

EIS Volume 1 Chapter 11

Flora and Fauna



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11. Flora and Fauna

This chapter describes the flora and fauna of the Project region and assesses how Project construction and operation will affect ecological values including vegetation communities, flora and fauna habitat, nationally listed threatened and migratory species and species protected under State legislation.

11.1. Key Findings

- The Project has used the mitigation hierarchy as a driving principle throughout the route selection process to minimise impacts on flora and fauna.
- ElectraNet has engaged with key stakeholders and responded to feedback and concerns in a proactive manner, including route amendments where practical, to achieve better environmental outcomes.
- Approximately 413 hectares of native vegetation will be cleared along the 205 km alignment during construction (based on upper estimates of 135 ha permanent and 278 ha temporary disturbance). This represents a very small proportion of native vegetation in the region traversed by the Project, and will be offset by achieving a 'Significant Environmental Benefit' in accordance with the *Native Vegetation Act 1991*.
- Clearance of habitat for threatened species will be minimised and is not expected to result in a significant impact to listed flora or fauna species.
- The Project is not expected to impact any listed Threatened Ecological Communities.
- The route has been selected to minimise impacts to conservation areas; vegetation clearance in these areas will be minimised and will not result in significant impact to their conservation value.
- The Project will not impact the ecological character of the Riverland Ramsar site.
- The Project follows existing infrastructure corridors and diverts around key habitat areas and will not significantly increase habitat fragmentation.
- Indirect impacts to vegetation and fauna habitats will be short term and limited in extent.
- Lighting effects at camps and other sites during construction will be short term and localised and will not have a significant impact on any species.
- Noise disturbance will be temporary and localised and will not have a significant impact on any species.
- The incidence of fauna injury or mortality will be localised and short term and will not have a significant impact on any species.
- Low numbers of birds (or bats) are expected to be impacted by collision with transmission line infrastructure, and this is not expected to have a significant impact on any species.
- Project activities and the presence of access tracks are not expected to result in an increase in the existing level of pest species present in the transmission line corridor.
- Project activities and the presence of access tracks are not expected to result in an introduction, increase or spread of weeds above the existing level present.
- Project activities and the presence of access tracks are not expected to result in an introduction or spread of pathogens.
- Uncontrolled fire has the potential for significant impact to native vegetation and fauna. The level of risk associated with fires during construction and operation can be appropriately managed with the implementation of risk treatment and mitigation measures.
- No significant or long-term impacts to listed flora or fauna are expected.

11.2. Setting the Context

This section provides information to explain the context within which impact assessment is undertaken. It describes:

- the relevant EIS Guidelines
- relevant requirements in legislation and other standards
- views of stakeholders and the environmental and social outcomes they would like the Project to meet
- the assessment methodology used to identify baseline environmental values and to undertake impact assessment.

11.2.1. EIS Guidelines

The EIS guidelines require assessment of the ecological effects of Project EnergyConnect, both during construction and operation of the transmission line. The State Planning Commission (SPC) acknowledged the ecological importance of the area and the need for the investigations to cover impacts upon:

- the Murray River Basin as it includes large tracts of vegetation and provides important wildlife habitat, including breeding waterbirds
- the Riverland Biosphere Reserve, (which includes Taylorville and Calperum Stations) and contains one of the largest intact stands of old-growth mallee vegetation, and an area listed on the Commonwealth Register of Critical Habitat for the nationally endangered Black-eared Miner
- the Riverland Ramsar site, recognised as a wetland of international importance
- threatened fauna and flora species.

The EIS Guidelines relevant to flora and fauna are provided in Table 11-1.

Table 11-1: EIS Guidelines addressed in the Flora and Fauna chapter

EIS Guidelines and Assessment Requirements	Assessment level	Relevant Section
Effect on Conservation Values		
<i>Assessment Requirement 3:</i> The proposed development traverses a corridor which contains significant and extensive tracts of remnant habitat (including one of the largest stands of old-growth mallee vegetation in Australia) and has high conservation values. It is also within close proximity of the floodplain habitat of the River Murray.		
3.1: Identify the potential effects and measures to avoid and or mitigate the proposal on the local, regional, state or national conservation status of individual species and vegetation communities during both construction and maintenance (including species listed in the SA <i>National Parks and Wildlife Act 1972</i> and the Commonwealth <i>Environment Protection Biodiversity Conservation Act 1999</i>).	Critical	11.4.1 11.4.7 11.4.8
Effect on Native Vegetation		
<i>Assessment Requirement 4:</i> The proposed development traverses significant stands of native vegetation.		
4.1 Describe the location, extent, condition and significance of native vegetation, including individual species and communities in the proposal's environs. Include reference to areas that have Heritage Agreements under the <i>Native Vegetation Act 1991</i> .	Critical	11.3.1 11.3.2 11.3.3
4.2: Describe the location, extent, condition and significance of native vegetation species and communities that may need to be cleared or disturbed during both construction and maintenance.	Critical	11.3.2 11.3.3 11.4.1
4.3: Describe the ability of communities or individual species to recover, regenerate or be rehabilitated during both construction, operation including maintenance.	Critical	11.4.1 11.4.3

EIS Guidelines and Assessment Requirements	Assessment level	Relevant Section
4.4: Identify the habitat value of native vegetation and the potential for habitat fragmentation during both construction and maintenance (and decommissioning), including a description of the effects of any fragmentation that may occur over the life of the transmission line.	Critical	11.3.2 11.4.2
4.5: Detail any changes in biological diversity that may result at the interface between the powerline easement and existing vegetation (i.e. the “edge effect”) during construction and over the life of the transmission line, including maintenance.	Critical	11.4.3
4.6: Outline measures to mitigate effects on native vegetation by addressing the mitigation hierarchy, including any compensatory activities in already degraded areas and use of existing easements. Make reference to guidelines produced by the Native Vegetation Council and outline the effectiveness of any mitigation measures adopted during both construction and maintenance.	Critical	11.4.1 11.4.9
4.7: Identify the potential impact of fire on native vegetation, and the effects of fire risk management processes during both construction and maintenance.	Critical	11.4.6 11.4.1
Effect on Native Fauna		
<i>Assessment Requirement 5:</i> The proposed development traverses habitat that supports significant populations of native fauna		
5.1: Describe the location, extent, condition and significance of native fauna populations, including individual species and communities in the proposal’s environs.	Critical	11.3.5 11.3.6
5.2: Describe the location, extent, condition and significance of native fauna species and populations that may be affected during both construction and operation.	Critical	11.3.5 11.3.6 11.4.4 11.4.8
5.3: Describe the ability of populations or individuals to recover during both construction and operation.	Critical	11.4.4 11.4.8
5.4: Identify the effect of habitat fragmentation including, if any, the potential for any hybridisation of fauna.	Critical	11.4.2
5.5: Detail any changes in biological diversity (i.e. hybridisation) resulting at the interface between the powerline easement and existing habitat (i.e. the “edge effect”) during both construction and over the life of the transmission line, including maintenance.	Critical	11.4.2 11.4.3
5.6: Outline measures to mitigate the effects on native fauna, including any compensatory activities in already degraded areas and use of existing easements.	Critical	11.4.1 11.4.3 11.4.4 11.4.9
5.7: Identify the potential impact of fire on native fauna, and the effects of fire risk management processes during both construction and maintenance.	Critical	11.4.6 11.4.1
Hazard Risk		
<i>Assessment Requirement 10:</i> The construction and operation of a high voltage powerline involves a range general and specific risks.		
10.8: Describe the likelihood of bird strike and the management of such a hazard.	Medium	11.4.4
Effect on the Physical Environment		
<i>Assessment requirement 12:</i> The proposed development has the potential to disturb landforms and soils and to affect stormwater run-off		
12.2: Identify any risks and implications of causing or exacerbating land degradation, especially soil erosion and the impacts of dust emissions during construction and ongoing maintenance	Medium	11.4.3
Introduction / spread of exotic plant and animal species		
<i>Assessment Requirement 13:</i> The proposed development has the potential to establish a corridor for the spread of introduced or nuisance plants and animals		

EIS Guidelines and Assessment Requirements	Assessment level	Relevant Section
13.1: Describe the extent and significance of existing exotic plant and animal species, and diseases in the proposal's environs.	Medium	11.3.7 11.3.8
13.2: Identify the potential for the introduction or dispersal of new exotic plant and animal species, and the associated implications for native species, habitat and agricultural land.	Medium	11.4.5
13.3: Identify the potential for increased distribution and abundance of existing exotic plant and animal species, and the associated implications for native species, habitat and agricultural land.	Medium	11.4.5
13.4: Identify any risk of spread of disease (such as Phytophthora and Mundulla Yellows), and the implications of this spread.	Medium	11.4.5
13.5: Outline mitigation measures and their effectiveness in reducing or avoiding the introduction or spread of exotic plant / animal species and diseases (e.g. decontamination of plant, equipment and materials), having regard to the effectiveness of such mitigation measures in the past.	Medium	11.4.5
Construction, Operation and Maintenance Effects		
<i>Assessment requirement 15:</i> The construction and operation of the proposal would require a range of impacts to be minimised, mitigated and monitored through an environmental management plan framework		
15.1: Describe construction techniques and the timing of construction, with reference to any climatic and temporal implications for the biophysical environment. This should include reference to potential land degradation, pollution and implications for the breeding seasons of native species.	Standard	11.4.3 11.4.4 11.4.8
Planning and Environmental Legislation and Policies		
<i>Assessment requirement 16:</i> A range of planning, environmental and energy related statutory requirements would need to be met for the construction and operation of the proposed development.		
16.3: Outline any other Commonwealth or State Government initiatives that may relate to the proposed transmission line, including greenhouse issues, principles of ecologically sustainable development, power generation, and the conservation or protection of the biological environment. Describe the proposal in terms of its consistency with these initiatives.	Standard	11.2.2

Aspects of assessment requirements identified in Table 11-1 above which are not addressed in this chapter are listed in Table 11-2 together with the applicable chapter.

