

**Submission  
No 76**

**INQUIRY INTO FEASIBILITY OF UNDERGROUNDING  
THE TRANSMISSION INFRASTRUCTURE FOR  
RENEWABLE ENERGY PROJECTS**

**Name:** Shana Nerenberg

**Date Received:** 12 July 2023

---

Standing Committee on State Development  
Legislative Council  
Parliament of NSW

via online submission form

12 July 2023

Dear Committee members,

## RE: Inquiry into the feasibility of undergrounding the transmission infrastructure for renewable energy projects

Please accept my technical submission addressing the following terms of reference:

- (a) the costs and benefits of undergrounding,
- (d) any environment impacts of undergrounding.

### Introduction

My former occupation was Consultant Botanist at Biosis Pty Ltd undertaking Environmental Impact Assessment for large government projects. I am no longer in the industry and have no conflicts of interest in transmission projects. My only interest is compliance with and protection of the environment under existing environmental legislation.

I have expert knowledge in assessing impacts on threatened species and threatened ecological communities, including those impacted by the Humelink project. Prior to my professional experience, I undertook ecological research in the South West Slopes of NSW including on some of the properties affected by Humelink. I became aware of the Humelink project when farmers affected by the proposed development approached me for help with scientific research data I collected on their properties.

From my knowledge of construction impacts on threatened species, one of the key benefits of undergrounding is the potential to reduce the impacts by up to 80% compared with overhead transmission. Undergrounding will, in some instances, completely avoid impacts to sensitive areas like waterways – an outcome not achievable with overhead transmission lines. The impacts of undergrounding on threatened species and native vegetation are therefore likely to be far less than overhead transmission.

The following sections will provide details of how impacts on threatened species and native vegetation can be reduced using underground transmission lines. It is assumed that only HVDC cables would be considered for undergrounding (not HVAC).

### Obligations under the EPBC Act

Transgrid submitted a referral (2021/9121) to the federal Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for approval of significant impacts on protected matters, termed Matters of National Environmental Significance (MNES).

NOTE: the current Humelink EIS is an approved bilateral process under the EPBC Act. Impacts on MNES will be assessed during the EIS process so that Commonwealth-protected as well as state-protected matters must be considered during the state-based planning process. I will focus on MNES as there is overlap between the two and typically Commonwealth-listed matters are the more seriously threatened.

Under the EPBC Act, the proponent is required to avoid and mitigate impacts on protected matters (DSEWPaC 2012). Only after impacts have been minimised, and a residual of impacts cannot be avoided, then biodiversity offsets can be considered (DSEWPaC 2012).

Transgrid's EPBC referral and the EIS scoping document (Aurecon 2022) have made zero assessment of whether overhead or underground transmission is better able to avoid or minimise impacts on protected matters. This is a serious flaw in the assessment process. The remainder of this submission will provide an overview of how underground transmission lines have far more potential to avoid and minimise impacts on threatened species and threatened ecological communities than overhead transmission lines.

## Benefits of undergrounding to threatened species and ecological communities

### 1. Reduced width of transmission corridor/easement

Habitat loss and fragmentation are key threats to native species. Construction of Humelink will require the clearing of large amounts of native vegetation and threatened species habitat, and the cleared corridor will contribute to fragmentation (Table 1). Overhead transmission lines for Humelink require a corridor 70 to 80 meters wide (Aurecon 2022). Where transmission lines are being duplicated, the corridor could be as wide as 130 m.

The initial impact assessment for Humelink has estimated that 1861.72 hectares of critically endangered woodland will be cleared to form this corridor (Table 1). For comparison, Bicentennial Park is 40 hectares so that 1861.72 hectares is a huge impact that will further threaten an ecosystem that is already on the brink of extinction.

Underground transmission lines could save as much as 80% of the impacts of overhead transmission lines. For example, the width of the easement for Basslink's underground cable is 11.5 metres, which is 80% narrower than Basslink's overhead transmission lines, which are 55 metres (APA 2023).

