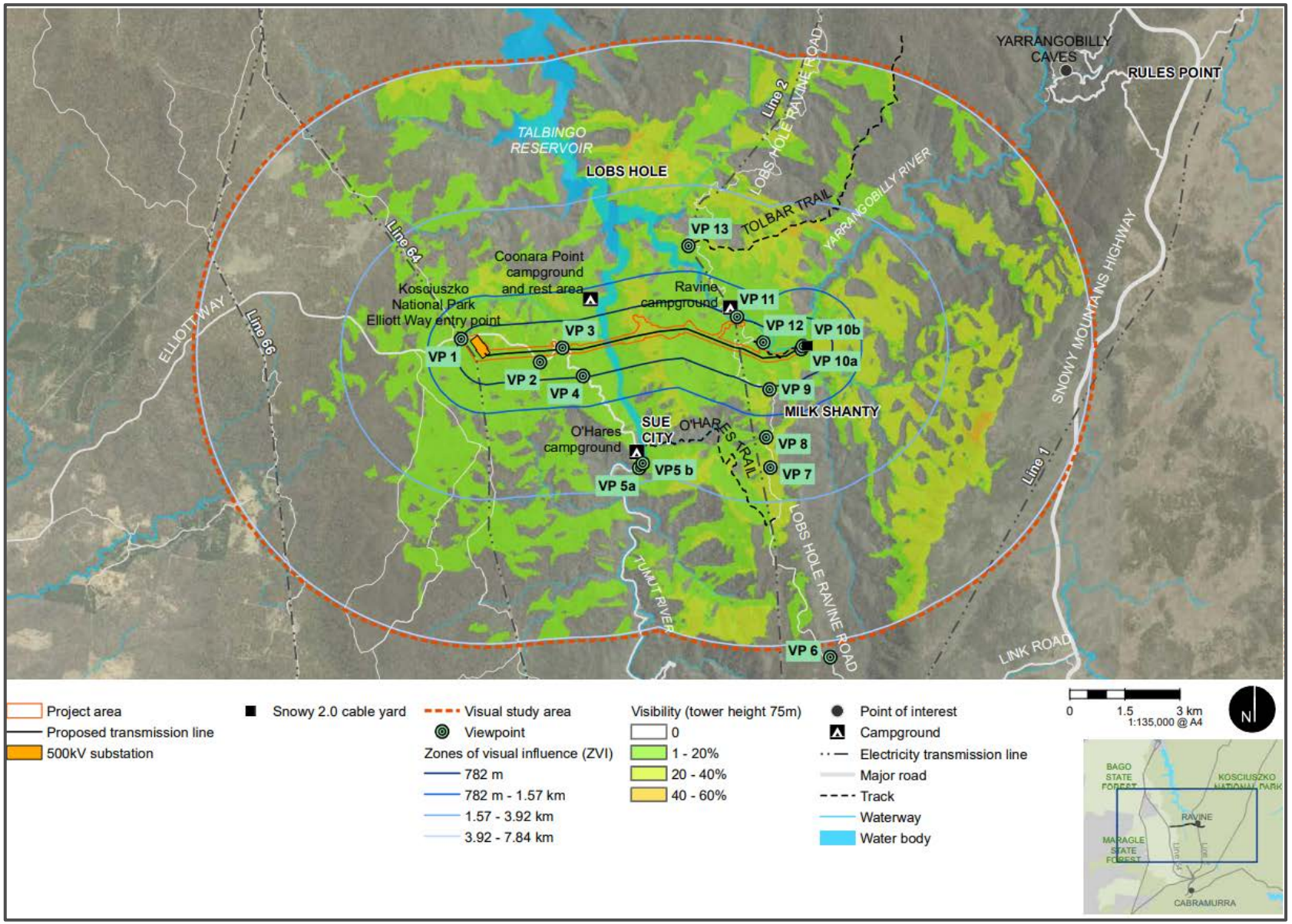


Figure 9 | Representative viewpoints and viewshed analysis

Table 9 | Viewpoints considered to experience moderate to high visual impacts

Location	Impact summary
 **different location with similar view and line crossing*	Elliott Way (VP 3): assessed as moderate to high visual impact, with transmission lines passing overhead, vegetation clearing for the easement and transmission structures located close to the road. Whilst the transmission line infrastructure and managed easements will be visible in close proximity, it will be fleeting in the context of the journey for road users.
	Mine Trail Campground (VP 10): assessed as high visual impact as the transmission line would pass overhead. However, the campground is currently closed to the public and unlikely to re-open, due to Main Works construction. Following construction, new camping areas would be established (positioned away from permanent infrastructure) to offset this loss of amenity.

Location	Impact summary
	Lobs Hole Ravine Campground (VP 11): assessed as moderate to high visual impact. The twin double-circuit towers would be approximately 800 m south of the site and visible, however the campground has existing views of transmission line 2 in the immediate foreground, located around 120 m west of the site. This campground has also been closed and used to construct Main Works. However, following construction of Main Works the campground would be reopened to the public. Nearby towers would be treated (pre-dulled or painted) to reduce visual impact.
	Mine Trail Road (VP12): high visual impact unlikely to be mitigated by vegetation regeneration and expected increased visitor numbers due to the upgraded road network. To reduce visual impact, elevated towers would be treated with a pre-dulled galvanised steel finish, and structures that are lower in the landscape would be painted olive green to better blend into the surrounding landscape.

Cumulative Impacts

Upon the completion of construction and rehabilitation in accordance with the infrastructure approval, the Snowy 2.0 Main Works project would leave a residual operational surface footprint of around 92 ha. This footprint would be concentrated mostly around the Talbingo and Tantangara reservoirs, as most of the other operational components would be located underground.

The transmission connection would add an additional 106 ha to the operational footprint, bringing a cumulative total of 198 ha within National Park. The Department acknowledges that the project would add an industrial element to the surrounding landscape and will be a visibly larger easement than Line 2, which is a single 330 kV circuit aligned north-south through Lobs Hole.

Additional measures

Despite the mitigation and avoidance measures proposed by Transgrid, the residual visual impacts to this section of National Park and State Forest would be significant. Therefore, the Department considers additional mitigation measures are warranted.

The Department recommends a condition requiring Transgrid to pay the NPWS a total of $5 million. This is to be spent evenly by NPWS on the following programs to improve the natural and cultural heritage values of the National Park:

- Snow gum dieback research and action program;
- Bogs/Fens rehabilitation;
- Ox eye daisy control;
- Replacement of four burnt structures at Kiandra (Wolgals, Pattinson, Matthews Cottage and Courthouse); and
- Aboriginal Community Connection to Country.

The Department also recommends additional measures to be developed in an Additional Easement Rehabilitation Strategy to provide:

- removal of the 11 kV overhead transmission line between Providence Portal substation to Tantangara Dam, replacement with a standalone supply or underground line between the Snowy 2.0 Tantangara intake/portal area and Tantangara Dam area, and rehabilitation of the easement; and
- removal of the Eucumbene Portal to Happy Jacks 11 kV transmission lines, with the damaged line to be removed and replaced with an alternative standalone power supply and rehabilitation of the easement.

Conclusion

The Department requested Transgrid explore further potential visual mitigation for the proposed overhead transmission (following consideration of other route and construction alternatives in section 6.2) and has concluded that other mitigation measures, such as alternate tower structures, would not be effective or have additional visual and biodiversity impacts.

To minimise visual impacts during construction, the Department recommends Transgrid progressively rehabilitate work areas, and for the permanent facilities, the Department requires Transgrid to submit final designs for approval, incorporating paints, textures and local materials to blend the infrastructure into the landscape.

With these measures together with contributions for additional measures for programs to improve park values, the Department is satisfied that the project could be undertaken in a manner that would reduce impacts on park values.

6.5 Other Issues

The Department's consideration of other issues is summarised in **Table 10**.

Table 10 | Summary of other issues

Findings	Recommendations
Heritage	
• Construction of the project would introduce an additional transmission line easement to the *Australian Alps National parks and Reserves* and *Snowy Mountain Scheme* National Heritage listed items, and involve direct impacts to Aboriginal heritage sites located within the disturbance footprint. **Historic Heritage** • The project would have minor impacts on the heritage values of the Australian Alps National Parks and Reserves, National Heritage Listed item's natural history and its aesthetic values. The project can be considered an augmentation of the existing Snowy Mountain Scheme. • The project would directly impact one item of local heritage significance, the Lobs Hole Copper Mine Water Race identified as R45 as part of the Exploratory and Main Works, and nine items with historical archaeological potential. Transgrid will be required to manage these plans in a manner consistent with Main Works requirements, including archival recording and salvage of significant items. • The Department considers that the project would not adversely increase impacts on historic heritage items in the local area. **Aboriginal Heritage** • Transgrid has undertaken test excavations at all identified PAD sites, and comments from RAPs were generally in support of the methodology and Aboriginal Cultural Heritage Assessment Report (ACHAR). • The location of transmission structures on elevated ground avoids impacts to areas of higher archaeological potential. • The project would have full or partial impacts on five Aboriginal heritage sites in the disturbance footprint. The ACHAR concluded that the items are of low significance. Where these sites cannot be avoided, the recommended management action would involve a surface collection salvage program with RAPs to be managed under a heritage management plan. • The amended project footprint avoids impacts to one Aboriginal heritage site. • The Department recommends Transgrid detail procedures to manage risks to heritage items in a heritage management plan.	• Implement measures to avoid direct and indirect impacts on heritage items outside of the construction envelope. • Archival recording, test excavation and salvage of impacted items. • Implement a heritage management plan, prepared in consultation with key stakeholders, including RAPs. • Prepare and implement mitigation measures and reporting procedures for previously unidentified heritage items.

Findings	Recommendations
Transport	
• The project requires the delivery of plant, equipment and materials, including the movement of over-dimensional vehicles that require escort, such as the transformer delivery vehicle which is expected to be at least 175 tonnes and 60 m long. • The haulage routes are: - **Project area west:** o for heavy vehicles: Hume Highway, Snowy Mountains Highway (via Tumbarumba), Batlow Road, Tooma Road and Elliott Way; and o for heavy vehicles requiring escort: Hume Highway, Little Billabong Road, Tumbarumba Road, Wagga Road, Masons Hill Road, Albury Street, The Parade, Bridge Street, Winton Street, Regent Street, William Street, Tooma Road, Elliott Way and enter site access road at Maragle substation. - **Project area east**: Snowy Mountains Highway (via Cooma and Tumut), Link Road and Lobs Hole Ravine Road. • The road network has adequate spare capacity to accommodate peak construction traffic from the project and the low volumes associated with operation. • Transgrid would implement measures to manage and regulate traffic movements, minimise the number of workers using private vehicles and manage oversize vehicles. • Specific restrictions would be in place to minimise the potential for vehicle strikes of threatened fauna, particularly for the Smoky Mouse within National Park in line with the requirements for Main Works. • In Project Area East, Lobs Hole Ravine Road and Mine Trail were recently upgraded as part of Snowy 2.0 to increase road width and improve operating conditions for heavy vehicles. TfNSW has recently completed upgrades to the Snowy Mountains Highway, including passing bays and intersection works in Cooma to ease congestion during the ski-season peaks. No further upgrades are required in Project Area East for the project. Vehicles requiring escort would utilise the project area west route and road network impacts associated with these vehicles would be minimal due to the low number of movements. • In Project Area West, the intersection of the access road off Elliot Way in Nurenmerenmong would be upgraded to provide permanent access to the substation at Maragle. • Transgrid has identified that in project area west, upgrade / reinforcement works may be required to 12 bridge crossings and existing road infrastructure, subject to the final dimensions of the transformer delivery vehicles. • NPWS and FCNSW requested access to construction areas be maintained within National Park for NPWS staff and State Forests for FCNSW staff and Transgrid has confirmed this would be provided. • The Department has recommended conditions of approval to include road dilapidation surveys and repair of damage.	• Prepare and implement a Transport Strategy to confirm the scope of works for bridge upgrades, in consultation with relevant road authorities. • Survey and repair any damage to roads. • Vehicles requiring escort vehicles to adhere to specified routes. • Restrict vehicle speeds and volumes on specific routes within National Park. • Maintain access for NPWS and FCNSW officers. • Implement a transport management plan.

Findings	Recommendations
Hazards	
• Lobs Hole is the main area of potential contamination concern, due to its history as a copper mine and existing areas of identified metal contamination. Targeted geological investigations would be undertaken to determine the level of management to be implemented for soils and contamination. • There is a low risk of encountering soils containing naturally occurring asbestos (NOA). Geotechnical investigations would verify the presence of NOA in areas of vegetation clearing and ground disturbance. A NOA management plan would be developed as part of the Spoil Management Plan and any NOA found would be managed in accordance with standard work, health and safety practices. Any NOA material found would be disposed of outside of the National Park at a suitably licenced facility, or emplaced within the Snowy 2.0 Main Works Tantangara emplacement area in accordance with the approved Naturally Occurring Asbestos Management Plan. • Transgrid would install an impervious surface and oil containment system at the substation site. Transformers and other large volume oil fill equipment would be designed in a leak-proof bunded compound. • The Department considers that the likely potential impacts from contamination including contaminated land and asbestos would be limited and would be managed trough conditions requiring TransGrid to prepare and implement a Spoil Management Plan.	• Prepare and implement a Spoil Management Plan.
Land	
• The project would result in some localised landform changes, including the establishment of new access tracks, substation and hardstand areas to construct transmission towers. • Tufa deposits are considered to have national and regional significance under the National Park Plan of Management, however there are no known tufa deposits of the Ravine Karst system within the development footprint. The nearest deposits (Cave Gully and Lick Hole Gully) located 1 km south of the project and Transgrid would implement an unexpected tufa finds procedure and a water quality monitoring program to ensure there are no impacts to tufa deposits. • Up to 180,000 cubic metres (140,000 in Project area east, 40,000 in Project area west) of excess spoil would be excavated during construction. Transgrid would detail procedures for maximising the recovery and re-use of topsoils for rehabilitation in the spoil management rehabilitation management plans. This would include details on soil management measures including a topsoil stripping and stockpiling procedure and a soil reinstatement methodology. • Spoil from National Park that cannot be beneficially reused would be emplaced at locations already approved as part of the Main Works project. No subaqueous emplacement of spoil at Ravine Bay is proposed. Spoil from Project Area West that cannot be beneficially reused would be disposed of at an appropriately licensed facility. • The spoil management plan would be developed in consultation with NPWS and FCNSW.	• Prepare and implement a Spoil Management Plan and a Rehabilitation Management Plan

Findings	Recommendations
Water	
• Waterways within the project area and downstream of the disturbance footprint including the Yarrangobilly River are valued habitat for threatened fauna and aquatic species including the Booroolong Frog and Murray Crayfish. The Talbingo Reservoir is valued for recreational purposes and feeds into the Murrumbidgee Irrigation Scheme. • Construction requires approximately 60 ML of water, which for project area east would be sourced from Talbingo Reservoir, and for project area west would be sourced from the Snowy Hydro Tumut 2 Tailbay, Paddy's River Flat Campground and town water supply. • During operation approximately 10 kL of water per year would be required for maintenance activities and the operation of the substation. **Surface water** • Construction activities have the potential to divert overland flows, increase flooding in adjacent land and cause erosion and export of sediment to waterways. The Department considers that erosion and sedimentation risks of this development can be managed through best practice measures, with particular attention near riparian areas. • Transgrid would develop a Water Management Plan (WMP) which includes mitigation and management measures for construction water. In response to EPA's concerns regarding water quality, the WMP would include a water quality monitoring strategy to appropriately characterise the baseline water quality of the receiving waterways and monitor impacts of the project. • The Department also notes that it is a strict liability offence to pollute any waters off the site under the *Protection of the Environment Operations Act 1997*. • The far eastern extent of project area east may be impacted by flooding during construction. However, most of the project area would be located away from major drainage lines and flood prone land, so the risk of flooding is low. • During operation the development would not cause significant changes to flood levels. • The substation site may be subject to overland flooding as the site is located on two waterways (New Zealand Gully and an unnamed tributary of Yorkers Creek), requiring a small section of New Zealand Gully, a second order stream to be filled and new drainage infrastructure installed to manage runoff through the substation site. • DPE Water, Council and the Department are satisfied that the flood impacts would be appropriately managed through recommended conditions. **Groundwater** • Impacts to groundwater systems are considered unlikely due to the generally shallow depths of excavation. Should dewatering activities exceed 3ML, additional approvals and entitlement must be obtained. • Where shallow earthworks are not suitable for construction of the transmission tower foundations, piles would be installed to a depth of 10 to 20 m. Piles would not require removal of groundwater. • There would be no operational impacts on groundwater.	• Ensure adequate water supply for the development, and if necessary, adjust the scale of the construction (i.e. stage) to match its available water supply. • Comply with legislation to ensure no pollution of waters. • Prepare and implement a Spoil Management Plan and Water Management Plan. • Obtain water licenses and sufficient entitlement in groundwater source if volume for dewatering activities exceeds 3 ML. • Maximise reuse of water on site. • Ensure the development is designed, constructed and maintained in such way that it does not materially alter the flood storage capacity, flows or characteristics in the development area. • Take all reasonable and feasible measures to prevent a discharge to waters. • Flood modelling and assessments must be completed during the detailed design phase for infrastructure located in floodplain areas.