Table 11-2: Aspects of assessment requirements addressed in other chapters

Assessment Requirement	Chapter
12.2 Impacts of soil erosion and dust emissions during construction	Chapter 10 Physical Environment
12.2 Impacts of dust emissions during construction and ongoing maintenance	Chapter 14 Air Quality
13.2 Implications for agricultural land of introduction of exotic plant and animal species	Chapter 9 Land Use and Tenure
15.1 Description of construction techniques and timing	Chapter 7 Project Description
15.1 Potential land degradation and pollution	Chapter 10 Physical Environment
16.3 Commonwealth or State Government initiatives that may relate to the proposed transmission line including power generation.	Chapter 2 Project Justification Chapter 5 Legislative and Planning Framework

11.2.2. Requirements in legislation and other standards

Threatened flora and fauna species and some vegetation communities (as indicated by legislatively established Conservation Status) within South Australia are protected both at the Commonwealth and State levels. Additionally, native vegetation is afforded legislative protection at a State level and some birds which are migratory or inhabit or utilise terrestrial and wetland environments are also afforded

legislative protection under Commonwealth legislation that gives effect to international treaties. The applicable legislation relating to flora and fauna within South Australia is as follows:

Commonwealth legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas. Under the environmental provisions of the EPBC Act, actions that are likely to have a 'significant impact' on a matter of national environmental significance require assessment and approval by the Commonwealth Environment Minister. There are nine matters of national environmental significance identified under the EPBC Act; of relevance to the Project are:

- wetlands of international importance (listed under Ramsar Convention)
- listed threatened species and ecological communities
- migratory species listed under international agreements.

ElectraNet submitted an EPBC Act referral for the Project in June 2019, and it was declared to be a 'controlled action' and therefore subject to assessment under the EPBC Act. The relevant matter of national environmental significance identified for the controlled action was 'Listed threatened species and communities. The Project will be assessed under the provisions of the Bilateral Agreement between the South Australian and Commonwealth governments, prior to the Commonwealth Minister making a (separate) decision whether or not to approve the proposed action under Part 9 of the EPBC Act.

Significant impact guidelines published under the EPBC Act (DoE 2013) have been used in the assessment of impacts on threatened species and communities listed under the EPBC Act.

South Australian Legislation

The *National Parks and Wildlife Act 1972* (Schedules 7, 8 and 9 of the Act) (NPW Act) provides for the protection of habitat and wildlife through the establishment of parks and reserves and provides for the use of wildlife through a system of permits allowing certain actions, i.e. keeping, selling, trading, harvesting, farming, hunting and the destruction of native species. This Act also assigns species to State conservation categories Endangered (Schedule 7), Vulnerable (Schedule 8) and Rare (Schedule 9).

The *Native Vegetation Act 1991* and associated *Native Vegetation Regulations 2017* outlines the controls related to the clearance of native vegetation within South Australia and provides incentives, education measures, and assistance to landowners and proponents in relation to the preservation and enhancement of native vegetation. It provides for Vegetation Heritage Agreements between the State and landowners.

Approval is required under the Act to clear native vegetation unless the clearing activity meets circumstances prescribed under the Regulations. Under Regulations 12 and 13, vegetation clearance for major developments that are approved under an EIS (that was referred to the Native Vegetation Council (NVC) for comment) is permitted, provided that it is undertaken in accordance with the development consent and an approved management plan (or a payment into the Native Vegetation Fund) which results in a significant environmental benefit (SEB). A number of guidelines and policies have been approved by the NVC under the Native Vegetation Act (NVC 2020a,b,c,d) which set out methods for vegetation assessment and calculation of a SEB. These have been used in this chapter and supporting appendices.

The *Landscape South Australia Act 2019* provides for the protection and management of the State's natural resources, including provisions relating to land management, water resource management and pest plant and animal control. Regional landscape plans and control policies are in force under the Act to guide management of water, soil and biological assets and define water affecting activities which require a permit. The western 20 km of the transmission line corridor is in the Northern and Yorke

landscape management region, and the remainder is in the Murraylands and Riverland landscape management region.

The Act further legislates control requirements for 'declared' plants (specific to each region or statewide), which controls the movement of declared plants, requires landowners / managers to destroy or control infestations of certain declared plants and requires further notification of authorities when an infestation of certain declared plants is detected. A permit or notification to the relevant Landscape Board representative may be required if movement or relocation of cleared vegetation containing declared plants will be undertaken (as per sections 186 and 197 of the Act).

For further detail about the application of these Acts, refer to Chapter 5 Legislative and Planning Framework.

11.2.3. Views of stakeholders

ElectraNet has engaged with key stakeholders and responded to feedback and concerns in a proactive manner, including route amendments where practical, to achieve better environmental outcomes.

Consultation undertaken for the Project has highlighted concerns regarding the potential for impact to threatened mallee bird species that occur in the extensive tracts of old growth mallee on Calperum, Taylorville and Hawks Nest stations. Consultation with DEW, Australian Landscape Trust (ALT), Birdlife Australia and other key stakeholders, along with ecological surveys, has resulted in significant modification of the alignment on Calperum and Hawks Nest stations to divert southwards around areas of higher quality habitat for threatened mallee birds.

Details of stakeholder consultation are set out further in Chapter 6 Stakeholder Engagement.

11.2.4. Assessment method

The ecological study of the transmission line corridor involved a staged assessment of alignment options along the approximately 205 km between Robertstown substation and the border of SA and NSW. Assessment of ecological values included both desktop studies, and in-field surveys during Spring 2018, Autumn 2019, Summer 2019 and Summer 2021. Some elements of the assessment were undertaken before the final route was established to inform the route selection process and minimise potential impacts.

Sites assessed in-field (representative vegetation patches within or intersected by the transmission line corridor, including those assessed on superseded alignment options) were given a unique numerical identifier and captured in a geographic information system (GIS) data layer for future analysis. Ecological studies involved both desktop review of flora and fauna records, as well as field survey (Bushland Assessment Method, as per the Native Vegetation Council native vegetation clearance assessment requirements) to determine vegetation type and habitat condition. The results of the studies were used to inform the alignment route selection process, to determine habitat conditions and therefore appropriate significant environmental benefit (SEB) offset requirements for inclusion into native vegetation clearance applications, and to assess the potential for conservation significant flora and fauna to be present. The data was used to determine likely and potential impacts to ecological values as a result of the Project, and to develop mitigation measures to reduce ecological impacts. Brief details on these methods are provided below.

The following study focus areas were used during the ecological assessment:

- Ecological study area (ESA) – a 25 km buffer based on the alignment as at January 2021 (i.e. a 50 km wide corridor). Note that the early ecological constraints investigations and the EPBC referral used an ESA centred on the indicative alignment at the time. The alignment has subsequently been refined (as described in Chapter 4 Route Selection) and the ESA used in this EIS is based on the proposed alignment presented in this EIS.

- EPBC Protected Matters search area – a 5 km buffer on the alignment as at January 2021 (10 km wide corridor)
- transmission line corridor – a 500 m buffer on the alignment as at January 2021 (1 km wide corridor).

The proposed alignment was further refined in February 2021 to avoid Aboriginal cultural heritage sites on Hawks Nest Station (see Chapter 4 Route Selection and Chapter 12 Cultural Heritage). This alignment is discussed throughout this chapter where relevant.

Desktop review

A desktop review was undertaken to describe the existing environment likely to be affected by the proposed alignment. The review took into account the legislative requirements and stakeholder views, and included assessment of publicly available information from the following sources:

- Department of Environment and Water (DEW) NatureMaps (2021a).
- Modelled species distributions in the EPBC Act Protected Matters Search Tool (PMST) – (25 km buffer on the alignment for baseline / constraints studies, i.e. the ESA, noting that a 5 km buffer was used for the EIS (refer Appendix I-1)).
- Historical and recent flora and fauna records from the Biological Database of South Australia (BDBSA 2020, December extract) (approx. 25 km buffer, i.e. the ESA, plus Riverland Biosphere Reserve separate study area) (Initial ESA Recordset number DEWNRBDBSA190902-2, updated 2020 Recordset number DEWNRBDBSA201201-1).
- Historical and recent flora and fauna records from the Atlas of Living Australia (ALA), where relevant and additional information was required.
- Regional spatial information (e.g. DEW State vegetation mapping, IBRA regions, DEW vegetation remnancy statistics, conservations reserves and parks locations and aerial imagery) (DEW 2021a).
- Relevant literature (refer reference lists in Appendices and Chapter 22).
- General distribution ecology texts (refer Chapter 22).
- Species specific government fact sheets (e.g. Species profiles from the Species Profiles and Threats Database (SPRAT) Department of Agriculture Water and the Environment (DAWE 2020c).
- Review of the SNI Environmental Impact Statement (EIS) (SKM 2002) and relevant working papers (e.g. Carpenter 2002).
- Published biodiversity information for the region (e.g. Bush Condition Monitoring Manual Croft, Milne and Pedler (2009), Ramsar Ecological Character Description (ECD) (Newall, Lloyd, Gell and Walker (2009)).

