

Chapter 26: Ecology

Environment Effects Statement



26 Ecology

26.1 Introduction

This chapter summarises the potential impacts to ecology associated with the construction, operation and decommissioning for the Victoria to New South Wales Interconnector (VNI) West (Victorian component) (the Project). It describes the assessment of those impacts and the measures proposed to avoid, minimise and manage them. This chapter is based on the findings of *Technical Appendix S: Ecology*.

The key issues identified in *Technical Appendix S: Ecology* relate to the potential for significant effects on Ecological Vegetation Classes (EVCs), listed threatened ecological communities (TECs) and species and other protected flora or fauna, potential initiation or exacerbation of potentially threatening processes, potential impact on wetlands, disruption to habitat connectivity, and the risk of collisions with, and electrocution from, transmission line infrastructure.

Threatened species and TECs are those listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act).



Key definitions

Ecological Vegetation Classes (EVCs) are the standard unit for classifying native vegetation types in Victoria. They group vegetation according to its plant species composition, plant lifeforms and ecological characteristics, and its association with particular environmental conditions.

Threatened Ecological Communities (TECs) are naturally occurring groups of native plants, animals and other organisms that occur together in a particular habitat and are at risk of extinction or significant decline.

A **scattered tree** is a native canopy tree that does not form part of a patch of native vegetation.

Existing conditions assessments have been undertaken progressively since 2023. These included desktop and field assessments that informed the route refinement process to select a Proposed Easement that would avoid impacts on key areas of native vegetation and habitat of threatened species, as far as practicable. Key, known biodiversity features in the landscape that were avoided through the route refinement process included Kerang Wetlands Ramsar site, Great Spectacle Lakes Complex and the Northern Victorian Wetlands and St Arnaud Box-Ironbark Region Key Biodiversity Areas. The avoidance and minimisation approach applied to the route refinement process has resulted in the Proposed Easement traversing a landscape that has been predominantly cleared of native vegetation due to historical and ongoing agricultural land use. Dryland farming dominates in the south, transitioning to more irrigated farming in the north. While the landscape is highly modified, the Project still intersects remnant native vegetation (including patches and scattered trees), and this chapter quantifies the extent of native vegetation affected.

Potential biodiversity impacts of the Project are therefore mainly associated with the remaining biodiversity features such as native vegetation near rivers, within roadside reserves, and scattered patches in agricultural land. These features are often important in modified agricultural landscapes as they may represent the last remaining habitat for some species and serve as movement corridors.

26.2 Assessment scope

The scoping requirements provided by the Minister for Planning for the Project set out the specific environmental matters to be investigated and documented in this Environment Effects Statement (EES). The EES Scoping Requirements inform the scope of each EES technical study. Issues identified in the EES Scoping Requirements to be addressed in this ecology assessment include:

- Direct or indirect loss, disturbance and/or degradation of terrestrial and aquatic biodiversity values, including native vegetation, listed or other protected flora and fauna species under the EPBC Act and FFG Act and nearby habitat that may support listed or other protected flora, fauna or ecological communities
- Potential for significant effects on native vegetation, listed TECs, key threatened flora species and key threatened fauna species (including migratory species)
- Potential initiation or exacerbation of listed potentially threatening processes under the FFG Act
- Potential impact on the ecological character and limits of acceptable change of the Kerang Wetlands Ramsar site
- Potential impact on groundwater-dependent ecosystems caused by groundwater drawdown or surface hydrological changes
- Disruption to the movement of fauna (both day and night) between areas of habitat across the broader landscape, including risk of collisions with transmission line infrastructure
- Potential cumulative effects on listed threatened flora and fauna species (including migratory species), from the Project in combination with other projects
- The availability of suitable offsets for the loss of native vegetation and habitat for listed threatened species under the EPBC Act and/or FFG Act.

According to Section 4.2 of the EES Scoping Requirements, impacts on biodiversity were considered to be a high priority for assessment.

Technical Appendix S: Ecology was prepared to inform this EES. The technical appendix provides more detailed information on the investigations and impact assessment conducted in response to the EES Scoping Requirements. Where relevant to ecology, the findings of other studies were considered in *Technical Appendix S: Ecology*. These linkages are summarised in Table 26-1.

Table 26-1 Related chapters and relevance to ecology

EES Chapter	Relevance
<i>EES Chapter 9 Geology and soils</i>	Considers the potential for the presence of contaminated soil, acid sulfate soils (ASS), and erosive/dispersive soils to be uncovered by the Project, resulting in run-off and impact on the ecology of surrounding water bodies.
<i>EES Chapter 10: Groundwater</i>	Provides information on the groundwater levels along the Proposed Easement and the potential presence of Groundwater Dependent Ecosystems.
<i>EES Chapter 12: Bushfire</i>	Describes the requirements for vegetation management during construction works and ongoing management during operation. This chapter has considered whether these requirements impact vegetation clearance quantification.
<i>EES Chapter 14: Surface water</i>	Considers impacts on water quality which can impact aquatic ecosystems. This chapter considers whether there are designated waterways as ecological features that may be impacted by the Project.

EES Chapter	Relevance
<i>EES Chapter 18: Traffic and transport</i>	Identifies road intersections on local roads which would be used for accessing the Proposed Easement from the construction laydown areas and workforce accommodation where vegetation clearance would be required to achieve safe sight line distances for vehicles using those roads.
<i>EES Chapter 23: Land use and planning</i>	Identifies planning requirements relevant to ecology.
<i>EES Chapter 25: Aboriginal cultural heritage</i>	Characterises and assesses potential impacts on Aboriginal cultural heritage. The broader outcomes of the ecology impact assessment supported the Aboriginal cultural heritage impact assessment, particularly with respect to the avoidance of areas of ecological value that also represent areas with higher potential for culturally modified trees to occur.
<i>EES Chapter 27: Matters of National Environmental Significance</i>	Provides a summary of potential impacts on Matters of National Environmental Significance (MNES) informed by the findings of the ecology existing conditions and impact assessment summarised in this chapter.

26.3 Methodology

This section summarises the methods adopted for the ecology impact assessment and the approach used to characterise existing conditions, identify ecological values and assess potential impacts.

26.3.1 Ecology existing conditions and impact assessment

The assessment was informed by the scoping requirements and drew on a combination of desktop constraints mapping, staged field investigations where access was available, and supplementary desktop methods where access was not available. Desktop assessment and early field investigations contributed to route refinement at a strategic scale, while the detailed field assessment and targeted surveys were undertaken to inform the EES impact assessment of the Proposed Easement and other Project activities. To address the scoping requirements outlined in Section 26.2, the ecology impact assessment adopted the following approach:

- Definition of an assessment area for relevant Project components for assessment, including the Proposed Easement, proposed Tragowel Terminal Station, proposed Bulgana Reactor Station and laydown and/or workforce accommodation areas (Section 26.5).
- Desktop reviews of ecological databases administered by DEECA and the National Environmental Protection Agency (National EPA), together with other databases, websites, aerial photography and light detection and ranging (LiDAR) imagery for the Proposed Easement to characterise the landscape and identify known or potential biodiversity values.
- Field assessments included vegetation quality assessments (VQAs), assessments for potential TECs and habitat assessments to identify areas that may support threatened species. These assessments were undertaken in 2023, 2024 and 2025 in accessible areas along the Proposed Easement, including public land and private properties where land access was granted. Field assessments later in 2024 and 2025 also focussed on documenting values within the proposed Bulgana Reactor Station and laydown and/or workforce accommodation areas.
- Use of supplementary assessment methods for inaccessible areas, including aerial imagery, LiDAR, historical imagery and, where possible, field verification from adjacent accessible land, to identify areas with known or potential ecological value.

- Assessment of the likelihood of occurrence of EPBC Act-listed and FFG Act-listed threatened and/or migratory species and the likelihood of occurrence of EPBC Act-listed and FFG Act-listed TECs.
- Targeted flora and fauna surveys for species with a greater than low likelihood of occurrence (2024-2026). Transects were walked to search for threatened flora species and fauna surveys utilised a range of techniques including tile grids, diurnal bird surveys, acoustic detectors, spotlighting, call playback and eDNA sampling.
- Characterisation of land use and soil disturbance to provide context to the capacity of native vegetation and threatened species to persist in the broader agricultural landscape.
- Integration of community, landholder and agency feedback into the ecological assessment.
- Application of a risk screening process to identify the key ecological impact pathways requiring detailed assessment.
- Calculation of native vegetation loss based on the assumed construction footprint for the Proposed Easement and other Project components, including towers, access tracks, stringing locations, laydown areas, workforce accommodation areas, proposed Bulgana Reactor Station and Tragowel Terminal Station.
- Calculation of the extent of TEC and threatened flora and fauna habitat loss for the Proposed Easement and easement options. Calculations of the extent were based on imagery analysis and corresponding EVCs assigned as a proxy to calculate impacts for threatened flora and fauna habitat and TECs where field surveys could not be undertaken to confirm the occurrence of a TEC. The geographic range of threatened flora and fauna species also informed calculations of extent of EVCs as potential habitat.
- Assessment of impacts on EPBC Act-listed threatened species and communities with a greater than low likelihood of occurrence and assessment of the potential for major impacts on species and communities listed under the FFG Act.



The [Ramsar Convention](#) is an international treaty adopted in 1971 in Ramsar, Iran, that provides a framework for the conservation and wise use of wetlands and their resources. Countries that are parties to the Convention commit to identifying and protecting wetlands of international importance and promoting their sustainable use.

A [Ramsar site](#) is a wetland of international importance that has been formally designated under the Ramsar Convention because it meets internationally recognised criteria for its ecological, biological or hydrological importance.

- Assessment of potential impacts on migratory species, wetlands listed under the Ramsar Convention, threatening processes, bird and bat collision risk, including identification of species of concern and areas where collision risk would be highest.
- Collision risk assessment for birds and bats drawing on DEECA's 'species of interest' framework developed for wind turbine collision risk (Lumsden et al. 2019; DEECA 2024), supplemented by transmission line-specific considerations including the static nature of conductors/earth wires and visibility factors. The framework was used to identify 'species of concern' for the Project and to inform the qualitative risk ratings presented in this chapter.
- Undertaking of a cumulative impact assessment to consider the combined effects of the Project with other proposed projects that have potential to impact on the same receptors as the Project and for which potential impacts were quantified.
- Identification of Environmental Performance Requirements (EPRs) to reduce the likelihood or consequence of potential impacts. The EPRs define the environmental outcomes that must be achieved by the Project and form a mandatory and enforceable component of the Project's Environmental Management Framework (EMF).
- Calculation of offsets required to compensate for unavoidable residual impacts.

Ecological investigations evolved alongside, and informed, the route refinement process. Existing conditions assessments were undertaken progressively from the broad Area of Interest and Draft Corridor through to the Proposed Easement and other Project activities. Early desktop and field investigations informed route refinement and helped identify areas of ecological value to avoid where practicable. As the Proposed Easement was refined, more detailed field assessment and targeted surveys were undertaken to inform the EES impact assessment. Some vegetation and habitat assessments, and some fauna surveys, were therefore undertaken in locations that are no longer part of the Project; however, that information has informed the broader understanding of landscape context and the route refinement process.

Overall, the Project intersects 445 properties with 440 properties associated with the Proposed Easement and four of the laydown and workforce accommodation sites proposed on the same property as the Proposed Easement. Another five properties are the locations of proposed laydown and workforce accommodation sites. Of the 445 properties intersected by the Project, 241 properties (approximately 54%) were field inspected for ecology assessment. The inaccessible 46% of properties were assessed using a range of desktop and remote methods, including aerial imagery, LiDAR and historical imagery. In addition, representative examples of aerial imagery indicating potential native vegetation were ground-truthed in accessible areas to test the reliability of the desktop assessment approach. The combination of field and desktop assessment enabled the Proposed Easement to be broadly characterised into dominant land uses as a means of identifying the proportion that was known or had potential to support ecological values.

The alternative assessment approach for inaccessible land was discussed with Department of Energy, Environment and Climate Action (DEECA), the National Environmental Protection Agency (EPA) and Department of Transport and Planning (DTP). In areas where access was not available, a conservative approach was adopted so that potential impacts were not understated. This included the use of a precautionary approach, using remotely sensed and modelled datasets to identify potential native vegetation and potential habitat values. The desktop methods were agreed in principle with DEECA and the National EPA to be the best available to identify potential ecological values in the absence of access.

The results of the field and desktop methodologies have informed the existing conditions and impact assessment discussed in this chapter.

26.3.2 Avoidance and minimisation

The principles of avoidance and minimisation adopted for the Project are outlined in *EES Chapter 6: Assessment framework*. That chapter describes the evaluation framework developed for the Project and applied consistently throughout the route refinement process. A summary of the evaluation framework as it relates to ecology is provided below along with an outline of the avoidance and minimisation applied during the refinement of the Project from a broad Area of Interest to a Proposed Easement.

26.3.2.1 Evaluation framework

An evaluation framework was developed for the Project, where key environmental considerations were identified and used to evaluate proposed options for the Project.

The evaluation framework, which was applied consistently throughout Project development, is detailed in *EES Chapter 6: Assessment framework*.

For the ecology impact assessment, the following evaluation framework criteria were considered relevant:

- Avoid location of infrastructure in national parks, state forests, state parks, nature conservation reserves, wildlife reserves and other protected areas.
- Avoid location of infrastructure in Ramsar wetlands.
- Avoid waterways and riparian areas where possible. As a first priority, avoid areas within 50 m of waterways, where practicable.
- Avoid the removal, destruction or lopping of native vegetation present in private land and along streamside and roadside reserves wherever practicable. Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
- Avoid areas of known threatened flora and fauna species identified through desktop studies and direct and indirect on-ground surveys, wherever practicable

- Avoid wetlands used for breeding or nesting by Brolgas and other waterbird species wherever possible and minimise the intersection with guideline buffer areas as per the Brolga Interim Guidelines and Brolga Standards.



The [Victorian Biodiversity Atlas \(VBA\)](#) is a Victorian Government database of species occurrence records that provides information on the distribution and abundance of plants, animals and other species across Victoria.

- Avoid wetlands identified by DEECA as current wetlands wherever practicable.
- Avoid areas housing any known Victorian Biodiversity Atlas (VBA) threatened sensitive fauna records and all threatened species listed under both the FFG and EPBC Acts, and associated habitat values wherever practicable.
- Avoid the following sensitive zones where practicable:
 - Public Conservation and Recreation Zones (PCRZ)
 - Public Park and Recreation Zones (PPRZ).
- Avoid the following sensitive overlays where practicable:
 - Environmental Significance Overlay (ESO)
 - Vegetation Protection Overlays (VPO).

By following these criteria, the Project was able to avoid and minimise interaction with areas of high receptor sensitivity as much as practicable during identification of the route refinement process.

26.3.2.2 Avoidance and minimisation during route refinement

Detailed information on route refinement and the Proposed Easement identification process is provided in *EES Chapter 3: Project development and alternatives*. This section summarises that process in the context of avoiding and minimising impacts on ecological values. The progression from the Area of Interest to the Draft Corridor and then to the Proposed Easement, together with the key ecological constraints that informed that process, is shown in Figure 26-1 and Figure 26-2.

Area of Interest

The Area of Interest defined for the Project was a 5–50 km wide area identified once the need for the Project was established. It was selected based on the technical requirements of the Project and following consultation with stakeholders, Traditional Owners, local government and community members. The Area of Interest was assessed as the most suitable broad corridor having regard to ecological and non-ecological constraints.

From an ecological perspective, the Area of Interest was characterised by a predominantly cleared agricultural landscape, with most native vegetation and habitat associated with roadsides, waterways and wetlands. Early desktop assessment of biodiversity values, including historical species records and key landscape-scale ecological constraints, informed refinement of the Area of Interest to avoid potentially unacceptable impacts on important biodiversity features. This included direct avoidance of the Patho Plains Important Bird Area/Key Biodiversity Area and the core re-introduction area for the critically endangered Plains-wanderer *Pedionomus torquatus*.

Refinement at this stage also sought to avoid larger and more regionally significant ecological features, including the Kerang Wetlands Ramsar Site and Northern Victorian Wetlands Key Biodiversity Area, Kara Kara National Park, the Great Spectacle Lakes Complex, the St Arnaud Box-Ironbark Region Key Biodiversity Area/Important Bird Area, other large wetland complexes, and major conservation reserves.

The Strategic Biodiversity Values (SBV) dataset was used for the route refinement process. The SBV dataset represents a modelled, statewide biodiversity prioritisation layer derived from multiple datasets and was used at a strategic level to inform route refinement; they are not equivalent to mapped EVCs or confirmed EPBC Act-listed communities. The more recently developed (October 2024) Habitat Values map was used for the purposes of the EES assessment, as discussed in this chapter.



Strategic Biodiversity Values (SBV) is a modelled, landscape-scale measure that ranks the relative biodiversity importance of locations across Victoria. It considers biodiversity values including species habitat, vegetation type and condition, rarity and depletion, and landscape connectivity. Higher SBV scores indicate locations of greater relative biodiversity value.

Draft Corridor

The Area of Interest was refined to an approximately 2 km wide Draft Corridor through desktop assessment and a broader constraints assessment involving engagement with Traditional Owners, landholders, community members and government agencies. From an ecological perspective, this stage drew on available spatial information, including DEECA's Strategic Biodiversity Values mapping, to identify areas of relative biodiversity importance and priority areas for avoidance.

The Draft Corridor then became the focus of field investigations to support further refinement to the Proposed Easement, which is assessed in this EES. These field investigations primarily focussed on a 270 m wide survey area to allow flexibility to identify an optimal route for the Proposed Easement and enable localised adjustments, where required.

Proposed Easement

Based on the constraints assessment of the Draft Corridor, and the outcomes of the engagement with landholders, Traditional Owners and other stakeholders, the Draft Corridor was refined to the Proposed Easement. In ecological terms, this refinement sought to avoid and minimise impacts on ecological values to the extent practicable by reducing interaction with wetlands and wetland bird habitat, remnant native vegetation, streamside vegetation, wildlife reserves, nature conservation reserves and modelled TECs.

The Proposed Easement was also refined to avoid or reduce impacts on specific ecological features in different parts of the alignment. This included applying buffers to wetlands associated with Brolga and other wetland birds, maintaining separation from the Kerang Wetlands Ramsar site, avoiding reserves such as Leaghur State Park, Plumpton Wildlife Reserve, Benjeroop Wildlife Reserve, Quambatook Bushland Reserve, Wooroonook Lakes Wildlife Reserve, and Morri Morri and Mount Bolangum Nature Conservation Reserves, and selecting river and creek crossing points in locations intended to minimise impacts on remnant vegetation within streamside corridors. In agricultural areas, the Proposed Easement was also refined to avoid or minimise impacts on high-quality remnant vegetation, scattered trees and other known sensitive ecological values where practicable.

At Tragowel and Teddywaddy, two Proposed Easement options remain under consideration. For the purposes of the ecology impact assessment, both options have been assessed and are reflected in the impact calculations.

Tower siting

The Proposed Easement was further refined by optimising tower locations and making minor adjustments to the Proposed Easement based on the outcomes of field assessments and consultation with landholders. Further detail on the refinements made during this period is available in *EES Chapter 3: Project development and alternatives*. This process provides an additional opportunity to avoid and minimise impacts on native vegetation, habitat features and other identified ecological values.

Tower siting formed an important part of the Project's avoidance and minimisation approach. Across the alignment, tower locations were reviewed iteratively to identify opportunities to reduce interaction with remnant native vegetation, scattered trees, habitat features and other localised ecological constraints. This included consideration of opportunities to slightly shift individual tower locations, where practicable, to avoid or reduce impacts on scattered remnant patches and trees while maintaining engineering, constructability, safety and landholder requirements.

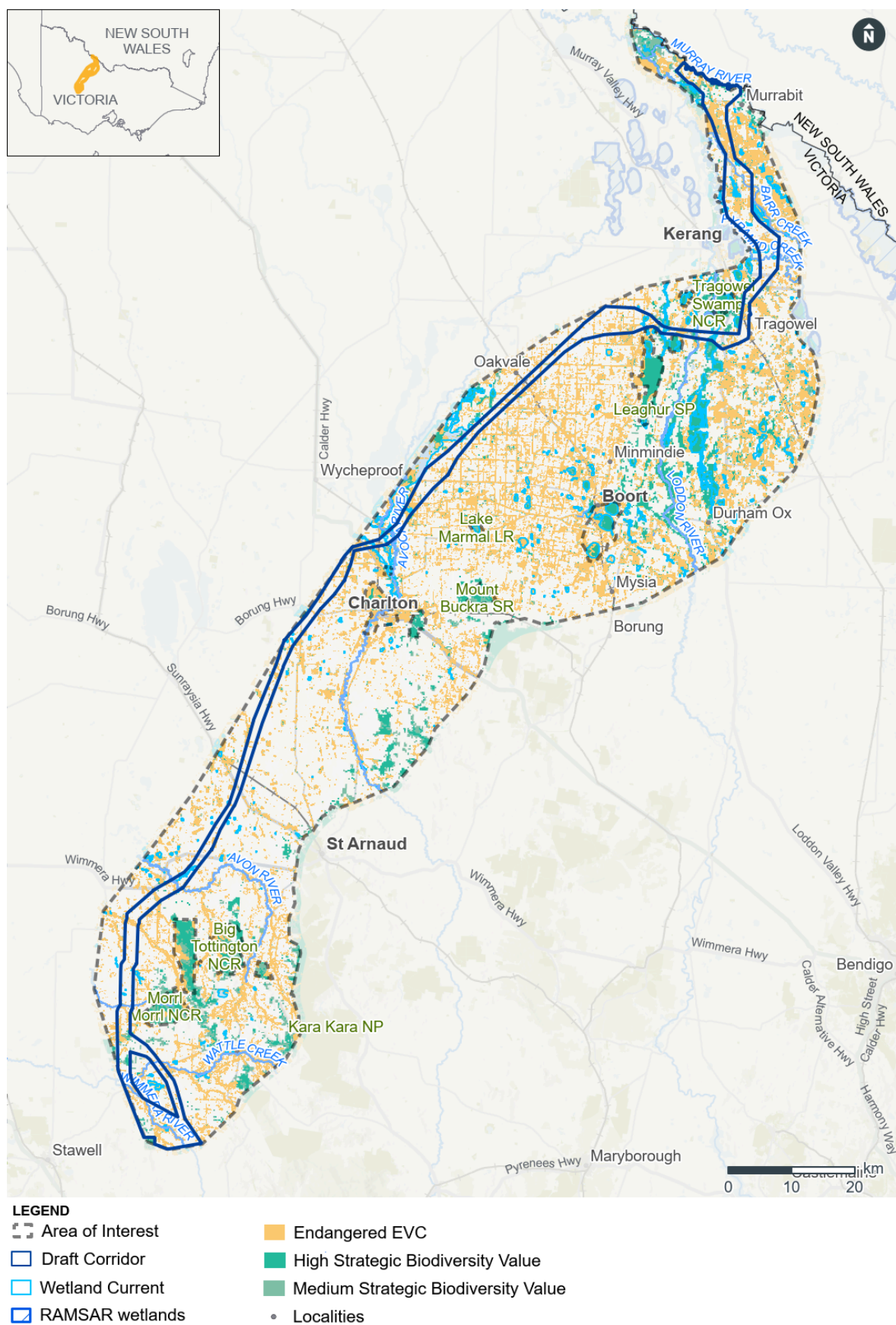
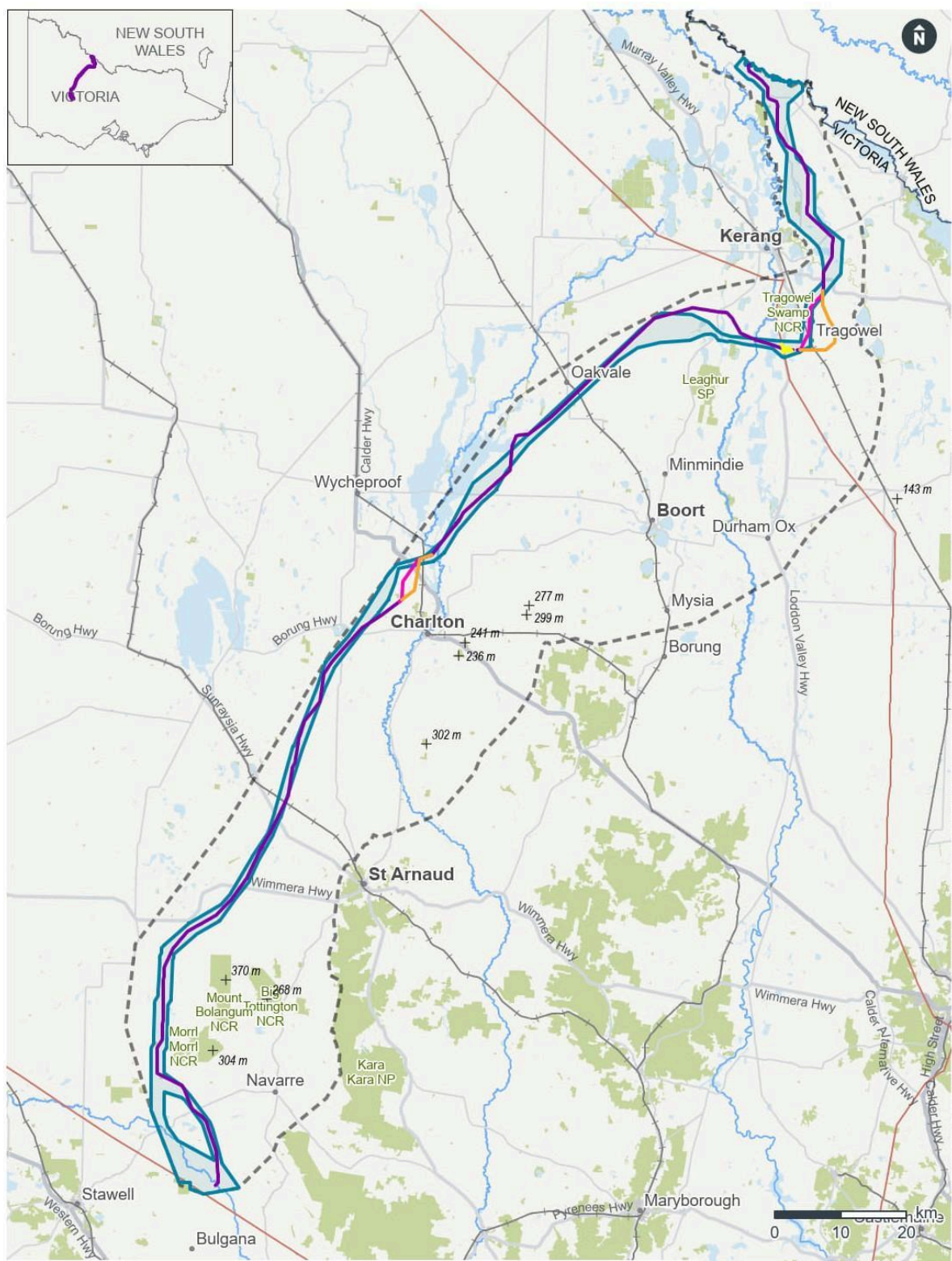


Figure 26-1 Area of Interest and Draft Corridor in relation to strategic biodiversity values



LEGEND

- Proposed Easement
- Proposed Easement Option
- Proposed Easement Option
- Proposed 220kV Easement
- VNI West Draft Corridor
- Option 5A Area of Interest
- + High Points
- Existing 220kV Transmission Line

VicGrid
AECOM

Figure 26-2 Proposed Easement refined from Draft Corridor and Area of Interest

26.4 Summary of stakeholder and community engagement

Stakeholder and community engagement activities have been ongoing since the Project's inception. *EES Chapter 7: Stakeholder and community engagement* details the key engagement activities undertaken for the Project. The purpose of this engagement was to keep stakeholders informed of key Project milestones, capture stakeholder feedback and respond to enquiries.