Findings	Recommendations
Bushfire safety and emergency management	
• The project would introduce additional risks for on-site ignitions which may result in a fire escaping to the surrounding state forests or National Park. These may arise from electrical failure, contact between conductors and vegetation, or hot works during construction or operation causing ignition at the project area. • Transgrid would maintain asset protection zones (APZ) around the construction site and substation. • Vegetation removal and trimming along the transmission line easement and APZ surrounding the substation would be undertaken to maintain appropriate clearances to manage bushfire risk. • The project was amended to include six distinct management zones that would be subject to specific clearing requirements. A variety of vegetation management approaches that consider these zones would be used for management of bushfire risk. For example, vegetation removal and trimming along the transmission line easement and APZ surrounding the substation would be undertaken to maintain appropriate clearances. • Access for management and emergency management activities would be unaffected. • All permanent infrastructure would be designed to meet the requirements of *Planning for Bushfire Protection (2019)* (PBP) and Australian Standards for buildings in bushfire prone areas. • The preventative fire mitigation practices within State Forest would be in accordance with FCNSW's Fire Practices Codes. • Transgrid would manage bushfire risks via an emergency management plan, which is consistent with the National Park Fire Management Strategy. A Prepare-Act-Survive bushfire response plan would also be prepared for the project in consultation with NPWS, FCNSW and Snowy Valleys Bush Fire Management Committee. • The Department, FCNSW, NPWS and FRNSW are satisfied that the bushfire risks can be suitably controlled through the implementation of standard fire management plans and procedures.	• Maintain asset protection zones and design buildings in accordance with PBP and relevant Australian Standards. • Manage dangerous goods in accordance with relevant guidelines. • Ensure the development is suitably equipped to response to fires on site, including the provision of a 20,000 litre water supply. • Prepare and implement an emergency management plan.
Electric and Magnetic Fields	
• Like other electrical equipment, the development's electrical components, including the transmission lines, substation and interconnecting cabling, would generate electric and magnetic fields (EMF). It is noted that EMF also comes from natural sources such as the Earth's magnetic field. • All the predicted levels are well below the relevant International Commission on Non-Ionizing Radiation Protection (ICNIRP) EMF criteria of 2,000 milligauss (mG) for general public exposure. The substation would be designed to ensure predicted EMF exposure limits would be within the EMF reference levels. • The EIS assessment of the EMF levels beneath the proposed 330kV transmission lines against public exposure guidelines predicts that EMF levels would be 192 mG. • The Department is satisfied the development is unlikely to cause any significant EMF-related impacts.	• Comply with the applicable EMF criteria.

Findings	Recommendations
Noise and Vibration	
• Construction noise would be below relevant EPA noise management levels at all sensitive receiver locations. • Road traffic noise during construction would comply with the relevant criteria in the EPA's *Road Noise Policy*. Vehicle movements and the extraction of water at the Paddy's River Flat Campground may generate adverse impacts to sensitive receivers, however these would be minor, temporary and short-term. • Due to the distance from blasting locations to the nearest receivers, vibration impacts from blasting (including air blast overpressure) would comply with the applicable amenity criteria at all identified sensitive receivers.	• Minimise noise from construction, operation and decommissioning.
Air	
• Air quality impacts from construction activities include excavation and vegetation clearing, vehicle movements, wind erosion of unsealed surfaces, and emissions from equipment exhausts. • Transgrid has committed to minimising air quality emissions as much as possible. • Impacts can be readily avoided through the implementation of standard construction mitigation measures that the Department has recommended in the conditions and would be unlikely to have a significant impact.	• Minimise emissions of dust, fume, blast and other air pollutants of the development. • Minimise surface disturbance of the site.
Social and Economic	
• As part of the EIS, Transgrid identified and assessed a range of potential social and economic impacts. These include: - increased pressure on community services (such as health services) due to increased demand by construction workers; - disruption of access to and use of recreational facilities and activities, including a temporary exclusion zone approximately 100 m wide on either side of the centreline of each transmission line spanning Talbingo Reservoir during the overhead stringing of conductors and wires across the span (for several hours per conductor), and a hunting exclusion area within the State Forest; - loss of productive State Forests, noting that compensation would be payable to FCNSW under the Land Acquisition (*Just Terms Compensation) Act 1991*; - clearing of vegetation, impacting community values relating to scenic and landscape amenity and the environment; and - traffic impacts to nearby towns; • Once operational, the project is unlikely to result in significant demand on community services and infrastructure (excluding roads considered above) given the relatively low level of local employment generated once operational. • Transgrid has committed to preparing a Community and Stakeholder Engagement Plan (CSEP) to ensure the community is provided with timely and accurate information during construction and disruptions to the use of recreational facilities and activities. The CSEP would include consultation with local businesses, accommodation providers, NPWS, FCNSW and managers of social infrastructure.	• Prepare and implement a Community and Stakeholder Engagement Plan.

Findings	Recommendations

• The project would generate direct and indirect benefits to the local community, particularly during construction, including:
  - increased employment opportunities through creation of up to 140 jobs during the construction period;
  - expenditure on accommodation and business in the local economy by workers residing in the area; and
  - the procurement of goods and services by Transgrid and associated contractors.
• The Department considers that with the recommended conditions of approval, the project (in combination with other elements of Snowy 2.0) would provide significant economic benefits for the local community.	

Cumulative Impacts	
• The project would have cumulative impacts with the other stages of Snowy 2.0 and other projects in the region. • During construction, potential cumulative impacts would be associated with biodiversity, traffic, amenity, water quality and bushfire risk generally localised to the Lobs Hole Ravine area. • During operation, there would be a cumulative visual impact with other infrastructure for Snowy 2.0 within the area. • Up to 495 ha of native vegetation inside National Park would be cleared to construct Snowy 2.0, and a further 82 ha outside National Park. Existing approvals and the recommended conditions of approval include strict requirements for the rehabilitation of these construction areas. • Up to 157.3 ha of permanent infrastructure, including 38 ha of new transmission line easement would remain within National Park. • Snowy Hydro and Transgrid would pay a total of $92.88 million ($82.29 million under existing approvals and additional $10.59 million for the transmission project) to the NPWS to carry out actions to significantly improve catchment health, strengthen ecosystems, protect threatened species and communities and deliver long-term strategic conservation benefits for the National Park; and • Snowy Hydro and Transgrid would pay a total of $11.96 million ($6.96 million under existing approvals and additional $5 million for the transmission project) to the NPWS to improve park values in the National Park surrounding the project area.	• No additional requirements

7 Evaluation

The Snowy 2.0 Transmission Connection is critical for energy security and reliability in NSW as it would connect Snowy 2.0 to the electricity network, providing the NEM with 2,000 MW of electricity and 350,000 MWh of necessary additional deep storage. Consequently, the then Minister for Planning declared all the Snowy 2.0 project components to be Critical State significant infrastructure.

Snowy 2.0 would play an essential role in supporting the transition from a long-standing reliance on coal-fired power stations to a reliance on renewable energy. It is also consistent with AEMO's roadmap for the NEM, the *Integrated System Plan* and relevant strategic NSW planning and policy documents, including the *Transmission Infrastructure Strategy*, the *Electricity Strategy*, and more broadly the *Climate Change Policy Framework and Net Zero Stage 1: 2020 – 2030*.

The Department has carried out a detailed assessment of the merits of the project in accordance with all relevant NSW legislation, policies and guidelines. It has also consulted widely with the community and key government agencies, and closely considered the issues they have raised during this consultation in its assessment.

The key issue raised in community and special interest group submissions was the consideration of alternative options and impact of the proposed option on biodiversity. The Department has evaluated the alternative options in detail in consultation with independent technical experts and experts within government. The Department accepts the overhead line option achieves an appropriate balance between the need to minimise unavoidable impacts and the need to meet the project objectives including schedule, cost, system reliability and ability to export energy from Snowy 2.0 to the NEM.

The key impacts of constructing a 9 km transmission line through largely undisturbed sections of National Park and State Forest are biodiversity, visual and park values. The Department has also considered a range of other impacts in its assessment including heritage, transport, land use, hazards, water, noise, air quality, social, economic and cumulative impacts.

The Department has worked closely with key government agencies to prepare a comprehensive framework of recommended conditions of approval, requiring a range of controls and measures to minimise the impacts of the project. This includes requiring Transgrid to contribute a further $15.59 million (to add to the $89.25 million Snowy Hydro is already required to pay to NPWS) to improve the biodiversity and recreational values of the National Park. Consequently, the project can be carried out in a manner that is consistent with the principles of ecologically sustainable development.

On balance, the Department considers that Snowy 2.0 Transmission Connection's benefits to energy security and reliability outweigh its costs, and the project is in the public interest and approvable, subject to strict conditions.

8 Recommendation

It is recommended that the Minister for Planning:

- **considers** the findings and recommendations of this report;
- **accepts and adopts** all of the findings and recommendations in this report as the reasons for making the decision to grant approval to the application;
- **considers** any advice provided by the Minister having portfolio responsibility for the project;
- **agrees** with the key reasons for approval listed in the notice of decision;
- **grants approval** for the application in respect of Snowy 2.0 Transmission Connection (SSI 9717) as amended, subject to the conditions in the attached project approval; and
- **signs** the attached project approval and recommended conditions of approval (see **Appendix H**).

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Clay Preshaw
Executive Director
Energy, Resources and Industry

01/09/2022

David Gainsford
Deputy Secretary
Development Assessment

9 Determination

The recommendation is **Adopted** by:

02/09/2022

The Hon Anthony Roberts MP
Minister for Planning

Appendices

Appendix A – List of referenced documents

Snowy 2.0 Transmission Connection – Environmental Impact Statement, Transgrid (February 2021)

Snowy 2.0 Transmission Connection – Submissions Report, Transgrid (March 2022)

Snowy 2.0 Transmission Connection – Amendment Report, Transgrid (March 2022)

Snowy 2.0 Transmission Connection – Response to Request for information, Transgrid (July 2022)

Snowy 2.0 Transmission Connection – BDAR (Revision 7), Transgrid (August 2022)

Appendix B – Environmental Impact Statement

See the Department's website at:

https://www.planningportal.nsw.gov.au/major-projects/projects/snowy-20-transmission-connection

Appendix C – Submissions

See the Department's website at:

https://www.planningportal.nsw.gov.au/major-projects/projects/snowy-20-transmission-connection

Appendix D – Submissions Report

See the Department's website at:

https://www.planningportal.nsw.gov.au/major-projects/projects/snowy-20-transmission-connection

Appendix E – Amendment Report

See the Department's website at:

https://www.planningportal.nsw.gov.au/major-projects/projects/snowy-20-transmission-connection

Appendix F – Additional Information

See the Department's website at:

https://www.planningportal.nsw.gov.au/major-projects/projects/snowy-20-transmission-connection

Appendix G – Agency Advice

See the Department's website at:

https://www.planningportal.nsw.gov.au/major-projects/projects/snowy-20-transmission-connection

Appendix H – Recommended Instrument of Approval

See the Department's website at:

https://www.planningportal.nsw.gov.au/major-projects/projects/snowy-20-transmission-connection

Appendix I – Independent Expert Advice

Independent Review of the Biodiversity Offset Strategy

Our ref: LTR-ECO ST BOS REVIEWrevB

By email
anthony.ko@planning.nsw.gov.au

17 August 2022

Anthony Ko
Team Leader, Energy Assessments
Energy, Resources & Industry Assessments|Department of Planning and Environment
4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150

Dear Anthony

The Department of Planning, Industry and Environment (Department) required the services of a biodiversity specialist to provide independent expert advice regarding the Biodiversity Offset Strategy (BOS) (EMM, 2022) for the proposed Snowy 2.0 Transmission Connection Project (the project) in New South Wales.

The following provides a summary of an independent technical review of the revised BOS (EMM 2022), principally focused on the quantification and approach to the proposed conservation management and offset outcomes. In addition, a final recommendation of offset liability is provided.

The advice builds on previously provided review and recommendations for biodiversity offsets within the Kosciusko National Park (KNP) adopted for the approval of the Snowy 2.0 Main Works project (Snowy 2.0), proposed by Snowy Hydro Limited (Snowy Hydro).

INTRODUCTION

The approved Snowy 2.0 is uniquely situated within the biologically significant Alpine bioregion of the Snowy Mountains. It is almost entirely positioned within KNP and includes the development of underground tunnels to link the existing Tantangara and Talbingo Reservoirs, a new underground power station and connection to Transgrid's electricity transmission system.

Transgrid is now seeking approval under Part 5 Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) for the construction and operation of an overhead transmission line connection and substation (the project) to enable the grid connection of the Snowy 2.0. The project has been declared critical State Significant Infrastructure (SSI) under State Environmental Planning Policy (State and Regional Development) 2011.

An Environmental Impact Statement (EIS) for the project was prepared and publicly exhibited. This included a Biodiversity Development Assessment Report (BDAR) (Jacobs 2022) that outlined the residual impacts on approximately 118.35 hectares of native vegetation and habitat. These residual impacts have been determined in accordance with the Biodiversity Assessment Methodology (BAM) to generate an offset liability of 12,589 biodiversity credits.

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The BOS (EMM 2022) provided a high-level commitment to offset residual impacts through two separate mechanisms. For the projects residual impacts within the KNP, offsets are proposed using a consistent approach to the previously agreed and approved Snowy 2.0. The project differs however from Snowy 2.0 as it incorporates only a proportion of its impacts within KNP with a residual impact area outside of the KNP boundary. The proposed approach to meeting the projects offsets outside of KNP will be in accordance with the NSW BOS and BAM.

METHODOLOGY OF THE REVIEW

The technical review of the project BOS incorporated the following approach and methods;

1. Extensive consultation with key stakeholders including; NSW National Parks and Wildlife Service (NPWS) representing KNP, the Department including biodiversity specialists from NSW Biodiversity Conservation Division (BCD), threatened species experts , Transgrid and Snowy Hydro.

   The reviews recommendations on the BOS management actions and offset liability were also subject to comments and consultation with the above stakeholders.

2. A desktop review and analysis of management actions and conditions with KNP using the appropriate and available literature, including;
   - key threats as documented in Bionet and the Threatened Biodiversity Data Collection (TBDC)
   - Saving our Species (SoS) management actions for each species
   - relevant species management and recovery plans
   - Kosciuszko National Park Plan of Management 2006 (KNP PoM,) (DEC 2006)
   - The project BDAR, technical documentation (Jacobs 2022) and BOS (EMM 2022)
   - Snowy 2.0 project BDAR, technical documentation and revised BOS (EMM 2021)
   - disturbance data on horse impacts in the Alps (Robertson et al 2015)
   - Caring for our Australian Alps Catchments (Worboys and Good 2011), including condition mapping
   - horse and deer abundance and disturbance mapping (KNP 2016)
   - broad scale vegetation mapping
   - existing ecology reports, topographic maps and aerial photographs
3. Validating proposed rates and conservation management actions against;
   - existing conservation management standards
   - previous expert experience for CSSI and SSI BOS and conservation management actions
   - government advice for conservation management under the BCT and BAM
   - NSW Biodiversity Assessment Methodology (BAM) (BCD 2020)
   - State and Commonwealth offset policy and guidelines
   - relevant KNP biodiversity and management documentation

OFFSET DELIVERY OUTSIDE OF KNP

Following consultation between the proponent, DPE, National Parks, BCD and species experts it was agreed that all residual impacts of the project outside of KNP will be offset in accordance with the NSW BOS and BAM. This outcome is supported by this independent review.