The EPBC Act PMST identifies protected species that may occur in the area as well as potential pests and weed species, including Weeds of National Significance (WoNS). For the EIS assessment the PMST review incorporated species within a buffer of 5 km from the centreline of the proposed transmission line corridor. Search results are discussed in more detail for a broader 25 km buffer (the original ESA) in a preliminary constraints report (which has informed reporting for the native vegetation clearance application, the EPBC referral and options refinement) and the SA EPBC Significant Impact Assessment Report (Jacobs 2019), Threatened Mallee Birds Assessment (Appendix I-4) and the Review of Potential Impacts to Wetland Birds Review (Appendix I-5) and results are summarised below in Section 11.3.

Searches of the BDBSA incorporated the entire initial alignment with buffers of approximately 25 km (the ESA) from the centreline of the initial alignment and were also reviewed specifically for the current transmission line corridor. Search results are summarised below in Section 11.3. Reference to regional

records within wider search areas are made where there is a paucity of information for a particular species (e.g. Black-eared Miner).

Likelihood of occurrence assessment

As mentioned above, in order to assess impacts to conservation significant species, initial desktop assessments, supported by field assessments were conducted to determine the actual likelihood of threatened or migratory species occurring in the ESA and ultimately the transmission line corridor to determine risk of impact and mitigation strategies.

Flora and fauna identified as potentially occurring via desktop assessments were assessed further to determine their likelihood to occur within the transmission line corridor. The likelihood of occurrence criteria were defined as:

- Present – recorded within the transmission line corridor since 1995 during Department of Environment and Heritage (DEH) Biological Surveys (to align with NVC Bushland Assessment Methodology, NVC 2020b).
- Likely – based on the presence of suitable habitat, multiple recent database records from the transmission line corridor or immediate proximity to the transmission line corridor boundary since 1995¹.
- Possible – suitable habitat for the species is present within the transmission line corridor or immediate proximity, but no or very limited recent (since 1995) database record(s) exist within the transmission line corridor or adjacent environments.
- Unlikely – there is a lack of suitable habitat within the transmission line corridor for the species (or community) and / or a lack of proximate historic (pre 1995) records which indicate previous or current occurrence.

These criteria were also used in more detailed assessments presented in this chapter (using desktop and field data) and in a review of wetland birds of the adjacent Riverland Ramsar site and their potential for bird strike (Jacobs 2021, Appendix I-5). The detailed assessments considered the likelihood of occurrence of EPBC listed and migratory species, followed by the likelihood of any impacts being significant to species that were present, likely or considered to possibly occur, in accordance with EPBC Act significant impact guidelines (DoE 2013). The avifauna review considered the likelihood of occurrence of wetland species and potential for bird collision with the transmission line based on various features (e.g. body size, wing span, flight type).

Field survey

Vegetation and habitat assessments

Field surveys were undertaken within the ESA by Jacobs in Spring 2018, Winter and Spring 2019, and Summer 2021 as the alignment was being refined. The vegetation field surveys were undertaken to establish the environmental values present, such as vegetation type and condition, threatened ecological communities, threatened or listed flora and fauna species or suitable habitat to support such species.

The vegetation field surveys involved the following tasks:

- The transmission line corridor and adjacent areas (alternate alignment options) were surveyed between 19 – 22 November 2018, 3 – 7 June, 28 – 30 October 2019 and 6 – 8 January 2021.
- Each vegetation type within (or intersected by) the transmission line corridor, including those assessed on previous alignment options (within the ESA), was given a unique numerical identifier and captured in GIS data layer as a polygon for future analysis.

¹ Records since 1995 have been used as this aligns with the Bushland Assessment Method and NVC guidelines (2020a,b,c,d)

- Data was collected using SA Bushland Assessment Method (as per NVC 2020b) and included 94 sites within the transmission line corridor / ESA corridor (and options) (see Figure 11-1) on private land (where approval was provided by the landowners) and within vegetation along publicly accessible road corridors. Broad vegetation characterisation and condition assessment for all accessible patches was undertaken.
- Identification and inspection of potential ‘hot spots’ i.e. habitat for EPBC listed species and NPW Act listed species or Threatened Ecological Communities (e.g. Pygmy Blue-tongue Lizard, Malleefowl, Black-eared Miner, Peppermint Box Grassy Woodland of South Australia, Iron-grass Natural Temperate Grassland of South Australia). Where potentially suitable habitat was located, targeted searches were undertaken (e.g. Pygmy Blue-tongue Lizard, Malleefowl, Black-eared Miner).
- Assignment of ‘condition’ ratings for vegetation patches as a basis for avoiding important areas and determining Significant Environmental Benefit (SEB) offsets (as a requirement of the Native Vegetation Act and Regulations and the SEB Policy and Guide (NVC 2020c,d) and assessing potential regional impact (see below).

Threatened mallee birds assessment

A field survey and assessment of the potential presence of and impact to threatened mallee birds was undertaken by Nature Advisory in Spring 2019 with a focus on EPBC listed as threatened species (refer Nature Advisory 2021, Appendix I-4). It involved the following tasks:

- Survey of 56 sites within the ESA between 22 – 29 October 2019, of which 44 sites are within the transmission line corridor (12 Hawks Nest Station sites are no longer within the corridor, refer Figure 11-1).
- Targeted Survey of key mallee habitats on foot for five species of interest, including four EPBC listed species (Black-eared Miner, Malleefowl, Red-lored Whistler, Regent Parrot) and one State listed species (Mallee Striated Grasswren) (Nature Advisory 2021, Appendix I-4).
- Surveys include grid and linear transects with observers watching for birds, listening for calls and at the end of each walk using call-playback to elicit responses from the Black-eared Miner, Red-lored Whistler and Striated Grasswren.
- Review of records / distribution / biology for each targeted species and assessment of potential impacts of the Project.

Impact assessment

The method of impact assessment has followed that set out in Chapter 8: Impact Assessment Methodology.

The impact assessment considers the impacts that are expected to occur as part of the construction and operation of the proposed transmission line and substation.

Where there was uncertainty in the assessment of expected impacts, this was evaluated using risk assessment tools, as discussed in Chapter 8 Impact Assessment Methodology. This is discussed under each impact event where relevant. A summary of the evaluation of uncertainty for all impact events is contained in Appendix O.