Engagement activities, between 2023 and 2025, that specifically involved ecology specialists were:

- Two meetings with the Barapa Barapa Traditional Owner group in relation to microbat surveys and Corben's Long-eared Bat
- Multiple meetings with local residents at Boort, Kerang, Charlton, Stawell, Murrabit between 2023 and 2025 to answer general questions and document feedback in relation to ecology
- Meetings with landholders and near neighbours of the Project at their properties, businesses or online who were willing to share insights on the ecological values on their property
- Meetings with a local ecologist and landholder near Lake Meran and the Great Spectacle Lakes Complex to discuss the presence of Brolgas and other waterbirds
- Meeting with a landholder who had been monitoring a population of Victorian Inland Carpet Pythons on their property, to determine if the surrounding area represented suitable habitat
- An On-Country day at the Murray River to observe older remnant vegetation in areas near Flowerday Lane.

Stakeholder, community and landholder feedback on ecological values was used to inform route refinement, the existing conditions assessment, and targeted field investigations. This included information on the locations of rare or threatened native flora and fauna, areas containing Buloke and Box trees, endangered orchids, remnant native vegetation, important wetlands and floodplain areas, and locations where species such as Wedge-tailed Eagle had been recorded. This local knowledge provided valuable place-specific information that informed the broader ecological assessment, including identification of areas of sensitivity and opportunities to avoid or minimise impacts where practicable.

Agency engagement (DEECA, the National EPA and DTP) informed the assessment framework and assumptions applied in relation to inaccessible land.

26.5 Study area

As the Project has evolved through the route refinement and tower siting process described in Section 26.3.2.2, a formal boundary for an ecological study area was not defined. Assessment areas were identified progressively for the Project. Existing conditions assessments progressed from the broad Area of Interest and a Draft Corridor to the Proposed Easement and other Project activities relevant to the EES impact assessment. Collectively, those areas are referred to as the Project area where distinction of specific Project components is not required. The Project area encompasses:

- The Proposed Easement, which is the location of the 500 kilovolt (kV) double-circuit overhead transmission line. The Proposed Easement is 70 m wide, except at two transposition locations where it would be 170 m wide. Proposed Easement options are being considered at two locations (Tragowel and Teddywaddy). The Proposed Easement, including the options, intersects 440 properties comprised of private property and public land.
- The proposed Tragowel Terminal Station, that is contained within a single property (privately owned), is required to interface and connect the 500 kV transmission line into the existing 220 kV Bendigo to Kerang transmission line (AusNet asset).
- Nine potential laydown and/or workforce accommodation areas to temporarily receive and store materials, plant and equipment and the like at locations selected to enhance construction efficiency and accessibility and/or temporarily house the workforce during construction. The locations of these areas were subject to a technical and environmental desktop assessment to ensure that selected areas met Project requirements without causing unacceptable environmental impacts. This process is discussed in *EES Chapter 3: Project development and alternatives*.
- The proposed Bulgana Reactor Station, which is contained within a single property (privately owned) at the southern end of the Proposed Easement. The proposed Bulgana Reactor Station is to be constructed inside or adjacent to the proposed Bulgana Terminal Station (WRL) being built by AusNet. Shunt reactors help control voltage levels and improve stability of electricity as it travels through transmission lines. The specific location of the Bulgana Reactor Station would be determined during detailed design, but an indicative area needed to accommodate the facility informed the assessment of ecological impacts.

Access points from local roads into the Proposed Easement and laydown areas that may require localised alterations to intersections or vegetation clearance to improve sight lines for compliance with safe intersections sight distance (SISD) and/or to accommodate large construction vehicles were also considered by the ecology impact assessment.

These components have been assessed because they have the potential to result in vegetation clearance, habitat loss or disturbance, either within the Proposed Easement or at discrete supporting infrastructure locations.

For the purposes of the EES, four temporary workforce accommodation areas are being assessed, with the assumption that only three would ultimately be used. These are located at Kerang South, the proposed Tragowel Terminal Station site, near Charlton and near Greens Creek. Each of the laydown and potential workforce accommodation areas have been considered to identify ecological constraints and confirm its suitability from an ecology perspective.

26.6 Existing environment

The Project is located in a landscape that has been largely cleared of native vegetation. The landscape comprises vast extents of agricultural land used for grazing or cropping from dryland farming in the south to increasingly irrigated farming in the north. Historical land use is described in more detail in *Technical Appendix P: Land use and planning*. The extent of clearing that has been undertaken historically means that the remnants that do remain are the last areas of habitat in which many species, including common species, can persist. A detailed discussion and mapping of existing conditions is provided in *Technical Appendix S: Ecology* and is summarised in the following sections.

The properties proposed for the laydown and/or workforce accommodation areas are primarily agricultural land characterised by predominantly introduced vegetation. Most of the areas are highly degraded and dominated by crops or grazing land. Some of the properties support small patches of native vegetation.

The property proposed for the Tragowel Terminal Station is largely devoid of native vegetation due to historical and on-going agricultural practices typical of the broader landscape characterised by broadacre cropping. The Bulgana Reactor Station area has two patches of woodland, with the remainder being a low-quality patch of native vegetation formed by improved pasture with a low density of perennial native grasses among the exotic annual grasses. The main patch of woodland occurs along the Wimmera River and there is another small depression on the site with indigenous forbs and graminoids.

The Proposed Easement is dominated by introduced vegetation, predominantly grazed pasture and cropping land with most remnant vegetation confined to roadsides and streamsides, and smaller patches or scattered trees occasionally retained within farmland. A small number of non-indigenous plantings (mainly shelterbelts) are also intersected by the Project, although most are not connected to areas of native vegetation.

The remnant vegetation and habitat that remain within the Proposed Easement are primarily woodland, although areas of mallee, riverine forest, grassland, and chenopod shrubland also occur. Scattered eucalypts and Buloke are also present in some agricultural areas. Some patches of woodland and forest EVCs occur as treeless forms and are known as derived native grasslands.

The Proposed Easement is approximately 87% agricultural land use (cropping and grazing) and 12% natural areas, with native vegetation occurring across 13% of those natural areas. Although limited in extent, these remaining natural areas are important because they often contain remnant habitat, structural diversity and connectivity values that persist within the broader modified agricultural landscape.

The Proposed Easement traverses three river basins (the Loddon River Basin, Avoca River Basin and Wimmera-Avon Basin), within a landscape containing hundreds of waterways, irrigation channels and numerous wetlands. Further details on surface water bodies are provided in *Technical Appendix G: Surface water*.

The Proposed Easement has been selected to avoid wetlands, including the Kerang Wetlands Ramsar site. The Proposed Easement does not intersect the Ramsar site at any point but does pass between Fosters Swamp (2.5 km to the west) and Johnson Swamp (located 12 km to the south-east).

Other key biodiversity areas avoided by the Project are the Northern Victorian Wetlands Key Biodiversity Area and Important Bird Area, Patho Plains Important Bird Area/Key Biodiversity Area (which forms part of the broader Northern Victorian Wetlands Key Biodiversity Area) and the St Arnaud Box-Ironbark Region Key Biodiversity Area and Important Bird Area.

The Project area spans multiple Victorian bioregions. These regions and their broad location from north to south are:

- Murray Fans along the Murray River inland to approximately Pyramid Creek (Figure 26-3)
- Victorian Riverina, which occurs from approximately Pyramid Creek to Avoca River and surrounds the area of Murray Mallee bioregion (Figure 26-3 and Figure 26-4)
- Murray Mallee surrounded by the Victorian Riverina, from approximately Dingwall to Glenloch (Figure 26-3 and Figure 26-4)
- Wimmera (small extent) from approximately Avoca River to Morrl Morrl (Figure 26-4 and Figure 26-5)
- Goldfields in the south from Morrl Morrl to the Bulgana with a narrow section of Wimmera Bioregion extending across around Heifer Station Creek and Greens Creek (Figure 26-5).

The Project passes through multiple Local Government Areas (Gannawarra Shire, Loddon Shire, Buloke Shire and Northern Grampians Shire) and crosses the traditional Country of the Wamba Wemba, Barapa Barapa, Dja Dja Wurrung and Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk Peoples.



Key biodiversity areas are sites of significance for the global persistence of biodiversity. These areas are identified using globally standardised criteria established by the International Union for Conservation of Nature (IUCN) through a collaborative effort involving scientists, conservation organisations, and government agencies worldwide.

Bioregions are a landscape-scale approach used by DEECA to classify the environment based on a range of attributes including climate, geomorphology, geology, soils and vegetation.

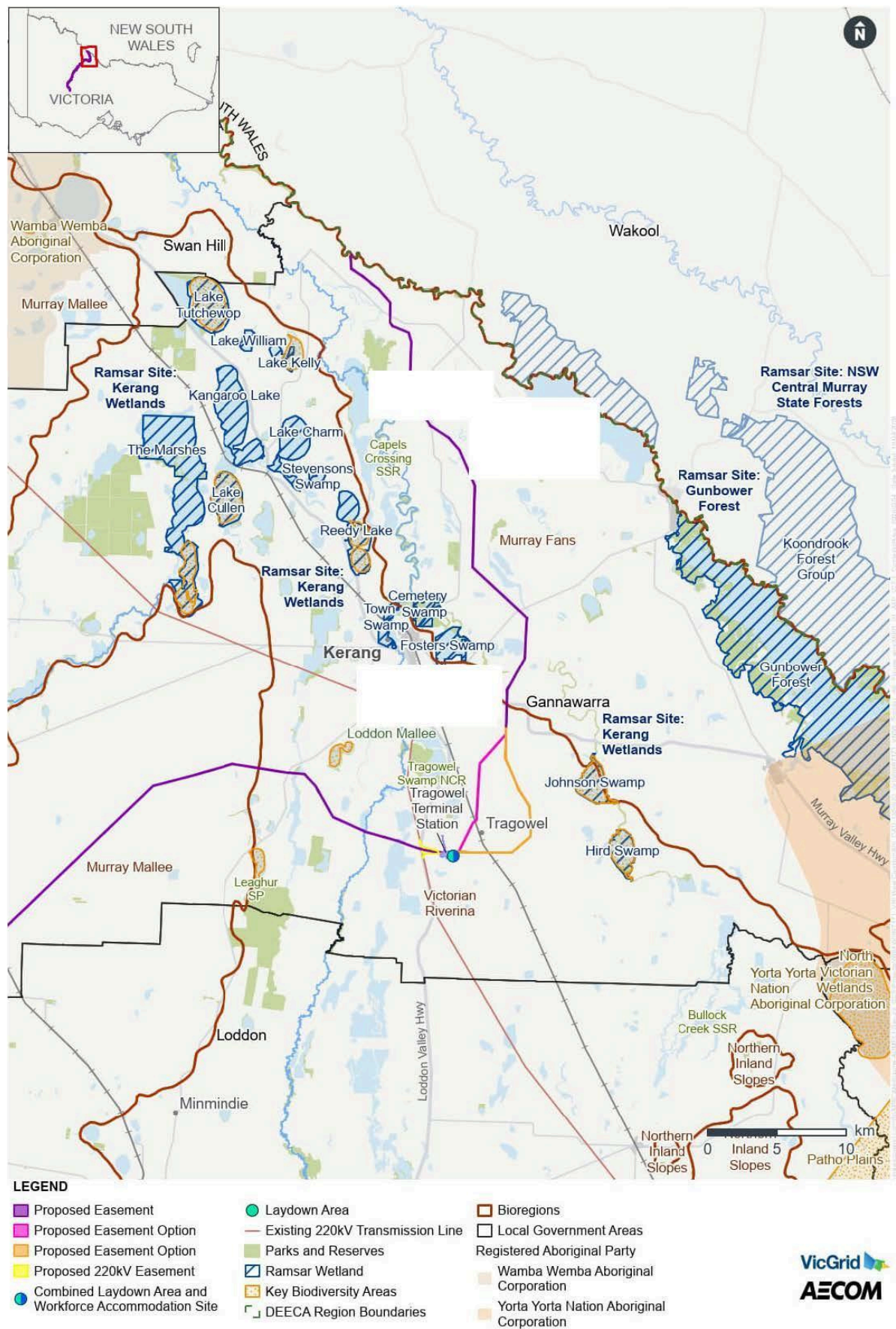


Figure 26-3 Bioregions, wetlands and waterways of the Proposed Easement (northern portion)

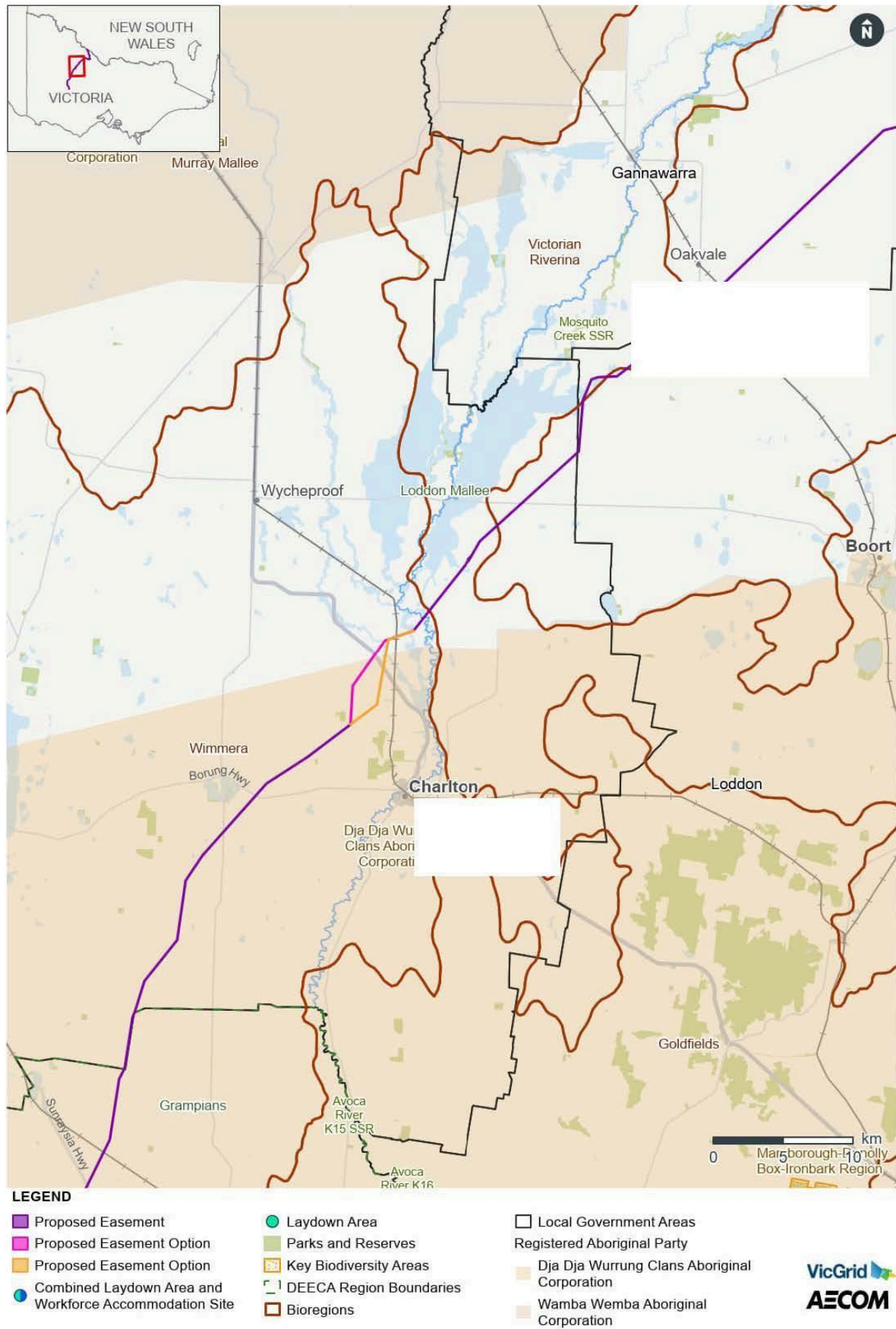


Figure 26-4 Bioregions, wetlands and waterways of the Proposed Easement (central portion)

Figure 26-5 Bioregions, wetlands and waterways of the Proposed Easement (southern portion)

26.6.1 Matters of National Environmental Significance



The **Protected Matters Search Tool (PMST)** is an official Australian Government online tool that identifies Matters of National Environmental Significance (MNES) and other protected matters under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that may occur in a selected area.

Matters of National Environmental Significance (MNES) are nationally significant values protected under the EPBC Act. There are nine categories of MNES that include World Heritage Properties, National Heritage Places, Ramsar wetlands, nationally listed threatened species and ecological communities and listed migratory species.

The Project was referred to the Commonwealth under the EPBC Act and determined to be a 'controlled action' requiring assessment and approval under the EPBC Act due to potential for the Project to have a significant impact on three of the MNES categories:

- Wetlands of International Importance (Ramsar wetlands)
- EPBC Act-listed threatened species (flora and fauna) and ecological communities
- EPBC Act-listed migratory species.

Identification of MNES within 10 km of the Draft Corridor was conducted using the EPBC Act Protected Matters Search Tool (PMST). The PMST results were then reviewed and, where relevant, refined using habitat assessment and field survey information.

The three controlling provisions are discussed below. Further details of MNES are discussed in *EES Chapter 27: Matters of National Environmental Significance*.

26.6.1.1 Wetlands of international importance (Ramsar)

Ramsar sites are wetlands of international importance designated under the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention). Australia is expected to manage Ramsar wetlands to maintain their ecological character.

The PMST identified that the Project is in proximity to two Ramsar sites - the NSW Central Murray State Forests and the Kerang Wetlands (see Figure 26-3).

NSW Central Murray State Forests Ramsar Site

The PMST search area extended into NSW by virtue of the buffer applied to the Proposed Easement, which resulted in the NSW Central Murray State Forests Ramsar Site being included in the search. However, no part of the Project is within the Ramsar site and the closest point of the Ramsar site to the Project is Campbells Island State Forest, which is 6.5 km east of the Proposed Easement.

Kerang Wetlands Ramsar Site

The Kerang Wetlands Ramsar Site consists of a collection of 23 named lakes, marshes and swamps and occupies approximately 9,400 hectares (ha). The Ramsar site provides important feeding and nesting habitat for waterbirds including species threatened at the international, national or state level and/or listed as migratory under international migratory bird agreements.

The Proposed Easement at its closest point is approximately 2.5 km to the east of the Kerang Wildlife Reserve which contains Fosters Swamp (Figure 26-3), one of the wetlands that forms part of the Kerang Wetlands Ramsar Site. The Project would not intersect the Ramsar site at any point, however, the Project may present a collision risk to threatened and migratory bird species which use the Ramsar site. This is discussed in Section 26.7.5.

26.6.1.2 EPBC Act-listed threatened ecological communities

Threatened ecological communities are naturally occurring groups of native plants, animals, and other organisms that interact within a unique habitat. These communities are listed under the EPBC Act when they are at risk of collapse or extinction.

The PMST identified eight EPBC Act-listed TECs with potential to occur within the 10 km search area. PMST presence ratings are known, likely and unlikely. These terms are defined as:

- Known - Confirmed presence in the searched area based on field surveys or reliable recent records
- Likely - Suitable habitat is present and the species/TEC is expected to occur
- Unlikely - Habitat absent or is highly fragmented.

Two of the eight TECs (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland and Weeping Myall Woodlands) are unlikely to occur in the Project area but are in the PMST search radius results because the search extended into NSW. These are not listed in Table 26-2.

No EPBC Act list TECs occur within the proposed Tragowel Terminal Station, proposed Bulgana Reactor Station, or in the laydown and/or workforce accommodation areas.

Five EPBC Act listed TECs were recorded in the Project area (in the Proposed Easement) during field assessments or have potential to occur in inaccessible areas. These are listed in Table 26-2.

In the case of the faunal TEC (Mallee Bird Community of the Murray Darling Depression Bioregion), the species associated with the TEC was unconfirmed and therefore presumed to be present based on the modelled presence of suitable habitat.

Table 26-2 EPBC Act-listed TECs identified by PMST search and their likelihood of occurrence based on field surveys

TEC	Status	PMST rating of potential occurrence in 10 km search area	Likelihood of occurrence in Project area based on field survey
Natural Grasslands of the Murray Valley Plains	EPBC Act CR	Known	Recorded

TEC	Status	PMST rating of potential occurrence in 10 km search area	Likelihood of occurrence in Project area based on field survey
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Plate 26-1)	EPBC Act EN	Likely	Recorded
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	EPBC Act EN	Known	Recorded
Plains Mallee Box Woodland of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (Plate 26-1)	EPBC Act CR	Known	Recorded
Mallee Bird Community of the Murray Darling Depression Bioregion	EPBC Act EN	Likely	Medium
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	EPBC Act CR	Likely	Unlikely – no corresponding vegetation was detected during surveys, suitable depressions absent in surveyed areas or unlikely to occur in unsurveyed areas

Table notes:

CR Critically endangered: Extremely high risk of extinction in the immediate future

EN Endangered: Very high risk of extinction in the near future



Plate 26-1 Grey Box Woodlands EPBC TEC at Sheales Road (left) and Plains Mallee Box Woodlands EPBC TEC at Weir Road (right)

26.6.1.3 EPBC Act-listed threatened flora species

There are five EPBC Act-listed threatened flora species with a greater than low likelihood of occurrence within the Project area based on targeted surveys. The species are listed in Table 26-3. Four of the EPBC Act-listed species are also listed as threatened in Victoria under the FFG Act.

One EPBC Act-listed flora species was recorded during surveys for the Project: Turnip Copperburr.

Table 26-3 EPBC Act-listed threatened flora species (greater than low likelihood of occurrence)

Scientific name	Common name	Status	PMST rating for occurrence based in 10 km search area	Likelihood of occurrence in Project area based on targeted survey
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	EPBC Act VU	Known	Medium
<i>Lepidium monoplacoides</i>	Winged Peppergrass	EPBC Act EN FFG Act EN	Likely	Medium
<i>Maireana cheelii</i>	Chariot Wheels	EPBC Act VU FFG Act EN	Known	High
<i>Myriophyllum porcatum</i>	Ridged Water-milfoil	EPBC Act VU FFG Act CR	Known	Medium
<i>Sclerolaena napiformis</i>	Turnip Copperburr	EPBC Act EN FFG Act CR	Known	Recorded (75 plants recorded in Proposed Easement)

Table notes:

CR Critically endangered: Extremely high risk of extinction in the immediate future

EN Endangered: Very high risk of extinction in the near future

VU Vulnerable: High risk of extinction in the medium-term future

26.6.1.4 EPBC Act-listed threatened fauna species

There are 19 EPBC Act-listed threatened fauna species with a greater than low likelihood of occurrence within the Project area. These are listed in Table 26-4. Most species are also listed as threatened in Victoria under the FFG Act.

Table 26-4 EPBC Act-listed threatened fauna species with a greater than low likelihood of occurrence

Scientific name	Common name	Status	PMST rating of potential occurrence	Likelihood of occurrence in Project area based on survey
Mammals				
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	EPBC Act VU FFG Act EN	Likely	Low (revised from medium following targeted survey)

Scientific name	Common name	Status	PMST rating of potential occurrence	Likelihood of occurrence in Project area based on survey
				Targeted survey undertaken from November 2025 to January 2026 with three surveys completed in three areas of representative habitat around Kerang. Species not detected during those surveys despite over 400 bats being captured in that time
Birds				
Terrestrial (woodland or grassland habitats)				
Swifts				
<i>Hirundapus caudacutus</i>	White-throated Needletail	EPBC Act VU Mi FFG Act VU	Known	Medium Targeted survey not undertaken due to intermittent occurrence of species (presumed presence)
Parrots and cockatoos				
<i>Lathamus discolor</i>	Swift Parrot	EPBC Act CR FFG Act CR	Known	Medium (south region), low elsewhere Targeted survey not conducted due to intermittent occurrence of species (presumed presence)
<i>Lophochroa leadbeateri leadbeateri</i>	Pink Cockatoo	EPBC Act EN FFG Act CR	Known	Medium Not detected during diurnal bird surveys but may occur in the north of the Project area (presumed presence)
<i>Neophema chrysostoma</i>	Blue-winged Parrot	EPBC Act VU FFG Act VU	Known	Medium Targeted survey not undertaken due to intermittent occurrence of species (presumed presence)
Australian warblers, treecreepers, robins and finches				
<i>Aphelocephala leucopsis</i>	Southern Whiteface	EPBC Act VU FFG Act VU	Known	High Although not recorded in areas of potential woodland habitat during bird surveys (presumed presence)
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern)	EPBC Act VU FFG Act VU	Known	Recorded

Scientific name	Common name	Status	PMST rating of potential occurrence	Likelihood of occurrence in Project area based on survey
	Plate 26-2			Observed during surveys in areas of dry open woodland habitat along rivers and roadsides
<i>Melanodryas cucullata</i>	Hooded Robin	EPBC Act EN FFG Act VU	Known	Low-Medium Diurnal bird survey did not detect the species and habitat may be too fragmented to support the species suggesting likelihood of occurrence may be lower (presumed presence)
<i>Stagonopleura guttata</i>	Diamond Firetail	EPBC Act VU FFG Act VU	Known	High Although diurnal bird survey did not detect the species could occur in association with areas of grassy woodland (presumed presence)
Wetland habitats				
Shorebirds (<i>Charadriiformes</i>)				
<i>Charadrius bicinctus</i>	Double-banded Plover	EPBC Act Mi	Known	Medium Targeted survey not undertaken as primary areas of potential habitat avoided by Project and species is highly mobile (presumed presence)
<i>Gallinago hardwickii</i>	Latham's Snipe	EPBC Act VU Mi FFG Act VU	Known	Medium Targeted survey not undertaken as species is highly cryptic and mobile (presumed presence)
<i>Rostratula australis</i>	Australian Painted-snipe	EPBC Act EN FFG Act CR	Known	Medium Targeted survey not undertaken as most potential habitat avoided by Project and species is highly mobile (presumed presence)
Reptiles				
<i>Delma impar</i>	Striped Legless Lizard Plate 26-3	EPBC Act VU FFG Act VU	Known	Recorded Detected during tile surveys at two locations in public roadsides around Glenloch and may occur in other areas of potential habitat
Frogs				

Scientific name	Common name	Status	PMST rating of potential occurrence	Likelihood of occurrence in Project area based on survey
<i>Crinia sloanei</i>	Sloane's Froglet	EPBC Act EN FFG Act EN	Known	Low Targeted survey did not detect species and Project is west of the primary distribution
<i>Ranoidea raniformis</i> (recent taxonomic revision from <i>Litoria raniformis</i>)	Growling Grass Frog	EPBC Act VU FFG Act VU	Known	Medium (reduced from high following targeted survey) Not recorded during targeted survey undertaken at locations in proximity to past records north of Kerang. Targeted surveys at the Tragowel Terminal Station in 2023 did not detect Growling Grass Frog. Advice from a local expert at the time suggested an unlikely presence of the species in the general area due to chemical treatment of the irrigation systems.
Fish				
<i>Bidyanus bidyanus</i>	Silver Perch	EPBC Act EN FFG Act EN	Known	High (both species) No survey as rivers avoided and indirect impacts could be avoided by setbacks and a Surface Water Management Plan (SWMP) (presumed presence)
<i>Maccullochella peelii</i>	Murray Cod	EPBC Act VU FFG Act EN	May occur	
Invertebrates				
<i>Synemon plana</i>	Golden Sun Moth	EPBC Act VU FFG Act VU	Likely	High Potential grassland habitat is present in the south. Targeted survey not undertaken due to access constraints (presumed presence)

Table notes:

CR Critically endangered: Extremely high risk of extinction in the immediate future

EN Endangered: Very high risk of extinction in the near future

VU Vulnerable: High risk of extinction in the medium-term future

Mi: Migratory: Species that visit Australia as part of their seasonal migrations



Plate 26-2 Brown Treecreeper (EPBC Act vu; FFG Act vu)



The ***Flora and Fauna Guarantee Act 1988*** (FFG Act) is Victoria's primary legislation for the conservation of biodiversity and the management of potentially threatening processes.