The proponent has identified the calculated BAM credit liability for the area outside of KNP as 5,624 species credits and 1,364 ecosystem credits. The revised BOS preferred mechanism for meeting this liability will be through;

- a) purchase and retire suitable credits that are existing in the market; and
- b) developing Biodiversity Stewardship Agreements (BSAs) on land within the local area supporting the biodiversity values required by the project.

These offset strategies will ensure 'like for like' offsets are delivered and direct local conservation outcomes for the biodiversity values impacted by the project.

The proponent has not currently established a BSA or secured any available suitable credits, however has demonstrated through investigations that a range of suitable biodiversity values exist in the locality. This is further supported by the preliminary result of surveys on potentially suitable sites. It is therefore considered likely that potential offset sites suitable for much of the projects credit liability for impacts outside of KNP could be met through the above preferred mechanisms.

It is acknowledged that the timeframes involved in identifying, securing and establishing a BSA can be onerous and in many cases requires the outcomes of the project approval and final BDAR to proceed. Formal establishment timeframes provided by the Biodievristy Conservation Trust (BCT) suggest the review and processing of a BSA may take up to 6 months, and only following submission of a completed application incorporating the results of surveys, assessment and land ownership documentation.

The NSW BOS does provide proponents the option to meet their credit liability through payment into the Biodiversity Conservation Fund (BCF). The BCF payment liability for the project's liability outside of KNP has been determined to be **$24,869,236 Million**.

While the BOS makes commitments to meet any residual liability through payment into the BCF, its preferred offset mechanism is to establish the local BSAs.

Given the demonstrated progress the proponent has made in identifying and surveying potential suitable BSAs and the additional localised conservation benefits this would provide, it is recommended that the establishment of BSAs in preference of the payment into the BCF is encouraged by supporting some flexibility in the timeframes required for securing the projects offset liability.

The risks of offset delivery not being met is considered unlikely given the proponent's commitment to enter into a deed of agreement/ or similar legally binding commitment with the Planning Secretary to secure the financial liability commensurate to the full cost of payment into the BCF. The timeframe for establishment of the offset liability should be specified within the projects condition of approval.

OFFSET DELIVERY WITHIN KNP.

The residual project impacts within the KNP, will affect both terrestrial and aquatic ecosystems. These project impacts have been comprehensively assessed and quantified in accordance with the NSW BAM (OEH 2020) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), with a residual credit liability of 4,076 species credits and 1,525 ecosystem credits.

The BOS proposes to meet the project offset liability for these residual impacts on biodiversity within the KNP by adopting the '*conceptual framework developed and approved for the Snowy 2.0 offset strategy (EMM 2020)*'.

This framework acknowledged the unique setting of Snowy 2.0 and the limitations in the current NSW BOS in providing conservation outcomes for biodiversity generally restricted to the existing reserve estate of KNP.

The Snowy 2.0 offset strategy incorporated extensive consultation with key stakeholders including KNP, BCD and relevant species experts to identify, design and cost specific management actions for each impacted biodiversity values. The quantum of the final agreed actions was informed by areas required to generate an equivalent credit liability determine under BAM. Many of the final agreed management actions would also deliver holistic conservation outcomes within affected catchments in KNP, resulting in much broader conservation benefits to species and communities.

This review of the BOS (EMM 2022) and proposed **$10.6M** offset contribution for the projects impacts within the KNP, focused on the adequacy of the proposed management actions, the pro rata rates/costs attributed to each action and the data used to quantify the scale of the proposed approach. A summary of these is provided below;

ECOSYSTEM OFFSETS

The biodiversity values impacted by the project are generally consistent with those identified and offset by Snowy 2.0, including all of the impacted Plant Community Types (PCTs). Therefore the adoption of the Snowy 2.0 previously agreed management actions and costs for PCTs on a pro rata base for its ecosystem liability is supported.

SUMMARY OF RECOMMENDED ECOSYSTEM OFFSET LIABILITY

The recommended ecosystem offset liability will provide direct benefits and outcomes for each of the PCTs affected by the project. A summary of the final ecosystem offset liability is provided below in Table 1. A detailed breakdown of the recommended management cost is provided in Attachment A.

Table 1 Summary of Recommended Ecosystem Offset Liability

ECOSYSTEM MANAGEMENT ACTION	COSTS
— Pest and feral animal control	$1,717,098
— Weed control	$2,130,234
— Administration/equipment	$763,800
Total	**$4,611,132**

SPECIES OFFSETS

The BOS acknowledged that not all species are impacted by the project to the same extent and as such a tiered approach was adopted to provide species specific offsets incorporating the following two options;

- payment to KNP of the equivalent BOPC species credit liability in accordance with BAM
- payment to KNP for the costs associated with the implementation of species specific management actions

This approach is considered appropriate for the project.

Following consultation with KNP and BCD, and a review of individual species/TEC management plans developed by species experts, direct species management actions were recommended and costed for three species substantially impacted by the project.

The recommended species management actions were guided by the following general principals;

- where possible actions should preferentially target outcomes for each species within KNP
- actions should be guided by existing species recovery planning and species expert recommendations
- avoid duplication of broader pest and weed management actions proposed and costed under the ecosystem offset liability
- considered EPBC Act Environmental Offsets Policy (DSEWPaC 2012) requirements for 'direct' actions
- provide long term benefits and outcomes
- be proportionate to the project impacts
- for species identified as 'priority affected species/TEC' in the Commonwealth guidance following the 2019-20 bushfires (DAWE 2020), consider additional bushfire recovery management requirements and actions within areas unaffected by the 2019-2020 bushfire.
- implementation of the management actions should be monitored and reported.

Two species, Eastern Pygmy-possum (*Cercartetus nanus*) and Booroolong Frog (*Litoria booroolongensis*) were previously included in the subject species identified for targeted conservation management actions within the Snowy 2.0 BOS. These species have been appropriately costed using a consistent approach to the agreed management actions on a pro rata base for the project impacts.

Additional consultation with the species experts, NPWS and BCD on the Booroolong Frog (*Litoria booroolongensis*) identified concerns for the project potential indirect impacts and that some of the original costings and management actions for the species were already adequately funded following the Snowy 2.0 BOS. However, it is considered that the pro rata costing of the previous management actions for this species remains relevant to the project and reasonably transferrable to additional habitat sites within KNP. It is recommended that while indirect impacts from the project are unlikely to be significant, additional controls for monitoring and if required adaptive management be considered for the species as part of post approval condition of consent.

The project impacts on the Yellow-bellied Glider (*Petaurus australis*) endangered population on the Bago Plateau has the potential to be substantial. This species was not previously considered within the Snowy 2.0 BOS and therefore required consultation and development of specific management actions to be adopted and costed. The proposed management actions were determined in consultation with

relevant experts, BCD and KNP. A summary of these actions are presented in the BOS and are supported by this review.

For the remaining species, Masked Owl (*Tyto novaehollandiae*), *Caladenia montana* (*Caladenia montana*) *and* Gang-gang Cockatoo (*Callocephalon fimbriatum*) the project offset credit liabilities are reasonably addressed through the contribution of funds to KNP of the equivalent BCF payment liability. This is considered reasonable based on the relatively small scale of the projects impacts and/or the likely limited response to management actions by these species.

SUMMARY OF RECOMMENDED SPECIES OFFSET LIABILITY

The recommended species offset liability will provide direct benefits and outcomes for all 6 species affected by the project. A summary of the final species offset liability is provided below in Table 2.

A detailed breakdown of the recommended management cost is provided in Attachment A.

Table 2 Summary of recommended species offset liability

METHOD	RULE SET	SPECIES	OFFSET COST
Equivalent BOPC credit liability payment to KNP[1].	— relatively small direct project impact and/or — on ground actions not achievable and/or — management actions disproportionately costlier than BOPC offset liability and/or — on ground actions, limited application for targeted species	*Caladenia montana*	$52,120
		Gang-gang Cockatoo	$833,399
		Masked Owl	$640
Sub Total			**$886,159**
Species specific targeted management actions	— species considered to be substantially impacted by the project and/or — BOPC offset liability disproportionate to project impacts and/or — priority bushfire affected species and/or — species requiring offsets under the EPBC Act Environmental Offsets Policy (DSEWPaC 2012)	Eastern Pygmy-possum	$392,902
		Booroolong Frog	$3,076,533
		Yellow Bellied Glider	$1,619,300
Sub Total			**$5,088,735**
TOTAL SPECIES LIABILITY			**$5,974,893.72**

Notes 1. Offset liability current of the BOPC July 2022

CONCLUSION

KNP is one of the most complex conservation reserves in Australia, having unique glacial landscapes and a rare and unusual assemblage of plants and animals, several which are found nowhere else in the world. Given these key factors a strategic BOS was developed and approved for Snowy 2.0 that both directly targeted the project impacts, provides for strategic conservation outcomes in KNP and considers State and Commonwealth legislation and policy guidance.

For the projects impact within KNP the proponent has proposed to build on the Snowy 2.0 BOS through the contribution of funds for direct conservation management actions within KNP. These actions were developed in direct consultation with key stakeholders; the Department, KNP and BCD species experts.

Given the PCTs impacted by the project are all values addressed by agreed targeted actions within the Snowy 2.0 BOS, it is recommended the pro rata estimated ecosystem liability and administration contribution of funds totalling approximately **$4.6M** be supported.

This review also recommends the provision of direct offset outcomes for all 6-threatened species. These should be proportionate to the project impacts and incorporate a tiered approach consistent with the BOPC liability under the BAM, or for those species substantially impacted by the project, based on costed targeted management actions previously agreed for the Snowy 2.0 BOS.

The specific and targeted species management actions adopted for the Yellow-bellied Glider were developed with guidance from relevant species experts. These actions will specifically target impacts within the KNP. The proposed establishment of BSAs in the locality of the Bargo Plateau to address the projects liability outside of KNP, is also likely to further benefit the endangered population of the species. It is recommended the project BOS estimated contribution of funds for species totalling approximately **$6M** is supported.

These recommendations provides a framework tailored to directly contribute to the ongoing and future management of KNP, while providing species specific offset outcomes for the residual biodiversity impacts of the project.

By providing funding for direct on ground actions for Commonwealth listed species, the recommended offset outcomes will *'provide a measurable conservation gain for an impacted protected matter'* in accordance with the EPBC Act Environmental Offsets Policy (DSEWPaC 2012).

This total contribution of approximately **$10.6M** to KNP provides an opportunity for a significant long-lasting contribution to the conservation management of biodiversity and threatened species within KNP.

The delivery of the projects offset liability for impacts outside of KNP in accordance with NSW BOS and BAM is considered appropriate and supported. The commitment to meet the majority of the liability through a preferred delivery of local BSAs has merit and considered likely. The proponents offer to provide legal security of the equivalent BCF cost liability to the Department for a limited period prior to establishing these BSAs substantially reduces any risk of the offset liability not being met.

Yours sincerely

Alex Cockerill
Ecology National Team Executive

Encl: Attachment A Management costing

ATTACHMENT A – DETAILED BREAKDOWN OF FINAL RECOMMENDED MANAGEMENT COSTS

No.	Offset type	Management group	Management category	Management type	Management Action	Final for SGC
1	Ecosystem	Montane dry sclerophyll forests	Feral animal control	Direct	Feral animal control (shooting).	$806,907
2	Ecosystem / species		Feral predator control	Direct	Feral predator control (baiting).	$103,284
3	Ecosystem		Feral herbivore control	Direct	Feral herbivore control (poisoning/gassing).	$806,907
4	Ecosystem		Weed control	Direct	Weed control (primary).	$96,829
5	Ecosystem		Weed control	Direct	Weed control (secondary).	$72,622
6	Ecosystem		Weed control	Direct	Weed control (secondary).	$217,865
7	Ecosystem		Weed control	Direct	Weed control (general).	$1,742,919
8	Species	Eastern Pygmy-possum	Species - Eastern Pygmy-possum	Direct	Construction and distribution of nesting logs for Eastern Pygmy-possum in burnt habitats	$134,735
9	Species		Species - Eastern Pygmy-possum	Indirect - Research	Detailed survey and monitoring program	$258,167
10	Species	Booroolong Frog	Species - Booroolong Frog	Indirect - Research	Establishment of a monitoring program for the Booroolong, including baseline surveys across sites within KNP to determine occupancy of breeding habitat by males, including testing of the population for Chytrid fungus.	$946,667

11	Species		Species - Booroolong Frog	Direct	Weed control along the banks of the Yarrangobilly River and other identified habitats in KNP, particularly Blackberry, using appropriate control methods.	$1,200,000
12	Species		Species - Booroolong Frog	Direct	As above - years 10-20	$929,867
	Species	Yellow-bellied Glider	Species - Yellow-bellied Glider	Indirect - Research	Detailed survey and monitoring program post-fire.	$324,710
			Species - Yellow-bellied Glider	Direct	Strategy to improve connectivity	$897,510
			Species - Yellow-bellied Glider	Direct	Genetic study	$397,080
13	Species	Caladenia montana	Total - Caladenia montana	Direct	Payment based on credits liability for the BOPC	$52,120
14	Species	Gang-gang Cockatoo	Total- Gang Gang Cockatoo	Direct	Payment based on credits liability for the BOPC	$833,399
15	Species	Masked Owl	Total - Masked Owl	Direct	Payment based on credits liability for the BOPC	$640
					Total - Ecosystem credits	$3,847,332
					Total - Species credits	$5,974,894
					Admin costs	$763,800
					TOTAL	$10,586,027

MBB Group

MEMORANDUM

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18 August 2022

Nicole Brewer
Director Energy Assessments
Energy, Resources and Industry Assessments
Department of Planning, Industry and Environment
4 Parramatta Square, 12 Darcy Street
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Dear Nicole,

SNOWY 2.0 CONNECTION PROJECT

1. INTRODUCTION

This memo is in response to an engagement initiated by the NSW Department of Planning and Environment (DPE) on 29 July 2021 for an advisor to provide a review and expert advice of the options analysis undertaken by Transgrid in relation to the Snowy 2.0 Transmission Connection Project (the Project).

The review has been conducted solely by Nic Candotti of MBB Group Pty Ltd and is undertaken with a view to industry best practice.

The Project involves the development of a new 330 kV transmission connection between the approved Snowy 2.0 pumped hydro generation project in Kosciuszko National Park and the existing high voltage transmission network in the Bago State Forest near Nurenmerenmong.

Transgrid's preferred option, Option 4, is to construct two 330 kV double-circuit overhead transmission lines, approximately nine kilometres long, linking the Snowy 2.0 cable yard in Kosciuszko National Park to a new substation adjacent to Line 64.

2. BACKGROUND

DPE initially provided documentation submitted to them by Transgrid and its consultants (dated 6 August 21) as an information request response to a presentation made by EMM Consulting Pty Limited (EMM), Transgrid and Snowy Hydro Limited (Snowy Hydro) to DPE and the NSW National Parks and Wildlife Service (NPWS) on the results of the 'screening phase' of the options analysis of the Project where 12 options (Options) were screened against a set of defined project objectives and evaluation criteria relating to technical, environment and community and safety aspects. These Options included both the proposed Maragle substation siting and the proposed line interconnection with existing transmission line infrastructure. This memorandum is limited to an opinion on the technical, construction and design considerations of the proposed line and substation construction and excludes planning criteria used in the Options analysis and infrastructure siting considerations, number of circuits and the like (undertaken by a separate expert).

A review of the documentation then led to discussions and a presentation by Transgrid on the Options analysis. Further requests for information were issued and responded to and a number of discussions and presentations held to deepen DPE and NPWS' understanding of critical technical, construction and planning options associated with the analysis and potential alternatives. There were a range of responses received and reviewed, as emailed documents, over the course of the engagement.

The review focussed on the summary of findings related to TranGrids' Options analysis and the assumptions that were made on constructability, feasibility and cost, the benefits and costs of the Option that best met the criteria (Preferred Option), the identification of any additional mitigations, and the environmental impact improvements or design changes that could be implemented as part of the detailed design stage of the Project.