The benefits of a narrower transmission corridor for threatened species include:

- Reduced overall amount of clearing and habitat loss – an 80% reduction in corridor width has potential to save up to 1488.94 hectares of critically endangered grassy woodland and threatened species habitat (Table 1).
- Reduced risk to wildlife when crossing the corridors – Koalas, for example, are most vulnerable to predators when they have to descend from the trees and cross open ground. The risk of crossing an 80 m corridor is far greater than 11.5 m.
- Reduced barriers to wildlife movements – many species will not cross large open gaps at all and so become isolated when vegetation is cleared. Isolation is especially detrimental for threatened species with small numbers remaining. Species particularly affected barriers to movement include Squirrel Gliders (vulnerable in NSW) and Greater Gliders (Table 1). For example, Squirrel Gliders typically glide between gaps 20 – 35 m wide (van der Ree *et al.* 2010) so a corridor 70 to 80 metres wide may isolate populations. If gliders crossed on the ground, they would be very vulnerable to foxes, feral cats and other predators, so that the transmission easement would still contribute to their mortality.

While the construction corridor would be wider than the permanent easement, careful construction management can keep impacts to a minimum. Figure 1 shows a carefully managed construction corridor for a 525 kV underground transmission line. The construction corridor is not more than 20 m wide, still a 75% reduction compared with an 80 m corridor (Figure 1). The Committee must be sure to use Australian standards of construction management when assessing construction impacts. Unfortunately, I have come across some misinformation regarding the width of the construction corridor based on overseas examples with poor environmental regulation or confusion between HVDC and HVAC cables.

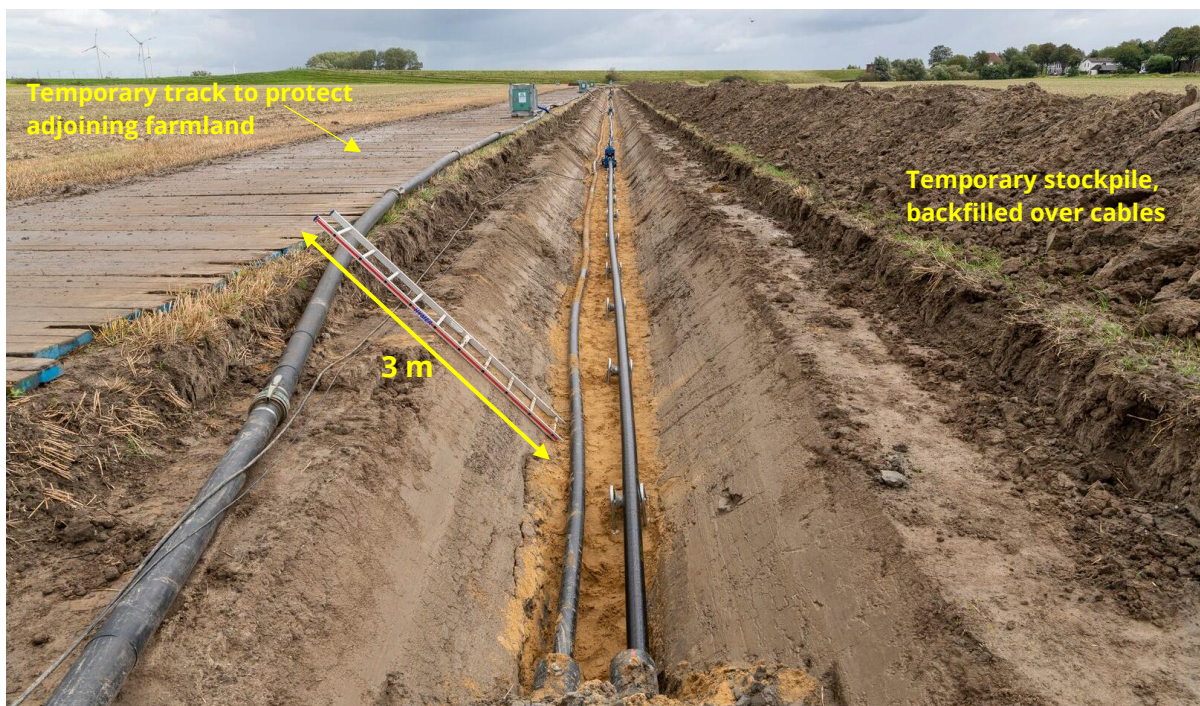


Figure 1. Construction of the 500 km long 525 kV SuedOstLink in Germany using construction corridor of minimum width necessary, as would be required in Australia. The construction corridor appears to be close to the 11.5 m width quoted above with another 3 m on each side for access and stockpiling excavated material, totalling 17.5 m. Source: TenneT

Table 1 lists the proposed impacts on MNES as provided in the Humelink EPBC referral 2021/9121. Data in *italics* is copied and pasted from the referral. The last column estimates the potential reduction that could be achieved through a carefully designed underground transmission line.