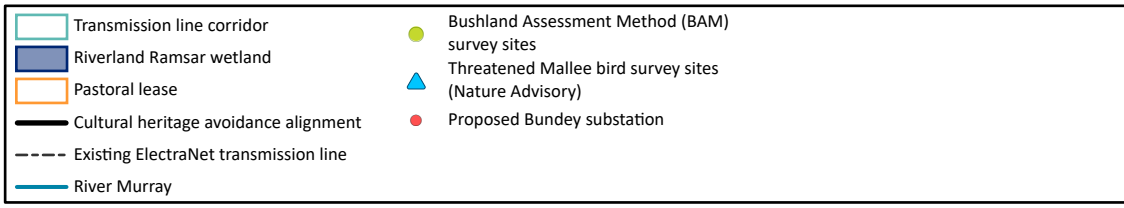
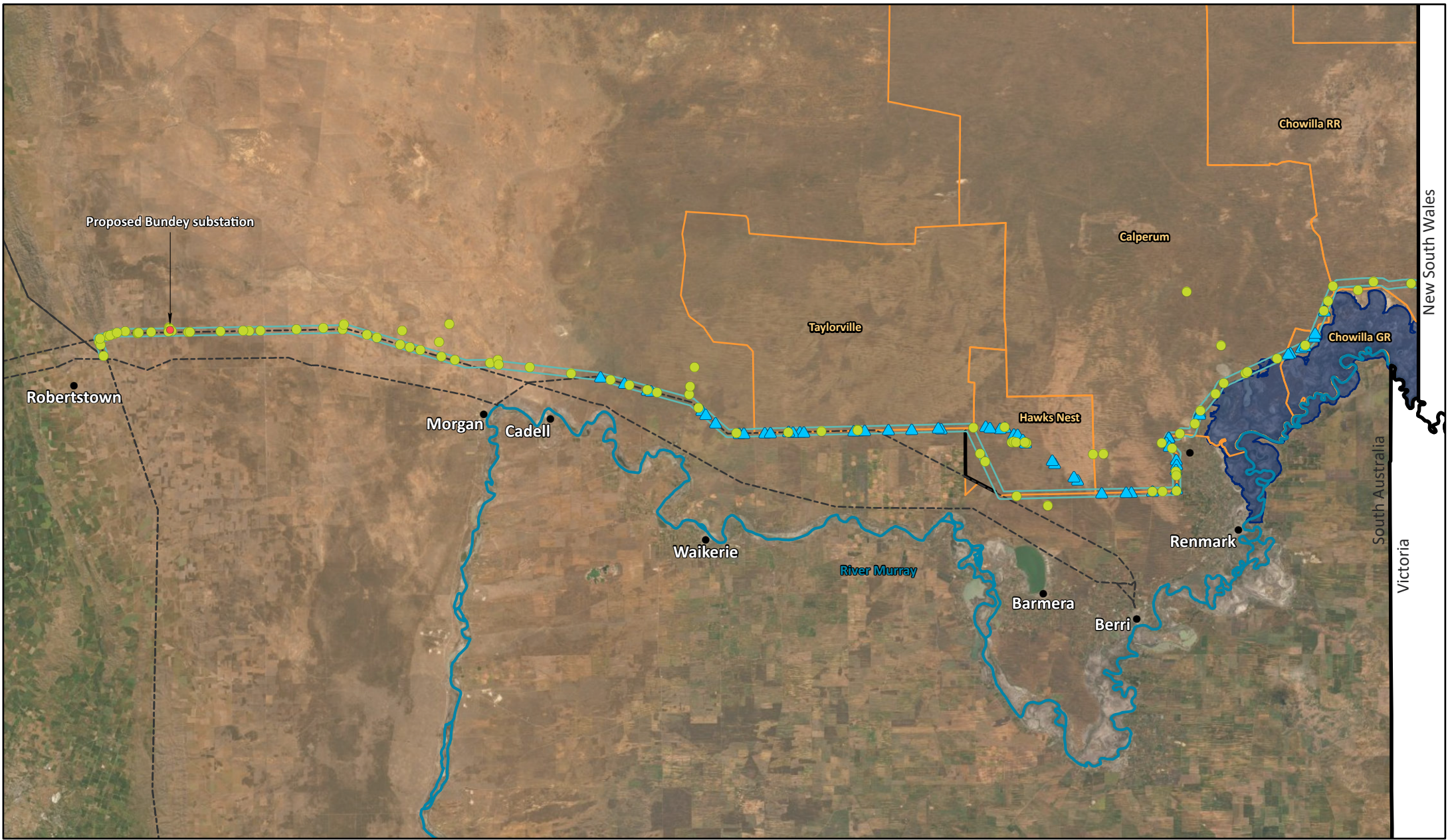


Figure 11-1
Flora and fauna survey sites

<p>0 20 Kilometres</p>	<p>N</p>

11.3. Description of the Existing Environment

This section provides a summary of the condition of the existing ecological environment and the key environmental values within and in the region of the transmission line corridor, including matters of national environmental significance under the EPBC Act.

The existing environment is described in terms of the proposed alignment, transmission line corridor and the ESA as described in Section 11.2.4.

11.3.1. Regional context

Biodiversity and conservation

Remnant vegetation within the proposed alignment varies in condition, with higher value vegetation generally located along the eastern portion of the ESA, primarily within conservation areas (see 11.3.1 below), but also as discrete and isolated patches within cleared or heavily grazed private land towards the western end of the transmission line corridor.

A number of conservation areas occur within the broader ESA, including Conservation Parks and Reserves, Heritage Agreement Areas and National Parks (refer Figure 9-1 and 9-4 in Chapter 9 Land Use and Tenure). These areas are often significant from a landscape perspective in terms of providing habitat for a diverse range of flora and fauna, including threatened and protected species. A summary of conservation areas, proximity to the transmission line corridor and potential ecological constraints is provided in Table 11-3.

The ESA encompasses a number of the conservation parks / reserves that includes contiguous significant habitat that forms a part of the Riverland Biosphere Reserve (formerly the Bookmark Biosphere Reserve), which has a total reserve area of 900,000 ha. A biosphere reserve incorporates one or more protected areas and surrounding lands that are managed to combine both conservation and sustainable use of natural resources. The Riverland Biosphere Reserve is recognised by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) as providing old-growth mallee woodland and shrubland, habitat for the EPBC listed as Endangered Black-eared Miner, as well as wetlands and riverine communities within proximity to the River Murray.

Key properties within the Riverland Biosphere Reserve are listed in Table 11-3, with details relative to the transmission line corridor. The majority of these properties are avoided by the proposed alignment. Where possible, the proposed alignment parallels existing tracks and roads within the greater Riverland Biosphere Reserve including the Taylorville and Calperum southern boundary tracks (and the existing 132 kV transmission line for over half the Taylorville southern boundary), Cooltong Conservation Park (CP) northern boundary track and Wentworth-Renmark Road. These tracks / roads already fragment the landscape and include road reserves either side of the track, existing areas of disturbance (e.g. a long history of introduced herbivore grazing) and weed and pest fauna presence (refer 11.3.6 below). There are a number of other conservation areas within the ESA which also protect native vegetation and support threatened species (summarised in Table 11-3 below in relation to interaction with the transmission line corridor). The majority of these other conservation areas are avoided by the transmission line corridor.

The ESA also encompasses the Riverland Ramsar site, which is listed under the Ramsar Convention as a wetland of international importance. This 30,600 ha site contains the River Murray channel and a series of creeks, channels, lagoons, billabongs, swamps and lakes which are subject to variable regimes of inundation. As discussed in Chapter 10 Physical Environment, the transmission line corridor passes predominantly north of the Riverland site boundary and the River Murray floodplain, on higher ground on the northern side of the Wentworth-Renmark Road. It does not cross any areas that are regularly inundated, and crosses three areas of upper floodplain (totalling approximately 2 km in length) that were flooded in the 1956 flood and could be flooded in extreme flood events.

Table 11-3: Land managed for conservation within the ESA

Area	Location and interaction with transmission line corridor	High level conservation values Identified
Riverland Biosphere Reserve		
Taylorville Station (HA 1543)	Majority avoided by transmission line corridor. Project located along southern boundary (approximately 28 km).	Key properties of the Riverland Biosphere Reserve A portion of this area (part of HA 1544) is in the Riverland Ramsar site. Multiple records for EPBC listed fauna (Malleefowl, Regent Parrot, Black-eared Miner, Red-lored Whistler) Provide extensive areas of old growth mallee habitat with a mosaic of fire scar history, which provides optimal habitat for threatened species, in particular Malleefowl.
Calperum Station (HA 1544)	Majority of HA avoided, intersects the alignment for approximately 43 km along southern boundary and Wentworth-Renmark Road. Proposed route primarily abuts southern boundary of this station, passes through southern boundaries of HA 1544-A, HA 1544-D northern boundary of HA 1544-E and bisects southern extent of HA 1544-C (where already bisected by existing Wentworth-Renmark road, for 44 km). Proposed alignment is 50 km away from HA1544_B).	
Gluepot Reserve (HA 1196)	Avoided by the transmission line corridor. Proposed alignment is 24 km south of boundary of this reserve.	
Danggali Wilderness Protection Area	Avoided by the transmission line corridor, proposed alignment is 32 km south of boundary of this reserve.	
Cooltong Conservation Park	Transmission line corridor occurs along existing track of northern boundary (Cooltong Boundary Track). Project occurs adjacent Cooltong boundary within Calperum Station.	Key property of the Riverland Biosphere Reserve Threatened species records (e.g. Malleefowl, Regent Parrot, and State listed fauna)
Chowilla Regional Reserve	Proposed alignment is within and adjacent to the southern boundary of this reserve. Generally parallels existing unsealed road – Wentworth-Renmark Road	Key property of the Riverland Biosphere Reserve Multiple records for EPBC-listed Regent Parrot, Southern Bell Frog. Multiple records for and State listed flora and fauna. Includes boundary of the Riverland Ramsar site. Records for EPBC-listed Malleefowl and State listed fauna.
Chowilla Game Reserve	Proposed alignment intersects approximately 5 km and 0.8 km of this reserve north of Wentworth-Renmark Road.	
Loch Luna Game Reserve	Avoided by the transmission line corridor, proposed alignment is ~5.5 km north of boundary of this reserve	Key property of the Riverland Biosphere Reserve Includes boundary of Ramsar Wetland (Banrock Station Wetland Complex)
Moorook Game Reserve	Avoided by the transmission line corridor, proposed alignment is 11 km north to north-east of the boundary of this reserve	Part of the Riverland Biosphere Reserve
Murray River National Park (multiple sites)	Avoided by the transmission line corridor, proposed alignment is ~6.5 km west of the boundary of the northern area of this park (Renmark North) park.	Part of the Riverland Biosphere Reserve Includes portion of Riverland Ramsar site Multiple records for EPBC-listed Southern Bell Frog, Regent Parrot and State listed fauna.