In the 12 Options proposed, early discussions focussed on determining which Options would pragmatically be best looked into further and was based on plausible elimination criteria (e.g. technically not viable) and a range of outcomes that would seek to provide the least impact for the duration of the construction whilst also considering longer term benefits. The remaining Options were further interrogated into greater detail on specifics related to constructability, supply chain, design, operations and maintenance, vegetation clearance and alternate tower configurations such as monopole construction.

3. FINDINGS

In summary, the Options interrogated were seen to have been screened and evaluated on the basis of a set of defined project objectives and evaluation criteria that relate to technical, environment and community and safety aspects. These objectives and criteria were considered to be reasonable and to be at a standard that is acceptable within the energy industry as to the type of criterion to be applied for this type of project.

The Options considered a wide range of construction and line design techniques such as undergrounding (trench), undergrounding (deep tunnel), horizontal direction drilling, overhead transmission line and hybrids of these. The base case was highlighted as Option 4 an overhead transmission line to Line 64 which was deemed to best meet the criteria.

Constructability

From a constructability perspective the Options had considered existing infrastructure usage, suitability and upgrading whilst also looking at areas such as traffic movement, spoil generation, vegetation clearance, gradient, corridor width, temporary and permanent access track formation, safety, methodology (helicopter/crane), boring, excavation, construction period (months) and construction cost.

On balance the comparative metrics were seen to be in line with standard practice to determine quantum and as an order of magnitude difference between options, within typical comparative benchmarks known in industry. Much of the discussion and issues that factor in constructability are related to the geology, terrain, and topology with various options available as standard treatments. The Project is being constructed in mountainous areas and across a variety of naturally formed waterways and vegetation green belts and hence the focus was to preserve the integrity of the natural surroundings as much as is feasible utilising the benefits of modern construction, design and in considering the available options operationally to mitigate risks that would otherwise necessitate more mechanical treatment.

Underground options were considered extensively and featured predominantly during discussions as to ways in which to manage and treat constructability and safety during construction. In looking at all of the approaches and Options available it is clear that the underground solution would look to be prohibitive from an impact on environment perspective, high cost of the final solution and technical challenges and as such it was ultimately not able to be progressed.

Further, consideration was given to alternative overhead transmission involving structures such as a monopole design in place of the typical four leg lattice steel tower structure. In reviewing the Monopole designs they were highlighted as having high complexity in design. Due to the turning moment of the pole in the ground (long spans 500 to 600m) these structures would have significant foundations and more piles required than for an equivalent tower. Towers also provided a greater flexibility to deal with slope and thereby minimise impact. The easement width would be the same with a larger disturbance during construction at the foundations due to the need for a flat area for the single large foundation. These arguments were seen as justifiable given the challenging terrain and the need for a balance of achievable cost and minimal disturbance during construction. In consideration of the above and based on the

arguments put forward for each Option, Option 4 an overhead transmission line to Line 64 was considered to afford an appropriate balance of constructability factors that put it ahead of the other Options considered.

Feasibility

The Project's feasibility is considered in relation to a combination of factors such as prudent cost, constructability, efficiency, bankability and best for project outcome that delivers the most appropriate mix of outcomes having met the defined project objectives and key evaluation criteria nominated for the Project both during construction and over the life of the asset. Across the options it was increasingly apparent that a divergence from criteria was developing as the Options of hybrid and underground were further explored. The remaining focus was therefore on the base case analysis and variants using alternate structure types (monopoles) and increased tower height (over the canopy). The monopole introduced complexity in areas such as the heavy engineering, manufacturing and design components which further reduced the practicality (extent of civil foundation construction) and use of alternate construction methods such as helicopters would be challenging. It is noted that the design assumptions for the monopole are predicated on the existing tower locations with a like for like exchange, however, even with rationalisation, it is expected that the above impacts would not be significantly mitigated to an extent that it would be preferred ahead of the base case.

Cost

The costs across the Options tabled were evaluated throughout the submitted documentation and based on all-inclusive costs (including Maragle substation), development and construction through to commissioning. In early discussions, there was great disparity (>3 times the cost for underground and hybrid) between the various Options driven by complexity and environmental impact that drove significant cost and potential uncertainty, as discussion progressed to a transmission line with variance in tower types and heights this disparity was reduced in the order of circa 10% difference from the base case. The biggest differentiator was a different type of cost, the cost in time. With the program now into assessment following a Critical State Significant Infrastructure (CSSI) application which would require a revised concept design and amended documentation to be submitted which would set the project back by 12 months. Tower heights were equally identified as adding time to the current process which is a consideration and points more to whether the delay may push critical path for the Project.

Whilst not specifically addressed within correspondence the issue of substation design and the opportunity to reduce the footprint of the substation through an indoor substation solution was not addressed due to identified limitations that were not yet tested with technology suppliers, original equipment manufacturers (OEMs). That said, the cost of indoor GIS is likely to be higher at conservatively three time the cost of the base case switchyard and delivery timing will be dependent upon design and production slots which may also impact the Projects' critical path.

Hence, in consideration of the above surrounding cost and time and based on the arguments put forward for each Option, Option 4 an overhead transmission line to Line 64 was considered to afford an appropriate balance of cost and time factors that put it ahead of the other Options considered.

4. PREFERRED OPTION

The Preferred Option, Option 4 an overhead transmission line to Line 64 (base case) presents as at the lower end in line route length and disruption being 9 km of 2 x double circuit 330kV transmission lines with 10km of access tracks, it provides for key infrastructure based outside of the Kosciusko National Park (KNP) (500/330kV substation and HumeLink connection), is technically achievable, reasonable in cost, has lower end of vegetation clearance requirements, reduced likely spoil volumes and a construction timeline that meets with the overall delivery time line and community benefits from an energy supply perspective.

5. ADDITIONAL MITIGATIONS

Whilst the Preferred Option provides a balance of considerations and was the established base case, arguments have looked to provide reasons as to why the base case is the best for project solution from a

project lens where some additional overall benefits to the community could be further evaluated and ranked through deeper analysis with other parties such as with OEMs and AEMO.

Over the Tree Canopy Design

Regarding the consideration of increased tower heights to achieve an above tree canopy alternate design, it may be conceivable to further develop the concept and consider how to mitigate the risks highlighted in fuel load below the spans linked to bushfire risk. These, however; have been flagged as an 'unacceptable operational risk' to the asset and the broader NEM due to the intolerable level of bushfire risk' highlighted due to the nature of the environmental conditions and vegetation types as compared to other regions.

Construction Methodology

The use of helicopters during construction was flagged and considered plausible. Whilst not highlighting that a reduction in construction footprint is likely nor showing reduction in spoil volumes, this is an area that would benefit from deeper discussions with contractors as to the ability for innovation with regards to micro siting of towers and elements of constructability that might yield optimised construction. It has been acknowledged that helicopters can assist in the construction of the transmission line and would have a positive benefit through the reduction in construction vehicle movements. Whilst a commitment to the use of helicopters could not be given, helicopter use was highlighted as able to be further investigated by Transgrid's construction contractor as part of detailed construction planning.

Indoor Gas Insulated Substation

Indoor gas insulated switchgear (GIS), whilst having limitations, is recognised to often have smaller footprint size compared to substations using outdoor switchgear equipment. The housing of equipment within buildings also affords the ability reduce overall noise and apply coatings that assist to integrate the building into the landscape better improving its visual amenity. It is noted that Transgrid had stated that it had not been able to identify a supplier that can provide a suitable gas insulated high voltage plant solution that meets with the site-specific grid connection requirements. This doesn't account for other alternatives that could be offered by OEMs and consequently, the basis on which technical limitations associated with the use of outdoor GIS equipment at the proposed substation led to an inability to perform a conclusive comparative assessment of impacts associated with the current proposed substation design to that using GIS equipment. It is suggested by the reviewer that discussions should be furthered with OEMs to identify the solutions that could be offered that would meet with the technical requirements and to better understand their benefits to the project.

6. CONCLUSION

The reviewer concludes that it concurs with the Options analysis findings and considers that, in relation to the balance of factors attributable to the development and delivery of these transmission assets, the base case Option (Preferred Option) presented has a greater number of factors that support it as the logical transmission connection solution. That said, there are a number of additional mitigations as detailed, that should be considered as to potential ongoing approaches during the detailed design and constructability reviews and in consultation with NPWS that could further improve the development and look to reduce conservatism within the design, thereby permitting concessions to reduce overall impact in the short and longer term.

Yours sincerely,

Nic Candotti

Director
MBB Group Pty Ltd

HATCH

DPIE
Snowy 2.0 Transmission Options Review

Engineering Report
Electrical Engineering
Technical Study Report

Report

Snowy 2.0 Transmission Options Review

22-08-2022	A	Client Approval	Nalin Pahalawatta	Sunil Abeyratne	Steven Bond	
DATE	REV.	STATUS	PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY
				Discipline Lead	Functional Manager	Not Required

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Ver: 04.03

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DISCLAIMER - IMPORTANT NOTICE TO READER

This report was prepared by Hatch Pty Ltd ("**Hatch**") for the sole and exclusive benefit of Department of Planning and Environment (the "**Client**") for the sole purpose of assisting the Client to assess the transmission options considered for the connection of Snowy 2.0 generating station to the existing high voltage transmission grid (the "**Project**"), and must not be provided to, relied upon or used by any other party. The use of this report by the Client is subject to the terms of the relevant services agreement between Hatch and Client.

This report is meant to be read as a whole, and sections should not be read or relied upon out of context. The report includes information provided by the Client and by certain other parties on behalf of the Client. Unless specifically stated otherwise, Hatch has not verified such information and does not accept any responsibility or liability in connection with such information.

This report contains the expression of the opinion of Hatch using its professional judgment and reasonable care, based upon information available at the time of preparation. The quality of the information, conclusions and estimates contained in this report is consistent with the intended level of accuracy as set out in this report, as well as the circumstances and constraints under which this report was prepared.

1. Executive Summary

NSW Department of Planning Industry and Environment (DPIE) has engaged Hatch as an independent expert to review the transmission options considered by Transgrid for the connection of Snowy 2.0 generating station to the existing high voltage transmission grid.

The Snowy 2.0 pumped hydro generation development project is predominantly located within the Kosciuszko National Park. The works associated with the project includes the development of underground tunnels to link the existing Tantangara and Talbingo Reservoirs, a new underground power station, and the connection to Transgrid's electricity transmission system.

Transgrid has considered twelve options for the development of transmission connecting the Snowy 2.0 generation to the Transgrid's existing network.

Transgrid's preferred option is to construct two 330 kV double-circuit overhead transmission lines, approximately nine kilometers long, linking the Snowy 2.0 cable yard in Kosciuszko National Park to a new substation adjacent to the existing 330 kV transmission line (i.e. Line 64) at Maragle.

The assessment has considered, the importance of a reliable transmission connection for the project, the impact of the generation system on the Australian national electricity market (NEM), and the environmental impact on the development on the Kosciuszko National Park. The connection options were also considered in the context of the need for Snowy 2.0 to be connected to the planned future high voltage developments in NSW, such as HumeLink, interconnecting the renewable generation in the state with the load centers in the eastern seaboard.

The operation of the Snowy 2.0 generation plant may have a significant impact on the NEM for the following reasons:

- Snowy 2.0 will provide a generation capacity of 2,000 MW, which could become critical in compensating for the anticipated generation deficit arising out of the retirement of the coal fired power stations
- When pumping, it has the potential to perform as a large electrical load, of capacity 2,000 MW. Under such conditions, this would be the largest single load connected to the NEM, and would likely to use the surplus solar power generation during the light load periods (approximately during the noon time)
- It is likely to play a critical role in managing the intermittency of renewable generation in the NEM, and hence, enhancing the availability of dispatchable power for the above purpose

Hatch's review indicated that Transgrid's preferred transmission option has the potential to provide a robust connection of the generating plant to the existing transmission network.

Hatch concedes that when considered with the other factors associated with the developments, such as additional costs, visual amenity, environmental damage (in terms of vegetation clearance and spoil quantity), the preferred option may provide the overall best transmission solution.

There are a number of ways Transgrid could engineer the preferred transmission option to reduce its environmental impact / footprint. These involve:

- Reduction in tower heights where possible.
- Use of GIS substations for reducing the size of the footprint of the 330 kV connection.

The reviewer acknowledges that relevant incremental costs and benefits (both environmental and financial) need to be evaluated by Transgrid prior to determining if either of the above options are viable and could be implemented.

2. Introduction

DPIE has engaged Hatch as an independent expert to review the transmission options considered by Transgrid for the connection of Snowy 2.0 generating station to the existing high voltage transmission grid.

Information relevant to the transmission connections considered by Transgrid has been provided via presentations in several meetings and options description reports. The salient reports used for review include:

1. Environmental Impact Statement, Snowy 2.0 Transmission Connection Project, Environmental Impact Assessment, February 2021, Volume 2
2. Submissions Report, Snowy 2.0 Transmission Connection Project, Transgrid, March 2022
3. Transmission Connection Project for Snowy 2.0, Options Report, November 2021

Transgrid is also proposing Humelink project for transferring the power generated from Snowy 2.0 (and other generation sources in Wagga – Tumut area) to Sydney. In this evaluation, the need for robustly connecting the Snowy 2.0 generation with this high voltage transmission network is also considered.

The information on HumeLink was obtained from the following documents:

1. Reinforcing the New South Wales Southern Shared Network to increase the transfer capacity to the state's demand centres, Project Specification Consultation Report, 25 June 2019
2. Reinforcing the NSW Southern Shared Network to increase transfer capacity to demand centres (HumeLink), Project Assessment Draft Report, 10 January 2020

3. Proposed Options

Transgrid has considered twelve transmission options for connecting Snowy 2.0 generation to the existing Transgrid's High voltage transmission network. The options considered are summarized in the following table:

Option	Description
1	Overhead line connection to Line 2, connection point within Kosciuszko National Park (KNP)
2	Overhead line connection to Line 1, connection point within KNP
3	Overhead line connection to Upper Tumut Switching Station (UTSS)
4	Overhead line connection to Line 64, connection point outside KNP
5	Underground cable connection to Line 64 using a cable tunnel, connection point outside KNP
6	Underground cable connection to Line 64 using a cable trenches, connection point outside KNP
7	Underground cable connection to Line 64 using directional drilling, connection point outside KNP
8	Underground cable connection to Line 64 using a combination of cable tunnel & cable trenches, connection point outside KNP
9	Underground & submarine cable connection to Lower Tumut Switching Station (LTSS)
10	Underground cable connection using cable trenches to LTSS
11	Overhead line connection to LTSS
12	Underground cable connection using cable tunnel to LTSS

At the request of DPIE, Transgrid has also investigated the following sub-option:

Option	Description
3.1	Overhead line connection to UTSS – progressively upgrading the existing line to 2xdouble circuit 330 kV lines, to reduce the need for expansion of the easement.

Options 4 - 8 consist of transferring the generation out of the Snowy 2.0 by connecting to the 330kV/500 kV switching substation located in the Bago State Forest near Maragle.

Options 1 -3 as well as options 9 -12 contemplated the connection to newly created substations within KPS or augmented existing 330kV switching stations at UTSS located within the KNP and at LTSS located north of KNP.

Maragle switching station is one of the key connection points, planned by Transgrid, to connect the Snowy 2.0 with the rest of the high voltage transmission network in NSW. The planned transmission connection, HumeLink, consists of 500 kV (initially may be operated at 330 kV) transmission lines connecting, Maragle, Bannaaby, and Wagga Wagga. LTSS and UTSS substations will also be upgraded as a part of the HumeLink project.

4. Option Evaluation

Transgrid has used a multi criteria evaluation for comparing the proposed transmission options. The criteria considered included:

- Area of vegetation clearing
- Spoil quantity
- Cost
- Time required for construction
- Network resilience

Hatch's review has also recognized:

- the need for and importance of robustly connecting the Snowy 2.0 with the rest of the NSW transmission system
- the important role Snowy 2.0 will play in successfully transitioning NEM to renewable power generation

In assessing the options, the reviewer conceded that the following options would not merit significant further investigation because of the potential negative impact they have on the KNP. This is so because such options entail the creation of a connection switching station within KNP and also the need for making a connection with the HumeLink[1] within KNP.