**Table 1. Proposed impacts on matters protected under the EPBC Act (MNES) by Humelink overhead transmission project**

Protected matter (MNES)	Listing status	Size of impact	Potential savings by undergrounding
<b>Threatened ecological communities</b>			
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	1861.72 ha [4598.6 acres]	Reduce by up to 80% down to 372.34 ha [920 acres]
Alpine Sphagnum Bogs and Associated Fens	Endangered	5.27 ha	Reduce by up to 80% down to 1.05 ha
Grey Box Grassy Woodlands and Derived Native Grasslands.	Endangered	0.14 ha	Avoid completely with reduced corridor width
<b>Threatened flora species</b>			
Yass Daisy ( <i>Ammobium craspedioides</i> )	Vulnerable	<i>The proposed action would potentially clear large areas of habitat of these species</i>	Reduce by up to 80%
Hoary Sunray ( <i>Leucochrysum albicans</i> var. <i>tricolor</i> )	Endangered		
Button Wrinklewort ( <i>Rutidosia leptorrhynchoides</i> )	Endangered		
Swamp Everlasting ( <i>Xerochrysum palustre</i> )	Vulnerable		
Bago Leek Orchid ( <i>Prasophyllum bagoense</i> )	Critically Endangered	<i>The proposed action has the potential to remove small areas of potential habitat for these species, introduce weeds and potentially alter hydrological processes that may support species' microhabitats.</i>	Avoid completely with reduced corridor width
Terrestrial Leek Orchid ( <i>Prasophyllum keltonii</i> )	Critically Endangered		
<b>Threatened fauna species</b>			
Swift Parrot ( <i>Lathamus discolor</i> )	Critically Endangered	<i>The proposed action may result in clearing of potential foraging habitat in suitable woodland areas near Wagga Wagga</i>	Reduce by up to 80%
Superb Parrot ( <i>Polytelis swainsonii</i> )	Vulnerable	NOTE: Initial assessment appears inadequate – Swift Parrot and Superb Parrot assessed as having the same habitat requirements when their life histories and foraging behaviour are completely different. Swift Parrot forages in trees on flowers and psyllid lerps in Eucalyptus species (TSSC 2016). Superb Parrot feed mostly on the ground, where they take a variety of native and introduced seeds (TSSC 2016a).	
Pink-tailed Worm Lizard ( <i>Aprasia parapulchella</i> )	Vulnerable	<i>The proposed action may result in clearing of potential habitat for these two species.</i>	Reduce by up to 80%
Striped Legless Lizard ( <i>Delma impar</i> )	Vulnerable	NOTE: Initial assessment appears inadequate – Pink-tailed Worm Lizard assessed with Striped Legless Lizard but the two have different habitat requirements (TSSC 2015, TSSC 2016b).	
Koala ( <i>Phascolarctos cinereus</i> )	Endangered (QLD, NSW, ACT)	<i>The proposed action would result in the clearing of known and potential habitat, including koala use trees (used for sheltering, dispersal, foraging and potentially breeding).</i>	Reduce by up to 80%
Greater Glider ( <i>Petauroides volans</i> )	Endangered	<i>This species has been observed during survey and field verification of the extent of habitat is subject to further field surveys in 2022. [...] While efforts would be made to minimise or avoid hollow bearing trees, it is likely that hollows and other features would be removed from potential Glider habitat.</i>	Reduce by up to 80%
Golden Sun Moth ( <i>Synemon plana</i> )	Vulnerable	<i>The proposed action may result in clearing of large areas of potential habitat for the Golden Sun Moth.</i>	Reduce by up to 80%

## 2. Use of Horizontal directional drilling

Horizontal directional drilling (HDD) is a construction method commonly used to avoid impacts on sensitive areas such as waterways, wetlands, sensitive vegetation and cultural heritage (Figure 2). HDD involves drilling a tunnel under an obstacle rather than digging a trench from the surface (as seen in Figure 1). HDD is also used to install cables under roads and other built environment. By avoiding open trenching, HDD further reduces the impacts of habitat loss and fragmentation.

HDD can only be used for underground infrastructure. This method of avoiding and minimising impacts is not available for overhead transmission lines. HDD still needs to be carefully managed to minimise impacts at the start, end and during the drilling and there are likely to be engineering constraints in very steep terrain.