Area	Location and interaction with transmission line corridor	High level conservation values Identified
Other NPW Act Reserves		
Pooginook CP	Majority of CP avoided by transmission line corridor, northern boundary abuts. Potential use of existing park access tracks during construction (subject to approval).	Multiple records for National and State listed flora and fauna (Malleefowl, Regent Parrot, Red-lored Whistler records and habitat)
Hopkins Creek CP, Mimbara CP	Avoided by transmission line corridor (northwest of)	Known to contain EPBC listed / State threatened Hairy Pod Wattle (<i>Acacia glandulicarpa</i>). Multiple records for National and State fauna.
White Dam CP	Linear CP, the majority of which is avoided by transmission line corridor, but is intersected at both ends for approximately 2.5 km at each end. Alignment parallels existing 132 kV transmission line through the park.	Black Oak low open woodland with Bluebush. Records of State listed fauna.
Morgan CP, Hogwash Bend CP, Maize Island Lagoon CP	Avoided by transmission line corridor (south of)	Multiple records for EPBC-listed fauna (Regent Parrot, Southern Bell Frog) and State listed fauna and flora.
Other Heritage Areas		
HA 448, 1495 and HA 1601	Majority of HA avoided by transmission line corridor. Proposed alignment abuts northern boundaries. Along the existing Hawks Nest Station and Overland Corner Boundary Track.	Pre 1995 records for Sand Lily. No records for threatened fauna species, but would provide suitable habitat. SA Vegetation layer suggests mallee forest and mallee woodland.
HA 1519 (small HA adjacent 1543)	Avoided by the transmission line corridor	Habitat is contiguous with Riverland Biosphere Reserve
HA 280, 423	Majority avoided by transmission line corridor, abuts corridor (south of)	
HA 476	Connects to Taylorville Station, majority avoided by transmission line corridor, abuts corridor (south of)	
HA 1386, HA 1337	Majority avoided by transmission line corridor, abuts corridor (west and south of)	
HA 1520, 1294, 958, 727	Avoided by transmission line corridor (west and north of)	
HA 1511 (field site 8)	Majority avoided by transmission line corridor, abuts corridor (south of)	
HA 1126, 314, 1340, 1198, 1570, 1120, 266, 1123	Avoided by transmission line corridor (south of)	

HA = Vegetation Heritage Agreement Area

Bioregions

The ESA is located across three bioregions as defined by the Interim Biogeographic Regionalisation for Australia (IBRA) as described in Chapter 10 Physical Environment. The majority of the transmission line corridor is within the Murray-Darling Depression (MDD) bioregion, with less than 5 linear kilometres within the Flinders Lofty Block, approximately 11 km on the boundary of the Riverina and 15 km within the Riverina IBRA bioregions (see Figure 10-4 in Chapter 10).

IBRA subregions further describe the landscape. The western end of the transmission line corridor is in the Broughton subregion, the centre of the transmission line corridor traverses the Braemer, Murray Mallee and South Olary Plain subregions and the eastern end traverses the edge of the Murray Scroll Belt subregion. Further statistics about these subregions are provided in the draft native vegetation clearance data report (Appendix I-6). High level statistics for native vegetation remnancy for IBRA subregions on the transmission line corridor are summarised below (Table 11-4), noting that NatureMaps IBRA association statistics for the majority of the subregions that the Project traverses have not been revised (DEW 2021a). Further detail about the landform, soils and vegetation within each subregion are provided in Chapter 10 Physical Environment.

Broadly, the MDD bioregion is characterised by extensive gently undulating sand and clay plain of Tertiary and Quaternary age frequently overlain by aeolian dunes with vegetation consisting of semi-arid woodlands (Black Oak / Belah, Bullock Bush / Rosewood and Acacia spp.), mallee shrublands and heathlands and savanna woodlands. The region, which extends into Victoria and NSW includes areas of wind eroded and cleared mallee, however substantial areas remain in the west aeolian dunes of South Australia. Some areas also occur in western NSW, but there has been widespread clearing in the north eastern portion of the bioregion (in NSW).

Across the bioregion, habitat fragmentation and degradation are recognised as the key threatening processes for native flora and fauna as a result of the significant clearance of native vegetation which has occurred for agriculture and grazing (DEH 2001). The remnant vegetation within the region is thus considered important for the remaining flora and fauna, particularly nationally and State listed species, but also regionally threatened and common fauna. It is acknowledged that larger blocks of vegetation are more able to withstand impacts, but small blocks are more susceptible to impacts of fragmentation, edge effects, fire, weed and pests and genetic isolation (DEH 2001, Clarke et al. 2010).

Table 11-4: IBRA regions and subregions on the transmission line corridor

IBRA bioregion	IBRA subregion	IBRA subregion area in SA (ha)	Native vegetation remnancy ² (ha)
Murray-Darling Depression (MDD)	South Olary Plain ¹	1,219,032	1,182,461 (97%)
	Braemer ¹	966,276	966,276 (100%)
	Murray Mallee	2,121,127	445,437 ha (21%)
Flinders Lofty Block (FLB)	Broughton ¹	1,032,918	103,292 (10%)
Riverina (RIV)	Murray Scroll Belt ¹	166,462	93,218 (56%)

¹ Areas not updated to IBRA version 7, as per NatureMaps (DEW 2021a)

² Remnancy % from Bushland Score Sheet version 2020, hectares derived from IBRA mapping layer NatureMaps 2020.

11.3.2. Native vegetation

Regional vegetation community types

Whilst the IBRA provides very broad high level vegetation associations for the region, Bushland Condition Monitoring (BCM) Vegetation Communities and Associations (as described by Croft, Pedler and Milne 2009) provide richer descriptions that have been benchmarked and therefore allow more accurate assessment of condition against regional examples. The SA vegetation clearance approval and

offsetting process also requires that vegetation is assessed in accordance with these regional benchmarks, which are incorporated into automated data templates (NVC 2020 a,b,c,d).

Broadly, 12 major benchmark vegetation communities are noted to occur across the Murray-Darling Basin area of South Australia (MDBSA) as defined by Croft et al. (2009). These communities are further divided into subgroups based on soil type and depth of sand. Condition characteristics are described for each subgroup and factors that cause natural variance are also taken into account. For example, seasonality, level of rainfall or a particular species presence within a vegetation community. Similar variation occurs for other 'Bush Condition' estimates such as number and threat of weed species per vegetation community in very poor to excellent condition.

Vegetation community types

Broadly, the native vegetation of the transmission line corridor is comprised of various densities and compositions of Mallee and Chenopod shrubland, Black Oak (*Casuarina pauper*), with a small area of grassland (with emergent saltbush).

Vegetation at 94 Bushland Assessment Method (BAM) sites within the ESA was characterised following four field surveys, of which 71 sites align with the final transmission line corridor. The sites selected were representative of the broad vegetation and habitat types within the original transmission line corridor and immediate surrounds, however some associations are not present in the final transmission line corridor, related to alignment changes (refer Appendix I-2 Vegetation Assessment Summary). Site locations are shown on Figure 11-2 below.

The transmission line corridor and associated vegetation patches are presented in a series of maps in Appendix I-2. Summary information for each patch (e.g. northings and eastings, photos, dominant species and condition information) are also provided in the (Appendix I-2).

Vegetation associations encountered along the transmission line corridor can be broadly grouped in to 7 of the major MDBSA Communities (Croft et al. 2009). The distribution of these communities along the transmission line corridor is shown in Figure 11-2. These communities primarily range from overstorey of Mallee, Black Oak woodlands or Tall shrubland to understorey of Chenopod, sclerophyll shrub or Spinifex (*Triodia*), and are summarised below:

- MDBSA Community 1 – Open woodlands, shrubland and grasslands on low rainfall, limestone plains.
- MDBSA Community 2 – Open mallee and low open woodlands with a chenopod shrub understorey and chenopod open shrublands.
- MDBSA Community 3 – Mallee +/- Native Pine with open sclerophyll and chenopod shrub understorey on calcareous loams of flats or swales.
- MDBSA Community 4 – Mallee with open shrub understorey +/- Spinifex and shrublands on deep red or loamy sands.
- MDBSA Community 9 – Woodlands with an open grassy understorey and grass and matrush sedgeland.
- MDBSA Community 10 – Riparian, freshwater and brackish swamps and floodplain vegetation – River Murray Corridor and Lower Lakes.
- MDBSA Community 11 – Coastal and inland saline swamp and riparian vegetation.

Further details regarding BCM sub-communities and vegetation associations present within the transmission line corridor are summarised in Table 11-5, with further detail for each BAM site provided in Appendix I-2. Detailed mapping of the transmission line corridor has been undertaken using the data collected in field assessments, statewide vegetation mapping and knowledge of the alignment. This mapping is used in the native vegetation clearance data report (Appendix I-6) to determine the required offset for impacts to vegetation.

Table 11-5: BCM vegetation communities and broad vegetation associations that represent vegetation of the transmission line corridor.