- Option 1: Overhead line connection to Line 2, connection point within KNP
- Option 2: Overhead line connection to Line 1, connection point within KNP

[1] HumeLink is referred to in its context as a transmission augmentation needed for robustly connecting Snowy 2.0 and other renewable generation with the rest of the NSW transmission system.

The reviewer has also conceded that the following options may require construction methods unsuitable for the terrain, or pose significant logistic issues requiring long construction durations and therefore may not be viable:

- Option 7: Underground cable connection to Line 64 using directional drilling, connection point outside KNP
- Option 9: Underground & submarine cable connection to Lower Tumut Switching Station (LTSS)

The following options were considered as inferior to the option preferred by Transgrid (i.e. Option 4: Connection of Snowy 2.0 generation via overhead transmission lines to line 64 and HumeLink at Maragle). Such a view is formed because it appears that one or several of the factors outlined above in the multi-criteria for the assessment of the options have not been adequately satisfied.

- Option 5: Underground cable connection to Line 64 using a cable tunnel, connection at Maragle
- Option 6: Underground cable connection to Line 64 using a cable trenches, connection at Maragle
- Option 8: Underground cable connection to Line 64 using a combination of cable tunnel & cable trenches, connection at Maragle
- Option 10: Underground cable connection using cable trenches to LTSS
- Option 12: Underground cable connection using cable tunnel to LTSS

A significant attention was focused on the following options where the existing line corridors could be expanded and used for connecting Snowy 2.0 to either LTSS or UTSS.

- Option 3: Overhead line connection to UTSS
- Option 11: Overhead line connection to LTSS

Transgrid has highlighted the negative impact on network resilience, when Snowy 2.0 is also connected to the already significantly congested (in terms of the number of the transmission lines connecting to the switching station) switching stations LTSS and UTSS. TransGrid therefore has considered that these options are inferior to the preferred option considered, i.e. Options 4.

Connection to LTSS or UTSS, will also require expanding these switching stations to enable the connection with HumeLink, and in the case of UTSS, significantly increasing the project's footprint within KNP.

The industry practice has been to consider the need and impacts on the network resilience, together with the other alternative options available. Such practice is illustrated by the following. Although there are a large number of transmission lines connecting to Sydney South or Sydney West switching stations, and their critical importance for ensuring a secure electricity supply to Sydney, such connection configurations have been considered acceptable because of other constraints associated with developing alternative options. Such

other constraints include the availability of the land and cost of development. Figure 4.1 shows a comparison of the transmission connection configuration at Lower Tumut, Upper Tumut, Sydney South and Sydney West substations.

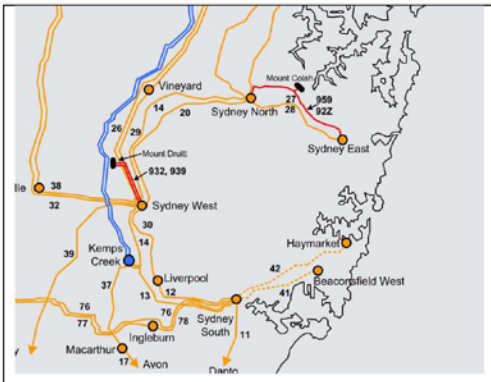

Figure 4.1(a): Network connections at Sydney West and Sydney South

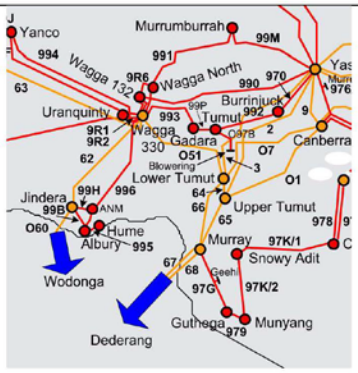

Figure 4.1(b): Network connections at UTSS and LTSS

Figure 4.1 Consideration of impact of transmission connections on network resilience

The impacts of the options considered on the network resilience should have been assessed and compared using a detailed network analysis study. However, the Transgrid's submission was only limited to a qualitative assessment of such impacts, which made the Hatch's review more difficult. Hatch does not consider the complexity of the connection configuration by itself warrants discarding the transmission options to connect Snowy 2.0 to Lower Tumut or Upper Tumut.

When the negative impacts of the above two options 3 & 11 are considered together, such as the needs for widening the existing corridors, expansions to the existing switching stations, and the impacts on the network resilience, the reviewer conceded that the net benefits provided by implementation of these options are likely to be marginal (if any).

As a part of Hatch's review of the transmission options put forward by Transgrid, further optimization of the transmission option 4, a 2 x double circuit transmission lines for connecting Snowy 2.0 to Maragle has also been considered. While 1xdouble circuit transmission line would have sufficient transmission capacity to transfer the power generation from Snowy 2.0, additional operational measures need to be employed in managing the power system security under some operating conditions (e.g. during bushfires, transmission circuit outages etc). The reviewer concedes that a reduced connection together with imposed additional operational constraints on the generating plant may compromise the usefulness of the generating project.

The above considerations have pointed to option 4 as a viable and preferred option out of the 12 options proposed by Transgrid.

There are a number of ways Transgrid could engineer the preferred transmission option to reduce its environmental impact / footprint. These involve:

- Reduction in tower heights where possible.
- Use of GIS substations for reducing the size of the footprint of the 330 kV connection.

The reviewer acknowledges that relevant incremental costs and benefits (both environmental and financial) need to be evaluated by Transgrid prior to determining if either of the above options are viable and could be implemented.

5. Conclusion

The 12 transmission options proposed by Transgrid as potential options for the connection of the Snowy 2.0 generating plant to the NSW high voltage transmission network have been reviewed by Hatch.

Hatch's review has been informed by a number of meetings, presentations and technical memos provided by Transgrid, in response to numerous clarifications sought by DPIE. A multi-criteria assessment has been used by Transgrid for the options comparison and selecting a preferred option.

The reviewer concurred that the options 4, connection of Snowy 2.0 generating station to the NSW high voltage transmission network via two, 330 kV double circuit transmission lines with the switching station located adjacent to the existing transmission line 64, near Maragle, would be the best option out of the 12 options considered.

Appendix J – Consideration of Commonwealth Matters

In accordance with the Bilateral Agreement between the Commonwealth and NSW Government. the Department provides the following additional information required by the Commonwealth Minister, in deciding whether to approve a proposed action (i.e. the project) under the EPBC Act.

The Department's assessment has been prepared based on the assessment contained in the Snowy 2.0 Transmission Connection Environmental Impact Statement (EIS), Submissions Report, Amendment Report, revised Biodiversity Development Assessment Report (BDAR) and additional information provided during the assessment process, public submissions, and advice provided by the Department's Biodiversity Conservation Directorate (BCS), other NSW government agencies and the DCCEEW.

This Appendix is supplementary to, and should be read in conjunction with, the assessment included in **section 6.3** of this assessment report which includes consideration of impacts to listed threatened species and communities, and mitigation and offsetting measures for threatened species and communities, including Matters of National Environmental Significance (MNES).

Identifying MNES

The Commonwealth Referral Decision (EPBC 2018/8363) (Referral Decision) was based on likely significant impacts on 22 threatened species and communities, five migratory species and the heritage values of a two National Heritage places.

The revised BDAR for the project identified and addressed all the listed threatened species and communities, migratory species and the heritage values included in the Referral Decision.

Assessments of significance were undertaken for the threatened species that were identified as having a moderate or higher potential to occur on the site, including four threatened flora species, seven threatened fauna species and four migratory species.

Transgrid assessed the significance of the impacts on these listed species and communities using the methodology outlined in the *Matters of National Environmental Significance Significant Impact Guidelines 1.1 (2013)* as documented in Section 8 and Appendix G of the revised Biodiversity Development Assessment Report.

Impacts on EPBC Listed Threatened Species and Communities

The project was determined by the DCCEEW to be a controlled action for the controlling provision of listed threatened species and communities (sections 18 and 18A of the EPBC Act). DCCEEW considered that the project was likely to have a significant impact on the following 11 listed threatened species and communities:

- Critically endangered – Natural Temperate Grassland of the South Eastern Highlands, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Bago Leek-orchid (*Prasophyllum bagoense*), Brandy Mary's Leek-orchid (*Prasophyllum innubum*), Kelton's Leek-orchid (*Prasophyllum keltonil*)
- Endangered – Alpine Sphagnum Bogs and Associated Fens, Smoky Mouse (*Pseudomys fumeus*), Spotted-tailed Quoll - SE mainland population (*Dasyurus maculatus* - SE mainland population)
- Vulnerable – Alpine Tree Frog (*Litoria verreauxii alpina*), Austral Toadflax (*Thesium australe*), Broad-toothed Rat (*Mastacomys fuscus mordicus*)

DCCEEW also requested further assessment for 11 further threatened species, namely:

- Critically endangered – Blue-tongued Greenhood (*Pterostylis oreophila*)
- Endangered – Alpine She-oak Skink (*Cyclodomorphus praealtus*), Australasian Bittern (*Botaurus poiciloptilus*), Australian Painted Snipe (*Rostratula australis*), Booroolong Frog (*Litoria booroolongensis*), Macquarie Perch (*Macquaria australasica*)
- Vulnerable – East Lynne Midge-orchid (*Genoplesium vernale*), Greater Glider (*Petauroides volans*), Koala - combined populations of Queensland, New South Wales and the Australian Capital Territory (Phascolarctos cinereus- combined populations of Qld, NSW and the ACT), Painted Honeyeater (*Grantiella picta*), Wingless Raspwort (*Haloragis exalata subsp. exalata*)

Transgrid identified an additional seven EPBC Act threatened species based on database searches. However, these species were considered unlikely to occur and were excluded from further assessment and surveys.

Section 6.3 describes the biodiversity assessment undertaken for the project and the resulting BDAR. The results of the BDARs completed for the Snowy 2.0 Exploratory and Main Works were used to inform the preparation of, and to supplement the work undertaken for, the project's BDAR. The final area of disturbance for the project which require assessment and approval is approximately 125 ha, comprising of 118.35 ha of native vegetation (115.28 ha of woodland, 1.13 ha of DNG and 1.95 ha of derived shrubland).

BCS considers that the Snowy 2.0 Exploratory and Main Works BDAR results were used appropriately to provide local context for threatened species habitat preferences and to augment vegetation survey and mapping.

The Department has considered the approved conservation advice and national recovery plan under the EPBC Act for the Booroolong Frog in assessing the impacts of the project, and notes that the most significant threat to the viability of Booroolong Frog populations is through smothering and entraining of rock crevices by sediments, and subsequent vegetation impacts, which reduces the quality and extent of breeding habitat for this species. Other threats and causes for decline in Booroolong Frog population include disease (*chytridiomycosis*) caused by infection with the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*), habitat degradation, altered stream flows, and stream drying associated with recent severe droughts.

The national recovery plan includes a number of objectives, recommendations and actions relevant to the project, including reducing the impact of known or perceived threats contributing to the ongoing decline of the species, identify other potentially threatening processes and determine species distribution and population trends across the species range.

The project has the potential to indirectly impact the Booroolong Frog during construction from increased risk of erosion and sedimentation from cleared sections of the project area flowing into Yarrangobilly Creek and its upstream tributaries.

Targeted surveys confirmed a population of one EPBC listed threatened fauna species, the Booroolong Frog, within the Yarrangobilly River, that has the potential to be directly and indirectly impacted by the proposed action. Direct impacts on Booroolong Frog habitat have been largely avoided through exclusion zones and the residual impacts to 1.7 ha of habitat has been calculated (see **section 6.3** of this report). Indirect impacts to the species would be mitigated through adopting enhanced sediment and erosion control measures, water quality monitoring, stringent rehabilitation requirements as well as an adaptive management strategy. The measures above are consistent with the recommended management practices for the species outlined in the National Recovery Plan.

Two EPBC listed threatened fauna species (Spotted-tailed Quoll and White-throated Needletail) were assessed to use suitable habitat on site and potential impacts on these species have been accounted for through the ecosystem species credits (see **Table 6** and **section 6.3** of this report).

No EPBC Act listed threatened flora species or ecological communities were identified during the field survey in the project area or immediate surrounds.

For the reasons set out in **section 6.3** of this report and this appendix, the Department recommends that the impacts of the project on threatened species would be acceptable, subject to the implementation of the avoidance and mitigation measures described in the EIS, and the requirements of the recommended conditions.

Impacts on EPBC Listed Migratory Species

DCCEEW considered that the project was likely to have a high to moderate likelihood of impact on the following listed migratory species:

- Latham's Snipe (Gallinago hardwickil);
- White-throated Needletail (*Hirundapus caudacutus*);
- Satin Flycatcher (*Myiagra cyanoleuca*);
- Rufous Fantail (*Rhipidura rufifrons*); and
- Fork-tailed Swift (*Apus pacificus*).

A further seven listed migratory species were identified by the Transgrid via the Protected Matters Search Tool for further investigations.

While some migratory bird species are likely to use the study area and locality, the study area is not considered as 'important habitat'. The project will not substantially modify, destroy, or isolate an area of important habitat for the migratory species, and it will not seriously disrupt the lifecycle of an ecologically significant proportion of a population of migratory birds.

The project's impacts on threatened species and communities listed under the EPBC Act are summarised in **section 6.3** of this report. BCS has undertaken a detailed review of the impacts of the proposed action on threatened communities and species listed under the EPBC Act, in accordance with templates provided by DCCEEW.

Table J1 provides a detailed review of whether the assessment documentation (i.e. the EIS, Submissions Report, Amendment Report and BDAR) includes all relevant required information. It also includes:

- summaries of proposed impact avoidance, minimisation, mitigation and management measures;
- confirmation of the threatened species and communities listed under the EPBC Act that occur in the Project area and its vicinity, or in the vicinity (i.e. on land to which impacts may extend);
- for each listed threatened species and/or community, summaries of the:
    - nature and consequences of impacts (i.e. direct and indirect);
    - duration of impact;
    - quantum of impact;
    - consequences of impacts on the species, the population and / or extent of the community at local, state and national scales, and
    - confirmation of the level of predicted impact (likely high risk or low risk of impact);

- confirmation of impacts requiring offsetting, the number and class of biodiversity credits needed in accordance with the BAM and, if known, the proposed offsetting approach;
- consideration of any relevant Australian Government guidelines and policy statements, and
- recommendations regarding conditions of development consent.

Table J2 contains a summary table of all impacts and offsets for all impacts on threatened communities and species which are listed as MNES.

Impacts on EPBC National Heritage Places

The project is located within the curtilage of two heritage places on the National Heritage List, being the Australian Alps National Parks and Reserves, and the Snowy Mountains Scheme.

The project would not impact any of the physical components of the Snowy Mountains Scheme, but the project area includes about 81 ha of KNP, which is one of 11 parks and reserves that comprise the larger Australian Alps National Parks and Reserves heritage place.

Transgrid has assessed the project against the National Heritage Significance Criteria for the Australian Alps National Parks and Reserves in Appendix M of the EIS, which is listed for:

- Criterion A – Events, Processes (natural environmental features including glacial/periglacial features, fossils, karst and biological heritage along with historic cultural events);
- Criterion B – Rarity (unique natural environment);
- Criterion D – Principal characteristics of a class (pastoral history and post-contact human occupation);
- Criterion E – Aesthetic characteristics (natural features and human artistic output);
- Criterion G – Social value; and
- Criterion H – Significant people.

Transgrid has consulted with DCCEEW throughout the assessment of the project, and DCCEEW has been generally supportive of the level of assessment and described impacts on both National Heritage Places.

Although the 81 ha disturbance area only represents 0.0049% of the Australian Alps National parks and Reserves, Transgrid concedes the project would impact the biodiversity values found within the National Park, and would be a visible feature in the landscape.

To ensure the project does not have an unacceptable impact on MNES, measures to reduce impacts to biodiversity values (Criterion B) of the National park are considered in **section 6.3** of this report, while the density of existing woodland vegetation would limit views of the project from public viewpoints (Criterion E,G) (see **section 6.4**). The project has also avoided the key natural heritage features present in the National Park (Criterion A) and would carefully manage impacts to cultural heritage features (Criterion D) located within the disturbance area.