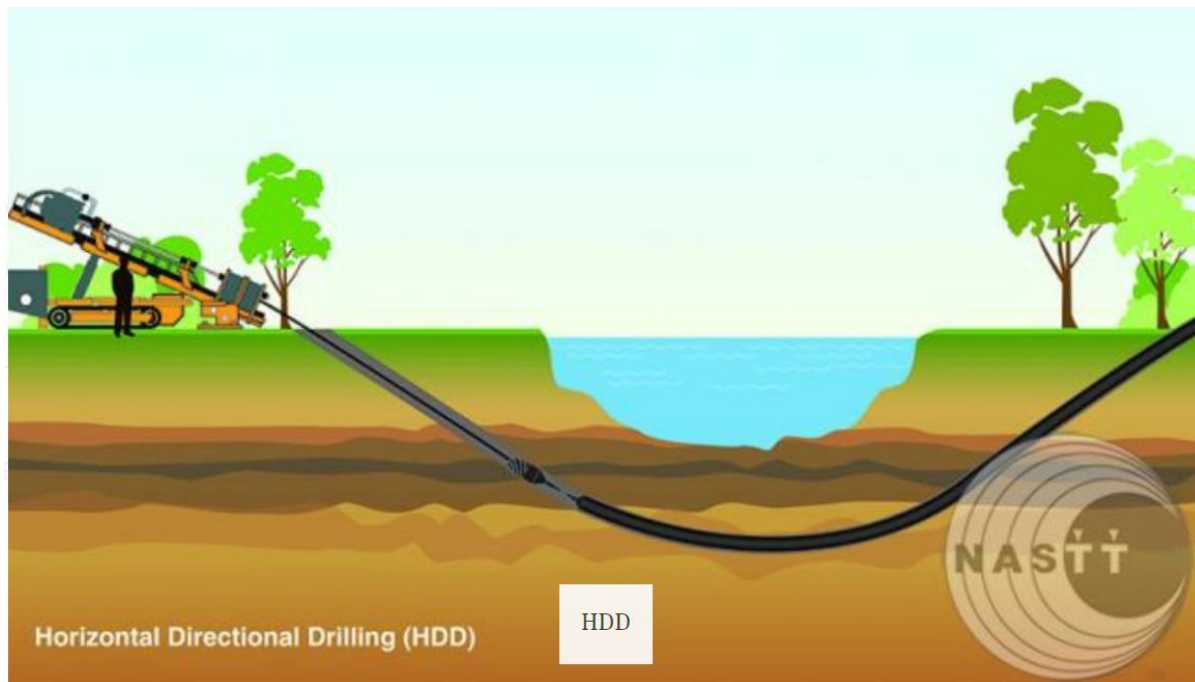


Figure 2. Horizontal directional drilling used to minimise impacts on rivers and sensitive vegetation. Source: NASTT

## 3. Co-location within existing easements

Underground transmission lines can be located within existing transmission corridors, utilities easements, transport corridors and under roads. Co-location minimises the need for new land clearing and so minimises impacts on threatened species habitat and native vegetation.



Figure 3. Underground transmission line being installed within existing transmission easement. Source: Renewables Grid Initiative

#### 4. Reduced need to clear vegetation on an on-going basis

Overhead transmission lines require a 70 – 80 m easement to be managed for vegetation for the entire life of the infrastructure (Figure 4). Underground transmission lines would reduce the amount of vegetation management and associated disturbance to trees and wildlife by 80% due to the reduced width of underground easements.