The Act provides for:

- The listing of threatened species and communities of flora and fauna in Victoria; and
- The listing of potentially threatening processes that may threaten the survival, abundance or evolutionary development of native flora or fauna.

Some species and ecological communities listed as threatened under the FFG Act may also be listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).



Plate 26-3 Striped Legless Lizard (EPBC Act vu; FFG Act vu)

26.6.1.5 EPBC Act-listed migratory species

Migratory species are protected under international agreements to which Australia is a signatory. The bilateral agreements and conventions for the conservation of migratory birds are:

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (RoKAMBA)

- Bonn Convention, which is the Convention on the Conservation of Migratory Species of Wild Animals.

The route refinement process to select the Proposed Easement has avoided wetland areas of potential migratory shorebird habitat and the other Project components do not support suitable wetland habitat. Four migratory species, Double-banded Plover, Latham's Snipe, White-throated Needletail and the Fork-tailed Swift, were identified as having a greater than low likelihood of occurrence. Latham's Snipe and White-throated Needletail are also listed as vulnerable under the EPBC Act and FFG Act (Table 26-4).

26.6.2 State biodiversity values

State biodiversity values considered in the ecological assessment included:

- Native vegetation protected under the native vegetation removal regulations under the Victoria Planning Provisions (*Planning and Environment Act 1987*)
- FFG Act-listed TECs
- FFG Act-listed threatened flora and fauna species
- Hollow-bearing trees
- Habitat corridors
- Waterways.

These values are described in the following sections.

26.6.2.1 Native vegetation

Native vegetation is defined as plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses. Native vegetation types are described and mapped in Victoria based on the EVCs classification system. EVCs group vegetation communities based on similar ecological characteristics, such as:

- Floristic composition (types of plant species present)
- Structure (e.g. forest, woodland, grassland)
- Environmental factors (soil type, climate, topography).

Each EVC is also assigned a bioregional conservation status, which shows how much of that vegetation type remains in a bioregion, and its condition, relative to its pre-1750 extent. Categories include:

- Endangered (EN) where less than 10% of its pre-1750 extent remains in a bioregion, or the community is highly degraded
- Vulnerable (VU) where 10–30% of the original EVC extent remains in a bioregion
- Depleted is where 30–50% of pre 1750 extent remains
- Least concern is where more than 50% of pre-1750 extent remains and is in relatively good condition.

The Project area has been subject to extensive clearance and modification due to historical agricultural land use. Most remnant vegetation is restricted to roadsides and streamside's, with the occasional patch retained within farmland or scattered trees.

Twenty-three EVCs have been recorded in the Project area using a combination of surveys and desktop mapping. Of the 23 EVCs, 17 are listed as 'endangered' and the remaining six are either 'vulnerable' or 'depleted' in at least one of the bioregions described in Section 26.6. The full list of EVCs is provided in *Technical Appendix S: Ecology*.

DEECA mapped wetlands are also regarded as native vegetation (EVC 74 Wetland Formation) under the Guidelines for the removal, destruction or lopping of native vegetation (DEECA, 2025). There are 30 DEECA-mapped wetlands intersected by the Proposed Easement, nine of which are temporary freshwater marshes (lignum swamps) that are naturally occurring and are periodically inundated and can act as breeding grounds for Brolgas and other waterbird species. The remainder are periodically inundated dams/water storages.

DEECA confirmed in 2025 that there are no Victorian native vegetation offset sites intersected by the Project. No offset sites occur on properties proposed for laydown and/or workforce accommodation areas. It is unlikely that the Proposed Easement intersects any EPBC Act offset sites as the route has avoided larger patches of remnant vegetation.

26.6.2.2 FFG Act-listed threatened ecological communities

Eight FFG Act-listed TECs are known or have the potential to occur within the Proposed Easement. These FFG Act-listed TECs are listed in Table 26-5 along with their EPBC TEC classification where the TECs are synonymous.

Table 26-5 FFG Act-listed TECs known or with the potential to occur within the Project area

FFG Act TEC classification	Presence rating
Creekline Grass Woodland (Goldfields) Community	Known
Grey Box – Buloke Grassy Woodland Community Synonymous with EPBC Act listed TECs – Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (endangered) and Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (endangered)	Known
Northern Plains Grassland Community Synonymous with EPBC Act listed TEC – Natural Grasslands of the Murray Valley Plains (critically endangered)	Known
Semi-arid Northwestern Plains Buloke Grassy Woodland Community Similarities with EPBC Act listed TEC – Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (endangered)	Known
Victorian Temperate Woodland Bird Community	Known
Red Gum Swamp Community No. 1	Possible in inaccessible areas
Victorian Mallee Bird Community Synonymous with EPBC Act-listed TEC of the same name (endangered)	May occur in Ridged Plains Mallee along roadsides
Lowland Riverine Fish Community	May occur in Murray River and other non-ephemeral waterways such as Loddon River and Pyramid Creek

26.6.2.3 FFG Act-listed threatened flora species

In addition to four flora species also listed as threatened under the EPBC Act (Table 26-3), there are 50 FFG Act-listed threatened flora species with a greater than low likelihood of occurrence in the Project area. These species include endangered, vulnerable and critically endangered orchids, herbs, grasses, shrubs and trees and are identified in *Technical Appendix S: Ecology*.

Eighteen of those species were recorded during targeted surveys, which include individuals reported in areas adjacent to, but outside of the Proposed Easement. These, along with the numbers of individuals recorded during surveys, are shown in Table 26-6.

Where individuals were identified in the Proposed Easement, this is stated in the table. Full details of all species are provided in *Technical Appendix S: Ecology*, specifically Appendix C of that report.

Table 26-6 FFG Act-listed threatened flora species known to occur and number of individuals of species recorded

Scientific name	Common name	Status	Number of individuals recorded during surveys (number in Proposed Easement)
<i>Acacia oswaldii</i>	Umbrella Wattle	cr	241 (66)
<i>Allocasuarina luehmannii</i>	Buloke	cr	365 (55)
<i>Amyema linophylla</i> subsp. <i>orientalis</i>	Buloke Mistletoe	cr	12
<i>Asperula gemelli</i>	Twin-leaf Bedstraw	en	243 (24)
<i>Centipeda crateriformis</i> subsp. <i>Crateriformis</i>	Lagoon Sneezeweed Plate 26-5	en	4 (none but may be present)
<i>Chenopodium desertorum</i> subsp. <i>Desertorum</i>	Frosted Goosefoot Plate 26-7	en	647 (none but may be present)
<i>Dianella porracea</i>	Riverine Flax-lily Plate 26-8	cr	71 (19)
<i>Dianella tarda</i>	Late-flowered Flax-lily	cr	1 (none but may be present)
<i>Dichondra</i> sp. 1	Silky kidney weed Plate 26-9	en	31 (none but may be present)
<i>Duma horrida</i> subsp. <i>horrida</i>	Spiny Lignum	cr	569 (188)
<i>Eragrostis australasica</i>	Cane Grass	cr	900 (410)
<i>Eragrostis lacunaria</i>	Purple Love-grass Plate 26-6	en	16 (none but may be present)
<i>Eremophila divaricata</i> subsp. <i>divaricate</i>	Spreading Emu-bush	vu	187 (83)

Scientific name	Common name	Status	Number of individuals recorded during surveys (number in Proposed Easement)
<i>Eramophila maculata</i> subsp. <i>maculata</i>	Spotted Emu-bush	cr	None in Proposed Easement
<i>Minuria cunninghamii</i>	Bush Minuria	vu	8 (none but may be present)
<i>Sida fibulifera</i>	Pin Sida	en	386 (211)
<i>Vittadinia condyloides</i>	Club-hair New Holland Daisy Plate 26-4	en	1 in Proposed Easement
<i>Vittadinia cuneata</i> var. <i>hirsuta</i>	Fuzzy New Holland Daisy	en	302 in Proposed Easement

Table notes:

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en Endangered: Very high risk of extinction in the near future

vu Vulnerable: High risk of extinction in the medium-term future



Plate 26-4 New Holland Daisy *Vittadinia condyloides* (FFG Act endangered)



Plate 26-5 Lagoon Sneezeweed *Centipeda crateriformis* subsp. *crateriformis* (FFG Act endangered)



Plate 26-6 Purple Love-grass *Eragrostis lacunaria*
(FFG Act endangered)



Plate 26-7 Frosted Goosefoot *Chenopodium*
desertorum subsp. *desertorum* (FFG Act endangered)



Plate 26-8 Riverine Flax-lily *Dianella porracea*
(FFG Act critically endangered)



Plate 26-9 Silky Kidney-weed *Dichondra* sp. 1
(FFG Act endangered)

26.6.2.4 FFG Act-listed threatened fauna species

There are 27 FFG Act-listed threatened fauna species with a greater than low likelihood of occurrence in the Project area. These species include endangered, vulnerable, critically endangered and threatened mammals, birds, reptiles, frogs, fish, and invertebrates and are identified in *Technical Appendix S: Ecology*. Ten of those species were recorded during targeted surveys and these are the ones listed in Table 26-7. Other FFG Act listed fauna species that are also threatened under the EPBC Act are listed in Section 26.6.1.4. Full details of all species are provided in *Technical Appendix S: Ecology* (specifically Appendix D of that report).

Table 26-7 FFG Act-listed threatened fauna species recorded during surveys

Scientific name	Common name	Status	Observations during surveys
Birds			
<i>Falco subniger</i>	Black Falcon	cr	Observed during surveys
<i>Ninox connivens</i>	Barking Owl	cr	Heard calling in the distance from a linear roadside corridor around Nareewillock during nocturnal surveys
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler Plate 26-14	vu	Several family groups recorded along roadsides and riparian corridors during diurnal bird surveys north of Charlton to Murray River

Scientific name	Common name	Status	Observations during surveys
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	en	Not recorded during diurnal bird survey but observed incidentally in the landscape
<i>Hieraaetus morphnoides</i>	Little Eagle	vu	Species recorded during survey
Reptiles			
<i>Morelia spilota metcalfei</i>	Carpet Python Plate 26-13	en	Population known to occur near Glenloch and also observed near the Murray River
<i>Morethia adalaidensis</i>	Samphire Skink Plate 26-10	en	Populations found during surveys in Capels Crossing and Kerang East
<i>Pogona barbata</i>	Bearded Dragon Plate 26-12	vu	Observed at several locations in the landscape
<i>Pygopus schraderi</i>	Hooded Scaly-foot Plate 26-11	cr	Recorded in the Quambatook area
<i>Varanus varius</i>	Lace Monitor	en	Recorded at several locations along roadsides and riparian corridors during surveys to east and south of Kerang

Table notes:

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vu Vulnerable: High risk of extinction in the medium-term future



Plate 26-10 Samphire Skink (FFG Act critically endangered)



Plate 26-11 Hooded Scalyfoot (FFG Act critically endangered)



Plate 26-12 Bearded Dragon (FFG Act critically endangered)



Plate 26-13 Carpet Python (FFG Act endangered)
(Photo supplied by landholder)



Plate 26-14 Grey-crowned Babbler (FFG Act vulnerable)

26.6.2.5 Large habitat trees/hollow-bearing trees

Large, old trees are important for wildlife and ecosystem function because of their typically greater size and structural complexity. Large trees are often referred to as ‘habitat trees’ because they provide a range of resources that can support a variety of different species. Large trees are also most likely to contain hollows, and most hollow-bearing trees are likely to contain multiple hollows. Hollow-bearing trees provide critical nesting and roosting sites for a wide range of wildlife species and are a resource that is difficult to replace once lost. To be conservative, all large trees were assumed to have hollows. Any scattered trees mapped from desktop information were assumed to be large and therefore hollow-bearing, and patches mapped from desktop information were assumed to contain the benchmark number of large trees.

26.6.2.6 Habitat corridors

Habitat corridors provide for movement and exchange of individuals, genetic material, and ecological processes between different habitats, allow for the colonisation of new areas, and support ecological interactions such as pollination and seed dispersal. Habitat connectivity promotes the establishment and maintenance of larger and more viable populations.

Wildlife corridors and 'stepping stones' benefit native fauna, particularly in modified landscapes where much of the surrounding habitat has been cleared. Scattered trees (including large paddock trees) and small patches can act as 'stepping stones' facilitating movement of more mobile species such as birds through the landscape. Scattered trees provide functional connectivity, particularly where cropping has been limited and livestock grazing has been the primary practice.

Habitat connectivity in the Project area was considered based on field observations and a review of aerial photography to visually identify linkages in the landscape.

Riparian corridors along rivers and creeks and remnant roadsides are the primary habitat linkages that remain within the Project area. Some corridors provide linkages between larger patches of habitat, while others may facilitate movement of more mobile wildlife through the landscape.

Wider, more prominent forest and woodland linkages are associated with the major rivers and creeks, including Murray River, Pyramid Creek, Loddon River, Wandella Creek, Avoca River, Richardson River, Anderson Creek and Wimmera River.

Numerous roadsides crossed by the Proposed Easement provide linkages between larger patches, and others may facilitate movement of more mobile wildlife by functioning as 'stepping stones' where canopy connectivity is not continuous along the roadside or does not directly connect to large reserves. More notable roadside corridors identified during the field assessments encompassed:

- Meering West Road and Crump Road roadsides in Quambatook – links along the roadsides to the east with larger patches that extend into private land and ultimately to Leaghur State Park along Boort-Kerang Road some 14 km to the east of the Project. Meering West Road and Crump Road are connected and form a right angle of continuous Ridged Plains Mallee vegetation.
- Boort – Quambatook Road near Oakvale that is connected to Quambatook I208 Bushland Reserve, a patch on private land to the north, and along other roadsides (Furey Road and Mosquito Creek Road) to the Griffith Lagoon Nature Conservation Reserve.
- Gardners Road and Hemleys Road in Glenloth East that are connected to a larger patch to the immediate south-east of the Proposed Easement and to a network of roadsides with woodland corridors of varying width and continuity.
- Glynwylln Road and Wallaloo East Road in Morrl Morrl, which are extensions of vegetation within Bolangum Flora Reserve and connect through to Morrl Morrl Nature Conservation Reserve to the north and other bushland reserves along Callawadda – Navarre Road.

26.6.2.7 Waterways

Numerous major and minor waterways traverse the Project area. The categories of 'major' and 'minor' waterways were adopted from the 'DEECA HY_WATERCOURSE' spatial dataset in *Technical Appendix G: Surface water*. Broadly, major waterways are large, primary rivers or major tributaries often with substantial floodplains and more permanent flows. Minor waterways are smaller, often ephemeral (intermittent) streams, creeks or tributaries.

These waterways and their condition are discussed in *Technical Appendix G: Surface water* but a summary of the main rivers and creeks from north to south is provided below:

- The Murray River is a major woodland linkage along the border between Victoria and New South Wales
- Bannagher Creek is a minor tributary of the Loddon River comprising a network of sparsely vegetated braided channels
- The Loddon River is approximately 10 m wide where it crosses the Proposed Easement and is densely vegetated with a forested riparian zone

- The Avon River has vegetation through the riparian zone which provides a contiguous canopy cover and mostly consists of mature trees
- Anderson Creek is a meandering stream that has notable riparian vegetation, with the corridor spanning approximately 100 m wide where it crosses the Proposed Easement
- Wallaloo Creek is a meandering stream with sparse riparian vegetation
- The Wimmera River supports a narrow corridor of riparian woodland vegetation

The following ephemeral waterways also support riparian vegetation: Pyramid Creek, Barr Creek, Avoca River, Wandella Creek and Richardson River.

Although not recognised as waterways by definition under the *Water Act 1989*, irrigation channels also occur in the Project area, particularly in the northern half of the Proposed Easement. Some of the irrigation channels crossed by the Project are categorised as major waterways by DEECA. Those major irrigation channels are:

- Macorna Channel at Dingwall in Loddon River Basin and Channel No. 8/12 (a smaller irrigation channel)
- Waranga Western Channel, that carries water primarily from the Goulburn River

These waterways, irrigation channels and their locations in relation to the Project are discussed in more detail in *Technical Appendix G: Surface water*.

26.6.2.8 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are terrestrial, aquatic, or subterranean ecosystems that require access to groundwater to meet all or some of their requirements. The Project area includes potential GDEs based on the mapping in the National GDE Atlas. Figures showing the locations of potential GDEs identified by the GDE Atlas are provided in *Technical Appendix C: Groundwater* and *EES Chapter 10: Groundwater*.

Terrestrial GDEs

Terrestrial GDEs are terrestrial ecosystems that rely (at least partially) on the subsurface presence of groundwater, including through vegetation with roots that access groundwater. Terrestrial GDEs include some riparian vegetation communities. Native vegetation within EVCs such as Plains Grassy Woodland, Chenopod Grassland, Lignum Swamp and Riparian Woodland occurs in areas identified by the GDE Atlas as potentially supporting terrestrial GDEs.

Aquatic GDEs

Aquatic GDEs are those that rely on groundwater discharging to the surface, including rivers, springs and wetlands. The GDE Atlas indicates that the following potential aquatic GDEs cross the Proposed Easement:

- High potential GDEs: Wimmera River, Anderson Creek, Avon River, Pyramid Creek, Barr Creek, Murrabit River, and Heifer Station Creek
- Moderate potential GDEs: unnamed temporary freshwater swamps, marshes, and meadows
- Low potential GDEs: Avoca River and adjacent unnamed temporary freshwater swamps, marshes, and meadows (in the Teddywaddy area), and Loddon River
- Unclassified potential GDEs: temporary freshwater swamps

Subterranean GDEs

Subterranean GDEs are groundwater-dependent ecosystems that occur below the ground surface, including in aquifers and caves. These ecosystems may support fauna such as stygofauna (aquatic animals that live in groundwater systems) and troglifauna (air-breathing animals that live in caves and other air-filled subterranean spaces). Stygofauna may occur in the groundwater in the vicinity of the Project, although no published information on their potential diversity or abundance in the area was identified.

A site-specific stygofauna survey was not considered necessary because many stygofauna in shallow groundwater are geographically widespread (WA EPA, 2016) and any groundwater impacts associated with the Project would be localised (in the order of metres) and unlikely to influence stygofauna at a community-wide level (*Technical Appendix C: Groundwater*).

26.6.2.9 Biodiversity planning overlays

Areas covered by Environmental Significance Overlays (ESOs) and Vegetation Protection Overlays (VPOs) have been avoided where practicable in accordance with the evaluation framework for the Project.

The main ESO areas that have not been avoided are areas of riparian vegetation (VP01), near the Murray River, Pyramid Creek, Tragowel Terminal Station, Bannagher Creek and Loddon Rivers in Gannawarra Shire, and the Avoca River Reserve in Buloke Shire.

The main VPO areas that were not able to be avoided are a section of roadside vegetation on Dawe Road (VPO1), a section of remnant vegetation between Pyramid Creek and the Murray Valley Highway and an area on Bannagher Creek (VP02) in Gannawarra Shire. VP02 also applies to where the Proposed Easement crosses Mosquito Creek Road and where it crosses the Gardners Road/Hemleys Road.

The locations of these ESOs and VPOs are shown in *Technical Appendix P: Land use and planning* and are listed in *Technical Appendix S: Ecology*.

26.7 Impact assessment

Through the route refinement and tower siting process, the Project sought to avoid larger and more regionally significant ecological features and to minimise interaction with local ecological values where complete avoidance has not been possible. The Proposed Easement is therefore the outcome of an iterative avoidance and minimisation process applied at both the strategic route selection stage and through more detailed tower micro-siting.

Accordingly, the remaining potential ecological impacts are concentrated primarily in local-scale features within the broader modified agricultural landscape, including rivers, roadsides, streamside vegetation, scattered remnant patches and scattered trees. In these locations, the Project has also sought to use existing gaps in remnant vegetation corridors, cross areas with fewer scattered trees, span larger waterways and irrigation channels, and adjust infrastructure locations where practicable to reduce impacts on remnant vegetation and habitat features.

This section assesses the potential impacts on ecological values arising from the Project and identifies the EPRs proposed to avoid, minimise and manage those impacts. The discussion of impacts focuses on the key issues identified in the EES Scoping Requirements which relate to the loss, disturbance or degradation of biodiversity values including native vegetation, listed or other protected flora and fauna species and TECs under the EPBC Act and FFG Act, and potential initiation of exacerbation of listed potentially threatening processes.

Potential impacts of the Project relate primarily to:

- Clearing of areas of TECs, native vegetation and large trees (including tree hollows)
- Clearing of habitat for threatened flora and loss of plants
- Clearing of habitat for threatened fauna and potential injury or death of individuals during construction
- Disruption to the movement of fauna between areas of habitat across the broader landscape, including risk of collisions with transmission line infrastructure
- Potential indirect impacts on threatened flora, fauna and TECs associated with threatening processes including:
 - Disruption to habitat connectivity (habitat fragmentation)
 - Loss of hollow-bearing trees (large habitat trees)
 - Introduction and/or spread of weeds and pathogens
 - Degradation of riparian vegetation
 - Increased impacts associated with pest animals (rabbits, feral cats, Red Fox)
 - Fire risk associated with construction, operation and maintenance.
- Other potential impacts including fauna displacement, injury or mortality and groundwater change affecting GDEs.
- Potential cumulative effects on biodiversity from the Project in combination with other Projects.

Impacts are most likely to occur during construction however, there are some impacts associated with operation and decommissioning of the Project that relate to ecology. This chapter presents an integrated assessment of potential impacts for the Project in recognition of the potential continuation of some impacts between phases and the application of EPRs to avoid, minimise and manage those impacts across all stages. Distinction is made between Project phases and Project activities (Section 26.7.1) where relevant. *Technical Appendix S: Ecology* discusses impacts as they relate to construction, operation and decommissioning.

Further avoidance and minimisation of native vegetation and habitat removal will continue through the detailed design process, informed by additional survey information, refinement of access tracks and infrastructure siting, and the application of the relevant EPRs.

26.7.1 Overview of Project activities relevant to ecology

Construction

Construction activities relevant to the ecology impact assessment are those that may result in vegetation clearance, habitat loss, habitat disturbance, or indirect effects on retained ecological values.

Construction activities associated with the Proposed Easement include towers, temporary construction access tracks between towers, access points from public roads into the Proposed Easement, and stringing locations.

Other Project activities that have the potential for ecological impacts include construction of the nine laydown and/or workforce accommodation areas, Tragowel Terminal Station, the two shunt reactors at the proposed Bulgana Reactor Station, and potential vegetation removal at access points and intersections to improve sight lines for compliance with safety standards and/or to accommodate construction vehicles.

Construction activities are detailed in Table 26-8.

Table 26-8 Vegetation clearance assumptions (Proposed Easement)

Construction activity	Assumed clearance	Rationale	Potential for refinement
Proposed Easement			
Entire 240 km long, 70 m wide easement (which is 170 m wide at two locations)	Total, permanent clearance of all treed EVCs	Based on initial sag analysis. All treed EVCs have a benchmark canopy height of 10 m or greater. The Project has applied the statutory minimum vegetation clearance of 6.4 m (as specified under Clause 30(3)(a) and (b) of the Code of Practice for Electric Line Clearance) between vegetation and a transmission line to the worst-case conductor height for the Project. The 6.4 m minimum clearance results in a 9.1 m threshold for the maximum height of retained vegetation based on the sag of the lines.	Assumes the lowest sag applies across the entire 70 m wide easement and is therefore conservative. Once tower locations are determined at the detailed design stage, the sag and sway analysis can be used to determine whether trees closer to the towers, which are >9.1 m, can remain (EPR-EC01).
Towers and construction footprint required to construct the towers	Total, permanent clearance of all vegetation	70 x 78 m area which includes the tower hard stand and construction laydown area outside of this. This area is within the footprint of the 70 m wide Proposed Easement.	Potential for micro-siting at detailed design.
Temporary construction access tracks between towers	Temporary clearance of all treeless vegetation during construction in the 10 m wide access track corridor Permanent^ clearance of all treed areas would have occurred as part of easement clearance above.	Based on a nominal 10 m wide corridor extending between tower construction footprints, defined by 5 m either side of the Proposed Easement centreline.	May be refined to a narrower corridor during detailed design. May be micro-sited to around areas of TEC or habitat during detailed design where possible.

Construction activity	Assumed clearance	Rationale	Potential for refinement
Temporary construction access tracks (including entry/exit points) to the easement from public roads, through private property	Unknown but native vegetation will be avoided where possible using EPR-EC01.	Locations are subject to landholder agreements.	Siting would be guided by EPR-EC01.
Stringing locations	Temporary clearance of all vegetation during construction	40 x 25 m areas every 5 km along the Proposed Easement (~48). Most are within the 70 m footprint but 11 are “angled” and require a 40 x 25 m pad outside the Proposed Easement.	Potential for micro-siting at detailed design.
Other Project activities			
Workforce accommodation and laydown areas	Vegetation removal may be required at access points. Two sites where avoidance may not be achievable are included in the impact assessment.	Vegetation and habitat assessments of these sites were undertaken to identify areas within the properties where the infrastructure could be placed to avoid native vegetation clearance. Indicative footprints were identified within the properties based on a multi-disciplinary constraints assessment that considered ecology and other factors such as cultural heritage, surface water and bushfire. Those indicative footprints were used to confirm whether native vegetation would be able to be avoided. Most of the sites have few biodiversity constraints because they are largely extensively cleared agricultural land.	Most of the sites have sufficient space to avoid areas of native vegetation when locating the infrastructure. Further ecological verification would occur once final footprints are confirmed, and any required pre-clearance measures would be implemented through the relevant management plans/EPRs prior to ground disturbance.

Construction activity	Assumed clearance	Rationale	Potential for refinement
Tragowel Terminal Station	No impact on native vegetation, threatened ecological communities or species is anticipated. The proposed footprint is highly modified, and construction of the facility would not require clearance of native vegetation.	The property for the proposed Tragowel Terminal Station is largely devoid of native vegetation due to historical and on-going agricultural practices typical of the broader landscape characterised by broadacre cropping. Construction of the facility would not require clearance of native vegetation. Growling Grass Frog surveys were conducted in areas of potential habitat outside the proposed footprint. The species was not detected despite being readily detectable at a reference site at the time and advice from a local expert confirmed that the species was unlikely to occur in the general area due to chemical treatment of the irrigation systems.	-
Bulgana Reactor Station	Vegetation removal within the indicative area is needed to accommodate the facility. Location to be refined during detailed design. No impact on threatened ecological communities or species is anticipated.	Bulgana Reactor Station site has two patches of Riparian Woodland (EVC 641) with the remainder being poor quality improved pasture comprised of a low density of perennial native grasses among exotic, annual pasture. The main patch of woodland occurs along the Wimmera River.	The property is sufficiently large to enable avoidance of ecological values along the Wimmera River when finalising the specific reactor station design.