BCM community	# of BAM sites in TLC	Summary of vegetation associations within this BCM community recorded within the transmission line corridor	Length (km) / % of TLC
MDBSA 1.1 Open Woodland with arid adapted shrubland on limestone	4	Black Oak (<i>Casuarina pauper</i>) Low to Open Woodland over chenopod and sclerophyll shrubs or chenopods and mixed tall shrubs Red Mallee (<i>Eucalyptus oleosa</i>) Very Open Mallee over mixed shrubs Black Oak / Red Mallee / Yorrell (<i>E. gracilis</i>) Open Woodland with open tall shrub understorey	7.91 km / 3.5%
<u>Degraded forms</u> of MDBSA 1.1	2	Spear Grass (<i>Austrostipa</i> sp.) Open Grassland with emergent sclerophyll and chenopod shrubs Spear Grass Open Grassland / Black Bluebush (<i>Maireana pyramidata</i>) Low Open Shrubland with emergent Black Oak and / or Native Pine (<i>Callitris</i> spp.)	14.04 km / 6.9%
MDBSA 1.2 Tall Shrubland with Open Arid adapted Understorey on Limestone Plains	1	Desert Senna (<i>Senna artemisioides</i> ssp. <i>filifolia</i>) Open Shrubland with emergent Yorrell.	1.69 km / 0.8%
MDBSA 2.1 Open Mallee / Low Open Woodland with Chenopod shrub understorey	14	Red Mallee Low Mallee to Open Mallee over mid-dense chenopod shrubland or Pearl Bluebush (<i>Maireana sedifolia</i>) shrubland Black Oak Very Low Woodland to Woodland over Black Bluebush Low Open to Open shrubland +/- Pearl Bluebush False Sandalwood (<i>Myoporum platycarpum</i>) Very Low Open Woodland over Bluebush shrubland False Sandalwood / Black Oak +/- Red Mallee Open Woodland mosaiced with Bluebush Low Open Shrubland Yorrell / Red Mallee / Gilja (<i>E. brachycalyx</i>) Open Mallee over low open shrubs Red Mallee / Yorrell Very Open Mallee over chenopods	21.22 km / 10.4%
MDBSA 2.2 Chenopod Open Shrublands	13	Black Bluebush Low Very Open Shrubland (degraded) Black Bluebush Low Open Shrubland to Open Shrubland Bluebush Low Open to Very Open Shrubland or Open Chenopod Shrubland Bluebush Very Open Shrubland with isolated trees/groves of Black Oak Bluebush +/- Spiny Saltbush (<i>Rhagodia ulicina</i>) Low Open Shrubland Bluebush +/- Thorny Lawrencia (<i>Lawrencia squamata</i>) +/- Spiny Saltbush Open Shrubland	45.54 km / 22.3%
MDBSA 3.1 Mallee with Very Open Sclerophyll / Chenopod Shrub understorey	18	Narrow-leaf Hop-bush (<i>Dodonaea viscosa</i> ssp. <i>Angustissima</i>) Very Open Shrubland with emergent Southern Cypress Pine (<i>Callitris gracilis</i>) Yorrell Open Mallee over sparse Chenopod and Sclerophyll Shrubland Narrow-leaf Red Mallee (<i>E. leptophylla</i>) +/- Gilja over tall Sclerophyll shrubs Red Mallee Very Open Mallee to Mallee over open to very sparse Sclerophyll and Chenopod Shrubland Red Mallee / Yorrell old growth Mallee to Open Mallee over Chenopod and Sclerophyll shrubs Red Mallee Open Mallee over sparse Black Bluebush and Sclerophyll shrubs	35.64 km / 17.5%

BCM community	# of BAM sites in TLC	Summary of vegetation associations within this BCM community recorded within the transmission line corridor	Length (km) / % of TLC
		Red Mallee Open (old growth) Mallee +/- False Sandalwood over Chenopod and Sclerophyll shrubs Red Mallee Open Mallee over Bitter Saltbush (<i>Atriplex stipitata</i>) Red Mallee / Yorrell / Narrow-leaf Red Mallee old growth Mallee Very Open understorey Mallee Box (<i>E. porosa</i>) +/- Red Mallee over Desert Senna and Chenopods Beaked Red Mallee (<i>E. socialis</i>) / Yorrell Open Mallee over Desert Senna shrubland	
<u>Degraded forms</u> of MDBSA 3.1	7	Spear-grass Grassland and / or Short-leaf Bluebush (<i>Maireana brevifolia</i>) Low Very Open Shrubland Shrubby Twinleaf (<i>Roepera aurantiaca</i>) Low Shrubland +/- Bladder Saltbush (<i>Atriplex vesicaria</i>) with emergent shrubs Short-leaf Bluebush / Ruby Saltbush (<i>Enchylaena tomentosa</i>) with scattered Mallee Box / Red Mallee Bladder Saltbush Low Very Open Shrubland Short-leaf Bluebush Low Open Shrubland (regrowth in cleared paddock) Spear-grass Grassland (derived) with emergent shrubs including Peep-hill Hopbush (<i>Dodonaea subglandulifera</i>), and isolated mallee trees Short-leaf Bluebush Low Open Shrubland +/- patches of Spear-grass	5.98 km / 2.9%
4.1 MDBSA 4.1 Mallee with open shrub understorey on tall red-sand dunes or deep sand flats	2	White Mallee / Ridge-fruited Mallee +/- Yorrell Low Open Mallee over Spinifex Hummock Grassland Dune Tea-tree (<i>Leptospermum coriaceum</i>)	2.43 km / 1.2%
MDBSA 4.2 Mallee with understorey dominated by Triodia on moderate / low sand dunes	19	White Mallee (<i>E. dumosa</i>) Low Mallee to Mallee over Spinifex Hummock Grasslands White Mallee +/- Narrow-leaf Red Mallee (Mallee form) or Beaked Red Mallee (Mallee form) over Spinifex Hummock Grassland Yorrell Open Low Mallee over Spinifex Hummock Grassland. Ridge Fruited-Mallee (<i>Eucalyptus incrassata</i>) +/- Narrow-leaf Red Mallee +/- Beaked Red Mallee over Spinifex Hummock Grassland Ridge-fruited Mallee +/- Beaked Red Mallee +/- White Mallee Open Mallee over Spinifex Hummock Grassland Ridge-fruited Mallee over Triodia Hummock Grassland and Dark Turpentine Bush (<i>Beyeria opaca</i>) Red Mallee / White Mallee +/- Yorrell Open Mallee over an open understorey of Sclerophyll shrubs and Chenopod or over Spinifex Hummock Grassland	57.28 km / 28.1%
MDBSA 4.3 Shrublands on low & / or isolated red-sand dunes	3	Narrow-leaf Hop-Bush Tall Open shrubland +/- Black Bluebush on red sand dune / slope Black Bluebush Low Open Shrubland with emergent Narrow-leaf Hop-Bush	6.37 km / 3.1%
<u>Degraded forms</u> of MDBSA 9.1 Woodlands with an open grassy understorey	2	Buckbush (<i>Salsola australis</i>) Very Open Herbland with isolated Mallee Box or with emergent Short-leaf Bluebush	3.57 km / 1.8%

BCM community	# of BAM sites in TLC	Summary of vegetation associations within this BCM community recorded within the transmission line corridor	Length (km) / % of TLC
MDBSA 10.8 River Box Woodlands with Saline Tolerant chenopod Understorey	1	Blackbox (<i>E. largiflorens</i>) / Dryland Tea-tree (<i>Melaleuca lanceolata</i>) Low Open Woodland over Black Bluebush Low Open Shrubland (drainage line).	0.23 km / 0.1%
MDBSA 10.11 Low Woodlands / Shrublands of River Terraces / Inland Drainage Lines	1	Turpentine Bush (<i>Eremophila sturtii</i>) Tall Open Shrubland over Black Bluebush Low Open Shrubland (run on area) Spear-grass Open Grassland with emergent Bladder Saltbush (<u>degraded form</u>)	0.26 km / 0.1%
MDBSA 11.6 semi-saline shrublands of river cliffs, floodplains, depressions and drainage lines	4	Australian Boxthorn (<i>Lycium australe</i>) Open Shrubland +/- Cottonbush (<i>Maireana aphylla</i>) with emergent Spine Bush (<i>Acacia nyssophylla</i>) (Possibly derived community) Nitrebush (<i>Nitraria billardierei</i>) / Black Bluebush Very Open Shrubland to Nitrebush Low Open Shrubland Australian Boxthorn Shrubland with emergent Black Oak / Bullock Bush (<i>Alectryon oleifolius</i>) Black Oak +/- Bullock Bush (<i>Alectryon oleifolius</i>) Very Open Woodland over Australian Boxthorn shrubland	2.5 km / 1.2%