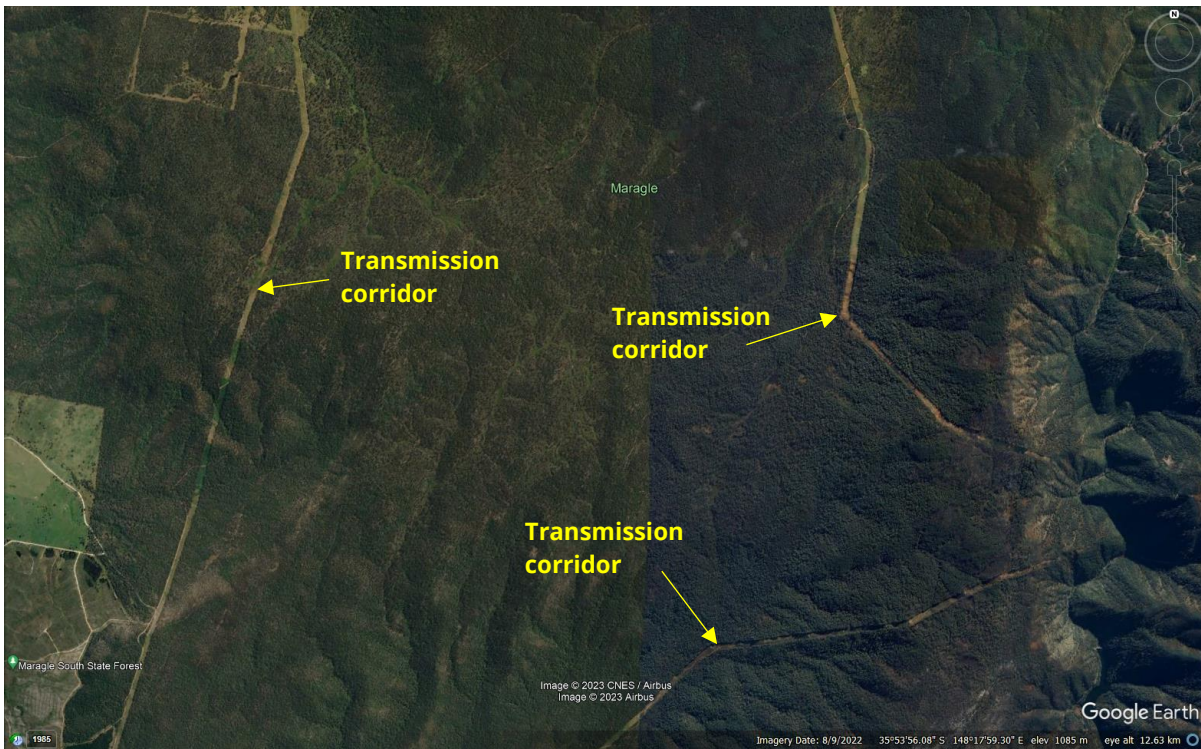


Figure 4 (above and below). Google Earth images of overhead transmission corridors constantly cleared of vegetation at Maragle in the Kozciuszko National Park. Notice how much wider the transmission corridors are compared with the road.



## Conclusion

My professional opinion is that the environmental impact assessment for Humelink to date has been inadequate for the scale of the impacts proposed. The impact assessment does not comply with requirements under the EPBC Act to avoid and mitigate impacts on protected matters. The EPBC referral and associated impact assessment contain errors in assessing habitat requirements for some threatened species suggesting external expertise is required to review the assessment.

When combined, the upgrades to the transmission network across south eastern Australia are going to amount to one of the biggest environmental impacts in recent history. Regulators and parliamentarians need to hold the developer to account rather than accept the excuses and laziness currently dressed up as economics.

Yours sincerely,

Shana Nerenberg.  
Botanist and registered native vegetation assessor

## References

- APA 2023. *Basslink easements*. Available at: <https://www.apa.com.au/our-services/other-energy-services/electricity-interconnectors/basslink/easements/>.
- Aurecon 2022, HumeLink Scoping Report Reference: 507179-160522-REP-NN-001. Prepared by Aurecon Australasia Pty Ltd on behalf of Transgrid, Neutral Bay NSW. Downloaded from <https://pp.planningportal.nsw.gov.au/major-projects/projects/humelink>
- Department of Agriculture, Water and the Environment (2021). *Conservation Advice for Synemon plana (Golden Sun Moth)*. Canberra: Department of Agriculture, Water and the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/25234-conservation-advice-07122021.pdf>.
- Department of Agriculture, Water and the Environment (2021). *Conservation Advice for Leucochrysum albicans subsp. tricolor (Hoary Sunray)*. Canberra: Department of Agriculture, Water and the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/89104-conservation-advice-20122021.pdf>.
- Department of Agriculture, Water and the Environment (2021). *Conservation Advice for Xerochrysum palustre (Swamp Everlasting)*. Canberra: Department of Agriculture, Water and the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/76215-conservation-advice-23112021.pdf>.
- Department of Agriculture, Water and the Environment (2022). National Recovery Plan for the Koala Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory). Department of Agriculture, Water and the Environment, Canberra. Available from: <http://www.dcceew.gov.au/environment/biodiversity/threatened/publications/recovery/koala-2022>.
- Department of Agriculture, Water and the Environment (2022). *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory*. Canberra: Department of Agriculture, Water and the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/85104-conservation-advice-12022022.pdf>.
- Department of Climate Change, Energy, the Environment and Water (2022). *Conservation Advice for Petauroides volans (greater glider (southern and central))*. Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-05072022.pdf>.
- Department of Sustainability, Environment, Water, Population and Communities (2012). *Approved Conservation Advice for Prasophyllum bagoense (Bago leek-orchid)*. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/84276-conservation-advice.pdf>.
- Department of the Environment (2014). *Approved Conservation Advice for Prasophyllum keltonii (Kelton's leek-orchid)*. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/83604-conservation-advice.pdf>.
- Department of the Environment, Water, Heritage and the Arts (2008). *Approved Conservation Advice for Ammobium craspedioides (Yass Daisy)*. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/20758-conservation-advice.pdf>.
- DSEWPac 2012. *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. October 2012. Commonwealth of Australia, Canberra.
- Energy Grid Alliance (2022). Engineering Victoria's Future Energy Grid. Downloaded from: <https://www.energygridalliance.com.au/wp-content/uploads/2022/06/Engineering-Victorias-Future-Electricity-Grid.pdf>
- EPBC referral 2021/9121, Attachment 4 – Detailed MNES impact assessment, downloaded from EPBC referrals list: <http://epbcnotices.environment.gov.au/entity/annotation/9c8171c0-aaa4-ec11-80d5-00505684c563/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1688880950611>