Construction activity	Assumed clearance	Rationale	Potential for refinement
Intersection upgrades for sight line distances and vehicle turning movements	It has been assumed that vegetation clearance is not required to achieve SISD at the 45 identified locations, but that minor, targeted pruning/lopping to the minimum extent practicable may be required.	Forty-five access points and intersections potentially requiring vegetation removal or trimming to provide safe intersection sight distances (SISDs) for drivers were identified by the traffic study. The type and extent of vegetation requiring removal without the application of other management measures was identified in <i>Technical Appendix S: Ecology</i> . Rather than remove vegetation, the Project would prioritise localised interventions through road design and intersection treatments (EPR-TT03) such as temporary speed reductions and site-specific Traffic Management Plans (TMPs) (EPR-TT01).	Native vegetation removal or lopping for construction access, large and oversize, overmass (OSOM) vehicle movements, swept paths or clearance requirements would be avoided to the extent reasonably practicable.

Table notes:

^ Permanent refers to the lifespan of the Project.

Operation

The Project would have an operational life of approximately 50–100 years. Ecological impacts during operation would primarily arise from the ongoing presence of transmission infrastructure and from periodic maintenance activities. The key operational impact pathways relevant to ecology are:

- Ongoing presence of transmission towers and transmission lines in the landscape and associated risk to birds and bats. Overhead transmission lines pose the following risks:
 - Potential for collision with cables and disruption of connectivity between habitats in the landscape.
 - Potential for electrocution from birds perching or nesting on towers or perching on conducting cables. Carpet Python may also be at risk of electrocution if individuals climb the towers.
- Ongoing management of vegetation underneath transmission lines in the right of way (ROW) leading to continued disturbance to wildlife and flora species along with the associated risk of introduction or spread of weeds or pathogens during maintenance activities
- Bushfire igniting as a result of the operation of the transmission line
- Vegetation management to mitigate bushfire risk during maintenance works
- The ability of emergency services to fight fires near transmission lines.

Decommissioning

Following its operational lifespan (50–100 years), the Project would be decommissioned. Decommissioning would involve the removal of all above-ground infrastructure, such as towers, structures, buildings, electrical, ancillary and auxiliary equipment. All footings would be excavated and demolished to at least 600 mm below ground level and then backfilled with suitable material. The remaining portion of the footings below 600 mm would remain in-situ to minimise the disturbance associated with decommissioning activities.

Project decommissioning activities relevant to the ecological impact assessment relate to whether this removal would impact on any native vegetation that may have reestablished in temporarily disturbed areas or where alternative access is required through areas not disturbed during construction and operation.

Potential impacts therefore relate to:

- Removal of native vegetation and associated habitat
- Removal of threatened plants that may have recolonised areas
- Injury or death of threatened animals that may have recolonised areas
- Damage to adjacent retained native vegetation
- Introduction and spread of weeds.

26.7.2 Approach to impact assessment and conservative assumptions

The impact estimates discussed below reflect the avoidance and minimisation already achieved through the route refinement and tower siting process described in Section 26.3.2.2.

This impact assessment intentionally adopts a conservative (worst-case) estimate of vegetation clearance because access constraints have limited field survey coverage along parts of the Proposed Easement, restricting the ability to quantify impacts using survey-based methods. In the absence of full survey coverage, desktop and proxy methods have been applied to intentionally overestimate clearance to avoid understating potential effects. Clearance estimates would be refined as further land access is obtained and as detailed design is completed, including through micro-siting and subsequent sag and sway analysis once final tower locations are confirmed, which is expected to reduce the need to remove large trees and native vegetation to the extent practicable (EPR-EC01 and EPR-EC11).

For direct native vegetation and TEC removal, the impacts presented are effectively the residual impacts, as removal of vegetation cannot be mitigated once it occurs and would instead require offsets. Offsets are required for residual native vegetation removal. Offsets are not a mitigation measure and should only be sought after avoidance and mitigation, as is the case for the Project. Offsets compensate for impacts that remain after avoidance and minimisation have been applied. Offsets for native vegetation removal are discussed in Section 26.10.

Impacts are discussed below at a Commonwealth and State level.

- Commonwealth biodiversity impacts relate to EPBC Act-listed TECs, flora and fauna (MNES) and impacts of threatening processes.
- State biodiversity impacts relate to native vegetation removal, impacts on FFG Act-listed TECs, flora and fauna and impacts of threatening processes.

Impacts on MNES are also addressed in *EES Chapter 27: Matters of National Environmental Significance*.

The significance of an impact to an EPBC Act-listed TEC or listed flora/fauna species is based on assessment against the significant impact criteria outlined in Matters of National Environmental Significance: Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (DoE 2013) and species-specific significant impact guidelines as well as species conservation advice and recovery plans where available.

Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. Where an impact is likely to be significant on a MNES, offsets may be required in accordance with the EPBC Act Environmental Offsets Policy.

Details of the significant impact assessments for TECs, flora and fauna are provided in *Technical Appendix S: Ecology* (specifically Appendix K of that report).



Native vegetation removal constitutes “land clearance” which is a EPBC Act-listed threatening process.

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), a threatening process is any process that threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community.

26.7.3 Native vegetation and threatened ecological community loss

26.7.3.1 Native vegetation removal

Construction of the Project would remove native vegetation wherever there is a construction footprint that occurs in areas of native vegetation. The avoidance of sensitive ecological areas and individual trees to the extent practicable during selection and refinement of the Proposed Easement played a major role in minimising the potential ecological impacts of Project construction.

Long-term vegetation management would be required in the Proposed Easement to ensure that vegetation does not exceed set heights. Although all treed EVCs within the 70 m wide Proposed Easement would have been removed during construction, noting that all treed EVCs have a benchmark canopy height of greater than 10 m, seedlings of these species may germinate over time and require management to maintain the required clearances.

Maintenance of vegetation under utilities is covered by the Procedure to Rely on the Utility Installations Exemption in Planning Schemes – Electricity Distributors (DEECA 2019). Under the Procedure, written agreement from the Secretary is required to conduct certain vegetation management activities to allow planned and unplanned maintenance. The Procedure specifies that native vegetation must be avoided where practicable and that tree removal, if required, is not covered by the Procedure and would require offsets if in addition to removals undertaken during construction.

Native vegetation removal or lopping for construction access, large and OSOM vehicle movements, swept paths or clearance requirements would be avoided to the extent reasonably practicable.

Calculation of native vegetation impacts includes the conservative assumption that all treed EVCs would be completely removed across the full 70 m wide Proposed Easement (and 170 m at the two transposition locations) for the purposes of impact assessment. This approach has been adopted to avoid understating potential impacts. The actual extent of clearance would be refined through detailed design, including sag and sway analysis, which may confirm that some trees within the easement can be retained while maintaining the required safe separation distances between vegetation and the electricity lines in accordance with the Electricity Safety (Electric Line Clearance) Interim Regulations 2025. Vegetation within the easement would need to be managed to maintain safe separation distances from the transmission lines, in accordance with the Electricity Safety (Electric Line Clearance) Interim Regulations 2025 (Vic) and the associated Code of Practice for Electric Line Clearance.

The transmission lines hang in a curve between towers. This is known as sag (Figure 26-6), with the lowest point of the span being the point closest to the ground. Sag increases as the conductor heats up, including in hotter weather and under higher electrical loading. Sag analysis conducted for the Project indicates that, at its lowest point, the transmission line would be 15.5 m above the ground. Applying the required minimum separation distance of 6.4 m between vegetation and the transmission line means that vegetation with a mature height of less than 9.1 m would generally not require removal beneath the line other than in the 10 m wide access track between transmission towers proposed within the 70 m Proposed Easement.

Transmission lines also move side to side in windy conditions, which is known as sway. The 6.4 m separation distance must also be maintained at the maximum extent of the sway (Figure 26-7 and Figure 26-8).

Because the lowest point of the line and the greatest side-to-side movement generally occur between towers, some trees taller than 9.1 m may be able to be retained closer to tower locations or outside the maximum sway limits, even if they are within the 70 m wide Proposed Easement. As such, the current impact assessment is conservative and the extent of vegetation removal may be reduced through detailed design.

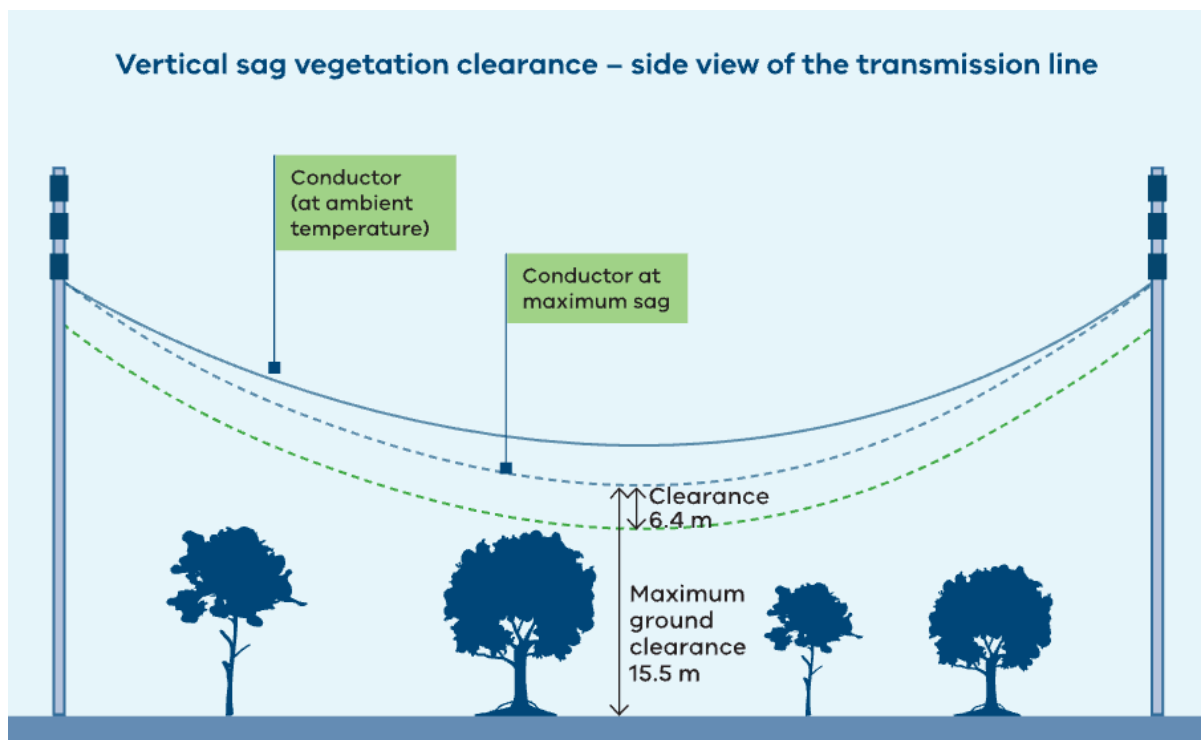


Figure 26-6 Conceptual diagram of sag

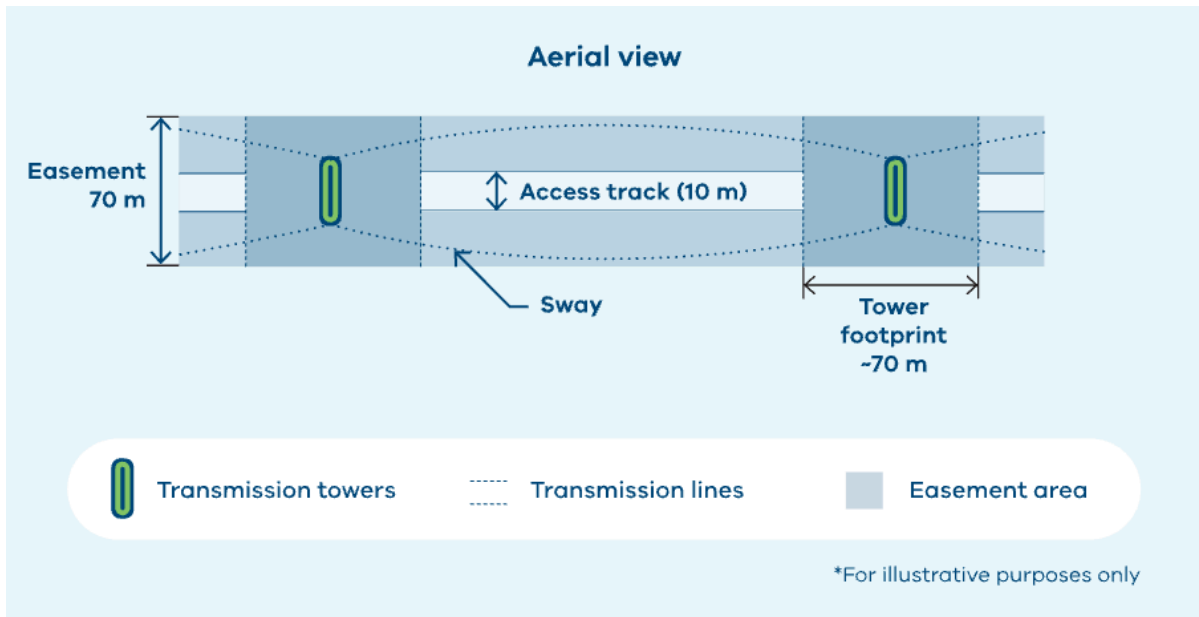


Figure 26-7 Conceptual diagram of sway

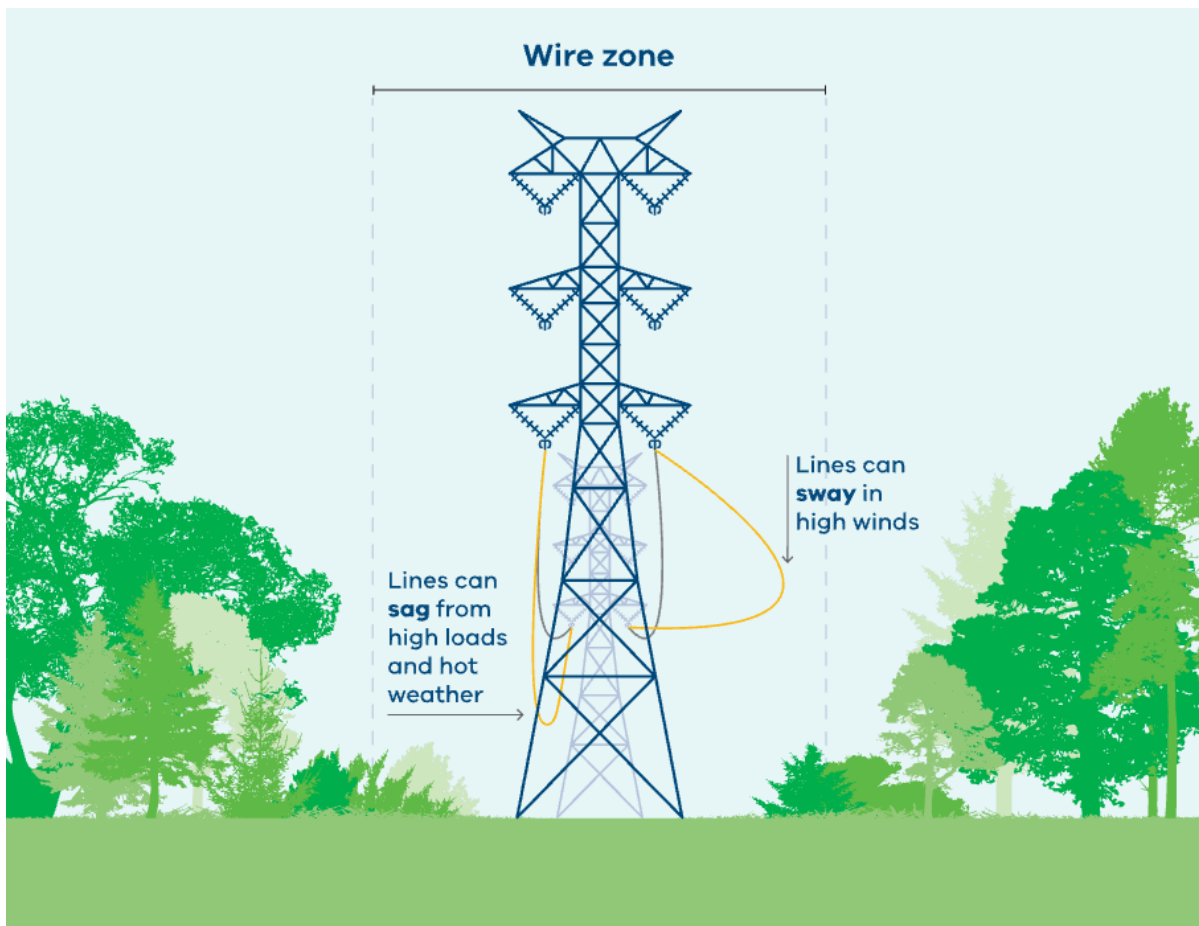


Figure 26-8 Conceptual diagram of sag and sway (looking along an easement)

The calculation of native vegetation impacts has considered the two locations where alternative Proposed Easement options remain under consideration (Tragowel and Teddywaddy) resulting in four possible combinations of the Proposed Easement footprint. These combinations were assessed for the purposes of identifying the worst-case (or maximum) native vegetation removal scenario:

- Combination 1: Tragowel eastern easement option/Teddywaddy eastern easement option
- Combination 2: Tragowel eastern easement option/Teddywaddy western easement option
- Combination 3: Tragowel western easement option/Teddywaddy eastern easement option
- Combination 4: Tragowel western easement option/Teddywaddy western easement option

The other components of the Project area (Tragowel Terminal Station, Bulgana Reactor Station, laydown and workforce accommodation areas) area included in the assessment of native vegetation impacts, although not all those components occur in areas with native vegetation.

In addition to direct impacts associated with native vegetation removal within the construction footprint, the works also have the potential to inadvertently impact native vegetation and habitat outside the construction footprint if construction activities stray beyond approved work areas.

Mitigation

The primary mitigation for native vegetation removal has been avoidance and minimisation through route refinement and tower siting. This is the principal means by which ecological impacts have been reduced for the Project. The Proposed Easement and tower locations have been progressively refined to avoid, where practicable, larger and more regionally significant ecological features, as well as localised remnant patches, scattered trees and other habitat features.

Most locations for the laydown areas and workforce accommodation have sufficient space to avoid areas of native vegetation when locating the infrastructure within the broader sites, with specific locations determined based on a multi-disciplinary constraints assessment. Further surveys would be required under EPR-EC01 and EPR-EC11 to guide the choice of access points during detailed design such that vegetation removal is avoided as far as possible.

Further reduction in native vegetation removal is expected through the detailed design process. This includes completion of sag and sway analysis (EPR-EC01) to refine the actual extent of tree clearance required within the Proposed Easement, refinement of temporary and permanent access track routes and access points, field verification in areas where current impacts are based on modelled data and continued micro-siting of infrastructure where practicable, particularly for areas of high biodiversity value (EPR-EC11). In this way, the impact assessment presented in this chapter represents a conservative assessment of the likely maximum impact rather than the final detailed design outcome.

Ongoing measures to minimise impacts on native vegetation during construction and operation include:

- Implementing construction controls through the relevant environmental management plans to protect retained vegetation and minimise degradation of adjacent habitat such as the Construction Vegetation and Habitat Management Plan (CVHMP) (EPR-EC02), Operational Vegetation and Habitat Management Plan (OVHMP) (EPR-EC09), Understorey Retention and Partial Clearance Plan (URPCP) (EPR-EC10), Culturally significant species and materials salvage plan (CSSMSP) (EPR-EC16)
- Refining access tracks and entry points to avoid native vegetation where practicable, including in consultation with landholders and with regard to ecological constraints (EPR-EM06)

- Establishing and fencing no-go zones around retained native vegetation and habitat areas to prevent accidental disturbance or clearing outside approved work areas (EPR-EC03) and restricting construction activities, plant movement, stockpiling and laydown to designated work areas
- Retaining felled trees, logs or other habitat material in situ where practicable and where this would not compromise safety clearance, access requirements or ongoing land use in accordance with EPR-EC10
- Reinstating disturbed areas, where practicable, with compatible ground and mid-storey species of local provenance, in a manner consistent with operational clearance requirements and long-term vegetation management under the transmission line in accordance with EPR-EC09.

Native vegetation removal or lopping to improve sight lines from intersections on local access roads where construction traffic would enter and exit the Proposed Easement would be avoided as far as practicable by implementation of other measures, such as speed reduction or traffic management in accordance with EPR-TT03.

Although native vegetation removal required for construction cannot be fully mitigated where clearing is necessary, the Project would continue to seek opportunities to further reduce the extent of removal before the design is finalised. Native vegetation offsets would be required for the residual removal, but offsets are not a mitigation measure; rather, they compensate for impacts that remain after avoidance and minimisation have been applied.

Accordingly, the mitigation response to native vegetation removal includes a continuing process of design refinement and construction controls intended to minimise the amount of vegetation ultimately affected.

EPRs proposed for impacts in the construction and operation phases of the Project would also be applicable in the decommissioning phase. However, due to the long lifespan of the Project current standards and approaches may no longer apply. The decommissioning stage of the Project would therefore be managed in accordance with a Project Decommissioning Environmental Management Plan (DEMP) (EPR-EM05), as required by the Project Environmental Management Framework, that would determine how to best avoid, manage or mitigate impacts at that time.

Residual impact

Most of the residual native vegetation impacts would be attributed to the Proposed Easement. Removal of native vegetation would be required to construct the transmission line towers, create access tracks, and maintain safe separation distances between vegetation and the transmission lines within the Proposed Easement. Removal of native vegetation would be required to establish two of the laydown areas and the proposed Bulgana Reactor Station.

Two proposed laydown areas would result in removal of native vegetation based on the areas of ecological constraint. One laydown area could impact on up to 4.8 ha of native grassland and another may remove a few small scattered trees. The proposed disturbance footprint for the other sites avoids native vegetation therefore no residual impact is anticipated for those workforce accommodation and laydown areas.

The property for the proposed Bulgana Reactor Station is dominated by a low-quality patch of native vegetation formed by improved pasture with a low density of perennial native grasses among the exotic annual grasses.

The extent of native vegetation that would be removed for the laydowns and reactor station is included in the calculation of native vegetation impacts. Implementation of traffic management measures to achieve safe intersection sight distances for access into the Proposed Easement and laydown and/or workforce accommodation areas would avoid the need to remove or lop native vegetation therefore, no native vegetation impacts are anticipated for construction traffic access.

A summary of native vegetation impacts for the Project by Proposed Easement option combination is provided in Table 26-9.

Native vegetation that would be removed for the Project comprises 115.7 ha of patches (475 large trees within those patches) and 149 scattered trees (130 large and 19 small) based on the maximum of each of the Proposed Easement combinations. Loss of 115.7 ha of native vegetation is substantial and represents approximately 13% of the Project disturbance footprint and approximately 0.001% of native vegetation remaining in Victoria (based on DEECA modelled extent of 10,703,153 ha). The loss of 605 large trees also represents a significant impact because large trees provide important resources for wildlife such as food, shelter and breeding sites (including hollows) and are not readily replaced.

Table 26-9 Summary of native vegetation impact extent (by Proposed Easement option combination)

Native vegetation feature	Combination 1	Combination 2	Combination 3	Combination 4
Native vegetation patches (ha)	115.7 ha	115.4 ha	112.7 ha	112.5 ha
Number of large trees in patches	471 trees	475 trees	471 trees	475 trees
Number of scattered trees (large)	133 trees	130 trees	133 trees	130 trees
Number of scattered trees (small)	19 trees	19 trees	19 trees	19 trees

Table note:

DEECA mapped wetlands are added to native vegetation patches and form part of the extent of native vegetation calculated for offsets. This equates to 6.979 ha in addition to the values above.

The native vegetation impacts associated with the Project are based on a combination of field-confirmed native vegetation and native vegetation modelled to occur in inaccessible areas. All scattered trees were generally assumed to be large unless available information indicated otherwise (i.e. field verification). Large trees in patches were derived based on the benchmark (i.e. expected) number of large trees for each EVC. However, in some cases it was possible to determine the number of trees with certainty (e.g. only one tree visible on aerial imagery), in which case individual trees were counted and considered large.

Accordingly, the impact assessment adopts a conservative approach in inaccessible areas so that potential impacts are not understated. The impact calculations are based on a precautionary construction footprint and clearance assumptions that have been applied consistently for the purposes of assessing the Project as proposed. The extent of native vegetation removal presented in this chapter is likely to overstate the final impact that would occur following detailed design. Further field surveys required under EPR-EC01 and EPR-EC11, sag and sway analysis, refinement of access tracks and access points, and continued micro-siting of infrastructure are expected to reduce the final extent of removal in at least some locations.

The extents of native vegetation impacts inform the offsets that would be required for removal of native vegetation for the Project. Large trees in patches are offset as part of native vegetation patches, while scattered trees are offset separately. Offsets required to compensate for the removal of native vegetation are subject to change once further field surveys and refinements to the design are undertaken (EPR-EC01).

A low level of ongoing disturbance to vegetation during operation is unavoidable given the need to maintain clearance heights, however, this is likely to be of low significance as the majority of treed EVCs would have already been cleared for construction. Remaining vegetation is likely to be low-lying and would not require regular maintenance as it would be below the required clearance height.

26.7.3.2 EPBC Act-listed threatened ecological communities

Five EPBC Act listed TECs were recorded during field assessments or have potential to occur in the Proposed Easement component of the Project area.

Mitigation

Consistent with the approach adopted for native vegetation, the principal mitigation for impacts on EPBC Act-listed TECs has been avoidance and minimisation through route refinement, easement refinement and tower siting. Where EPBC Act-listed TECs cannot be completely avoided, the Project would continue to seek opportunities through detailed design to minimise the extent of impact, including through micro-siting of infrastructure, refinement of access tracks and access points.

EPRs are proposed to protect retained EPBC Act-listed TECs by implementing no-go zones and construction controls to prevent inadvertent disturbance outside approved work areas. Where practicable, reinstatement of disturbed areas with compatible local provenance species may also assist in reducing indirect effects on adjoining retained vegetation. However, where clearing of an EPBC Act-listed TEC is required for construction, the direct loss of that TEC extent would remain unavoidable. The primary mitigation is therefore to avoid impacts.

Residual impact

Residual impacts on EPBC Act-listed TECs are summarised in Table 26-10. These figures are based on the maximum extent of any of the four Proposed Easement option combinations and encompass field-confirmed occurrences and inaccessible assumed occurrences. Further field surveys required under EPR-EC01 and EPR-EC11, sag and sway analysis, refinement of access tracks and access points, and continued micro-siting of infrastructure are expected to reduce the final extent of removal in at least some locations. As such, the impacts on EPBC Act listed TECs are subject to change.

In some cases, the same area may contribute to both EPBC Act-listed and FFG-Act listed TEC impact calculations where the communities are analogous.

Table 26-10 EPBC Act-listed TEC impacts

TEC name	Total impact (ha)	Likelihood of significant impact
Natural Grasslands of the Murray Valley Plains	13.7	Likely
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	37.5	Likely
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	2.0	Likely

TEC name	Total impact (ha)	Likelihood of significant impact
Plains Mallee Box Woodland of the Murray-Darling Depression, Riverina and Naracoorte Bioregions	3.9	Likely
Mallee Bird Community of the Murray Darling Depression Bioregion	4.3	Unlikely

The Project is likely to have a significant impact on four EPBC Act listed TECs – Natural Grasslands of the Murray Valley Plains, Grey Box Grassy Woodland, Buloke Woodlands and Plains Mallee Box Woodland, based on the extent of impact on confirmed occurrences of those TECs. A significant impact on the Mallee Bird Community TEC is considered unlikely.

Refinement would occur progressively as further land access is obtained during the EES exhibition and assessment period and would be confirmed prior to construction through detailed design and pre-construction surveys, with final impact/offset accounting updated in accordance with the EMF.