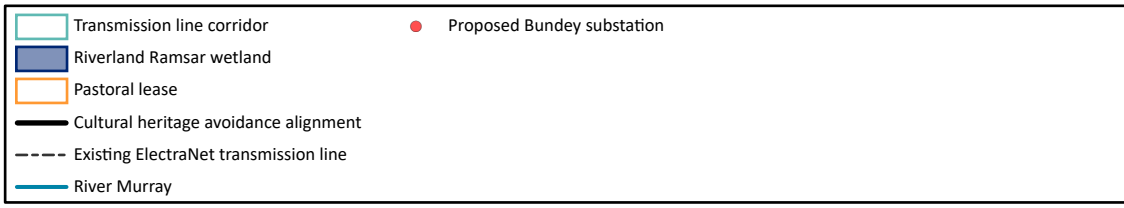
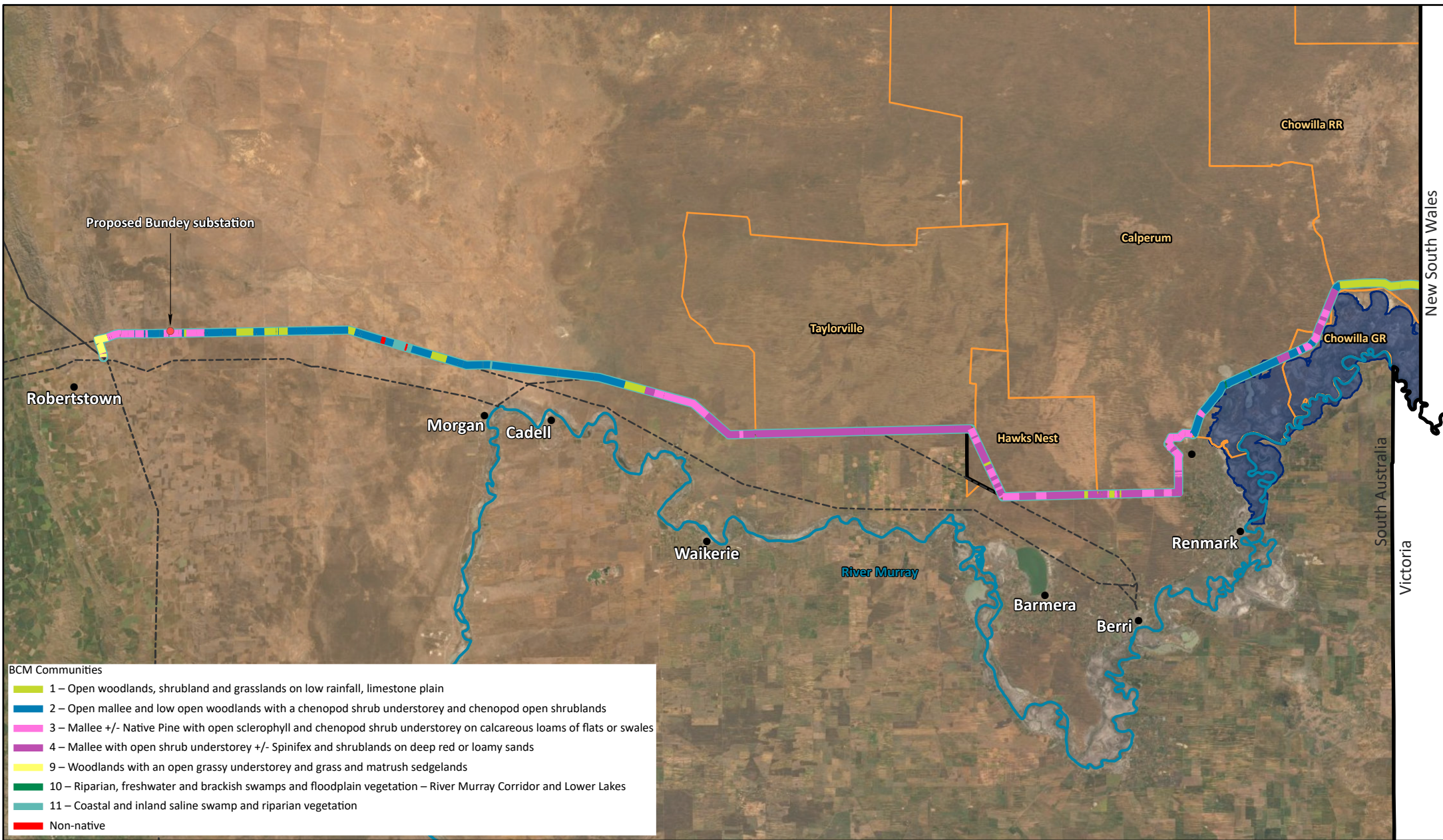
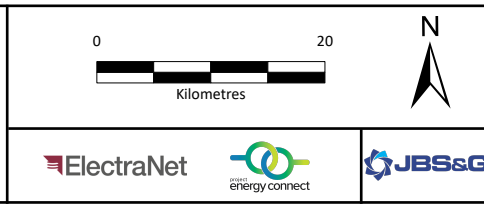


Figure 11-2
Vegetation communities on the
transmission line corridor



Vegetation condition

Between Robertstown and Morgan, the transmission line corridor largely traverses open and semi-cleared paddocks, or grazed and drought-impacted low open chenopod shrubland or Black Oak and / or False Sandalwood Open Woodland. Prolonged drought combined with ongoing grazing have resulted in reduced plant species diversity and abundance, particularly in the chenopod dominated associations. Several patches of remnant (old regrowth) low mallee (largely Red Mallee (*Eucalyptus oleosa*)) over chenopod shrubland (including Bluebush (*Maireana sedifolia*), Bladder Saltbush (*Atriplex vesicaria*) and / or Mallee Bluebush (*M. pentatropis*)) are present, particularly at the western end of Powerline Road. A vegetation Heritage Agreement (1511) protects a portion of mallee and chenopod shrubland vegetation near the intersection of the transmission line corridor with Salford Road. The proposed corridor traverses approximately 2.2 km of White Dam Conservation Park, mapped as Bluebush and / or Black Bluebush (*M. pyramidata*) shrubland.

From Morgan to Taylorville Station, the transmission line corridor traverses two broad habitat types: open low chenopod shrubland of Black Bluebush and / or Bluebush or Australian Boxthorn (*Lycium australe*) or Low Open Woodland over a chenopod understorey (with mixed grazing pressure). North-east of Morgan, this community crosses an ecotonal transition into mixed old growth and regrowth mallee communities over sclerophyll and chenopod shrubs and / or Spinifex hummock grassland in extensive tract of low dune country. Historic fires and clearance within this broad dune country have influenced the age and current ecological value of these mallee communities. The transmission line corridor follows the Taylorville southern boundary track, which follows an existing transmission line easement along the northern boundary of Pooginook Conservation Park and continues along the southern boundary of Taylorville Station. In the eastern portion of the transmission line corridor on Taylorville Station, the alignment diverges from the existing 132 kV transmission line easement (where the 132 kV line diverts south-east) to continue east along the Taylorville southern boundary track.

At Hawks Nest Station the transmission line corridor diverts to the south-east through taller open mallee over tall shrubs in swales and sandy loam flats, and smaller mallee over Spinifex on low sandy rises. The proposed alignment (the cultural heritage avoidance alignment) through this area is located further to the west and follows the western boundary of Hawks Nest Station southwards to the existing 132 kV transmission line, which it parallels until it reaches the Overland Corner track. Vegetation along this section is similar to the transmission line corridor, however there is existing disturbance present from tracks, fencelines and the 132 kV line easement and access track.

The proposed alignment then traverses east along the northern boundary of three smaller vegetation Heritage Agreement Areas (448, 1495, 1601), then southern boundary of Calperum station and the northern boundary of Cooltong CP along the 'Cooltong Track' through remnant mallee. Much of the mallee along this section is regrowth from bushfires in 2006 and / or 2014.

From the north-east corner of Cooltong Conservation park, the alignment traverses north along the eastern margin of the Riverland Biosphere Reserve (also HA 1544), which is the eastern margin of an extensive tract of mallee, and adjoins a mosaic of native vegetation, exotic pastures and irrigated agriculture to the east.

North-east of Cooltong, the alignment veers east and north-eastwards again, with the vegetation transitioning from mallee to broadly Black Bluebush shrubland on loam flats, and Hopbush shrubland on dunes, as it traverses through Calperum Station. Continuing north-east through Chowilla Game Reserve, Heritage Agreement 1544 and Chowilla Regional Reserve, Black Bluebush shrublands and Hopbush shrublands continue, and additionally, there are patches of old growth mallee, Black Oak Woodland and sparsely treed areas of Native Pine.

Along the length of the alignment, vegetation condition scores ranged from 6 (Very Low) to 67 (High). Vegetation at the western end of the alignment was generally in low condition due to land use (with cleared agricultural paddocks and heavily grazed shrublands subject to prolonged drought), as was

vegetation at the far eastern end (due to prolonged drought). Condition scores in the central portion of the proposed alignment were generally high. Vegetation in this central portion was dominated by extensive tracts of mallee, much of which occurs in protected areas such as conservation reserves or heritage agreement areas, and where domestic stock grazing is excluded.

Vegetation condition extent across the transmission line corridor is summarised in Table 11-6 and presented in Figure 11-3 and Plate 11-1 below. Vegetation condition was categorised at an additional 23 sites outside the transmission line corridor, and approximately 40% of these areas that were avoided were categorised as high vegetation condition. It is noted that 30.6% of the corridor is considered to comprise high condition vegetation, 35.5% has medium condition vegetation and the remainder is low to very low condition vegetation.

Table 11-6: Summary of vegetation condition extent across the transmission line corridor

Condition rating ¹	Relative condition score	Number of sites within TLC	Length within TLC (km)	% of TLC
Very Low	<20	5	8.7	4.2
Low	20 – 35	15	62.4	30.4
Medium	36 – 55	32	71.1	34.7
High	56+	20	62.5	30.5
	Totals	72	205	

¹ Corresponds with bar graph in Electronic BAM Score Sheet for surveys sites (NVC 2020b).