EPBC Referral 2021/9121, New transmission infrastructure, HumeLink, downloaded from EPBC referrals list:

<http://epbcnotices.environment.gov.au/entity/annotation/eed6dfe9-a9a4-ec11-80d5-00505684c563/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1688880950611>

NSW Office of Environment and Heritage (2012). *National Recovery Plan for Button Wrinklewort* (Rutidosia leptorrhynchoidea). NSW Office of Environment and Heritage, Hurstville. Available from: <http://www.environment.gov.au/resource/national-recovery-plan-button-wrinklewort-rutidosia%2%A0leptorrhynchoidea>.

Threatened Species Scientific Committee (2006). *Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/box-gum.html>.

Threatened Species Scientific Committee (2009). *Commonwealth Listing Advice on Alpine Sphagnum Bogs and Associated Fens*. Department of the Environment, Water, Heritage and the Arts. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/29-listing-advice.pdf>.

Threatened Species Scientific Committee (2010). *Commonwealth Listing Advice on Grey Box* (Eucalyptus microcarpa) *Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*. Department of the Environment, Water, Heritage and the Arts. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/86-listing-advice.pdf>.

Threatened Species Scientific Committee (2015). *Conservation Advice Aprasia parapulchella Pink-tailed worm-lizard*. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/1665-conservation-advice-01102015.pdf>.

Threatened Species Scientific Committee (2016). *Conservation Advice Lathamus discolor swift parrot*. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/744-conservation-advice-05052016.pdf>.

Threatened Species Scientific Committee (2016a). *Conservation Advice Polytelis swainsonii superb parrot*. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/738-conservation-advice-05052016.pdf>.

Threatened Species Scientific Committee (2016b). *Conservation Advice Delma impar striped legless lizard*. Canberra: Department of the Environment and Energy. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/1649-conservation-advice-16122016.pdf>.

van der Ree, R., Cesarini, S., Sunnucks, P., Moore, J. L., & Taylor, A. (2010). *Large Gaps in Canopy Reduce Road Crossing by a Gliding Mammal*. Ecology and Society, 15(4). <http://www.jstor.org/stable/26268221>

#### Photo sources:

Figure 1. Tennet 535 kV underground cable construction: <https://netztransparenz.tennet.eu/tinyurl-storage/detail/suedostlink-first-award-of-contract-for-plastic-insulated-underground-cable-for-525-kilovolts/>

Figure 2. Horizontal Directional Drilling diagram: <https://nastt.org/resources/photos/hdd/>

Figure 3. Underground cable construction: [https://renewables-grid.eu/fileadmin/user\\_upload/Files\\_RGI/Event\\_material/Prospects\\_of\\_undergrounding\\_power\\_lines/2017\\_RGI\\_workshop\\_underground\\_cables\\_Volker\\_Wendt\\_Europacable.pdf](https://renewables-grid.eu/fileadmin/user_upload/Files_RGI/Event_material/Prospects_of_undergrounding_power_lines/2017_RGI_workshop_underground_cables_Volker_Wendt_Europacable.pdf)

Figure 4. Google Earth © 2023