A summary of the significant impact assessment for the likely TECs is provided in *EES Chapter 27: Matters of National Environmental Significance* and full details of the significant impact assessment are provided in *Technical Appendix S: Ecology* (specifically Appendix K of that report).

26.7.3.3 FFG Act-listed threatened ecological communities

Eight FFG Act listed TECs were recorded during field assessments or have potential to occur in the Proposed Easement. These TECs encompass five vegetation communities and three that support fauna (birds and fish). The vegetation of these TECs and therefore the habitat of the faunal communities would be removed to construct the transmission line towers, create access tracks, and maintain safe separation distances between vegetation and the transmission lines.

Direct construction impacts to FFG Act listed TECs within the Proposed Easement have therefore been calculated based on the conservative vegetation clearance assumptions summarised in Table 26-8.

Mitigation

As with native vegetation removal, the principal mitigation for impacts on FFG Act-listed TECs has been avoidance and minimisation through route refinement, easement refinement and tower siting. Where a TEC cannot be completely avoided, the Project would continue to seek opportunities through detailed design to minimise the extent of impact, including through micro-siting of infrastructure, refinement of access tracks and access points.

Additional measures to protect retained TECs would include the implementation of no-go zones and construction controls to prevent inadvertent disturbance outside approved work areas. Where practicable, reinstatement of disturbed areas with compatible local provenance species may also assist in reducing indirect effects on adjoining retained vegetation. However, where clearing of a TEC is required for construction, the direct loss of that TEC extent would remain unavoidable. The primary mitigation is therefore to avoid impacts.

Residual impact

Residual impacts on FFG Act-listed TECs are summarised in Table 26-11. These figures are based on the maximum extent of any of the four Proposed Easement option combinations and include both confirmed occurrences and assumed occurrences in inaccessible areas. In inaccessible areas, impacts have been assessed conservatively using representative or analogous EVCs as a proxy for potential TEC occurrence. Accordingly, the impact figures are conservative and may overstate actual impacts in some locations.

In some cases, the same area may contribute to both EPBC Act-listed and FFG Act-listed TEC impact calculations where the communities are analogous.

Table 26-11 FFG Act-listed TEC impacts

TEC	Total impact (ha)	Severity rating
Northern Plains Grassland Community	17.6	Moderate
Grey Box – Buloke Grassy Woodland Community	42.8	Moderate
Semi-arid Northwest Plains Buloke Grassy Woodland Community	2.0	Low to moderate
Creekline Grassy Woodland (Goldfields) Community	<0.1	Negligible
Red Gum Swamp Community No. 1	0.8	Low
Victorian Mallee Bird Community	4.9	Low to moderate
Victorian Temperate Woodland Bird Community	30.6	Moderate
Lowland Riverine Fish Community	Impacts on aquatic habitat would be avoided for the major rivers.	Negligible

26.7.4 Threatened flora impacts

26.7.4.1 EPBC Act-listed threatened flora

Of the five EPBC Act-listed threatened flora species assessed as having a greater than low likelihood of occurrence, Turnip Copperburr (Plate 26-15) was the only species recorded during targeted surveys. No individuals of the other species were detected in accessible areas. However, this does not rule out their occurrence in inaccessible areas within the Proposed Easement and therefore potential habitat has been mapped using desktop methods and knowledge/assessment of habitat in accessible areas.



Mitigation

As with native vegetation and TECs, the principal mitigation for impacts on threatened flora has been avoidance and minimisation through route refinement, easement refinement and tower siting. Further reduction in impact is expected through assessment in inaccessible areas, detailed design refinement, micro-siting of infrastructure, and refinement of access tracks and access points where practicable.

EPRs are proposed, including an Environmental Line List (ELL) (EPR-EC13), which will identify habitat values, potential species occurrence and location-specific mitigation measures. The ELL will synthesise all the requirements from various ecological management plans in one place.

The CVHMP (EPR-EC02) will be developed to include the requirement for pre-clearance surveys and the establishment of no-go zones around occurrences, which can be retained. The CVHMP will also outline requirements for seed or propagule collection, salvage or translocation of individuals where feasible, and re-establishment or revegetation measures where appropriate.

The Threatened Species Management Plan (TSMP) (EPR-EC06) will include measures to mitigate impacts on threatened flora, including salvage of threatened species and establishment of reintroduction/planting areas with plants grown/translocation.

Residual impact

Alignment refinement and design development have prioritised avoidance of threatened flora habitat where practicable. In areas where avoidance was not feasible due to engineering, safety or land use constraints, impacts have been minimised through tower spotting and reduction of construction footprint. Notwithstanding these measures, clearance associated with construction would result in residual loss of habitat and individual plants in some locations.

Impacts on threatened flora are based on removal estimates of preferred EVCs within each species' geographic range representing habitat extent and the maximum extent of the four Proposed Easement option combinations. The impacts shown in Table 26-12 therefore represent a worst-case.

The significant impact assessments for EPBC Act-listed threatened flora species concluded a significant impact to the Turnip Copperburr is considered likely based on the assumed loss of 53 of the 75 individual plants recorded in the Proposed Easement. These 53 are in treed patches within the Proposed Easement and are therefore assumed lost as a result of clearance of the trees. Significant impacts are unlikely for the other species with a greater than low likelihood of occurrence. This conclusion is due to the species not being detected in surveyed areas and therefore being unlikely to occur in non-accessible areas in private properties where habitat is anticipated to be of lower quality due to land use practices.

Table 26-12 Significant impact on EPBC Act-listed threatened flora species (greater than low likelihood of occurrence)

Common name	Likelihood of significant impact
Turnip Copperburr	Likely
River Swamp Wallaby-grass	Unlikely
Winged Peppercress	Unlikely
Chariot Wheels	Unlikely
Ridged Water-milfoil	Unlikely

26.7.4.2 FFG Act-listed threatened flora

Of the 50 FFG Act-listed threatened flora species assessed as having a greater than low likelihood of occurrence, 18 species were recorded during targeted surveys (see Table 26-6). However, the impact assessment considered that the other species may occur and, as such, the Project has potential to impact on habitat for those threatened flora species.

Mitigation

As with native vegetation and TECs, the principal mitigation for impacts on threatened flora has been avoidance and minimisation through route refinement, easement refinement and tower siting. Further reduction in impact is expected through continued targeted flora survey, detailed design refinement, micro-siting of infrastructure, and refinement of access tracks and access points where practicable.

EPRs are proposed such as preparation of an ELL (EPR-EC13) identifying habitat values, potential species occurrence and location-specific mitigation measures, and preparation of a TSMP (EPR-EC06). Depending on the species and location, this will include pre-clearance surveys, establishment of no-go zones around known occurrences to be retained (EPR-EC03), seed or propagule collection, salvage or translocation of individuals where feasible, and re-establishment or revegetation measures where appropriate.

Residual impact

The residual impacts on the 19 recorded FFG Act listed species are provided in Table 26-13 and are of low to moderate severity. These ratings are based on number of individuals recorded within the impact area during surveys (not total number of individuals that may occur across all potential habitat), together with a broader habitat-based assessment informed by preferred EVCs and the maximum extent of the four Proposed Easement option combinations. The impact on all FFG Act listed threatened flora species with a greater than low likelihood of occurrence is listed in Table 9-8 of *Technical Appendix S: Ecology*.

The residual impacts on other FFG Act listed flora not recorded during surveys are of low severity. In most cases the potential for impact is relatively low based on the species not being detected in surveyed areas and therefore being less likely to occur in inaccessible areas. This is because inaccessible areas are primarily private properties subject to agricultural land use practices where habitat is likely to be of lower quality than the areas on public land that were surveyed. The final extent of impact on threatened flora is expected to be refined through further targeted survey and detailed design and may reduce where lower impact outcomes can be confirmed. Implementation of CVHMP would further mitigate potential impacts on the species in areas of potential habitat by limiting the number of individuals affected and protecting any individuals outside the Proposed Easement with no go zones.

Table 26-13 Impact on FFG Act-listed threatened flora species recorded during surveys

Common name	Residual Impact
Umbrella Wattle	Moderate
Buloke	Moderate
Twin-leaf Bedstraw	Moderate
Lagoon Sneezeweed	Low
Frosted Goosefoot	Moderate
Cane Spear-grass	Low
Riverine Flax-lily	Low
Silky Kidney-weed	Low
Spiny Lignum	Moderate
Cane Grass	Moderate
Purple Love-grass	Low
Spreading Emu-bush	Moderate
Blue Mallee	Low to moderate
Bush Minuria	Low
Pin Sida	Moderate
Club-hair New Holland Daisy	Low
Fuzzy New Holland Daisy	Moderate

26.7.5 Threatened fauna impacts

Threatened fauna impacts relates to both removal of habitat and risk of collision and/or electrocution.



Overhead ground wires are the thinner, uppermost wires required to protect conductors from lightning damage; also referred to as 'shield wires' or 'earth wires'.

Habitat removal

Removal of potential habitat for threatened species relates primarily to native vegetation and hollow-bearing trees required to be removed to construct the transmission line towers, create access tracks, and maintain safe separation distances between vegetation and the transmission lines. Long-term vegetation management would be required to ensure that vegetation does not exceed set heights. Native vegetation removal is discussed in Section 26.7.3.1. Loss of hollow-bearing trees is discussed in Section 26.7.6.2 and risk of displacement, injury or death of individuals is discussed in Section 26.7.6.3.

Bird and bat collision risk

The ongoing presence of transmission towers and transmission lines would present a collision risk where birds fail to detect overhead wires during flight. Collision risk is influenced by infrastructure design and bird behaviour and may be greater where less visible ground wires or shield wires are present, where lines intersect regular flight paths and where infrastructure occurs near wetlands, riparian corridors or other areas of high bird utilisation.

Collision risk would be managed through a Collision Risk Management Plan (CRMP) developed during detailed design in consultation with DEECA. The CRMP would confirm and refine priority collision-risk locations (including Kerang and Morrl Morrl) and specify practicable measures to improve wire detectability (e.g. line marking/diverters or other visibility-enhancing measures), supported by monitoring and adaptive management.

Smaller ground-dwelling or lower strata dwelling species are unlikely to fly at transmission wire heights and if they do, they are small and manoeuvrable and therefore more likely to be able to avoid collision. Furthermore, woodland birds are not identified as being species of concern for collision with wind turbines because their high flight manoeuvrability allows close-range avoidance of moving rotors and rapid changes in flight direction, suggesting that they could also avoid static Project infrastructure. Species generally most susceptible include larger, less agile birds, flocking species, and species that move frequently between wetlands or foraging areas (including shorebirds, waterbirds and some raptors). Species of concern identified for collision risk are listed in Table 26-14.

Waterbirds and shorebirds are most at risk at take-off and landing because that is when they are at the lowest altitude and most likely to encounter wires. In the Project area, this is most relevant in landscapes associated with the Kerang Wetlands and other wetland complexes. Species most at risk include EPBC Act-listed migratory species such as Double-banded Plover and Latham's Snipe, which have a high likelihood of occurrence in the northern part of the Project area.

Raptors are generally less prone to collision because they have high visual acuity, although risk may still arise where birds are focused on prey or during poor weather conditions. Birds that move at night and are known to have higher collision rates include shorebirds, pelicans, bitterns, herons, egrets, ibis, spoonbills, rails, coots, cranes, waterfowl and bustards.

Plains-wanderer is of possible concern due to the potential for some birds to be flying between areas of northern grassland habitat in the north of the Project area and the high consequence of loss of an individual. However, the number of birds moving through the landscape is likely to be small, as they are relatively sedentary and may fly at lower heights than the transmission infrastructure.

Plains-wanderers are also known to avoid moving within 200–300 m of tall trees, potentially due to predation risk of perching raptors. Transmission towers are frequently used as perches by raptors.

Collision risk in other flying species such as bats is not considered a likely impact due to the nature of the lines. Microbats and flying-foxes are more likely to be able to detect static structures in the landscape, unlike wind farm blades. Microbats such as Corben's Long-eared Bat have highly evolved echolocation senses that they use for navigation and prey detection and flying-foxes have excellent night vision. Flying-foxes often collide with distribution wires (i.e. power lines on suburban/rural roads) because these are often at canopy height and sit in amongst tree foliage. Larger transmission lines are within a corridor devoid of vegetation and wires are far apart.

Further details of collision risk are provided in *Technical Appendix S: Ecology*, including a collision risk assessment in Appendix M of that report.

Table 26-14 Species of concern for collision risk

Common name	EPBC Act Status	FFG Act Status
Shorebirds		
Australian Painted-snipe	EN	cr
Sharp-tailed Sandpiper	VU, Mi	-
Red-necked Stint	Mi	-
Double-banded Plover	Mi	-
Latham's Snipe	VU, Mi	-
Common Greenshank	Mi	en
Marsh Sandpiper	Mi	en
Waterbirds		
Magpie Goose	-	vu
Brolga	-	vu
Eastern Great Egret	-	vu
Plumed Egret	-	cr
Glossy Ibis	Mi	-
Musk Duck	-	vu
Blue-billed Duck	-	vu
Australasian Shoveler	-	vu
Freckled Duck	-	en
Australasian Bittern	EN	cr
Australian Little Bittern	-	en
Raptors		
White-bellied Sea-Eagle	-	en
Wedge-tailed Eagle	-	-
Ground-dwelling birds		
Plains-wanderer	CR	cr

Table notes:

CR Critically endangered: Extremely high risk of extinction in the immediate future

EN Endangered: Very high risk of extinction in the near future

VU Vulnerable: High risk of extinction in the medium-term future

Mi = Migratory

“-”: Not listed under that Act

Electrocution risk

Electrocution risk associated with the proposed 500 kV transmission line is considered low for birds, flying-foxes and Carpet Pythons.

Electrocution generally requires an animal to bridge between two energised components (phase–phase) or an energised component and earth (phase–ground). Electrocution is most associated with lower-voltage distribution networks where conductor spacing is small enough for many species to bridge components. By contrast, electrocution is relatively uncommon on high-voltage transmission infrastructure because conductor spacing, insulation clearances and separation from tower steelwork are substantially greater¹ (9–11 m).

Flying-foxes often confuse distribution lines as a place to rest, and their wings make contact with oppositely charged wires, causing electrocution. As flying-fox wing spans are only 1 m wide, Wedge-tailed Eagles are approximately 2.5 m wide, and the average adult length of a Carpet Python is 1.9 m (but may grow up to 3 m), they are unlikely to bridge components.

Overall, electrocution risk associated with the Project's transmission line infrastructure is considered low.

Electrocution risk is more relevant in terminal/reactor station environments, where smaller birds may perch, roost or nest in complex equipment layouts.

Mitigation

Specific mitigation measures are not recommended at this stage because the final design of the transmission line would be determined once the construction contractor is appointed. At that time, specific measures to mitigate the risk would be identified, drawing on the potential mitigations outlined below that are currently available and any emerging methods that may be identified in future.

EPR-EC01 and EPR-EC11 focus on further avoidance of habitat through ongoing refinement of the construction footprint for the Project, including minor adjustments to tower locations where practicable and refinement of access points and access tracks to avoid habitat.

Once avoidance to the extent practicable has been achieved, additional mitigation measures would be implemented through the CVHMP, the Fauna Management Plan (FMP) (EPR-EC05), TSMP (EPR-EC06), and the ELL (EPR-EC13). These plans would be prepared prior to commencement of construction (and prior to relevant ground disturbance works), following appointment of the Principal Contractor, and would be developed/implemented in accordance with the EMF and the relevant EPR triggers.

Depending on the species and location, measures in these plans would include pre-construction surveys for resident fauna, nests, and hollow occupancy; salvage and relocation of fauna by appropriately qualified personnel where required; requirements for artificial hollows or nest boxes, retention of felled habitat material such as logs where practicable; retention and protection of understorey vegetation in areas of partial clearance; reinstatement of disturbed habitat and connectivity where practicable; and traffic management measures, including reduced speed limits and contractor awareness measures, to reduce the risk of wildlife strike during construction.

¹ For VNI West, the scale of the proposed 500 kV and 220 kV structures means the separation between conductors and potential perch points on the tower would be expected to exceed these recommended minimum clearances by a substantial margin. In the current design, vertical separation between cross-arms is typically 9–11 m for 500 kV and 4–5 m for 220 kV, and horizontal spacing between conductors is also substantial (~14–15 m for 500 kV and ~9–10 m for 220 kV).

Where removal of hollow-bearing trees cannot be avoided, artificial hollows and/or appropriately designed nest boxes may be deployed where suitable to support both FFG Act-listed and EPBC Act-listed hollow-dependent species, with monitoring and maintenance requirements specified in the relevant management plans.

A Collision Risk Management Plan (CRMP) (EPR-EC07) will be developed by the Principal Contractor with input from a suitably qualified ecologist, in consultation with DEECA, to identify priority collision-risk locations and specify appropriate mitigation measures, monitoring and adaptive management.

Increasing wire detectability may be a key collision-risk mitigation measure for the Project during operation. Wire detectability could be improved by increasing wire diameters and/or use of wire markers, also known as bird flight diverters. A range of methods would need to be implemented depending on the location and 'species of concern' and not all measures would be practicable for the Project.

The sections of the Proposed Easement considered to present the greatest risk of collision and therefore the locations where mitigations would be focused are shown in Figure 26-9². The five sections comprise:

- One continuous section between Meering West and the Murray River that passes through a landscape that supports a series of wetlands associated with the Northern Victorian Wetlands Key Biodiversity Area and Important Bird Area, and/or the Kerang Wetlands Ramsar Site
- Four separate sections around Morrl Morrl where the alignment passes between Morrl Morrl Nature Conservation Reserve and Glynwylln State Forest, both of which form part of the St Arnaud Box-Ironbark Region Key Biodiversity Area and Important Bird Area

² The Wycheproof–Oakvale pale-blue areas represent floodplain hydrology rather than discrete wetland complexes with consistently high waterbird utilisation and were therefore not identified as priority collision-risk areas; these locations would remain subject to refinement through the CRMP based on field observations and stakeholder input.

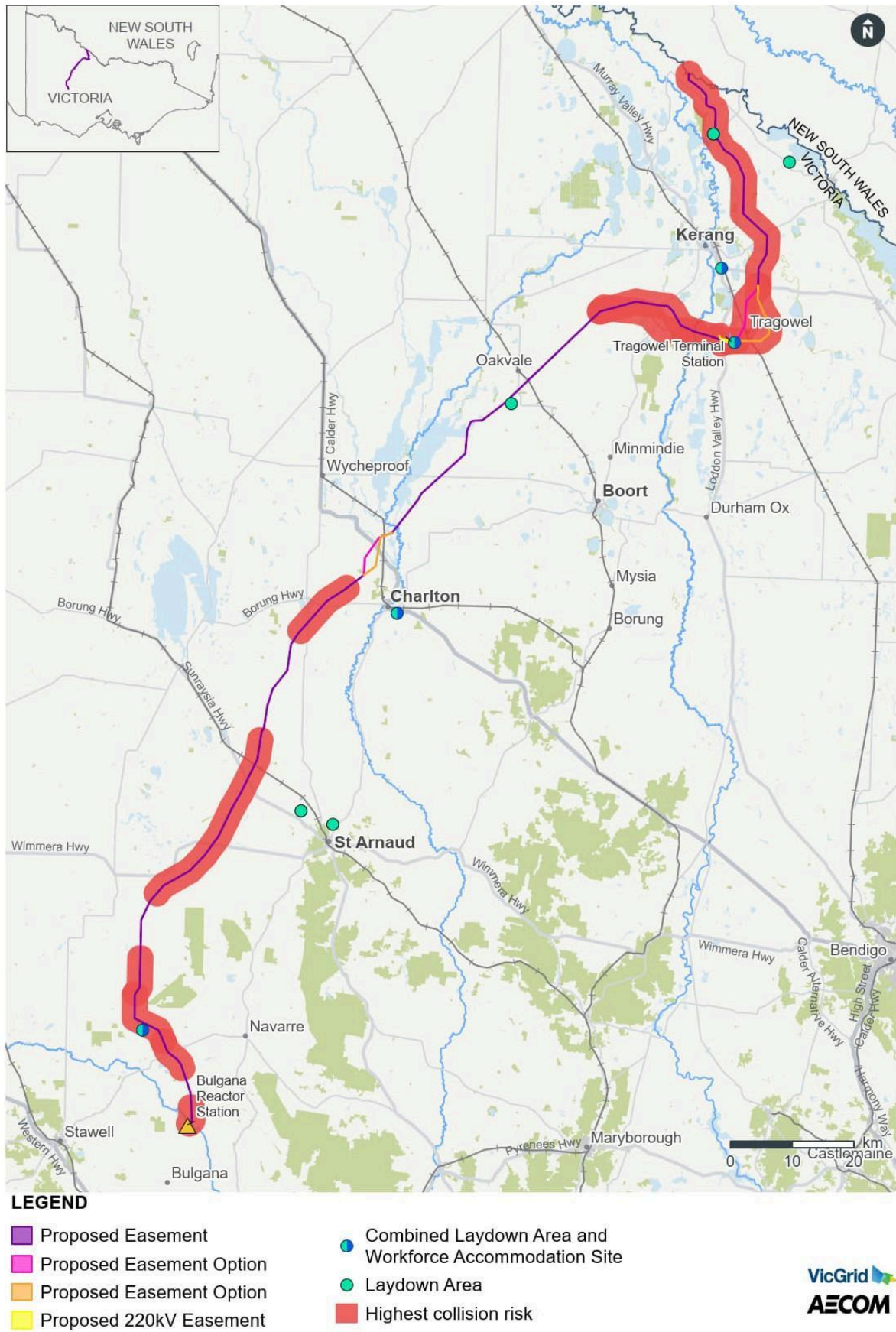


Figure 26-9 Locations of higher collision risk

Electrocution risk in terminal/reactor station environments would be managed through design to maintain separation between energised components and potential perch sites and, where required, through insulation/screening. Carpet Pythons are considered unlikely to occur within the terminal/reactor station locations. Overall, electrocution risk associated with the Project's transmission line infrastructure is considered low, noting that electrocution risk is typically more relevant to distribution networks and complex station environments rather than transmission line spans.

Residual impact

Species at greatest risk from habitat removal are those most likely to be present within the area of habitat at the time of clearing, or that rely on relatively small areas of habitat, defined territories, hollow-bearing trees, nesting sites or local habitat connectivity for persistence. This means that more sedentary species such as frogs and reptiles, nesting birds, and species with territory-based social structure may be more susceptible to construction impacts than highly mobile species.

Potential disturbance impacts on migratory species (including from noise, light spill and vehicle movements) have been avoided through siting of temporary facilities away from wetland systems where practicable and through construction environmental controls, as described in the migratory species assessment section and relevant management plans/EPRs.

Implementation of visibility enhancement measures in higher-risk locations would be expected to substantially reduce collision risk, although it is unlikely that all collision events could be eliminated over the life of the Project.

Monitoring would be conducted to assess the effectiveness of the mitigations and support adaptive management, including any need for additional line marking in specific locations.

Monitoring would commence from energisation of the first circuits and would continue through the construction period and into early operation, with the initial monitoring period typically spanning at least two migration/breeding seasons (e.g. a minimum of two years) in priority risk areas, before transitioning to a risk-based ongoing program informed by monitoring results and consultation with DEECA.

Some species at risk (particularly shorebirds and waterbirds) may move at night and, while visibility-enhancing devices can reduce collision risk, they may not eliminate all night-time collision potential. Accordingly, the CRMP would include monitoring and adaptive management to confirm performance and to trigger additional measures (e.g. additional marking in specific locations) if collision evidence emerges.

With mitigation in place, the residual collision impact for the threatened fauna is expected to be low.

EPBC Act-listed threatened fauna

EPBC Act-listed threatened fauna species with a greater than low likelihood of occurrence in the Proposed Easement are listed in Table 26-15, with an assessment of whether a significant impact is unlikely, uncertain or likely, having regard to habitat loss, disturbance and collision risk pathways.

Of the 16 EPBC Act-listed threatened fauna species assessed as having a greater than low likelihood of occurrence, two species (Brown Treecreeper and Striped Legless Lizard) were recorded during targeted surveys.

The potential for significant impact was assessed in accordance with the relevant significant impact guidelines and also considered collision risk.

For EPBC Act-listed woodland birds such as the Southern Whiteface, Hooded Robin, Diamond Firetail, Blue-winged Parrot, Pink Cockatoo, and Fork-tailed Swift the Project would remove some areas of habitat, but those discrete locations are unlikely to represent a significant impact in the context of the landscape, particularly given the mobility of those species.

A significant impact is likely for two EPBC Act listed woodland birds (Swift Parrot and Brown Treecreeper).

Plains-wanderer is unlikely to be significantly impacted. Known populations are avoided and, although the Proposed Easement skirts the edge of the Bunguluke Plains, potential habitat in the area is limited to grazing land and it is unlikely suitable habitat exists in the Project Easement. Collision risk should be possible to mitigate through implementation of measures to improve visibility of the conductors to be specified a Collision Risk Management Plan.

Striped Legless Lizard was recorded during surveys around Glenloth and may occur in other areas of potential habitat. As a sedentary species, the Project is likely to have a significant impact, although impacts to habitat may be avoidable as they mostly relate to access routes from public roadsides into private land.

Golden Sun Moth may occur in the south near Bulgana, however, removal of habitat at individual tower locations and for temporary access tracks during construction is unlikely to constitute a significant impact. Suitable habitat would be retained outside of those discrete areas, allowing the population to persist and to recolonise the cleared areas after reinstatement.

Table 26-15 Residual impact on EPBC Act-listed threatened fauna species

Common name	Likelihood of significant impact
Corben's Long-eared Bat	Unlikely
Southern Whiteface	Unlikely
Brown Treecreeper	Likely
Fork-tailed Swift	Unlikely
White-throated Needletail	Unlikely
Plains-wanderer	Unlikely
Swift Parrot	Likely
Pink Cockatoo	Unlikely
Hooded Robin	Unlikely
Blue-winged Parrot	Unlikely
Diamond Firetail	Unlikely
Latham's Snipe	Unlikely
Australian Painted-snipe	Unlikely
Striped Legless Lizard	Likely
Growling Grass Frog	Unlikely

Common name	Likelihood of significant impact
Golden Sun Moth	Unlikely

EPBC Act-listed migratory species

Double-banded Plover and Latham's Snipe were identified as having a medium likelihood of occurrence within the Project area. Neither species was recorded during surveys; however, as both are highly mobile migratory species, non-detection during surveys is not a reliable indicator of absence. In relation to construction impacts, the potential for significant impact to these species from habitat removal and disturbance is considered unlikely.

Key wetland habitats are avoided by the Project. As neither species breeds in Australia, potential habitat loss would relate to non-breeding habitat values, including foraging resources that may support individuals while present in Australia. Latham's Snipe may forage in areas of irrigated pasture around Kerang but the Project would not reduce the availability of such habitats given their abundance in the surrounding landscape.

Fork-tailed Swift and White-throated Needletail may intermittently occur in the area. The species may forage, roost or loaf in the airspace over the Project and on very rare occasions, rest in trees. The airspace over the Project would remain available for foraging and habitat that supports the life cycle of prey species (i.e. blocks of remnant vegetation) would remain available in the surrounding landscape.

The potential for the Project to have a significant impact on these species due to habitat loss is therefore unlikely and no further mitigation is required. Potential collision and electrocution risks are addressed separately in Section 26.7.5.

FFG Act-listed threatened fauna

Of the 27 FFG Act-listed threatened fauna species assessed as having a medium or high likelihood of occurrence, 10 species were recorded during targeted surveys Table 26-7.

The 10 recorded species are five birds (Black Falcon, Barking Owl, Grey-crowned Babbler, White-bellied Sea-Eagle and the Little Eagle) and five reptiles (Carpet Python, Samphire Skink, Bearded Dragon, Hooded Scaly-foot and Lace Monitor).