For the reasons set out in **Section 6.5** and above, the Department recommends that the impacts of the project on the Australian Alps National Parks and Reserves, and the Snowy Mountains Scheme would be acceptable, subject to the implementation of the requirements in the recommended conditions relating to native vegetation clearance limits, funding for biodiversity improvement works, rehabilitation objectives, funding to undertake park value improvement programs and the management of heritage values.

Table J1 | BCS Advice on EPBC Act listed threatened species and communities under the EPBC Act

TABLE 1: BCD Advice to DPE Planning on EPBC Act listed threatened species and communities

Requirement	Information	Reference (BAM / BLA[1])
Background & Description of Action	Does the EIS/BDAR[2]: ☐ clearly show how operational and construction footprints, including clearing boundaries, structures to be built and elements of the action are situated with regard to MNES ☒ depict stages and timing of the action that may impact on MNES ☒ provide a map(s) of the subject land boundary showing the final proposal/disturbance footprint with respect to location of MNES, including GIS shape files Include references to where this detail is provided.	BAM Chapters 3, 4, 5 and 8 BDAR s2.3, s2.3.3 s2.4 Fig 2-3 Fig 4-1
	Provide advice on the adequacy of the background and action description with respect to MNES and identify any recommended additional information requirements: The project was assessed by DPE under the Biodiversity Assessment Method (BAM), including the credit calculator (the Calculator) to produce a BDAR. BCD's review of the project EIS and the BDAR concluded that the assessment did not meet requirements of the BAM. Most issues raised in our review were adequately addressed at the Response to Submissions phase. Some issues including operational impacts will be addressed with post approval monitoring to be detailed in the environmental sub-plans for the project, including the Soil and Water Management Plan and Biodiversity Management Plan (BMP). The project includes construction and operation of a substation (24 ha including asset protection zones) and transmission line of approximately 9 km in length, resulting in direct impacts to 118.27 ha of native vegetation from 7 plant community types (PCTs). The BDAR maps the construction footprint in relation to MNES in Figure 4-1. A stand-alone map of the operational footprint has not been provided, however s2.4 identifies that operation of the development has the same footprint as construction shown in Figure 2-3. Project staging is provided in s2.3.3. Construction will occur between 5 am and 7 pm every day (including traffic movements) over 2.5 years. The likely effect of construction generally to biodiversity is indicated in s10.1.1 for direct impacts and Table 10-7 for indirect impacts. Sections 10.2.1-3, and 10.2.7 mention the effect of construction on MNES species (or habitat) and present general mitigation principles. The general effect of operation to MNES is presented in s 10.2.4–6 with links to mitigation measures in s11. BCD confirms that GIS shapefiles required for the BAM assessment were provided. These can be supplied to DCCEEW on request.	

[1] Bilateral agreement (BLA) made under section 45 of the EPBC Act, including Amending Agreement No. 1 (2020)
[2] Or revisions of the BDAR and associated documentation made as a result of previous reviews or project changes post-exhibition.

Requirement	Information	Reference (BAM / BLA[1])
	The location of sediment control structures that will be needed to manage stormwater and runoff during construction have not been identified or mapped. These structures will require total clearing, which may be within habitat for MNES species. Based on the lack of detail about these structures, BCD is concerned that the impacts will extend outside the total clearing zone or will require additional full vegetation clearing in the partial impact zones.	
Landscape Context of the MNES	**Provide advice on the adequacy of the landscape context information and identify any additional information requirements:** The project is located within Bago State Forest (Bago SF) and Kosciuszko National Park (KNP), in a largely natural landscape. It traverses two bioregions – Australian Alps, Snowy Mountains subregion, and South Eastern Highlands, Bondo subregion – which approximately match the boundaries of Bago SF and KNP respectively. The landscape is forested and mountainous in the west, crossing the Tumut River (Talbingo Reservoir), then along Sheepstation Ridge to the lower hills and valleys into Yarrangobilly River. The implications of the 2019/2020 bushfire season on native vegetation and the assessment are explored in Section 4.9. It provides a clear picture of the potential movement of water downhill from the project site including the location of streams and drainage through the landscape into Yarrangobilly River (habitat for Booroolong Frog) and Talbingo reservoir. Section 4 adequately describes the location of the project area in the context of landscape, habitat connectivity, catchment, and geological features. BCD confirms that details on landscape context have been undertaken in accordance with the BAM for linear developments, and the landscape assessment meets the requirements of Stage 1 (s3 and 4) of the BAM. No additional information is required.	BAM Section 3.1 BLA clause 7.4 BDAR s4.1–4.9
EPBC Act Listed Threatened Species & Communities	Verify that the EIS/BDAR includes relevant information on the identification of all EPBC Act listed threatened species and communities on the site or in the vicinity[3] via: ☒ field based survey effort ☒ published peer reviewed literature ☒ local data ☒ supporting databases (such as the NSW BioNet Vegetation Classification, NSW BioNet Threatened Biodiversity Data Collection, NSW BioNet Atlas, Commonwealth Species Profile and Threats Database search results)	BAM Chapters 4 and 5 BDAR s5.1 s6.1 s6.5 Figure 6-6 Appendix A

[3] On land to which impacts may extend

Requirement	Information	Reference (BAM / BLA[1])
	☒ Verify that the EIS/BDAR includes appropriate mapping of all EPBC Act listed threatened species and communities in accordance with the relevant Commonwealth Listing Advice. The EIS/BDAR should include important populations and critical habitat as defined in Approved Listing Advice, Approved Conservation Advice and Recovery Action Plans.	
	Provide advice on the adequacy of the identification methods and mapping information / any additional information requirements: The habitat assessment and targeted threatened species survey methods described BDAR s6.5 were undertaken in accordance with BAM. Development of the survey strategies included consultation with threatened species officers in DPE (s1.5 and 5.1). Habitat assessments for ecosystem species are in s6.1–6.3, Table 6-2 and Appendix A. Field survey methods are in the following BDAR sections: • Threatened flora – s6.5.1 • Threatened fauna – s6.5.2 The survey results for the Snowy 2.0 Exploratory and Main Works biodiversity assessments were used appropriately to provide local context for threatened species habitat preferences and to augment vegetation survey and mapping datasets (s5.1.1). Targeted field survey for threatened frogs and their habitat were not completed according to the Commonwealth or NSW guidelines. However, the more extensive surveys conducted for Snowy 2.0 Exploratory and Main Works (EMM 2017 & 2020) includes the Booroolong and Alpine Tree frog habitat within the project area and surrounds. In consultation with the species expert, those results have been incorporated into this BDAR (s6.7.2.10). No targeted fish surveys were undertaken. The BDAR (s7.2) relies on information from the Snowy 2.0 Exploratory and Main Works technical assessments for likely occurrence. The BDAR includes appropriate mapping of EPBC Act listed threatened species that are species credit species within the project area (Booroolong Frog, figure 6-6) and reproduces the Alpine Sphagnum Bogs and Associated Fens EEC mapping (EPA 2015)[4] in the vicinity (figure 5-2). Apart from Booroolong Frog records provided by EMM Consulting, existing database records for threatened species in the vicinity of the project area have not been mapped in the EIS/BDAR. For example, while it was not recorded for the project, there are 5 records for Greater Glider within 10 km of the substation. In our response to the EIS, BCD requested that existing records be mapped to assist in contextualising the project area and to visually assess connectivity.	BDAR s1.5 s5.1.1 s6.5
	In the opinion of BCD, all EPBC Act listed threatened species and communities that occur on the subject land, or in the vicinity, have been identified in the BDAR including those that are ecosystem credit species.	BDAR s6.3 Table 6-2 Table 6-3

Requirement	Information	Reference (BAM / BLA[1])
	No EPBC Act listed threatened flora or ecological communities were identified during the field survey, however s5.8.2 identifies the potential risk to Alpine Sphagnum Bogs and Associated Fens EEC mapped to the north and downhill of the project site. Threatened communities • Alpine Sphagnum Bogs and Associated Fens E – Mapping of vegetation equivalent to the Alpine Sphagnum Bogs and Associated Fens EEC was prepared by EPA (2015)[4] for State forest within the NSW alpine area. The metadata defines the boundary of the mapping as the State forest boundary. Figure 5-2(1) shows the extent of the EEC in Bago State Forest and its location with respect to the project site is described in s5.8.2. BCD assume that within the project location, the mapping covers Bago SF but does not continue into adjacent national park. The BDAR mentions that an area of the TEC 'on Yorkers Creek around 500 m downstream of the second order stream that flows from the substation site' may be subject to unmitigated stormwater and sediment movement. It is unclear if this location was surveyed and the EEC found not to be present, or if it was not surveyed. – From the description of drainage in and around the site in chapter 4, it is possible that this vegetation, if present, could be impacted by unmitigated stormwater and sediment movement during construction. The BDAR has addressed the following MNES that were recorded in the project site or have potential to occur on the project site due to presence of habitat in sections 8.3 to 8.6, Appendix A and Appendix G. Table 8-1 assesses the presence of habitat and importance for MNES migratory species. The list includes those species listed in the referral documentation (Referral Decision Brief – Snowy 2.0 Transmission Connection Project, NSW (EPBC 2018/8363) as follows. Birds • White-throated Needletail (*Hirundapus caudacutus*) V Mammals • Greater Glider (*Petauroides volans*) V • Spotted-tailed Quoll (*Dasyurus maculatus* SE mainland population) E Amphibians • Booroolong Frog (*Litoria booroolongensis*) E Fish • Macquarie Perch (*Macquaria australasica*) E	s8.3–6 Table 8-1 Appendix A Appendix G s5.8.2 BDAR s8.3–8.6 Appendix A Appendix G Table 6-2, 8.5, Table 8-1 s6.7.2.18 s6.7.2.14 s6.7.2.9

[4] EPA (2015) Assessment of Montane Peatlands and Swamps on NSW Crown Forest Estate. Survey, Classification and mapping completed for the NSW Environment Protection Authority. Url: https://datasets.seed.nsw.gov.au/dataset/dea7862a-c2de-40a4-83d0-4a61963caa50/resource/a9f35d8e-ef3d-47b7-91e8-3161eab0702c/download/nepa-forestrysrrtposkoala-and-tec-releasetecreportsfinal-reports-publishingfinalsassessment-mont.pdf

Requirement	Information	Reference (BAM / BLA[1])
	Migratory species • Latham's Snipe (*Gallinago hardwickii*) M • Satin Flycatcher (*Myiagra cyanoleuca*) M • Rufous Fantail (*Rhipidura rufifrons*) M • Fork-tailed Swift (*Apus pacificus*) M	s7.1.3–8, s7.2, s8.6 Table 8-1
	The following species and communities identified in the referral documentation have been excluded from further assessment because they do not occur on or near the site. The 8 species and 2 ecological communities below were excluded from the assessment in accordance with BAM s5.3 based on results of targeted survey undertaken in consultation with DPE and NPWS species experts. The vegetation survey plots and mapping were sufficient to demonstrate that threatened ecological communities were not present within the project site. • Natural Temperate Grassland of the South Eastern Highlands CE • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CE Flora Targeted threatened flora survey adequately sampled the project area over three spring seasons, including before and after the 2019-2020 bushfire season (s6.5.1). • Austral Toadflax (*Thesium australe*) V • Blue-tongued Greenhood (*Pterostylis oreophila*) CE Birds The targeted surveys for birds described in sections 6.5.2 accord with requirements of BAM s5.3. Habitat importance is assessed in Table 8-1. • Australian Painted Snipe (*Rostratula australis*) E • Painted Honeyeater (*Grantiella picta*) V Mammals The targeted surveys for mammals described in sections 6.5.2.5–7 accord with requirements of BAM s5.3. • Broad-toothed Rat (*Mastacomys fuscus mordicus*) V • Koala - combined populations of Queensland, New South Wales and the Australian Capital Territory (*Phascolarctos cinereus* - combined populations of Qld, NSW and the ACT) V • Smoky Mouse (*Pseudomys fumeus*) E	s8.3 s5.8.5 s8.4 s6.7.1.5 s6.4.3.4 s6.5.2, Fig 6-4, s6.7.2.16 s6.7.2.17 s6.7.2.18 Table A-2 s8.5

Requirement	Information	Reference (BAM / BLA[1])
	Amphibians • Alpine Tree Frog *(Litoria verreauxii alpina)* V – Survey effort for Booroolong Frog and Alpine Tree Frog described in s6.5.2.9 do not meet the NSW or Commonwealth survey requirements (further discussed in s6.7.2.10). The project area overlaps with the Exploratory/Main Works project area. That area and surrounds was adequately surveyed by EMM (2017, 2020) and the results incorporated into this BDAR (s6.7.2.10).	s6.5.2.9 s6.7.2.10
	Two MNES species are missing from the assessment: • Wingless Raspwort (*Haloragis exalata* subsp. *exalata*) V – This species was not predicted by the TBDC (or BAM-C) to be associated with any of the PCTs occurring in the project area (PCTs 285, 296, 300, 302, 729, 999 and 1196). It was not predicted, identified or assessed during the Snowy 2.0 Main Works[5] or Exploratory Works[6] biodiversity assessments. • Australasian Bittern (*Botaurus poicilptilus*) E – According to the TBDC, Australasian Bittern is not predicted to occur in the Bondo subregion of the South Eastern Highlands bioregion, or the Australian Alps bioregion. It is associated with montane bogs and fens within other SEH subregions.	
	Advise whether there is appropriate justification and supporting evidence for the addition and/or exclusion of any EPBC Act listed threatened species and/or communities from the list (if applicable): Appendix A of the revised BDAR provides a likelihood of occurrence assessment for listed TECs, threatened flora and fauna, and migratory species based on desktop assessment, consultation with threatened species officers in DPE, and onsite habitat assessments. Not all MNES listed in the referral or Appendix A are addressed in Section 8 (MNES) or Appendix G (MNES tests of significance). Based on this assessment, three threatened species were added to the list EPBC listed species requiring further survey and/or assessment in the referral decision. BCD consider these additions to be appropriate. • Kiandra Leek Orchid (*Prasophyllum retroflexum*) V was considered in Appendix A because it had been addressed by the Snowy 2.0 Main Works EIS. This species was then excluded due to lack of habitat in the project area (Table A-1).	BDAR Table 6-4 s6.4.2 s6.7.1 s8 Table A-1

[5] EMM (2020). *Biodiversity Development Assessment Report – Revised*. Appendix G of the Snowy 2.0 Main Works Response to Submissions, February 2020.

[6] EMM (2017). *Biodiversity development assessment report – Exploratory Works for Snowy 2.0*. Prepared for Snowy Hydro Ltd by EMM Consulting, July 2017.