However, the other species may occur and, as such, the Project has potential to impact on habitat for those threatened fauna species.

FFG Act-listed threatened fauna species with a greater than low likelihood of occurrence including the 10 species which were identified during surveys (Table 26-7) are listed in Table 26-16. This list does not replicate those species which are also listed under the EPBC Act and covered in Table 26-15.

Table 26-16 Residual impact on FFG Act-listed threatened fauna species recorded during surveys or with a greater than low likelihood of occurrence

Common name	Residual impact rating	Residual impact
Mammals		
Platypus	Low to moderate (if burrows present) Aquatic habitat avoided	Potential impact on burrows in banks if present. May occur in the more permanent creeks and rivers crossed by the Proposed Easement – Murray River, Loddon River, Pyramid Creek, Wimmera River

Common name	Residual impact rating	Residual impact
Squirrel Glider	Low to moderate (if present)	Removal of potential habitat that occurs along roadsides and riparian woodland corridors particularly along the Murray River, Loddon River and Avon River. Removal of tree hollows that are an essential nesting and shelter resource.
Brush-tailed Phascogale	Low to moderate (if present)	Removal of potential woodland habitat that occurs primarily along roadsides and riparian corridors, particularly south of Charlton. Removal of tree hollows that are an essential habitat resource.
Fat-tailed Dunnart	Low to moderate (if present)	Removal of more intact and extensive grassland and grassy woodland habitats particularly north of Kerang, around Teddywaddy and south of Kanya.
Birds		
Bush Stone-curlew	Low (moderate if nest is present)	Removal of habitat may result in the loss of a nest if present in that location. Timing of habitat removal to avoid a period when the species could be nesting would not fully mitigate this impact. Bush Stone-curlews can use the same nesting area in successive years and potentially for as long as 30 years (DELWP 2021) which means that if a nest were present and removed, the individual would need to establish an alternative nest elsewhere if a suitable location is available in the territory.
Diamond Dove	Low	Diamond Dove has a wide distribution across Australia. Removal of habitat unlikely to affect a population of the species. The species may be affected by habitat fragmentation although retention or reinstatement of understorey cover where vegetation is removed for transmission line clearance would reduce the potential disruption to connectivity.
Grey Goshawk	Low	Grey Goshawk is unlikely to make significant use of the Proposed Easement.
Black Falcon	Low	Habitat removal unlikely to affect availability of foraging resources.
White-bellied Sea Eagle	Low	Habitat removal unlikely to affect availability of foraging resources. Wetlands avoided.
Little Eagle	Low	Little Eagle is largely solitary and likely to hunt widely through areas of wooded farmland and woodland areas along roadsides. Individuals may occasionally use habitat for hunting and roosting but are unlikely to depend on the area.

Common name	Residual impact rating	Residual impact
Square-tailed Kite	Low	Individuals may occasionally use habitat for hunting and roosting but are unlikely to depend on the area
Barking Owl	Moderate	Barking Owl are more likely to be associated with larger woodland remnants in the landscape away from the Project. Most of the woodland patches to be removed are largely unsuitable for Barking Owl to use regularly because they are very thin, fragmented and exposed (e.g. low canopy cover). Individuals may occasionally perch in the trees while hunting or moving through the area. However, there are a few riparian corridors that may be more regularly used by the Barking Owl. The potential for Barking Owl to nest in hollow-bearing trees cannot be fully discounted particularly in the vicinity of the Avoca River.
Powerful Owl	Low	Powerful Owl is more likely to occur in larger tracts of woodland in reserves outside the Proposed Easement south of Wallaloo.
Ground Cuckoo-shrike	Low	Woodland in the landscape of the Project may be too fragmented to support Ground Cuckoo-shrike and the potential for the species to occur is based on a few old records from around Kerang. Potential for the species to occur along the riparian corridors of the Loddon River or Murray River seems to be limited but potential impacts relate to removal of woodland habitat.
Crested Bellbird	Low	Crested Bellbirds are unlikely to use all woodland habitat as they are more likely to inhabit woodland with a denser shrub layer dominated by Acacia, but with a variety of other shrubs and groundcovers (Higgins and Peters 2002). Much of the woodland habitat is degraded and floristically simple along roadsides
Grey-crowned Babbler	Moderate to Major	Suitable open forest and woodland habitat occurs along roadsides and riparian corridors. Recorded along roadsides and riparian corridors during diurnal bird surveys north of Charlton to Murray River.
Apostlebird	Low	Apostlebirds require three main habitat characteristics, tree cover, seed availability and bare ground (Higgins et al. 2007). It is possible that these three requirements are not present in all woodland habitat within the Project area.
Eastern Grey Egret	Low	Due to the wide tolerance of habitat type it is not anticipated that the species would be impacted by habitat loss
Reptiles		

Common name	Residual impact rating	Residual impact
Broad-shelled Turtle	Low to moderate (if nests)	Broad-shelled Turtles may occur in the Murray River Loddon River and Pyramid Creek. The turtles can nest more than 500 m from a river and some hatchlings would stay in the nest through the winter after they hatch.
Murray River Turtle	Low to moderate (if nests)	Murray River Turtle occurs naturally in the Murray River and its tributaries where it occurs in both main streams and billabongs. The species also been introduced widely in southern Victoria. The Project would avoid impacts to aquatic habitat in the rivers by spanning over the waterways and the risk of impacts on water flow or quality are anticipated to be low with mitigation. Works on banks of rivers or if the river is to be crossed by access tracks during construction could impact on turtles if nests are in those locations. The potential impact this may have on the species would depend on whether the location is an important nesting site and how readily the species can construct new nest/s.
Hooded Scaly-foot	Major	Removal of habitat from roadsides around Quambatook where a population is known to occur. Impacts to a single population of this species could have a major impact due to the very restricted distribution and number of known occurrences of the species.
Samphire Skink	Moderate to major	Removal of areas of Chenopod Grassland including three locations where populations are known to occur. Samphire Skink has a restricted distribution in Victoria therefore it is unknown what contribution the populations associated with the area of the Project make to the persistence of the species
Carpet Python	Low to moderate (if occupied hollows impacted)	Removal of hollow-bearing trees particularly in the area around Glenloch and the Murray River where populations are known to occur.
Bandy Bandy	Moderate (if present)	Removal of potential woodland habitat north of Kerang
Bearded Dragon	Low to moderate	Removal of woodland and mallee habitat at discrete locations. Considerable habitat remains available in the surrounding landscape
Lace Monitor	Low	Wide roaming species that is capable of traversing open areas between woodland patches therefore the removal of woodland habitat at discrete locations would be unlikely to represent disruption to habitat connectivity.

Common name	Residual impact rating	Residual impact
		Loss of hollow-bearing trees may impact Lace Monitors, although the species also uses hollow logs and burrows on the ground and is not solely reliant on hollows in trees. Construction traffic poses a risk to Lace Monitors basking on roads.
Brown Toadlet	Potentially major (if present), otherwise low	Towers avoid areas of potential habitat. Access tracks may cross potential habitat.

Table notes:

Low – impacts to some individuals, Moderate – impacts potentially meaningful at the population level

Shading indicates recorded during surveys

The severity of the impact for most species is low because the habitat removal would affect some individuals but is unlikely to result in substantial change for the species. For more sedentary species like Hooded Scaly-foot and Samphire Skink, the impact could be major due to the potential to disrupt population function through loss of individuals and loss of connectivity. For species like Grey-crowned Babblers that occur in family groups with defined territories, the impact of habitat removal could be moderate to major depending on whether a communal nest or central part of a territory could be impacted (compared with at the edge).

26.7.6 Threatening processes and indirect ecological impacts

26.7.6.1 Disruption to habitat connectivity

'Habitat fragmentation as threatening process for fauna in Victoria' is listed as a potentially threatening process under the FFG Act. Although not identified as a key threatening process under the EPBC Act, disruption of habitat connectivity affects EPBC Act listed species as well as FFG Act listed and non-threatened fauna.

In the context of this Project, habitat fragmentation may occur through disruption of habitat connectivity, where removal of native vegetation creates gaps in otherwise continuous habitat and increases the isolation of habitat patches. Factors influencing the susceptibility of species to fragmentation include the species' mobility, the size of gaps in the canopy or ground cover, the width of corridors, and the presence of suitable habitat to move to.

The Project is located in a largely cleared landscape with remnant vegetation limited primarily to roadsides and riparian corridors, with even scattered trees missing for large distances in places.

For the purposes of this assessment, it has been assumed that the gap created in continuous native vegetation due to construction of the transmission line would be the width of the Proposed Easement. Construction of the transmission line would create gaps where the Project Easement crosses areas of continuous native vegetation on roadsides and along watercourses. Those gaps are assumed to be 70 m wide. The two transposition locations where the Proposed Easement would widen to 170 m are located in areas cleared of native vegetation.

Creation of gaps where the Proposed Easement intersects areas of contiguous vegetation (namely linear corridors along roadsides and watercourses) means that the Project has the potential to exacerbate habitat fragmentation. The extent and ecological consequence of fragmentation would vary depending on vegetation type, landscape context and species-specific movement ecology.

Threatened species that are most likely to be impacted by loss of connectivity are those that are reliant on canopy cover for movement (arboreal mammals). These are the Squirrel Glider and the Brush-tailed Phascogale. Lace Monitor and Carpet Python are arboreal but are unlikely to be significantly impacted.

Woodland birds are generally capable of flight across gaps in vegetation. A maximum gap distance of 70 m (and in some instances 100 m) may be within the threshold for woodland birds. Scattered trees may contribute to the movement of more mobile species by functioning as stepping stones in the landscape. It is not possible to know the relative contribution each individual tree would make to movement, however, the context of the removals when viewed on aerial imagery suggests that many scattered trees remain in the surrounding landscape and losses attributed to the Project would not represent a material risk of impact to connectivity of 'stepping stones'.

Ground-dwelling reptiles such as the Hooded Scaly-foot may also be impacted by habitat connectivity due to the very restricted distribution and number of known occurrences of the species. The species may be impacted by construction traffic while trying to cross between areas of habitat.

The Project would span over watercourses and would therefore not affect aquatic habitat and adjacent corridor which could support amphibians such as the Growling Grass Frog (if present).

However, where riparian vegetation with a mature height of greater than 9.1 m occurs adjacent to watercourses, removal would be required to meet safe operating standards. Potential risks of bird collision as another means of disrupting connectivity are addressed separately in 26.7.5.

Mitigation

Measures to reduce impacts on habitat connectivity would be detailed in the CVHMP and must include retention and/or replanting of understory to provide cover for wildlife moving across canopy gaps, retention of felled trees as logs for refuge where practicable and reinstatement/restoration of habitat elements including hollows.

An Understorey Retention and Partial Clearance Plan (EPR-EC10) would be prepared to identify locations where full vegetation removal is not required and where understorey or ground layer vegetation can be retained while maintaining compliance with the Electricity Safety Act and Regulations and the Code of Practice for Electric Line Clearance. Measures to improve connectivity for threatened species would be determined when developing the TSMP (EPR-EC06).

Final clearing widths, and therefore the extent of canopy gap and disruption to habitat connectivity, would be further refined through the sag and sway analysis in accordance with EPR-EC01. Measures to improve connectivity would be determined through the TSMP once final clearing widths are confirmed and site-specific canopy gap distances can be quantified at key woodland and riparian corridors. Where post-construction gaps are predicted to exceed threatened species thresholds, and connectivity is otherwise materially disrupted, the feasibility of implementing glider poles and/or rope bridges at priority locations would be assessed.

Residual impact

The Project would result in gaps in corridors of native vegetation along some of the roadsides and waterways. The main corridors where removals would be of concern for connectivity would be:

- Murray River – 70 m gap in a 100 m wide corridor of Riverine Grassy Woodland.
- Loddon River – 70 m gap in a 100 m wide corridor of riverine woodland dominated by Black Box and River Red-gum overstorey with a Lignum understorey.
- Meering West Road and Crump Road – two 100 m gaps in a 60 m wide corridor of Ridged Plains Mallee.

- Boort – Quambatook Road – 100 m gap in a 35 m wide corridor of vegetation. The corridor is discontinuous and does not link to large reserves.
- Gardners Road and Hemleys Road intersection – two 100 m gaps in a 50 m wide corridor of Low Rises Woodland dominated by Yellow Gum.
- Avoca River – 100 m gap in a 150 m wide woodland corridor.
- Avon River – 70 m gap in a 35 m wide woodland corridor.
- Calder Highway at Teddywaddy – 100 m gap in 60 m wide corridor of Grassy Woodland with a Yellow Gum and black Box overstorey.
- Glynwylln Road – 70 m gap in a 45 m wide corridor of Grassy Woodland dominated by Yellow Gum.
- Wallaloo East Road – 70 m gap in a 45 m wide corridor of Grassy Woodland dominated by Grey Box.
- Wimmera River – 70 m gap in a 60 m wide corridor of Riparian Woodland dominated by River Red Gum.

It is uncertain to what extent mitigation measures would reduce this impact and therefore disruption of habitat connectivity remains a residual impact. The impact would be permanent where trees are removed, but the severity depends on the fauna species or groups of species that could be affected.

Habitat fragmentation therefore remains a residual impact for both threatened and non-threatened fauna. Threatened fauna with greatest potential to be affected would be Squirrel Glider and the Brush-tailed Phascogale, if present. The Project will implement mitigation measures to reduce the extent of connectivity loss and support movement of these species.

Lace Monitor and Carpet Python although arboreal are unlikely to be majorly impacted because those species are capable of moving through open landscapes.

The residual impact for woodland birds would be low. Woodland birds are generally capable of flight across gaps in vegetation therefore, with mitigation, there would be a lower risk of being impacted. Gaps created in corridors could reduce the capacity of some of the woodland species to move, particularly species that rely on the cover of trees. Because mitigation measures would be implemented to maintain or restore the understorey where required, this impact would be reduced.

26.7.6.2 Loss of hollow-bearing trees (large habitat trees)

Although the threatening process focuses on hollow-bearing trees, loss of large trees regardless of whether they contain hollows represents a substantial risk to biodiversity. Large, old trees are important for wildlife and ecosystem function because of their typically greater size and structural complexity. Large trees are often referred to as ‘habitat trees’ because they provide a range of resources that can support a variety of different species.

As previously mentioned, scattered trees can act as ‘stepping stones’ facilitating movement of more mobile species through the landscape. This section discusses impacts on large trees and assumes all large trees contain hollows.

Hollows are an essential habitat resource for a wide range of fauna and are a resource that is difficult to replace once removed. Small hollows such as those used by small mammals generally take around 100 years to form, medium hollows (such as those used by parrots) often take more than 200 years to form and hollows large enough to support larger forest owls take substantially longer.

Although the loss of potential hollow-bearing trees has been minimised to the extent practicable through route refinement and tower siting, the Project could result in the unavoidable loss of 605 large trees, each of which could be assumed to contain one or potentially more, hollows. Loss of hollow-bearing trees is a FFG Act-listed threatening process³.

The FFG Act Action Statement for the loss of hollow-bearing trees from Victorian native forests and woodlands identifies the mammals and birds that use tree hollows in Victoria. Reptiles and amphibians that utilise hollows are identified in Land for Wildlife Note 6 – Wildlife need natural tree hollows. Several of those species have a greater than low likelihood of occurrence in the Project area. Species that are either FFG Act-listed or EPBC Act-listed are shown in Table 26-17 together with the way in which they use hollows and the hollow sizes they are most likely to require.

Other non-listed species recorded in the Project area which use hollows include possums, bats, some ducks, corellas, cockatoos, rosellas, martins, kookaburras and lorikeets. The full list of hollow-using mammals and birds is provided in *Technical Appendix S: Ecology*.

Short-beaked Echidna, Bearded Dragon, Lace Monitor, skinks, frogs, and some snakes (including Carpet Python) could also be impacted by loss of hollow-bearing trees but those species also use hollow logs and burrows on the ground and are not reliant solely on tree hollows.

Table 26-17 FFG Act or EPBC Act-listed species which use tree hollows recorded in the Project

Common name	Scientific name	Status	Hollow use	Residual impact rating
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	FFG	Hollow-dependent	Moderate
Squirrel Glider	<i>Petaurus norfolcensis</i>	FFG	Hollow-dependent	Moderate
Powerful Owl	<i>Ninox strenua</i>	FFG	Hollow-dependent	Low
Barking Owl	<i>Ninox connivens</i>	FFG	Hollow-dependent	Moderate
Southern Whiteface	<i>Aphelocephala leucopsis</i>	EPBC	Uses hollows but is not dependent on them	Low (not dependent)
Hooded Robin	<i>Melanodryas cucullata</i>	FFG EPBC	Uses hollows but is not dependent on them	Low (not dependent)
Brown Treecreeper	<i>Climacteris picumnus</i>	EPBC FFG	Hollow-dependent	Moderate
Bearded Dragon	<i>Pogona barbata</i>	FFG	Uses hollows but is not dependent on them	Low (not dependent)
Carpet Python	<i>Morelia spilota metcalfei</i>	FFG	Uses hollows but is not dependent on them	Low (not dependent)

³ Continuing net loss of native hollow-bearing trees and coarse woody debris due to firewood harvesting practices was nominated for listing as a key threatening process under the EPBC Act. The Minister agreed the process was eligible for listing but found there would be no conservation benefit from listing process under the EPBC Act given there are existing mechanisms in place to address the threat. In Victoria, collection of firewood is controlled in Box-Ironbark Forests and loss of hollow-bearing trees and coarse woody debris are listed as threatening processes under the FFG Act.

Common name	Scientific name	Status	Hollow use	Residual impact rating
Lace Monitor	<i>Varanus varius</i>	FFG	Uses hollows but is not dependent on them	Low (not dependent)

Mitigation

The primary mitigation for loss of hollow-bearing trees is avoidance and minimisation through route refinement, easement refinement and tower siting, to reduce the number of large trees required to be removed. Further reduction in impact is also expected through detailed design, including sag and sway analysis and continued micro-siting of infrastructure where practicable.

EPRs include the Vegetation and Habitat Management Plan and Threatened Species Management Plan. These measures may include pre-construction inspection of trees proposed for removal to confirm the presence of hollows and determine whether fauna salvage is required, retention of felled trees as logs where practicable, identifying opportunities to selectively retain trunks of trees containing hollows, and investigation in consultation with DEECA of an artificial hollow replacement program at locations where removal of hollow-bearing trees cannot be avoided. Artificial hollows will be designed in consultation with the National EPA and DEECA and will consider the types of species which will use the hollows and the type of materials that are most suitable for the hollows.

Monitoring would include ongoing maintenance and replacement as required over the period that artificial hollows remain necessary (including through the operational life of the Project), with periodic review to reflect species uptake and the availability of natural hollows in retained vegetation.

Residual impact

For the purposes of the impact assessment, a conservative assumption has been adopted. All large trees have been assumed to contain hollows and, accordingly, the extent of this loss is equivalent to the number of large trees shown in Table 26-9. Replacement hollows would provide alternative shelter or nesting resources for some species; however, they would not fully compensate for the loss of natural hollows and, because hollows take a long time to form, this impact cannot be fully mitigated. This impact is particularly important in the largely cleared agricultural landscape traversed by the Project, where large trees and their hollows are already a limited resource. The loss of 605 large trees represents a significant impact.

Removal of hollow-bearing trees would result in a residual impact on hollow-dependent fauna. While impacts are distributed across a long linear corridor and avoidance/minimisation measures would reduce the number of hollow-bearing trees removed, the loss of mature hollows can have longer-term implications for species that rely on hollows for breeding and shelter. With implementation of the proposed avoidance/minimisation measures and the hollow management measures described above (including artificial hollow provision where required), the residual impact on hollow-dependent fauna is expected to be low to moderate, noting that localised impacts may be greater where hollow-bearing trees are scarce and connectivity is limited.

26.7.6.3 Displacement, injury or death of wildlife

Vegetation within the Project area provides habitat for native fauna, particularly arboreal mammals, microbats, birds, reptiles and frogs (including threatened species). Construction may remove habitat for those fauna and individuals could be displaced, injured, or killed during habitat clearance if not mitigated. Species most at risk would be those that are more sedentary such as nesting birds, possums, frogs, and lizards, as they would be less likely to move away from the construction works. Displaced animals would be vulnerable to collision with vehicles and susceptible to predation.

Species at greatest risk from habitat removal are those most likely to be residing within the area of habitat to be removed or that rely on smaller areas of habitat for their existence. Smaller, more sedentary species such as frogs and reptiles, nesting birds (including ground nesting Bush Stone-curlew) or fauna that occupy hollows (owls, owlet-nightjars, Lace Monitor, Carpet Python) are more likely to be present at the time of habitat removal and/or less able to move (or recognise the need to move) away of their own accord.

Mitigation

Avoidance of hollow-bearing trees would be prioritised during detailed design and only when all opportunities to avoid are exhausted would other mitigations be implemented.

A FMP (EPR-EC05) would be developed in consultation with DEECA and Traditional Owners to detail measures to minimise the risk of displacement, injury or death of wildlife and procedures in the event.

Residual impact

The Project would result in unavoidable loss of habitat and, as such, the unintended consequence of loss of wildlife occupying that habitat. Although salvage would form part of the measures in the FMP, not all animals are likely to be able to be found or be feasible to save. The magnitude of the impact may depend on the timing of habitat removal and therefore how many individuals may be residing in the habitat at the time.



Cinnamon Fungus (*Phytophthora cinnamomi*) is a soil-borne plant pathogen that causes root rot and dieback in susceptible native vegetation. It can spread through infected soil, water and plant material and may result in plant death and changes to affected ecosystems.

Chytrid fungus (*Batrachochytrium dendrobatidis*) is an infectious fungal pathogen of amphibians that causes the disease chytridiomycosis. Infection can cause illness, death and significant population declines in susceptible frog species.

Biosecurity Management Plan (BMP) is a document that sets out measures to identify, prevent, eliminate or minimise biosecurity risks, including the spread of pests, weeds and diseases during project activities.

26.7.6.4 Introduction and/or spread of weeds and pathogens

Weeds and/or pathogens may be introduced or spread through movements of plants and vehicles, personnel, and materials. Dieback caused by *Cinnamon Fungus Phytophthora* and infection of amphibians with *Chytrid Fungus*, resulting in chytridiomycosis, are EPBC Act-listed threatening processes.

Mitigation

Biosecurity in relation to agricultural impacts is discussed in *Technical Appendix M: Agriculture* and an EPR-AG02 has been developed with a focus on ensuring agricultural biosecurity through the development and implementation of a Biosecurity Management Plan (BMP). An EPR has been developed for an Ecological Biosecurity Management Plan (EPR-EC04) to address ecological biosecurity risks associated with the Project.

Residual impact

Implementation of EPR-AG02 and EPR-EC04 reduce the likelihood that this impact would occur. The risk of residual impact is low.

26.7.6.5 Degradation of riparian vegetation

Riparian land is defined as the area that adjoins, regularly influences, or is influenced by, a river and includes vegetation along floodplains and banks of rivers and streams. Intact areas of native riparian vegetation are important as they support a diverse flora and fauna, act as drought refuge, and are often the only reasonably healthy native vegetation in catchments that have been largely cleared. Riparian vegetation also acts as a wildlife corridor. Riparian vegetation is associated with most of the rivers and creeks traversed by the Proposed Easement.

Direct impacts to riparian vegetation have been avoided to the extent practicable. Indirect impacts such as the degradation of riparian vegetation may occur due to the introduction and spread of weeds and/or pathogens (discussed in Section 26.7.6.4), selective removal of canopy trees from the Proposed Easement (discussed in Section 26.7.6.1) and water quality/sedimentation impacts.

The potential for the Project to result in changes to surface water quality and existing drainage and flow regimes of drainage pathways including rivers and streams is discussed in *Technical Appendix G: Surface water*. Works to clear the Proposed Easement of vegetation would occur within riparian corridors. Temporary construction access tracks are not proposed to cross major watercourses but some access tracks that cross more minor, ephemeral watercourses could cause changes in hydrology and flood risk if not designed appropriately.

Mitigation

EPRs proposed to minimise riparian habitat loss are the same as those for the mitigation of native vegetation loss. In addition, construction site boundaries and works would be set back a minimum of 50 m from the top of the bank of designated waterways, channels and identified drainage pathways where possible. This is EPR-SW01 as specified in *EES Chapter 14: Surface water* and erosion will be managed through EPR-GS02 and EPR-GS03.

A Surface Water Management Plan (EPR-SW01) would be developed in consultation with relevant CMAs to outline the erosion and sediment control measures such that surface water quality in waterways is maintained, as well as strategies to be adopted to reduce the risk of changes to drainage and flow regimes.

Temporary construction access tracks would be designed to follow a route that avoids crossing drainage lines, creeks and waterways where possible. Temporary construction access tracks are not proposed to cross major watercourses which include the Wimmera, Avoca, Avon, Loddon and Murray Rivers. However, in some instances, it may not be possible to avoid crossing more minor watercourses or to achieve the required 50 m setbacks. A works on waterways permit would be required for any waterway crossing, vegetation clearance, channel modification or works within 50 m of a designated waterway. Where a permit is issued, the works would be carried out to meet specific requirements to ensure the upstream and downstream hydrological conditions are maintained.

Residual impact

Removal of riparian vegetation is accounted for in native vegetation impacts in Section 26.7.3 and would be offset accordingly.

With implementation of the mitigation measures, *Technical Appendix G: Surface water* concludes that potentially polluted surface water runoff from the construction sites is expected to be managed effectively and unlikely to reach waterways and wetlands. Any impacts that would occur to the receiving environment would be localised and short in duration.

Temporary construction access tracks are not proposed to cross major watercourses, which include the Wimmera, Avoca, Avon, Loddon and Murray Rivers. Some access tracks that cross watercourses could cause changes in hydrology and flood risk if not designed appropriately. *Technical Appendix G: Surface water* concludes that risks associated with flooding during construction are expected to be low.

26.7.6.6 Pest animals

The Project is unlikely to contribute to the occurrence of pest animals already existing in the environment. Red Foxes, rabbits and feral cats are already present in the landscape of the Proposed Easement and current and future land use is unlikely to further exacerbate this threatening process. No mitigation is required.

Fragmentation of habitat may increase the threats posed by the Noisy Miner as these birds are edge-specialists and are largely associated with smaller areas of habitat or the introduction of gaps and edges into areas of more extensive habitat.

26.7.6.7 Groundwater dependent ecosystems

GDEs may be impacted by a change in groundwater quality and/or level. The only construction activity that is likely to impact these aspects is the drilling of piles to support the transmission towers, the Tragowel Terminal Station and the shunt reactors at Bulgana Reactor Station. The risk of these piles intersecting aquifers, leading to a connection between aquifers and therefore a change in groundwater quality during installation (construction) is low. Any impact would be highly localised and temporary (hours/days) in nature (refer to EPR-GW02 in *Technical Appendix C: Groundwater*). As such, potential GDEs are unlikely to be affected as a result of changes in groundwater quality and/or level during construction of the Project.

Technical Appendix C: Groundwater identifies three potential operational risks to GDEs:

- Piles installed to support transmission towers, the Tragowel Terminal Station and Bulgana Reactor Station could potentially impede groundwater flow and therefore change groundwater levels within a 1 m radius of the individual piles
- The proposed Tragowel Terminal Station and Bulgana Reactor Station would have an impenetrable capping material that would reduce rainfall recharge to local groundwater and consequently lower groundwater levels
- Spills of hazardous materials during operations seeping into shallow groundwater

Mitigation

EPRs proposed to minimise the potential impact on groundwater during operation include:

- Undertaking a site-specific groundwater impact assessment for any transmission towers located less than 10 m from a potential GDE (terrestrial or aquatic) or waterbody. The assessment would characterise groundwater connection to the GDE and/or waterbody, identify potential impacts and recommend mitigation and monitoring measures if required. Refer to EPR-GW02 in *Technical Appendix C: Groundwater*.
- Refuelling or maintenance of equipment, machinery and vehicles at least 20 m or as far away as reasonably practicable from any waterway with appropriate measures to contain spills. Refer to EPR-GS05 in *Technical Appendix B: Geology and soils*.

Residual impact

Residual impact on aquatic or terrestrial GDEs is expected to be negligible based on the findings of *Technical Appendix C: Groundwater*. Any change in groundwater is not expected to be measurable within seasonal and long-term fluctuations and the risk of spills of hazardous materials would be localised, temporary and mitigated/managed.

26.7.6.8 Bushfire ignition risk during operation and maintenance

The Project is in a Bushfire Prone Area, however, *Technical Appendix E: Bushfire* concluded that the construction of the Project would not increase the existing risk of bushfires and would actively manage risk through a Construction Bushfire Management Plan (EPR-BF01).

Technical Appendix E: Bushfire concludes that the likelihood of bushfire ignition during operation is rare, reflecting the relatively low level of human presence and plant use during the operational phase, and the low likelihood of transmission infrastructure itself acting as an ignition source.

Bushfire risk during operation is more likely to arise from maintenance activities, particularly activities involving hot works such as cutting, grinding or welding. Such activities would require scheduling to avoid Total Fire Ban Days, localised fuel reduction measures within and around the designated work area, including mowing of grass and removal of leaf litter, to reduce ignition potential. Bushfire risk during operation will be covered by mitigations described in the Operational Bushfire Mitigation Plan (EPR-BF03).

Mitigation

Mitigation measures are not required for transmission line ignition as this is not considered a likely impact. Implementation of a hot work area will reduce the likelihood of maintenance activities causing an ignition.

Residual impact

With standard operational maintenance and hot works controls in place, residual bushfire ignition risk to ecological values is expected to be low.

26.7.7 Comparison of options

At Tragowel and Teddywaddy, two Proposed Easement options remain under consideration for the Proposed Easement. For the purposes of the ecology impact assessment, both Proposed Easement options at each location have been assessed and are reflected in the impact calculations. The following is a comparison of the four Project combination of options which could arise, depending on which Proposed Easement option combination is ultimately chosen. Any impacts associated with the other Project activities remain the same for all Proposed Easement combinations.

All four combinations are similar in the matters impacted and the extent of those impacts. The differences are in the order of 3 ha, which is low in the context of a 240 km easement.

Combination 1 (Tragowel eastern easement option/Teddywaddy eastern easement option) would have the greatest impact and Combination 4 (Tragowel western easement option/Teddywaddy western easement option) would have the least impact overall. The impacts vary between the values therefore a comparison by values is provided as follows:

- EPBC Act listed TECs – Combination 1 would have a slightly greater impact and Combination 4 would have the least impact.
- FFG Act listed TECs – Combination 2 would have a slightly greater impact and Combination 3 would have the least impact.
- Endangered EVCs – Combination 1 would have the greatest impact and Combination 4 the least impact.
- Native vegetation – patches – Combination 1 would have the greatest impact and Combination 4 the least (with a difference of <4 ha).
- Large trees in patches – Combinations 2 and 4 would have a slightly greater impact than Combinations 1 and 3 (based on a difference of four trees).
- Scattered trees – Combinations 1 and 3 would have a slightly greater impact than Combinations 2 and 4 (based on a difference of three large scattered trees).

26.8 Cumulative impact assessment

The cumulative impact assessment for ecology considers the combined effects of the Project when added to other planned and/or reasonably anticipated future Projects that may occur in the same area.

Cumulative impact assessment for the Project is complex due to the Proposed Easement length and the number of bioregions and vegetation types traversed by the Proposed Easement.

Information in relation to the extent and timing of other Projects is not always readily available, which means that cumulative impacts are often likely to be understated. To make as conservative an assessment as possible, potential projects within approximately 100 km of the Project were considered, based on a spatial overlap with the Project or the potential to overlap with the same receptors (namely, renewable energy projects and other linear projects such as road upgrades).

Temporal overlap (where a project would impact on a receptor at the same time) was not relevant for the ecological impact assessment because removals that occur at different times would result in a cumulative impact as the removals are permanent.

Projects taken through to the cumulative impact assessment were those that have potential to impact on the same receptors as VNI West and for which potential impacts were quantified. Cumulative impacts may also include collision risk to birds and bats associated with wind turbines and transmission lines.

Fourteen projects were considered in the cumulative impact assessment, noting that as these are proposed projects, they may not eventuate. These projects are listed in Table 26-18 and are shown on Figure 26-10.

Table 26-18 Projects included in cumulative impact assessment

Project name	Spatial overlap	Receptor overlap	Collision risk
VNI West – NSW section	Interface with VNIW Victorian section at the Murray River, Murrabit	Yes	Yes
Western Renewables Link (WRL)	Interface with VNIW at the proposed Bulgana Reactor Station	Yes	Yes
Watta Wella Renewable Energy Project	Not intersected by the Proposed Easement	Yes	Yes
Meering West Wind Farm	Intersected by VNIW	Yes	Yes
Navarre Green Power Hub	Intersected by VNIW	Yes	Yes
Normanville Energy Park	Not intersected by VNIW	Yes	Yes
Cannie Wind Farm	Proposed transmission corridor connects to the Tragowel Terminal Station	Yes	Yes
Wimmera Plains Wind Facility	Not intersected by VNIW	Yes	Yes
Avonbank Mineral Sands Project	Not intersected by VNIW	Yes	No
Donald Mineral Sands Project	Not intersected by VNIW	Yes	No
Goschen Mineral Sands Project	Not intersected by VNIW	Yes	No

Project name	Spatial overlap	Receptor overlap	Collision risk
Victorian Murray Floodplain Restoration Project East Package (Gunbower National Park and Guttrum and Benwell Forests)	Not intersected by VNIW	Yes	No
Western Highway duplication – Stage 3 – Ararat to Stawell	Not intersected by VNIW; located 30 km to the south of Bulgana	Yes	No
Western Highway duplication – Stage 2 – Sunbury to Ararat	Not intersected by VNIW; Ararat located 30 km to the south of Bulgana	Yes	No
Beaufort Bypass (Western Highway)	Not intersected by VNIW; located approx. 40–50 km south-west of the nearest section of VNIW	Yes	No
East Grampians Rural Pipelines	Intersects VNIW at several locations, where the pipeline network follows road reserves crossed by the proposed VNIW transmission alignment	Yes	No
Wimmera Renewable Energy Solutions	Not intersected by VNIW	Yes	Yes

The cumulative impact of native vegetation loss from the Project and the other projects is approximately 2,260 ha and 6,345 large trees. The Project would contribute to approximately 5% of the loss of patches and a 10% contribution to the loss of large trees associated with the projects included in the CIA.

The cumulative impact on TECs from the Project and the other projects is dependent on the TEC. The Project may be a major contributor to the cumulative impact on Grey Box Grassy Woodland and Buloke Woodlands.

Cumulative impacts on threatened species are anticipated but are difficult to quantify and assess from the information available and would depend on the species. The greatest cumulative impact would be on species that have restricted distributions and microhabitats (e.g. Striped Legless Lizard, Turnip Copperburr) and those where the population number is incredibly low (e.g. Swift Parrot).

There is likely to be cumulative collision risk posed by an increased presence of wind farms and transmission lines in the landscape. Wind turbines present a greater risk than transmission lines due to the rotation of the blades. Combined, the ten wind farms included in the CIA represent potential for 1,300 wind turbines to be added to the landscape. Cumulatively, this could have an adverse effect on birds and bats. The number of turbines is likely to change during the planning and approvals processes, meaning it is difficult to assess the risk.

Full details of the cumulative impact assessment are in *Technical Appendix S: Ecology*, (specifically Appendix L of that report).

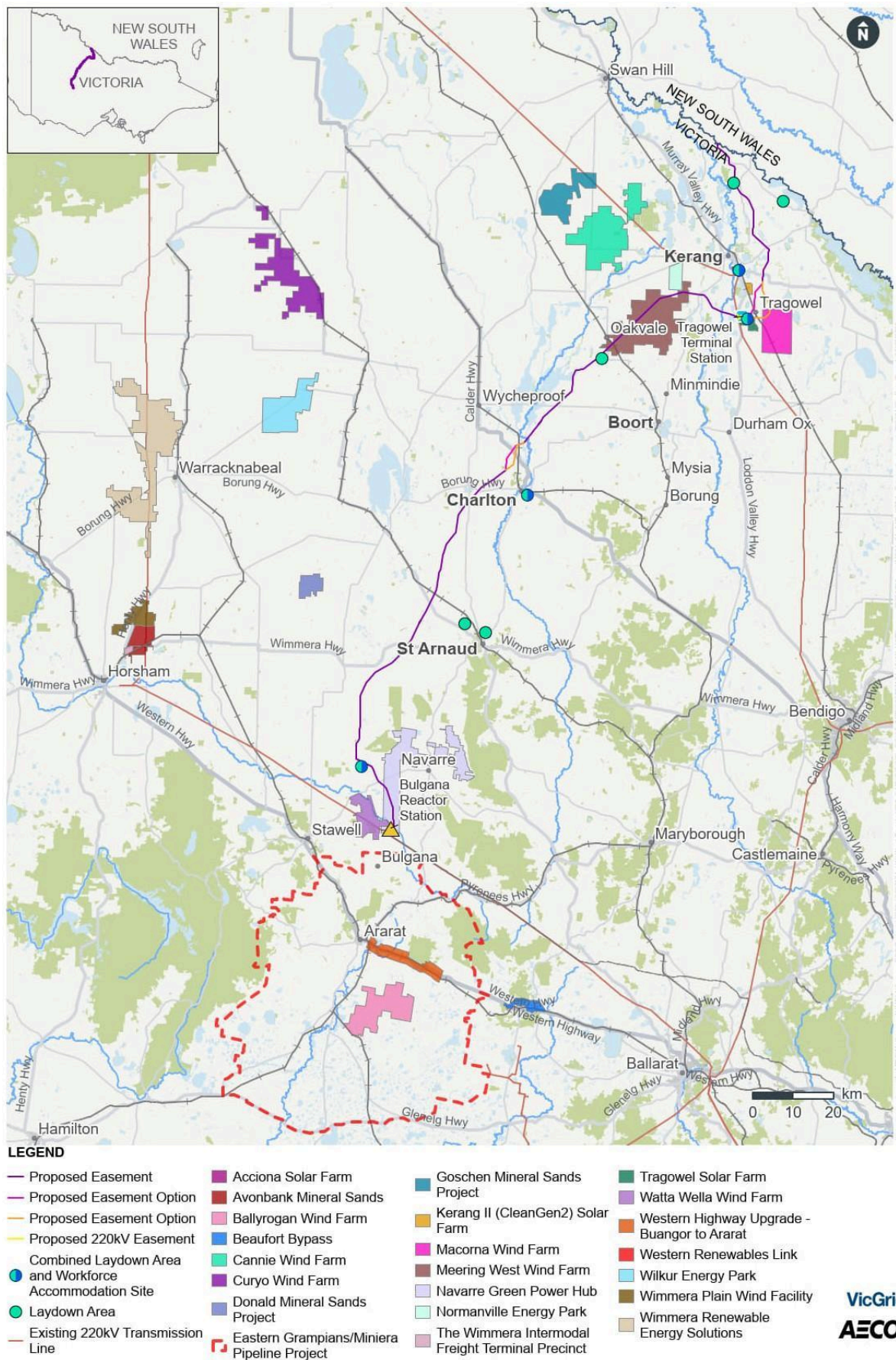


Figure 26-10 Cumulative impact project map

26.9 EPRs, monitoring and contingency measures

26.9.1 EPRs

EPRs define the environmental outcomes and performance standards that must be achieved by the Project.

EPRs are proposed to avoid and minimise impacts on native vegetation, threatened ecological communities, flora, fauna and habitat to the extent practicable, and to manage residual impacts where avoidance is not possible. Where further surveys, design refinement or management planning are required, those requirements are identified within the relevant EPR.

Table 26-19 outlines the EPRs developed to avoid and minimise potential impacts during construction, operation and decommissioning of the Project.

A full list of Project EPRs is provided in *EES Chapter 28: Environmental Management Framework*.

Table 26-19 EPRs related to Ecology

ID	Description	Phase
EC01	Complete ecological surveys, apply sag and sway analysis, and finalise design Prior to the finalisation of detailed design for an area, the Principal Contractor will complete additional ecological surveys in areas where survey has not previously been completed, or has only been partially completed, due to access constraints and where vegetation removal or habitat disturbance may occur. The additional surveys will refine and confirm the extent, type (EVC) and quality of native vegetation, threatened ecological communities, threatened flora and fauna habitat, and any targeted threatened species that may be impacted by the Project within areas that have not previously been surveyed, or have only been partially surveyed due to access constraints. Surveys will be timed to coincide with survey guidelines for specific species. Where targeted survey cannot reasonably confirm presence because of survey timing or species detectability constraints, suitable habitat will be assumed to support the relevant species unless evidence supports a lower-risk conclusion. Where additional surveys identify previously unrecorded ecological values that may be impacted by the Project, the findings will be incorporated into the updated ecological mapping and detailed design to avoid or minimise impacts where practicable. Any residual impacts and associated offset requirements will then be recalculated, where applicable. Where the findings identify materially different ecological values or impacts from those assessed in the EES, the Principal Contractor will consult with DEECA, National EPA and/or Traditional Owners, as relevant. During detailed design and prior to the finalisation of detailed design for an area, the Principal Contractor will identify vegetation and habitat that can be retained, including no-go zones, retained habitat areas, and Notional Root Zones (NRZs) (previously known as tree protection zones) associated with retained native trees and access tracks outside the easement.	Design Pre-construction

ID	Description	Phase
	The ecological mapping used to inform the Project design will be updated to reflect: • The outcomes of additional survey • The locations of no-go zones and retained habitat • The construction footprint within the Proposed Easement • NRZs and any trees initially assumed to be lost but subsequently identified through arborist assessment as capable of retention When finalising detailed design for an area, the updated ecological mapping and sag and sway analysis will be used to refine the Project footprint and adjust infrastructure, where practicable, to avoid native vegetation, NRZs, threatened ecological communities, wetlands and threatened species habitat. In doing so, the Principal Contractor will have regard to the ecological inputs relevant to identification of access tracks and other construction areas, including avoidance or minimisation of impacts to native vegetation, threatened species habitat, wetlands and riparian areas.	
EC02	Construction Vegetation and Habitat Management Plan (CVHMP) Prior to the commencement of construction, the Principal Contractor will develop and implement a Construction Vegetation and Habitat Management Plan (CVHMP) as a sub-plan of the CEMP to avoid and minimise impacts on native vegetation, threatened ecological communities, threatened species habitat and habitat connectivity during construction. The CVHMP will be prepared in consultation with DEECA, Traditional Owners and National EPA, where relevant, and will be consistent with this EMF, the Project's approach to avoidance, minimisation and management of ecological impacts, and applicable legislation and policy. The CVHMP must have regard to the requirements for bushfire management outlined in BF01 (Construction Bushfire Mitigation and Management Plan). The CVHMP will include, at a minimum: • Requirements for vegetation removal or management undertaken during construction to establish required electrical safety and operational clearance distances, or bushfire risk management setbacks and fuel management requirements, including controls to avoid or minimise associated ecological impacts to the extent practicable • Measures to protect and monitor native vegetation, threatened ecological communities and habitat values to be retained • Controls to identify, establish and maintain no-go zones and vegetation protection controls • Controls to protect retained native trees, including scattered trees where relevant, and their associated protection zones • Measures to minimise indirect impacts to retained vegetation, including disturbance outside approved work areas • A hollow replacement strategy, including identification of salvageable hollows, requirements for hollow salvage where practicable, opportunities for installation of artificial hollows or nest boxes where appropriate, and monitoring of any replacement habitat structures	Construction

ID	Description	Phase
	- Requirements for reuse of habitat features such as logs, salvaged hollows and coarse woody debris where practicable and subject to landholder agreement - Procedures for briefing contractors and subcontractors on protection requirements, including species identified as culturally significant in consultation with Traditional Owners - Requirements for rehabilitation and reinstatement of disturbed areas not required to be kept clear during operation, having regard to local provenance and/or culturally significant plant species and landholder requirements - Post-construction monitoring requirements for retained vegetation, rehabilitation, revegetation and weed management A Native Vegetation Removal Plan (NVRP) will be prepared that identifies native vegetation, threatened ecological communities and species habitat to be removed and retained, location of No Go Zones and the construction footprint boundaries. Where decommissioning is proposed in the future, relevant vegetation and habitat management requirements will be addressed through the DEMP and any ecology sub-plans required at that time, having regard to the conditions then existing and applicable approval requirements. Measures for culturally significant plant species will be addressed in the Culturally significant species and materials salvage plan (EC16). The CVHMP and NVRP will be reviewed by the Independent Environmental Auditor where required under EM02.	
EC03	No-Go Zones and retained ecological values Prior to the commencement of construction, the Principal Contractor will identify, map, physically demarcate and maintain no-go zones to protect retained ecological values, under supervision of a qualified ecologist. These will be maintained throughout the construction phase. No-go zones will include all areas identified for avoidance through detailed design and ecological assessment under EC01. No-go zones will be clearly communicated to all personnel and enforced through site controls. No-go zones will include, where relevant, retained threatened flora occurrences, retained habitat features. Where ground disturbance is required during operation or decommissioning, no-go zones relevant to those works will be re-established and maintained.	Construction Operation Decommissioning
EC04	Ecological Biosecurity Management Plan (EBMP) Prior to the commencement of construction, the Principal Contractor will develop an Ecological Biosecurity Management Plan to address ecological biosecurity risks associated with the Project. For the purposes of ecology, the Ecological Biosecurity Management Plan will be prepared in consultation with DEECA and will address, at a minimum: Weeds, pests and pathogens affecting native vegetation and habitat	Construction Operation Decommissioning

ID	Description	Phase
	• Disease transfer affecting aquatic and semi-aquatic fauna, including chytrid fungus where relevant • Hygiene and material movement controls for works in or near wetlands, waterways, riparian areas and other sensitive ecological locations • Procedures for detecting, managing and responding to ecological biosecurity incidents • Monitoring and record-keeping requirements relevant to ecological values	
EC05	Fauna Management Plan (FMP) Prior to the commencement of construction, the Principal Contractor will develop and implement a Fauna Management Plan (FMP) as a sub-plan of the CEMP to avoid and minimise impacts to native fauna during construction and decommissioning. The FMP will be prepared in consultation with DEECA and will include, at a minimum: • Pre-clearance inspections and supervision of habitat removal by suitably qualified personnel • Procedures for safe handling, salvage and relocation of fauna in accordance with applicable approvals and the Wildlife Act 1975 • Measures to avoid fauna entrapment in excavations and other construction hazards, including daily inspection requirements where relevant • Procedures for management of injured, displaced or killed fauna to be developed in consultation with wildlife handling specialists such as local wildlife carers and veterinarians • Measures to identify and manage active raptor nests where relevant, including nest mapping and buffers where required • Requirements for artificial hollows or nest boxes where hollow salvage is not practicable and where these measures are appropriate • Traffic, signage and speed control measures to reduce wildlife strike risk along access routes and work areas • Incident reporting, monitoring and adaptive management requirements.	Construction Decommissioning
EC06	Threatened Species Management Plan (TSMP) Prior to the commencement of construction, the Principal Contractor will develop and implement a Threatened Species Management Plan (TSMP) as a sub-plan of the CEMP to minimise impacts on threatened flora and fauna species and habitat. The TSMP will be prepared in consultation with DEECA and National EPA, where relevant, and may include species-specific schedules or guild-based requirements where needed. The TSMP will include, at a minimum: • Identification on relevant Project maps of confirmed and potential habitat for threatened species following pre-construction surveys to be completed under EC01 • Targeted survey requirements where additional information is required to inform construction and habitat management	Construction Operation where relevant Decommissioning

ID	Description	Phase
	- Species-specific or fauna group-based management requirements for threatened fauna and their habitat, tailored to species or groups with similar habitat or ecological requirements - Requirements to avoid, where practicable, construction activities in occupied habitat during sensitive periods such as breeding - Fauna salvage, relocation or translocation requirements where appropriate and lawful - Requirements to engage with National Herbarium of Victoria in relation to salvaging plants to establish ex-situ populations of threatened species - Procedures to avoid newly identified occurrences of threatened flora where practicable - Procedures for salvage, seed collection, propagation of threatened flora or revegetation measures where appropriate - Specific protection measures for significant threatened flora occurrences identified during assessment or additional survey - Procedures for briefing contractors and subcontractors on flora and fauna protection requirements, including species identified as culturally significant in consultation with Traditional Owners - Measures to retain or restore habitat structure where appropriate, including understorey, shrub layer, refuge features or replacement habitat structures where relevant to the species concerned - Habitat connectivity measures where these are appropriate and practicable, including identification of locations, design considerations, consultation requirements and post-construction monitoring - Species awareness and response procedures, including reporting procedures for construction personnel for incidents involving threatened wildlife, and the activities for which a suitably qualified ecologist is required on-site - Exploration of the option for involving Zoos Victoria in a captive breeding program for species that are not suitable to be released into adjacent habitat - Reporting and post-construction monitoring requirements to confirm compliance and assess effectiveness of the relevant controls and management responses	

ID	Description	Phase
EC07	Collision Risk Management Plan (CRMP) Prior to the commencement of construction, the Principal Contractor will develop and implement a Collision Risk Management Plan, in consultation with DEECA and National EPA, to minimise the risk of bird collision with transmission infrastructure during construction and operation. The plan will identify key collision risk areas and any other locations of high bird utilisation or proximity to wetlands, riparian corridors and movement corridors. The plan will include, at a minimum: • Controls to be applied in key collision risk areas during construction and operation, such as line marking, diverters or other visibility-enhancing measures • Monitoring requirements to assess the effectiveness of those measures including monitoring of targeted areas where mitigation measures are not implemented for comparison • Details of how this monitoring data will be used to add to the knowledge bank of Australian-specific information into collision risk management and to inform Traditional Owners of impacts on wildlife • Review and adaptive management requirements to determine whether additional controls are needed • Regard to current relevant guidance for reducing bird collision risk, including relevant BirdLife International guidance where applicable	Construction Operation
EC08	Riparian and aquatic habitat protection Prior to the commencement of construction, the Principal Contractor will develop and implement measures, documented in the CEMP and prepared in consultation with the relevant catchment management authorities and Traditional Owners, to avoid and minimise short- and long-term impacts on riparian vegetation, riverbed and aquatic habitat, and aquatic fauna connectivity. These measures will be developed and implemented in conjunction with SW01, including the requirements relating to setbacks from waterways, working within or adjacent to waterways, and erosion and sediment control. These measures will include, at a minimum: • Retention of native vegetation and habitat features in riparian areas where practicable • Measures to minimise disturbance to banks, beds and aquatic habitat features such as retaining lower trunks/root balls/roots of large riparian trees in situ if removal of the trees cannot be avoided • Erosion and sediment controls for works near waterways • Revegetation and rehabilitation requirements for disturbed riparian areas not required for operation • Consultation with landholders and Traditional Owners where fencing, rehabilitation or revegetation measures are proposed.	Construction Decommissioning
EC09	Operational Vegetation and Habitat Management Plan (OVHMP)	Operation

ID	Description	Phase
	Prior to the commencement of operation, the TNSP will develop and implement an Operational Vegetation and Habitat Management Plan (OVHMP), in consultation with DEECA, to manage native vegetation and flora and fauna habitat within the easement during operation. The OVHMP will be consistent with the <i>Electricity Safety Act</i> and Regulations and the Code of Practice for Electric Line Clearance, as amended from time to time. The OVHMP must have regard to requirements for bushfire management outlined in BF03 (Operations Bushfire Mitigation and Management Plan). The OVHMP will include, at a minimum: • Methods for ongoing vegetation management that minimise impacts on retained biodiversity values to the extent reasonably practicable • Requirements for management of identified areas of partial clearance or retained understorey where relevant • Controls to minimise unnecessary disturbance during maintenance activities • Controls to manage the spread of weeds and pathogens arising from maintenance activities • Monitoring and adaptive management requirements for retained vegetation and habitat values during operation.	
EC10	Understorey Retention and Partial Clearance Plan (URPCP) Prior to the commencement of construction, the Principal Contractor will prepare an Understorey Retention and Partial Clearance Plan, in consultation with DEECA and TNSP, to identify locations where full vegetation removal is not required and where understorey or ground layer vegetation can be retained while maintaining compliance with the <i>Electricity Safety Act</i> and Regulations and the Code of Practice for Electric Line Clearance. The URPCP must have regard to the requirements for bushfire management outlined in BF02 (Construction Bushfire Mitigation and Management Plan) and BF03 (Operations Bushfire Mitigation and Management Plan). Given the predominance of agricultural land within the Project area, this plan will focus on sensitive locations where understorey retention would provide a meaningful biodiversity benefit, such as remnant road reserves, riparian crossings, waterways, drainage lines and other higher biodiversity value areas. The plan will specify, at a minimum: • The locations where partial clearance or understorey retention is proposed • The extent of vegetation to be retained in each location • The measures that will be implemented to protect retained understorey during construction • How biodiversity value, constructability and safety requirements have been balanced • Any updates required to the ecological mapping and related management plans as a result of the plan. The plan will be reviewed by the Independent Auditor where required under EM02.	Design Construction

ID	Description	Phase
EC11	Further avoidance and minimisation framework for higher biodiversity value areas Prior to the finalisation of detailed design in areas identified through the ecological assessment, additional surveys or updated ecological mapping as having higher biodiversity value, the Principal Contractor will undertake a further targeted avoidance and minimisation assessment to determine whether additional native vegetation, habitat or ecological values can be retained through location-specific design refinement beyond the general process required under EC01. For the purposes of this EPR, higher biodiversity value areas are areas identified through ecological assessment, additional survey or updated ecological mapping as having elevated biodiversity sensitivity or constraint, including: • Native vegetation of higher condition or connectivity value • Threatened ecological communities • Confirmed threatened flora occurrences or areas of potential threatened flora habitat • Confirmed or higher-quality threatened fauna habitat • Wetlands, waterways, riparian corridors and associated habitat • Areas where concentrated habitat removal, fragmentation or connectivity impacts may otherwise occur • Areas where further avoidance or minimisation may reasonably be achieved through location-specific design refinement. This assessment will consider, where relevant: • Engineering or constructability options such as increased tower heights, altered spans or micro-siting • Implications for fire risk, safety, cost and visual impact • The extent of vegetation removal required for compliance with the Electricity Safety Act and Regulations • Identification of any additional no-go zones that can be established The outcomes of this assessment will be reflected in updated ecological mapping and final design for those areas.	Design
EC12	Pre-clearance surveys for threatened turtle nests Prior to the commencement of relevant works, the Principal Contractor will engage a suitably qualified ecologist to conduct surveys for nests of threatened turtle species within 500 m of the Murray River, Loddon River and Pyramid Creek. The surveys will be undertaken in consultation with Turtles Australia and Traditional Owners, and the results will be provided to those stakeholders and incorporated into the relevant Fauna Management Plan and Threatened Species Management Plan requirements and work scheduling.	Pre-construction Construction
EC13	Environmental Line List (ELL) Prior to the commencement of construction, the Principal Contractor will prepare and maintain an Environmental Line List (ELL) to identify ecological values and location-specific management requirements and controls along the Project.	Pre-construction Construction Operation where relevant

ID	Description	Phase
	The ELL will: • Identify ecological constraints and sensitive receptors • Specify the controls and management measures applicable at each relevant location • Be integrated into construction planning and delivery • Be updated as new information becomes available during construction and operation	
EC14	Ecological offsets VicGrid VNI West will determine, secure and implement ecological offsets in accordance with applicable Commonwealth and State legislation and policy, following application of the Project's approach to avoidance and minimisation of ecological impacts. Where impacts cannot be avoided or minimised to the extent reasonably practicable, offset requirements will be identified and secured before vegetation/habitat removal occurs. The draft Offset Management Strategy will be updated in consultation with DEECA, Traditional Owners and National EPA, as needed.	Pre-construction Construction Operation where relevant
EC15	Ecological monitoring and adaptive management Ecological monitoring will be implemented to assess the effectiveness of ecology management controls and to inform refinement of management responses (adaptive management) where required. Monitoring requirements and performance targets will be specified in each management plan to be developed in consultation with DEECA, National EPA and monitoring results provided to key stakeholders including Traditional Owners. Monitoring will: • Assess compliance with relevant ecology management plans and EPRs • Assess the effectiveness of key ecology management controls, including rehabilitation, habitat retention and any connectivity, hollow replacement or collision measures • Track the state of native vegetation, threatened ecological communities and habitat relative to prior to commencement of Project works • Identify emerging risks or non-compliance • Inform corrective actions and adaptive management where outcomes are not being achieved	Construction Operation Decommissioning
EC16	Culturally significant species and materials salvage plan (CSSMSP) Prior to the commencement of construction on the country of the relevant Traditional Owner groups, the Principal Contractor will prepare and implement a Culturally Significant Species and Materials Salvage Plan (CSSMSP) in consultation with the relevant Traditional Owner groups, unless otherwise agreed with those Traditional Owner groups. The plan will: • Specify opportunities for Traditional Owner salvage of plants, seeds or timber and salvage from construction areas on Crown land	Construction

ID	Description	Phase
	- Specify opportunities for Traditional Owner salvage of fauna materials (e.g. fur, skin or bones) - Be prepared having regard to Traditional Owner preferences for access for collection and salvage of plant and fauna materials - Identify any limitations on access or salvage, including: - The overriding obligation to comply with this EMF and any applicable approvals - Construction requirements, including timing constraints for commencement of works, ground conditions, weather and occupational health and safety requirements - Materials to be salvaged - Any need to obtain other approvals for collection or salvage The plan will be implemented during construction and coordinated with the relevant ecology and Aboriginal cultural heritage requirements, including ACH02. The CSSMSP must have regard to EC05 (Fauna Management Plan) with particular reference to procedures for management of injured, displaced or killed fauna being conducted by appropriately skilled and trained personnel holding appropriate authorisations for salvage of wildlife.	
EC17	Biodiversity induction Prior to any works that may affect biodiversity values, all relevant Project personnel will complete a biodiversity induction in accordance with the applicable phase-based environmental management plan (CEMP, OEMP or DEMP). The induction will: - Be delivered by a suitably qualified ecologist and explain why protection of biodiversity values is important - Include ecological and biodiversity background of the project easement and the types of vegetation, fauna and habitats that may be encountered - Outline specific areas of ecological sensitivity, culturally sensitive biodiversity values and protected, vulnerable and endangered species which could be encountered at different locations - Outline requirements in relation to designated No Go zones (EC03) - Outline how to minimise risks of causing traffic trauma to wildlife and procedures to follow if an animal is injured - Explain the relevant legal obligations and penalties under applicable legislation Refresher induction or awareness material will be provided where required, including where personnel are working in areas with high biodiversity sensitivity, where work methods or locations change, where an unexpected find has occurred, or where monitoring, audit findings or non-compliance indicate that refresher training is required. Periodic reinforcement of induction measures will occur at toolbox briefings, particularly where works are occurring in areas where high biodiversity or culturally sensitive values are present.	Construction Operation where relevant Decommissioning

ID	Description	Phase
	A summary of the induction will be made available to personnel undertaking Project works, including through posters or similar material displayed in relevant work areas.	