Requirement	Information	Reference (BAM / BLA[1])
	• Cotoneaster Pomaderris (*Pomaderris cotoneaster*) E was included as candidate species for assessment by the BAM-C. The species is data deficient and has a disjunct distribution around KNP. It was recorded from PCT 300 during pre-clearing surveys for Snowy 2.0 Main Works. (s6.7.1.4) • White-bellied Sea eagle (*Haliaeetus leucogaster*) M (breeding habitat) was included as a candidate by BAM-C and subsequently excluded following targeted survey. Five species in the referral list were excluded from further assessment due to the absence of habitat within the project site • Bago Leek-orchid (*Prasophyllum bagoense*) CE (s6.4.2.1) • Brandy Mary's Leek-orchid (*Prasophyllum innubum*) CE (Table A-1) • East Lynne Midge-orchid (*Genoplesium vernale*) V (Table A-1) • Kelton's Leek-orchid (*Prasophyllum keltonii*) CE (s6.4.2.1) • Alpine She-oak Skink (*Cyclodomorphus praealtus*) E (s6.4.2.4) The following species were added to the list because they were identified by the BAM calculator as candidate species. They were then excluded based on the absence of habitat constraints specified by BAM-C in accordance with BAM s5.2.3. • Guthega Skink (*Liopholis guthega*) E – included due to prediction by the BAM calculator to occur in the Australian Alps bioregion in rocky areas and granite substrates. It was subsequently excluded (s6.4.2.5) due to habitat not being present in the project site. • Spotted Tree Frog (Litoria spenceri) CE excluded due to lack of habitat (Table 6-4, s6.4.2) • Southern Corroboree Frog (*Pseudophryne corroboree*) CE excluded due to lack of habitat (Table 6-4, s6.4.2) • Northern Corroboree Frog (*Pseudophryne pengilleyi*) CE excluded due to lack of habitat (Table 6-4, s6.4.2)	
Avoidance, Minimisation, Mitigation & Management	Verify that the EIS/BDAR demonstrates all feasible alternatives and efforts to avoid and minimise impacts on EPBC Act listed threatened species and communities (including direct, indirect and prescribed impacts) including an analysis of alternative: ☒ designs and engineering solutions ☒ modes or technologies ☒ routes and locations of facilities ☒ sites within the subject site ☒ Verify that the EIS/BDAR identifies any other site constraints in determining the location and design of the proposal (such as bushfire protection requirements, flood planning levels, servicing constraints, etc).	BAM Chapters 6, 7 and 8 BLA clause 7.1 BDAR s9.1.1

Requirement	Information	Reference (BAM / BLA[1])
	Verify that the EIS/BDAR provides feasible measures to mitigate and/or manage impacts on EPBC Act listed threatened species and communities (including direct, indirect and prescribed impacts) including: ☒ techniques, timing, frequency and responsibility ☒ identify measures for which there is risk of failure ☐ evaluate the risk and consequence of any residual impacts ☐ any adaptive management strategy proposed to monitor and respond to impacts.	
	Provide advice on whether all feasible impact avoidance, minimisation, mitigation and management measures have been considered and are adequately justified: While the BDAR provides the framework for measures to mitigate and/or manage impacts on EPBC Act listed species, including specific mitigation actions in Table 11-1, the details of those measures are to be determined after project approval. For example, BCD are not able to determine if sedimentation measures to prevent harm to the Booroolong Frog population in Yarrangobilly River are feasible or likely to succeed. The BDAR provides a recommended framework for adaptive monitoring in Table 11-2 with timing, example methods, triggers and performance criteria. It is not clear to BCD if these examples represent commitments by the proponent. An options assessment for the Snowy 2.0 project to connect to the electricity grid is provided in the Submissions Report (Appendix D) and summarised in s9.1.1. BCD consider that adequate attention has been given to broad-scale options for locating the project. The BDAR does not document if consideration has been given to use of taller towers and spanning over the canopy to reduce clearing requirements. Bushfire protection requirements have been addressed for the substation. The footprint includes an asset protection zone (APZ) to 80 and 100 m surrounding the substation (Amendment Report s3.2 and sA.2.1.1). The easement and hazard tree zones were defined based on hazard management for transmission line construction and operation (Amendment Report sA.2.2.2–5). Spotted-tailed quoll: rock outcrops (potential den sites for Spotted-tailed Quoll) are to be avoided during detailed design and construction with a stop-work plan for previously unknown locations (s6.7.2.18, s8.5, s10.3.1, BIO1) Smoky Mouse: Habitat was avoided during options analysis (Table 9-3). An increase in predator access is probable due to the development (sG.4) and is to be mitigated by measures BIO17 and BIO18. Phytophthora infection is known to impact Smoky Mouse habitat. Measure BIO14 & BIO16 require a vehicle/machinery hygiene strategy to be prepared to minimise this risk. Mitigation measure BIO30 has been included to reduce the likelihood of vehicle strike on native fauna, including Smoky Mouse (s8.5, s10.3.6, sG.4), however there is no indication if the existing vehicle strike measures under the Snowy 2.0 Main Works approval will be applied to this project. Greater Glider: Two-stage pre-clearing surveys will minimise disruption to individuals during construction (BIO4). Disruption to connectivity and movement of gilding mammals is a prescribed impact. Localised movements may be impacted resulting in a reduced genetic exchange within the population. A three-metre-high security fence topped	Table 11-1 Table 11-2 Appendix D s6.7 s8.5 s10.3 Appendix G s9.3

Requirement	Information	Reference (BAM / BLA[1])
	with razor wire will be installed around the substation (Table 2-2), which is a well-recognised threat to gliders (s9.3.2). The substation is located within habitat for Greater Glider (PCTs 300 & 1196, s8.5) and there are 5 Greater Glider records within 10 km (BioNet). S10.3.3 states that use of barbed wire fencing around the substation will be minimised but there is no indication in the project design that this has been achieved (Amendment Report A.2.1.1). Table 11-1 Mitigation measure BIO27 requires improved visibility devices to be installed on razor wire. Measure BIO29 requiring arboreal crossing structures to mitigate loss of connectivity for Yellow-bellied Glider are also relevant to Greater Glider. Booroolong Frog: Direct impact to Booroolong Frog habitat has been largely avoided through exclusion zones (s9.3.3, Table 11-1 BIO5) and residual impacts calculated. s9.3.3 and s10.2.2 state that indirect impact to the Yarrangobilly River Booroolong Frog population from sedimentation via stormwater and runoff into the six drainage lines will be mitigated through sediment control measures and water quality monitoring (Table 11-1 BIO10 & BIO26, sG.3). The BDAR does not identify the location of sediment controls that will be necessary to mitigate impacts to Booroolong Frog. Residual impacts for clearing of Booroolong Frog habitat have been calculated. The BDAR assesses residual risk to Booroolong from sedimentation as unlikely (sG.3), however this relies on the success of mitigation measures. Macquarie Perch: Mitigation measures for Booroolong Frog also apply to potential water quality impacts to Macquarie Perch habitat (s7.2, Fig 7-1, sG.5). White-throated Needletail & migratory birds: the collision risk to birds and bats has been assessed in s10.2.5 and Appendix J. Measure BIO19 requires development of an adaptive strategy to identify where mitigation measures such as diverters/flappers should be installed and includes regular monitoring for evidence of collision.	
Impact Assessment	Verify that the EIS/BDAR: ☐ identifies the residual adverse impacts likely to occur to **each** EPBC Act listed threatened species and/or community after the proposed avoidance and mitigation measures are taken into account ☒ provides adequate justification and evidence for the predicted level of impact, with reference to the: • Commonwealth's Significant Impact Guideline: *https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf* • DPIE Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact (SAII): (*https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf*)	BAM Chapters 8 and 9 BLA clauses 6.2(b)(i)-(ii) and 7.1
	Complete the following information for each EPBC Act listed threatened species and/or community (add/remove rows as necessary): • EPBC Act listed threatened species and/or community • nature and consequences of impacts (i.e. direct and indirect)	BAM Chapters 8 and 9 BLA clauses 6.2(b)(i)-(ii) and 7.1

<table>
<tr><th>Requirement</th><th>Information</th><th>Reference (BAM / BLA[1])</th></tr>
<tr><td></td><td>

duration of impact (e.g. construction, operation, life of project)
quantum of impact
consequences of impacts on the species, the population and / or extent of the community at local, state and national scales

Confirm the level of predicted impact (cross appropriate):
☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets)

#For purposes of EPBC approval, as a minimum, significant adverse residual impacts must be offset (significant impact can be evaluated with reference to the significance impact guidelines)
<table>
<tr><th>Threatened Species / Community listed under EPBC Act</th><th>Risk level</th><th>Nature of impact</th><th>Quantum of impact (ha)</th><th>Duration of impact</th><th>Consequences of impact</th></tr>
<tr><td>Booroolong Frog</td><td>High</td><td>Direct</td><td>1.71 ha</td><td>Construction and operation</td><td>Loss of breeding habitat</td></tr>
</table>
All other species that are listed in Table 2 (moderate likelihood of occurrence and not impacted by project) do not require offset of any residual impacts.

Provide advice on whether adequate justification and evidence is provided for species and communities that have been identified as being at low risk of impact.

The level of impact for each MNES subject to the assessment is not expressed in Appendix G as either low risk or high risk of significant impact. However, BCD consider that the revised BDAR, specifically Section 8.6, Table 8-1, Appendix A, and the Assessments of Significance (Appendix G), provides adequate justification and reasoning for not identifying other MNES as requiring offsetting for residual impact.

Significance assessments are provided in Appendix G for MNES threatened biodiversity identified within the project area or considered moderately or highly likely to occur – 4 flora, 7 fauna, and 4 migratory species. The likelihood of occurrence is assessed in Appendix A for all MNES entities (except Wingless Raspwort and Australasian Bittern, which are not addressed by the assessment).
Section 8.6, Table 8-1, and Section G.7 identifies the project area as having no important habitat for migratory species.
Appendix G includes statements that there will be no significant impact to MNES after mitigation. While not specified in the BDAR, species with impacted habitat (not breeding) will be offset through the ecosystem credit liability calculated by the BAM.

<u>Note:</u> Section 8.5 incorrectly includes area figures for vegetation indirectly impacted by edge effects. An attempt to quantify edge effects was made in the EIS but removed in the revised assessment due to lack of justification.
</td><td>Section 8
Appendix G

Appendix A

Appendix G
s8.6
Table 8-1</td></tr>
</table>

Requirement	Information	Reference (BAM / BLA[1])
Offsets	Verify that the EIS/BDAR: ☒ identifies any MNES that haven't been offset using the BAM ☒ identifies how impacts requiring offsets correlate to MNES impacts ☒ identifies the plant community types (PCTs) requiring offset and the number and type of ecosystem credits required for impacts to MNES ☒ identifies threatened species requiring offset and the number of species credits required for impacts to MNES ☒ correctly uses the BAM (and BAM calculator) to identify the number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity ☒ identifies if ecological rehabilitation and/or biodiversity conservation actions are proposed for offsetting ☒ if known, identifies any other offsetting approach proposed, such as land-based offsets, retiring credits by payment into the Biodiversity Conservation Fund and/or through supplementary measures#. #In accordance with the BAM there is no longer a requirement to define the offsetting approach at EIS stage. **Complete the Impacts and Offsets Summary table below (Table 2)**	BAM Chapter 10 BLA clauses 7.1 and 7.2 BAM Chapter 10 BLA clauses 7.1 and 7.2
	Provide advice on the adequacy of the proposed offsets in meeting the requirements of the BAM: The total project offset obligation of the project is 2889 ecosystem credits and 9700 species credits. The offset liability for direct impact to Booroolong Frog is within Kosciuszko National Park (KNP) and is 38 species credits. BCD considers that the proposed offset strategy for acquitting the Booroolong Frog liability meets the requirements of the Secretary's Environmental Assessment Requirements (SEARs) and is consistent with the Snowy 2.0 Main Works approach to offsetting impacts within KNP. However, the offset for the Transmission Connection must be over and above the offset requirements for Snowy 2.0 Main Works. Snowy 2.0 Main Works was wholly within KNP, whereas the impacted area for this project is approximately 36.4% within Bago State Forest (63.6% in KNP). BCD expert review of the actions to acquit the Snowy 2.0 Main Works offset for Booroolong Frog has determined an updated approach in consultation with NPWS. The revised actions consider the spatial location of habitat and species biology and are focussed on targeted management that improves the population viability of this species across private and public land. <u>Summary of the offsetting approach</u>: The project SEARs require a "*strategy to offset any residual impacts of the project focusing on improving the biodiversity and conservation values of the Kosciuszko National Park (KNP) in the medium to long term.*	s15 Appendix L

Requirement	Information	Reference (BAM / BLA[1])
	The Biodiversity Offset Strategy outlined in Appendix L offset strategy considers impacts within and outside KNP separately to ensure alignment with the biodiversity offset strategy proposed for the Snowy 2.0 Main Works project. This Biodiversity Offset Strategy proposes a two-part approach to the provision of biodiversity offsets for the project to address impacts inside and outside KNP separately. This two-part approach includes: 1. application of the Snowy 2.0 Main Works offset strategy framework and principles to impacts within KNP and undertaking of conservation management actions to offset these impacts; and 2. application of the mechanisms for providing offsets, outlined in NSW Biodiversity Offset Scheme, to impacts occurring outside KNP.	
Other Considerations	Verify if any relevant Commonwealth guidelines and policy statements are applicable to the action and listed threatened species and/or community, including but not limited to: ☒ International environmental obligations ☒ Recovery Plans ☒ Approved Conservation Advice ☒ Threat Abatement Plans *The relevant Commonwealth guidelines and policy statements for each species and community are available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl*	BLA clauses 6.2(b)(iv), 7.2(c), 7.3 and 7.4 BLA clauses 6.2(b)(iv), 7.2(c), 7.3 and 7.4
	For each EPBC Act listed threatened species and/or community, provide advice on whether the assessment has been adequately informed by applicable Commonwealth guidelines and/or policy statements. For example, the interaction between the proposed action and important populations or critical habitat identified in policy documents and/or the interaction between the proposed action and threatening processes or recommended conservation actions outlined in Commonwealth policies and plans. BCD considers that the MNES assessment has been adequately informed by Commonwealth guidelines and policy statements. Appendix G outlines the relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans in relation to the listed threatened species and communities assessed for the project. Appendix G shows that Recovery Plans, Approved Conservation Advice, Threat Abatement Plans, and any International Environmental Obligations have been considered when determining the significance of the impact on the species and communities.	
Recommended Conditions	**Provide advice on any recommended conditions and reasons for imposing the conditions:**	BLA clause 6.2(c)(iii)

Requirement	Information	Reference (BAM / BLA[1])
	Avoiding and minimising impacts through mitigation and adaptive management strategies BCD is concerned that some measures being relied on in the biodiversity assessment to avoid, minimise or mitigate impacts have not been developed. BCD's experience with CSSI projects is that some mitigation strategies and adaptive management plans have not been included in the construction Biodiversity Management Plan, but prepared later without meaningful consultation with BCD subject matter experts. This reduces the department's ability to ensure that stated outcomes in the EIS and BDAR are achieved. It also potentially results in inadequate offsets for unmitigated impacts to threatened entities. **BCD recommends:** • The NSW consent specifies that all measures to avoid, minimise and mitigate biodiversity impacts in the BDAR are addressed in the Biodiversity Management Plan, in consultation with BCD. Risk to Booroolong Frog Potential impact to the Booroolong Frog population from in Yarrangobilly River has been identified in s9.3.3 and s10.2.2, however the risk of mitigation failure has not been quantified. If mitigation measures (Table 11-1, BIO10 & BIO26, sG.3) and the proposed adaptive monitoring program in Table 11-2 to prevent sediment from recurrently entering Yarrangobilly River are inadequate and fail, BCD consider the likely result to be extinction of that Booroolong Frog population. For the measures in Table 11-1 to succeed, the Construction Environmental Management Plan (CEMP) Soil and Water sub-plan must have regard to the BDAR. BCD require a trigger for the BDAR to be referenced in development of the Soil and Water sub-plan. **BCD recommends:** • the NSW consent specifies that actions in Table 11-1 of the BDAR must be addressed during preparation of the Soil and Water CEMP sub-plan. Clearing limits Installation of sediment control measures is likely to require additional full clearing in areas assessed and offset as partial clearing. These locations are not currently known so this clearing may impact habitat for MNES. **BCD recommends:** • the NSW consent is conditioned to limit the direct impact to the areas assessed for full and partial clearing zones. BCD understands that if impacts beyond the set limits are identified by the proponent during detailed design, then a project modification would be required.	BLA clause 6.2(c)(iii) s9.3.3 s10.2.2 Table 11-1

Requirement	Information	Reference (BAM / BLA[1])
	Biodiversity Offsets The Biodiversity Offset Strategy for Snowy 2.0 Transmission Connection must achieve biodiversity outcomes that are over and above the offset requirements for Snowy 2.0 Main Works. The actions proposed for Booroolong Frog in the Snowy 2.0 Main Works offset package specify works only within KNP because the impact for that project occurred only within KNP. BCD consider that management of Booroolong Frog habitat in reserves other than KNP and outside of public land is necessary to ensure a strategic approach to the species conservation and to align with the Saving our Species program. **BCD recommends:** • the NSW consent specifies that NPWS will develop a program, prior to any development that would impact on biodiversity values, and in consultation with DCCEEW and BCS, to carry out conservation actions to address the residual biodiversity impacts of the development on Booroolong Frog.	

Table J2 | Impact and offset summary for all MNES threatened communities and species

TABLE 2: MNES impact and offset summary

Threatened Species / Community listed under EPBC Act	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS, BDAR)
Species and ecological communities identified in the referral that WILL be impacted by the project					
Booroolong Frog (*Litoria booroolongensis*)	296, 302, 729	1.71	38	Application of the Snowy 2.0 Main Works offset strategy framework and principles to impacts within Kosciuszko National NP and undertaking of conservation management actions to offset these impacts within the NPWS reserve system and on other lands.	BDAR s6.7.2.9, s9.3.3, s11.3.1, Appendix G.3
Spotted-tailed Quoll - SE mainland population (*Oasyurus maculatus maculatus)*	Included in all zones across the entire project area but not recorded during survey.	118.34	Part of Ecosystem Credits	Application of the Snowy 2.0 Main Works offset strategy framework and principles to impacts within Kosciuszko National NP and undertaking of conservation management actions to offset these impacts within the NPWS reserve system and on other lands.	BDAR s6.7.2.18, Table 6-2, Appendix G.1
White-throated Needletail *(Hirundapus caudacutus)*	Included in all zones across the entire project area but not considered important habitat.	118.34	Part of Ecosystem Credits	Application of the Snowy 2.0 Main Works offset strategy framework and principles to impacts within Kosciuszko National NP and undertaking of conservation management actions to offset these impacts within the NPWS reserve system and on other lands.	BDAR s8.5, Appendix G.6

Threatened Species / Community listed under EPBC Act	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS, BDAR)
Critically endangered species and ecological communities identified in the referral that are NOT being impacted by the project					
Natural Temperate Grassland of the South Eastern Highlands	NA, the PCTs within the project area do not correspond to any EPBC Act listed TECs	-	-	None	BDAR s8.3
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	NA, the PCTs within the project area do not correspond to any EPBC Act listed TECs	-	-	None	BDAR s8.3
Bago Leek-orchid (*Prasophyllum bagoense*)	NA, excluded from survey due to limited distribution.	-	-	None	Appendix A Table A-1
Blue-tongued Greenhood (*Pterostylis oreophila*)	285, 637, 939, 1196 Not recorded during survey.	-	-	None	BDAR Table 6-6, s6.4.3.4, 6.7.1.2
Brandy Mary's Leek-orchid (*Prasophyllum innubum*)	NA, excluded from survey due to limited distribution.	-	-	None	Appendix A Table A-1
Kelton's Leek-orchid (*Prasophyllum keltonii*)	NA, excluded from survey due to limited distribution.	-	-	None	Appendix A Table A-1
Endangered species and ecological communities identified in the referral that are NOT being impacted by the project					
Alpine Sphagnum Bogs and Associated Fens	NA, the PCTs within the project area do not correspond to any EPBC Act listed TECs.	-	-	None	BDAR s8.3

Threatened Species / Community listed under EPBC Act	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS, BDAR)
Alpine She-oak Skink (*Cyclodomorphus praealtus*)	NA, removed from the assessment based on the absence of suitable habitat in the project area.	-	-	None	BDAR s6.4.2.4, Table A-2
Australasian Bittern (*Botaurus poiciloptilus*)	Outside of known and predicted habitat	-	-	None	Not considered in BDAR
Australian Painted Snipe (*Rostratula australis*)	NA, habitat in the disturbance area was not considered suitable.	-	-	None	BDAR Table A-2
Macquarie Perch (*Macquaria australasica*)	NA	-	-	None	BDAR Appendix G.5
Smoky Mouse (*Pseudomys fumeus*)	285, 300, 1196 Not recorded during survey.	-	-	None	BDAR s6.5.2.5, s8.5, Appendix G.4
Vulnerable species and ecological communities identified in the referral that are NOT being impacted by the project					
Alpine Tree Frog *(Litoria verreauxii alpina)*	Not recorded during survey.	-	-	None	BDAR s6.5.2.9, s6.7.2.10.
Austral Toadflax *(Thesium australe)*	Not recorded during survey.	-	-	None	BDAR s6.7.1.5,
Broad-toothed Rat *(Mastacomys fuscus mordicus)*	Not recorded during survey.	-	-	None	Table A-2

Threatened Species / Community listed under EPBC Act	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS, BDAR)
East Lynee Midge Orchid (*Genoplesium vernale*)	Excluded from survey based on habitat limitations.	-	-	None	Appendix A Table A-1
Greater Glider *(Petauroides volans)*	Not recorded during survey.	-	-	None	Appendix G.2
Koala - combined populations of Queensland, New South Wales and the Australian Capital Territory (*Phascolarctos cinereus* - combined populations of Qld, NSW and the Act)	Not recorded during survey.	-	-	None	BDAR s6.5.2.5, s6.5.2.7, s6.7.2.16
Painted Honeyeater *(Grantiella picta)*	Excluded from survey as no large areas of high-quality habitat were identified.	-	-	None	BDAR Table A-2
Wingless Raspwort *(Haloragis exalata* subsp. *exalata)*	Outside of likely habitat.	-	-	None	Not addressed in BDAR
Migratory species which were considered in the referral that are NOT being impacted by the project					
Latham's Snipe *(Gallinago hardwickil)*	Not considered important habitat.	-	-	None	BDAR s8.6, Table A-2
Satin Flycatcher *(Myiagra cyanoleuca)*	Not considered important habitat.	-	-	None	BDARs 8.6, Table A-2

Threatened Species / Community listed under EPBC Act	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS, BDAR)
Rufous Fantail *(Rhipidura rufifrons)*	Not considered important habitat.	-	-	None	BDARs 8.6, Table A-2
Additional species and ecological communities that are NOT being impacted by the project					
Guthega Skink (*Liopholis guthega*)	Excluded from survey based on habitat limitations.	-	-	None	BDAR s6.4.2.5, Table A-2
Spotted Tree Frog (*Litoria spenceri*)	Excluded from survey based on distribution.	-	-	None	BDAR s6.4.2.2, Table A-2
Southern Corroboree Frog (*Pseudophryne corroboree*)	Excluded from survey based on habitat limitations.	-	-	None	BDAR s6.4.2.3, Table A-2
Northern Corroboree Frog (*Pseudophryne pengilleyi*)	Excluded from survey based on habitat limitations.	-	-	None	BDAR s6.4.2.3, Table A-2

Note: The Gang-gang Cockatoo (*Callocephalon fimbriatum*) was only listed under the EPBC Act on 2 March 2022, thus it has been excluded from the assessment under s158A of the EPBC Act. The impacts however have been assessed under the BAM (89.02ha, 3024 credits).

Additional EPBC Act Considerations

Table J3 contains the additional mandatory considerations, factors to be taken into account and factors to have regard to under the EPBC Act additional to those already discussed.

Table J3 | Additional considerations for the Commonwealth Minister under the EPBC Act

EPBC Act section	Considerations	Conclusion
Mandatory Considerations		
136(1)(b)	Social and economic matters are considered in detail in in **section 6.5** of this report. The recommended conditions require TransGrid to implement road upgrades, manage traffic movements along the transport route, and minimise potential amenity impacts including noise, dust and visual.	The Department concludes that the proposed development would result in a range of economic and social benefits for the local and regional communities and economies and is of public benefit to the community of NSW. Overall, social impacts would be very minor compared with the social and economic benefits.
Factors to be taken into account		
3A, 391(2)	Principles of ecologically sustainable development, including the precautionary principle, have been taken into account, in particular: • the long term and short term economic, environmental, social and equitable considerations that are relevant to this decision; • conditions that restrict environmental impacts and impose monitoring and adaptive management, reduce any lack of certainty related to the potential impacts of the project; • conditions requiring the project to be delivered and operated in a sustainable way to protect the environment for future generations and conserving the relevant matters of national environmental significance; • advice provided within this report reflects the importance of conserving biological diversity, ecological and cultural integrity in relation to all the controlling provisions for this project; and • mitigation measures to be implemented which reflect improved valuation, pricing and incentive mechanisms are promoted by placing a financial cost on the proponent to mitigate the environmental impacts of the project.	The Department considers that the project, if undertaken in accordance with the recommended conditions of approval, would be consistent with the principles of ecologically sustainable development.
136(2)(e)	Other information on the relevant impacts of the proposed action to MNES.	The Department considers that all information relevant to the impacts of the project has been taken into account in its assessment, proposed conditions of consent and its advice to the Minister under the EPBC Act.

EPBC Act section	Considerations	Conclusion
Factors to have regard to		
176(5)	Bioregional plans	There is no approved bioregional plan related to the activity.
Consideration on deciding conditions		
134(4)	The drafting of conditions must consider: Article I. information provided by the person proposing to take the action or by the designated proponent of the action; and Article II. the desirability of ensuring as far as practicable that the condition is a cost-effective means for the Commonwealth and the person taking the action to achieve the object of the condition. All Project related documentation, including the material provided by Transgrid, is available from the Department's website: www.majorprojects.planning.nsw.gov.au.	The recommended conditions are based on material provided by Transgrid (including its EIS, Submissions Report, Amendment Report and final BDAR) and consultation with the DCCEEW, BCS and other government agencies. The Department considers that the conditions of approval included in **Appendix H** are comprehensive. They are efficient and cost-effective means of achieving their various purposes

Conclusions on Controlling Provisions

For the reasons set out in **section 6.3, section 6.4** and **section 6.5** of this report and this Appendix, the Department considers that the impacts of the project would be acceptable, subject to avoidance, mitigation and offsetting measures described in Transgrid's EIS, Submissions Report, Amendment Report, final BDAR and the recommended conditions of consent in **Appendix H**.

The Department believes that draft conditions B18 to B25 of the recommended development consent provide a suitable regulatory framework to manage the risk of impact to listed threatened species and National heritage places from the project.

Accordingly, the Department recommends that the Commonwealth Minister require Transgrid to implement conditions B18 to B25 the recommended development consent, where they relate to the management of potential impacts on listed MNES under the EPBC Act.

Other Protected Matters

DCCEEW determined that other matters under the EPBC Act are not controlling provisions with respect to the controlled action. These include listed Ramsar wetlands, World Heritage properties, Commonwealth marine environment, Commonwealth action, Commonwealth land, nuclear action, Great Barrier Reef Marine Park, overseas and a water resource, in relation to coal seam gas development and large coal mining development.

Conclusions

The Department considers that the recommended conditions would provide suitable protection for MNES under the EPBC Act. The Department notes that, if approved by the NSW Minister for Planning, the Project would be referred to the Commonwealth Minister for the Environment and Water for determination under the EPBC Act.

Appendix K – Consideration of the Objects of the Act

Table K1 | Consideration of the project against the relevant Objects of the EP&A Act

Issue	Consideration
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources;	• The project would provide ongoing socio-economic benefits to the people of NSW through the contribution to energy security and reliability in NSW and through ongoing employment opportunities during construction and operations. • Consideration has also been given to the sensitive environmental features located within proximity to the project including riparian areas, including Talbingo Reservoir, Yarrangobilly River and its tributaries, and endangered species and communities, with appropriate conditioning of the project to avoid, minimise and offset impacts.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;	• The Department considers that the project can be carried out in a manner that is consistent with the principles of ecologically sustainable development. The Department's assessment has sought to integrate all significant environmental, social and economic considerations. Consideration of the key principles and programs of ecologically sustainable development is detailed below. **Precautionary Principle** • The Department has assessed the project's potential direct and indirect environmental impacts and considers that there is sufficient scientific certainty regarding environmental impacts and residual risks to enable determination of the application. • The Department has assessed the project's threat of serious or irreversible environmental damage and considers there is sufficient scientific certainty regarding the environmental impacts and residual risks to enable determination of the application. • The EIS contains a number of specialist environmental impact assessments and a number of design, construction and operation measures to mitigate, remediate or offset potential impacts. • The Department has also recommended conditions of approval that further mitigate potential residual impacts of the project such limits on clearing, traffic generation, adequate buffer distances from riparian areas, dust suppression and requiring Transgrid to retire biodiversity offsets. • The Department considers that the recommended conditions can provide an appropriate level of protection to environmental values in the region. **Inter-generational equity** • The Department recognises that the NSW energy market is in a state of transition from one dominated by coal-fired power stations to a renewable energy mix. Whilst this transition is being fuelled by investment in renewable energy zones and increased battery storage systems, connecting the 2,000 MW of energy generated by Snowy 2.0 to the NEM will play a crucial role in diversifying electricity supply, facilitating reduced reliance on traditional power generation derived from fossil fuels and support the continued growth of renewable energy in NSW by providing essential storage for any excess electricity generated by wind and solar farms. • The Department recognises that climate change and reducing GHG emissions are key considerations for inter-generational equity and

Issue	Consideration
	consider that the project contributes to reducing potential climate impacts by linking energy generated by Snowy 2.0 to the energy market. **Conservation of biological diversity and ecological integrity** • The project's potential impacts on biodiversity were an important consideration of the Department's assessment of the project. As described in **section 6.3** and **Appendix J**, the Department considers that direct and indirect impacts on biodiversity and on EPBC matters, including the likely impacts to listed threatened species and communities, can be minimised through proposed mitigation measures and offsets. **Improved valuation, pricing and incentive** • This principle of ecologically sustainable development emphasises the internalisation of environmental costs in the pricing of assets and services. • The Department's assessment has sought to apply the 'polluter pays principle', insofar as Transgrid would be required to offset or remediate potential environmental impacts. As such, the Department has conditioned that biodiversity impacts be offset.
(c) to promote the orderly and economic use and development of land;	• The project site covers an area of around 259 ha, primarily zoned C1 - National Parks and Nature Reserves. Although the development is generally not consistent with the objectives in the C1 zone, provisions in both the NPW Act and the SHC Act provide a pathway for Transgrid to obtain the easement required for the proposed transmission corridor, as described in **section 4.9**. • The remaining area, which is in State Forest (about 57 ha) is zoned RU3 – Forestry.
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats;	• The Department considers that the project has been designed to minimise environmental and biodiversity impacts as much as practicable by designing the project to avoid and minimise impacts on high quality vegetation and habitat. • Although some clearing of threatened species habitat would be required, as described in **section 6.3** and **Appendix J**, the Department considers that the proposed biodiversity offset strategy would maintain or enhance biodiversity values in the medium to long term.
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage);	• The Department has assessed the project's impacts on built and cultural heritage (see **section 6.5**) and considers that potential impacts to heritage items can be appropriately minimised and mitigated through detailed design. • The Department has recommended a range conditions, including an ACHAR prepared in consultation with RAPs and Heritage NSW.
(g) to promote good design and amenity of the built environment;	• The Department recognised that, while the transmission lines would create a linear corridor across the landscape, this would not change the prevailing character and nature of the surrounding environment. • To minimise visual impacts during construction, the Department has recommended that Transgrid progressively rehabilitate work areas, and for the permanent facilities, the Department requires Transgrid to submit final designs for approval, incorporating paints, textures and local materials to blend the infrastructure into the landscape. • Further, Snowy Hydro has committed to:

Issue	Consideration
	- replace the overhead transmission line between Providence Portal substation to Tantangara Dam with underground lines, with full active rehabilitation of the easement; and - removal of the Eucumbene Portal to Happy Jacks transmission lines and replaced with an alternative standalone power supply and rehabilitation of the easement. • In addition, the Department has recommended additional measures and recommends a condition requiring Transgrid to pay the NPWS a total of $5 million to be spent by NPWS on programs to improve natural and cultural heritage values of the National Park.
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants;	• The proposed mitigation measures for fire safety and minimising bushfire risks would provide acceptable levels of protection for the health and safety of occupants of the accommodation camps during construction, the overall project site and surrounding campsites. • The Department has also conditioned further requirements including finalisation of emergency planning and construction and demolition conditions to ensure structural adequacy of the buildings and safe demolition of temporary facilities at the end of construction period.
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State; and	• The Department notified and consulted with the Snowy Valleys Shire Council and NSW government authorities (including further discussion of key issues with the BCS and NPWS) throughout the assessment of the project and carefully considered all responses in its assessment (see **Section 5**). • The Department has also consulted with the DCCEEW throughout the assessment due to the assessment process under the EPBC Act.
(j) to provide increased opportunity for community participation in environmental planning and assessment.	• The Department publicly exhibited the project application and EIS and made all relevant documents publicly available on its website (see **Section 5**). All public submissions have been considered by Transgrid and the Department during the assessment process.