In addition to the measures above, the EPRs from other chapters are relevant to reducing the potential for ecological impacts from the Project. These EPRs and linkages are summarised in Table 26-20 below.

Table 26-20 EPRs from related chapters

EPR ID	EPR	Project phase
GS02	Saline and Dispersive Soils Management Plan (SDSMP)	Pre-construction Construction
GS04	Acid Sulfate Soil Management Plan (ASSMP)	Pre-construction Construction Decommissioning
GS05	Hazardous Materials Management Plan (HMMP)	Construction Operation Decommissioning
GW02	Groundwater impact assessment for GDEs	Design Pre-construction Construction
SW01	Surface Water Management Plan (SWMP)	Pre-construction Construction Decommissioning
TT01	Traffic Management Plans (TMPs)	Pre-construction Construction Operation (if required) Decommissioning
TT03	Road design and intersection treatments	Pre-construction Construction
ACH01	Develop an engagement plan to outline requirements for Traditional Owner participation and oversight of the implementation of cultural heritage requirements for the life of the Project.	Design Construction Operation
ACH02	Commitment to assessment of inaccessible areas	Design Construction
ACH03	Avoidance-led design for Aboriginal cultural heritage	Design Pre-construction Construction Operation Decommissioning

EPR ID	EPR	Project phase
ACH06	Cultural Values Assessment recommendations and Aboriginal Cultural Heritage Implementation Plans	Design Pre-construction Construction Operation Decommissioning where relevant

A full list of Project EPRs is provided in *EES Chapter 28: Environmental Management Framework*.

26.9.2 Monitoring and contingency measures

The monitoring and contingency measures relevant to this assessment are summarised in Table 26-21.

These measures are intended to monitor the effectiveness of impact management and identify any need for further response where unplanned impacts occur.

Table 26-21 Monitoring and contingency measures relevant to ecology

Relevant EPR	Monitoring	Location	Frequency	Project phase(s)	Assigned responsibility
EC02 EC15	Monitor the success of revegetation, habitat reinstatement and remediation works at locations where these measures are implemented, including vegetation establishment, survival and weed incursion	Reinstated and revegetated areas	As specified in the relevant ecology management plan	Construction Post-construction Operation where relevant	Principal Contractor TNSP where relevant
EC07 EC15	Monitor bird and bat mortality at higher-risk sections of Project infrastructure using a repeatable survey method and frequency specified in the relevant ecology management plan	Higher-risk collision sections, including identified high bird-use areas	As specified in the Collision Risk Management Plan	Construction where relevant Operation	Principal Contractor TNSP

Relevant EPR	Monitoring	Location	Frequency	Project phase(s)	Assigned responsibility
EC04 EC09 EC15	Monitor weed establishment and spread in disturbed areas following construction, including areas subject to rehabilitation, revegetation or habitat reinstatement	Disturbed, rehabilitated and revegetated areas	As specified in the relevant ecology management plan and the Biosecurity Management Plan	Construction Post-construction Operation where relevant	Principal Contractor TNSP
EC02 EC05 EC06 EC15	Monitor the condition and use of artificial hollows, nest boxes, salvaged hollows and other installed habitat features at locations where they are used as habitat replacement or habitat enhancement controls	Locations where habitat structures are installed	As specified in the relevant ecology management plan	Construction Post-construction Operation where relevant	Principal Contractor TNSP
EC02 EC03 EC09 EC10 EC11 EC15	Monitor the condition and extent of native vegetation, threatened ecological communities, threatened flora and habitat at selected monitoring locations, including impact areas, reinstated areas and reference/control locations where relevant	Impact areas, retained areas, reinstated areas, and reference/control sites where relevant	As specified in the relevant ecology management plan	Construction Operation	Principal Contractor TNSP

Relevant EPR	Monitoring	Location	Frequency	Project phase(s)	Assigned responsibility
EC06 EC12 EC15	Undertake post-construction monitoring required by the Threatened Species Management Plan, including species-specific monitoring at locations and frequencies defined in that plan	Species-specific monitoring locations identified in the TSMP	As specified in the TSMP	Construction Post-construction Operation where relevant	Principal Contractor TNSP
EC05 EC06 EC07 EC15	Undertake repeatable fauna monitoring at selected higher-risk or indicator locations along the alignment, where identified in the relevant ecology management plans, using methods suitable to the target taxa and location	Selected higher-risk or indicator locations along the alignment	As specified in the relevant ecology management plans	Construction Operation	Principal Contractor TNSP
EC15	Review and audit implementation and effectiveness of ecology management controls and monitoring requirements, and assess any new or unanticipated ecological effects identified during construction or operation	Project-wide ecology measures	Periodic, as specified in the EMF and relevant plans	Construction Operation	VicGrid VNI West Independent Environmental Auditor where relevant Principal Contractor/ TNSP to support

Relevant EPR	Monitoring	Location	Frequency	Project phase(s)	Assigned responsibility
EC16	Monitor implementation of the Culturally Significant Species and Materials Salvage Plan, including collection/salvage opportunities, access arrangements and any limitations recorded during construction	Relevant construction areas on Traditional Owner Country, including Crown land where applicable	During relevant construction windows/opportunities	Construction	Principal Contractor VicGrid VNI West Relevant Traditional Owner groups where applicable

26.10 Offsets

Offsets for the loss of native vegetation would be required in accordance with the Victorian Native Vegetation Removal Regulations. Offsets would be required for significant residual impacts on TECs or threatened species in accordance with the EPBC Act Environmental Offsets Policy.

Priority will be given to offset sites closest to the Project and on the same Country as where the impact took place, prioritising land held by Traditional Owners where possible. The feasibility of achieving offsets in proximity to the Project will be influenced by factors that include landholder willingness to provide offsets for the Project and availability of landholdings that are suitable to be an offset.

26.10.1 State offsets

Removal of native vegetation would be offset in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DEECA, 2025), which is a requirement of Clause 52.17 (Native Vegetation) of the Victoria Planning Provisions. Under the Guidelines, state offsets are a requirement of the removal of native vegetation.

In Victoria, there are two types of biodiversity offsets (DELWP, 2019):

- Species offsets which are required when the removal of native vegetation has a significant impact on modelled habitat for rare or threatened species. These offsets are expressed as Species Habitat Units (SHU) when calculating offset obligations.
- General offsets which are required when the removal of native vegetation is not modelled to have a significant impact on a rare or threatened species. These offsets are expressed as General Habitat Units (GHU) when calculating offset obligations.

To determine offset requirements, native vegetation patch and tree impact data was supplied to DEECA, who then generated the Native Vegetation Removal reports (as the online Native Vegetation Regulation Map tool is not suitable for large, complex datasets).

Offsets would be obtained in accordance with the Draft Offset Strategy (*Attachment III: Draft Offset Strategy*), as required by EPR-EC14.

Offset requirements to compensate for this loss, as determined by the Native Vegetation Removal report are shown in Table 26-22.

Table 26-22 Indicative offset requirements for the Project

Unit type	Offset requirement by Proposed Easement option combination			
	1	2	3	4
General offset amount				
General Habitat Units (GHUs)	9.430	9.424	9.945	10.671
Vicinity	North Central, Wimmera CMA or Buloke Shire, Gannawarra Shire, Loddon Shire, Northern Grampians Shire			
Min. strategic biodiversity value score	0.186	0.187	0.184	0.184
Large trees*	111	114	140	168
Species offset amount (Species Habitat Units [SHUs])				
Downs Nutgrass	11.788	11.788	9.930	9.930
Erect Peppergrass	21.452	21.452	19.742	19.742
Chariot Wheels	25.146	26.325	23.078	23.257
Wavy Marshwort	14.877	14.877	13.292	13.292
Swamp Buttercup	34.387	34.297	31.256	31.165
Slender Darling-pea	42.907	43.112	39.771	None
Red Swainson-pea	44.780	44.985	41.649	41.854
Downy Swainson-pea	41.049	41.254	None	None
Fuzzy New Holland Daisy	29.584	29.576	28.239	28.231
Scaly Mantle	44.125	44.330	None	None
Grassland Bindweed	14.836	15.478	13.500	14.143
Large trees*	492	491	463	437
Total large trees				
*Total number of large trees that offsets must protect in either the general, species or combination across all habitat units protected	603	605	603	605

Offset security and management

Offsets can be achieved as either first- or third-party offsets and must be protected in perpetuity (forever) with an on-title security agreement. First party offsets are on land owned by the party removing the native vegetation. Third party offset sites are on land owned by another party for which native vegetation credits can be bought to meet offset requirements.

The biodiversity offset for the Project would be achieved via a third-party offset on land owned by another party (a native vegetation credit owner). Third party offset sites are established by the landholder via a security agreement registered on the land title that runs in perpetuity. Security agreements can be via a Section 69 agreement under the *Conservation, Forests and Lands Acts 1987* with the Secretary to DEECA or an offset covenant agreement under the Victorian *Conservation Trust Act 1972* with Trust for Nature.

Native vegetation credit owners are responsible for complying with their obligations under the security agreement, actively managing the site to generate gains, and reporting progress of this management to the relevant statutory body (DEECA or Trust for Nature).

Offset availability

Secured offset sites are registered on the DEECA native vegetation credit register (NVCR). The Draft Offset Strategy (*Attachment III: Draft Offset Strategy*) identifies that:

- General habitat units and large trees are readily available in both CMAs (North Central and Wimmera)
- Species habitat units are:
 - Available on registered credit sites for three of the 11 species requiring offset (Wavy Marshwort, Fuzzy New Holland Daisy and Grassland Bindweed)
 - Not available on registered credit sites for eight species (Downs Nutgrass, Erect Peppergrass, Chariot Wheels, Swamp Buttercup, Slender Darling-pea, Red Swainson-pea, Downy Swainson-pea and Scaly Mantle) but that shortfall is considered low risk with modelling showing availability from known, unregistered sites.

Offset reconciliation

Offsets can be reconciled at the end of the Project if the extent of native vegetation removed during construction is reduced from the extent anticipated at the time of approval (DEECA 2025). This provision means that any overestimate of impacts that may be required in keeping with a precautionary approach due to access constraints or because further refinements are made to the design can be reconciled if the impact extent is overestimated. Any excess offset credits can be retired, unallocated and banked or sold on if the Project provides evidence to DEECA and the responsible authority that the actual extent of removal was less than the anticipated removal that was approved for the permit.

26.10.2 EPBC Act offsets

Critical to the approval of an action under the EPBC Act, is an understanding of whether a suitable offset is available to compensate for any significant residual impacts to an MNES. The residual impacts of a project are those that remain (and are unavoidable) when all possible avoidance and mitigation measures have been enacted. Offsets do not reduce the likely impacts of a proposed action but instead compensate for any residual significant impact.

Offsets can be delivered by a range of mechanisms, including market-based mechanisms and contracting third party providers. Suitable offsets must improve or maintain the viability of the protected matter (DSEWPaC, 2012).

Offsets would be obtained in accordance with the Draft Offset Strategy (*Attachment III: Draft Offset Strategy*) as required by EPR-EC14.

Offset requirements for TECs and threatened species based on worst-case scenario are outlined in Table 26-23 and Table 26-24 respectively. These totals encompassed confirmed areas that have been identified based on field assessment and unconfirmed areas identified based on desktop-assessment. Offset requirements identified for the Project may be subject to change as more of the Project area is accessed for survey and the Project design is finalised and once candidate offset sites are identified.

Table 26-23 Area to be offset for residual impacts on TECs – total

Offset type	Area to be offset (worst-case)
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	10 ha
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	121 ha
Natural Grasslands of the Murray Valley Plains	115 ha
Plains Mallee Box Woodlands of the Murray Darling Depression, Riverine and Naracoorte Plain Bioregion	27 ha

Table 26-24 Area to be offset for residual impacts on threatened species – total

Offset type	Area to be offset (worst-case)
Turnip Copperburr	57 ha
Swift Parrot	121 ha
Brown Treecreeper	150 ha
Striped Legless Lizard	78 ha

Offset availability

Commonwealth offsets for the Project would be identified through a qualified offset broker and secured via a Trust for Nature conservation covenant. The estimated offset requirements were reviewed against known supply in consultation with a qualified offset broker to identify whether there would be risks to the availability of offsets for the Project. Supply risk for a project relates to whether there is known supply in the market for a particular offset.

Offsets for TECs are a moderate to extreme supply risk. Based on the worst-case impact extents, Natural Grasslands of the Murray Valley Plains, Buloke Woodlands, and Grey Box Grassy Woodland are a moderate supply risk, and Plains Mallee Box Woodland is an extreme supply risk. Offsets for confirmed occurrences of the TECs are a low supply risk for Grey Box Grassy Woodland and Natural Grasslands of the Murray Valley Plains and remain a moderate and high risk for Buloke Woodlands and Plains Mallee Box Woodland.

Offsets for Turnip Copperburr and Striped Legless Lizard are a moderate to high supply risk. Offsets for Swift Parrot and Brown Treecreeper are a low supply risk.

There is potential to co-locate some species and TEC offsets and the offset strategy will aim to maximise co-location of multiple MNES at individual sites. Sites for Striped Legless Lizard, Brown Treecreeper and Turnip Copperburr offsets would need to demonstrate presence.

Alternative offset arrangements

If suitable offset sites for particular species or communities cannot be found, alternative offset arrangements would need to be made in consultation with the National EPA. Alternative arrangements under the EPBC Act Environmental Offsets Policy (DSEWPaC 2012) and the EPBC Act reforms anticipated to commence on or before 1 December 2026 are discussed in the draft Offset Management Strategy.

26.11 Conclusion

The Project traverses a landscape that has been largely cleared of native vegetation due to historical and ongoing agricultural land use. The landscape comprises vast extents of agricultural land used for grazing or cropping from dryland farming in the south moving to more irrigated farming in the north.

Ecological investigations have evolved alongside, and informed, the route refinement process. Existing conditions assessments were undertaken progressively from the broader Area of Interest and Draft Corridor through to the Proposed Easement and other Project activities. Early desktop and field investigations informed route refinement and helped identify areas of ecological value to avoid where practicable.

The ecology impact assessment identified that the Project could have the potential to impact on areas of ecological sensitivity through construction activities removing native vegetation and habitat and through operational activities, where the ongoing presence of transmission infrastructure poses a collision risk to birds or bats and associated disruption of movement of fauna between habitats in the landscape.

Key mitigations

The key mitigation for residual impacts would be achieving further avoidance of the habitat through ongoing design refinements in accordance with EPR-EC01 and EPR-EC11 and where avoidance is not possible, EPRs are proposed to reduce the risk of impacts to ecological values.

Once avoidance to the extent practicable has been achieved, mitigation measures would be implemented through the management plans required under EPRs. These are:

- Construction Vegetation and Habitat Management Plan (CVHMP)
- Ecology Biosecurity Management Plan (EBMP)
- Fauna Management Plan (FMP)
- Threatened Species Management Plan (TSMP)
- Collision Risk Management Plan (CRMP)
- Operational Vegetation and Habitat Management Plan (OVHMP)
- Understorey Retention and Partial Clearance Plan (URPCP)
- Culturally significant species and materials salvage plan.

Additional measures such as the implementation of no-go zones, measures to protect riparian vegetation, pre-clearance surveys and an Environmental Line List would reduce impacts as far as practicable.

Following the implementation of EPRs, the Project would have a residual impact on native vegetation, FFG Act and EPBC Act-listed TECs, and threatened flora and fauna species.

Residual impact on Matters of National Environmental Significance

The Project is likely to have a significant impact on four EPBC Act listed TECs – Natural Grasslands of the Murray Valley Plains, Grey Box Grassy Woodland, Buloke Woodlands and Plains Mallee Box Woodland. A significant impact on the Mallee Bird Community TEC is considered unlikely.

The Project would be unlikely to have a significant impact on threatened flora species listed under the EPBC Act with the exception of Turnip Copperburr, which has a likely significant impact as 53 individuals would be lost in treed areas of the Proposed Easement.

For EPBC Act-listed woodland birds such as the Southern Whiteface, Hooded Robin, Diamond Firetail, Blue-winged Parrot, Pink Cockatoo, and Fork-tailed Swift the Project would remove some areas of habitat, but those discrete locations are unlikely to represent a significant impact in the context of the landscape, particularly given the mobility of those species.

A significant impact is likely for two EPBC Act listed woodland birds (Swift Parrot and Brown Treecreeper).

Plains-wanderer is unlikely to be significantly impacted. Known populations are avoided and, although the Proposed Easement skirts the edge of the Bunguluke Plains, potential habitat in the area is limited to grazing land and it is unlikely suitable habitat exists in the Project Easement. Collision risk should be possible to mitigate through implementation of measures to improve visibility of the conductors to be specified in a Collision Risk Management Plan.

Striped Legless Lizard were recorded during surveys around Glenloch and may occur in other areas of potential habitat. As a sedentary species, the Project is likely to have a significant impact although impacts to habitat may be avoidable as they mostly relate to access routes from public roadsides into private land.

Golden Sun Moth may occur in the south near Bulgana, however removal of habitat at individual tower locations and for temporary access tracks during construction is unlikely to constitute a significant impact. Suitable habitat would be retained outside of those discrete areas allowing the population to persist, and to recolonise the cleared areas after reinstatement.

There would be no residual impact on Kerang Wetlands Ramsar as the Project avoids the Ramsar site.

Impacts to MNES are also discussed in *EES Chapter 27: Matters of Environmental Significance*.

Residual impact on State biodiversity values

State biodiversity impacts relate primarily to the removal of 115.7 ha of native vegetation patches (including 475 large trees in patches) and 149 scattered trees (130 large and 19 small) for the Project. The extent of native vegetation loss would be substantial and represents approximately 13% of the Project disturbance footprint.

Most of the potential residual impacts on native vegetation would be associated with the Proposed Easement. One of the laydown areas could impact on up to 4.8 ha of native grassland and another may result in the removal of a few small scattered trees. The proposed disturbance footprint for the other sites avoids native vegetation therefore no residual impact is anticipated for those workforce accommodation and laydown areas.

The property for the proposed Bulgana Reactor Station is dominated by a low-quality patch of native vegetation formed by improved pasture with a low density of perennial native grasses among the exotic annual grasses. The two patches of Riparian Woodland can be avoided. No impact on native vegetation is anticipated for the Tragowel Terminal Station as the area is highly modified and does not support native vegetation.

Vegetation clearance to achieve SISD at the 45 identified locations and to accommodate oversized vehicle movements would be avoided and minimised to the extent practicable.

All large trees have been assumed to contain hollows, and their loss would therefore exacerbate a threatening process. The efficacy of mitigations, such as artificial hollows, would need to be investigated as part of developing the Construction Vegetation and Habitat Management Plan and Threatened Species Management Plan.

Removal of native vegetation along the Proposed Easement would result in gaps in corridors of native vegetation along roadsides and waterways. Those gaps would mostly be up to 70 m (the maximum width of the Proposed Easement) but could be up to 100 m at some locations where the Proposed Easement crosses a habitat corridor at an angle. The creation of gaps in the canopy would be particularly notable along large riparian corridors (e.g. Avoca River) and along roadside vegetation. The residual impact is potentially significant, particularly for species reliant on canopy cover for movement including arboreal mammals. Because it is uncertain to what extent mitigation measures would reduce this impact and therefore disruption of habitat connectivity remains a residual impact. The impact would be permanent where trees are removed, but retention or replanting of understorey would assist species to move across the gap. The magnitude of impact would be species-specific and dependent on their ability to cross treeless shrubland or grassland.

FFG Act listed threatened ecological communities confirmed to occur in the Proposed Easement and would therefore be impacted are Grey Box – Buloke Grassy Woodland, Northern Plains Grassland and Semi-arid Northwest Plains Buloke Grassy Woodland. The Victorian Temperate Woodland Bird Community is also likely to occur in woodland remnants and the Victorian Mallee Bird Community may occur in areas of mallee vegetation. Residual impacts on FFG Act listed TECs would be low to moderate.

Impacts on FFG Act listed threatened flora would be of low to moderate severity. In most cases, the likely impact is relatively low based on the species not being detected in surveyed areas where the habitat is anticipated to represent the better-quality areas by virtue of most accessible areas being public land, and therefore being unlikely to occur in non-accessible areas in private properties where habitat is generally of lower quality due to agricultural land use practices. Pre-clearance surveys and implementation of no-go zones would protect any individuals that may occur outside the Proposed Easement. The unavoidable loss of plants from impact areas is likely to affect the populations of some species at the local level.

Impacts on FFG Act-listed threatened fauna range from negligible to major, with Hooded Scaly-foot likely to experience the greatest impact due to their sedentary and less mobile nature in habitat that would be removed for the Project. Brown Toadlet may be similarly impacted if they are present within habitat to be removed, but if not present, the impacts would be low. Grey-crowned Babblers and Samphire Skinks would be impacted, but the extent can be reduced by micro-siting and effective mitigation.

Residual impact change

There is potential for impacts to change post-approval as the design is refined and as ecological assessments are completed on land where access becomes available. A rigorous evaluation of inaccessible areas was undertaken using a combination of DEECA modelled data and high resolution aerial imagery. The identification of ecological values in those areas was conservative, and it is possible that features may be discounted once accessed for assessment. However, there remains some risk of unexpected finds in previously inaccessible areas and therefore a low level risk of additional impacts on native vegetation, TECs and/or threatened species habitat that are currently not accounted for in the impacts and calculation of offsets. The risk of unexpected finds would be managed through the implementation of an EPR (EPR-EC01) that requires surveys in inaccessible areas to be undertaken prior to finalisation of the design to ensure that adjustments could be made to the positioning of towers, access tracks and other project infrastructure wherever practicable. Should tower locations shift, additional ecological assessment would be undertaken where required prior to approval.

The EPRs form a mandatory and enforceable component of the Project EMF. They are intended to have statutory effect through the proposed Planning Scheme Amendment (PSA) Incorporated Document and other statutory approvals. The PSA Incorporated Document requires the Project to submit a final detailed design via a Development Plan prepared to the satisfaction of the Minister for Planning, with all micro-siting of towers requiring assessment of ecological and other impacts. This provides an opportunity to verify the findings of the EES in inaccessible areas and consider any further mitigation if required. The PSA would oblige the Project to comply with the Guidelines for the removal, destruction or lopping of native vegetation and thus the Project must procure offsets equivalent to what is removed. This provision provides certainty that any changes to impacts would be accounted for and offset obligations met. Where there is a change in the Development Plan related to an EPBC Act protected matter, a variation to the approval under the EPBC Act may also need to be sought depending on consistency of the change with the EPBC Act approval for the Project.

Unexpected finds may also occur in areas that were accessed but where pre-construction works such as pre-clearance surveys are undertaken. Such unexpected finds are more likely to relate to threatened species occurrences rather than native vegetation and TECs (due to their more cryptic nature or through additional recruitment of plants between survey and construction) and would be managed through the TSMP (EPR EC06).

Offsets

Offsets for native vegetation would be required under Victoria's Native Vegetation Removal Regulations. Offsets would be required in accordance with the EPBC Act Environmental Offsets Policy for significant impacts on TECs or threatened species.

A Draft Offset Strategy has been prepared that details the approach to offsetting residual impacts of the Project on matters of national and state significance (see *Attachment III: Draft Offset Strategy*). The strategy sets out the proposed means for identifying the availability of, and securing, offsets required for the Project.

It is expected that the final offsets to be procured for the Project would be determined post-detailed design and would consider any reductions in impacts from the design process as well as any additional losses that may occur.

Priority will be given to offset sites closest to the Project and on the same Country as where the impact took place, prioritising land held by Traditional Owners where possible. The feasibility of achieving offsets in proximity to the Project will be influenced by factors that include landholder willingness to provide offsets for the Project and availability of landholdings that are suitable to be an offset.