Vegetation condition examples



Site 2b: Buckbush very open herbland, very low condition



Site 3c: Bladder Saltbush low very open shrubland, regrowth on past cropped land, low condition



Site 15a: Red Mallee over Chenopods, medium Condition



Site 6c: Black Bluebush shrubland, medium condition



Site 5c: Black Oak Woodland over Black Bluebush / Bluebush, medium condition



Site 9c: Mallee over Spinifex, medium condition



Site 18a: Mallee over Senna and Chenopods, high condition



Site 29c: Mallee over Spinifex post fire regrowth, high condition



Site 7c: Australian Boxthorn / Cottonbush, high condition (excluding bare areas in existing / tracks)



Site 6a: Mallee over chenopod, high condition

Plate 11-1: Examples of vegetation condition at survey sites along the transmission line corridor

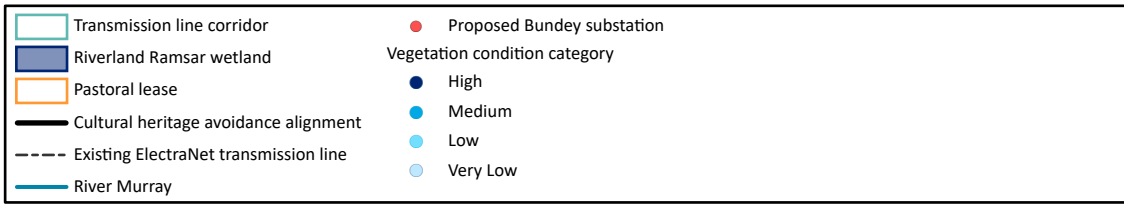
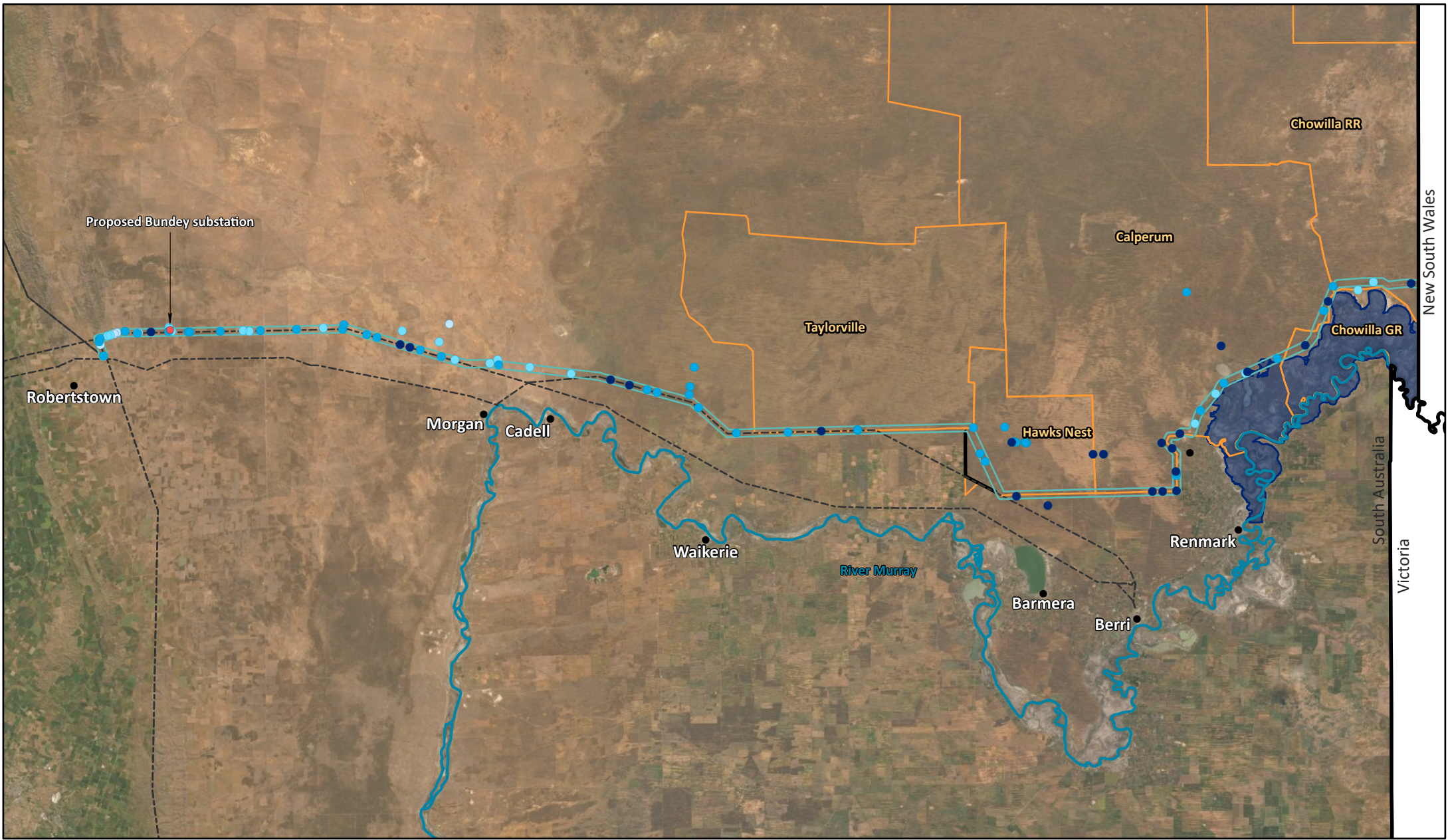


Figure 11-3
Vegetation condition at vegetation survey sites

<p>0 20 Kilometres</p>	<p>N</p>

Fire history

Within the transmission line corridor, mapped fire history dates from 1972 to 2014. These fires have been mapped for the portion of the alignment traversing mallee vegetation communities, from approximately 10 km north-west of Cooltong to the Riverland Biosphere Reserve, north of Cooltong Conservation Park. All vegetation impacted by fire within the transmission line corridor (overlapping with mapped fire history) has been mapped as mallee vegetation, and the majority of this has been mapped as Mallee over Spinifex (*Triodia* sp.). The most recent fire occurred in 2014, burning an area of 697 ha within the transmission line corridor. This fire was confined to the boundary area between Cooltong CP and the Biosphere Reserve, and the southern boundary area of Hawks Nest Station. Areas that were subject to this fire correspond to vegetation survey sites with high condition scores, reflective of effective regeneration in the short duration since the fire.

The 2006 fire covered almost 3,000 ha of the 4,670 burnt within the alignment. Within the transmission line corridor, this fire burnt discontinuously from about 10 km NW of Pooginook, along the northern boundary of Pooginook CP, southern boundary of Riverland Biosphere Reserve, and parts of the southern boundary of Hawks Nest Station. All areas burnt in this section of the transmission line corridor are also mapped as Mallee over Spinifex. These areas are also reflected by BAM (vegetation) survey sites which reported high condition scores. The relatively high condition scores for these sections of the alignment suggest that the mallee overstorey and understorey vegetation in areas affected by fire has regenerated well following the 2006 fire, with Spinifex forming a prominent groundcover.

Areas with fires pre-dating 2006 mapped within the alignment have largely been re-burnt in either 2006 or 2014, or the fires are old enough that evidence of the fire impact is not expected in the vegetation condition assessments or account for in DEW fire history data. Further detail on the fire history of vegetation within the transmission line corridor is provided in Appendix I-2 (Vegetation Assessment Summary). Years of fires and hectares burnt within the transmission line corridor are summarised in Table 11-7 below and shown in Figure 11-4.

Table 11-7: Fire history of vegetation within the transmission line corridor

Year of fire	Broad habitat type ¹	Hectares burnt within TLC
1972	Predominantly Mallee over Spinifex	450
1975	Mallee over Spinifex	23
1977	Mallee over Spinifex	9
1978	Old growth mallee over open sclerophyll and chenopod shrub understorey	213
1997	Mallee over Spinifex	152
2004	Mallee over Spinifex	130
2006	Mallee over Spinifex	2975
2010	Old growth mallee over open sclerophyll and chenopod shrub understorey	23
2014	Mallee over Spinifex / Post-fire regrowth mallee over sclerophyll and chenopod shrub understorey	697
Total		4672

¹ High level estimate aligning with mapping summary in Section 11.3.4

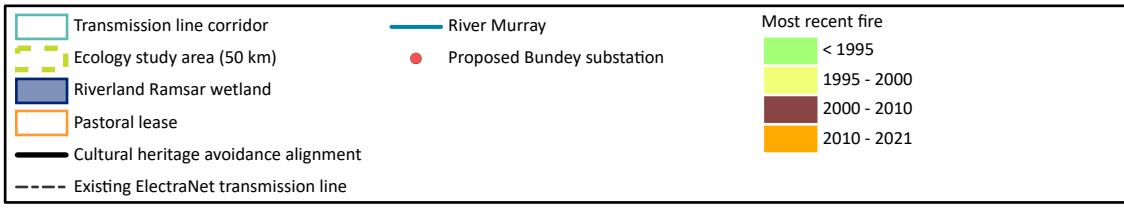
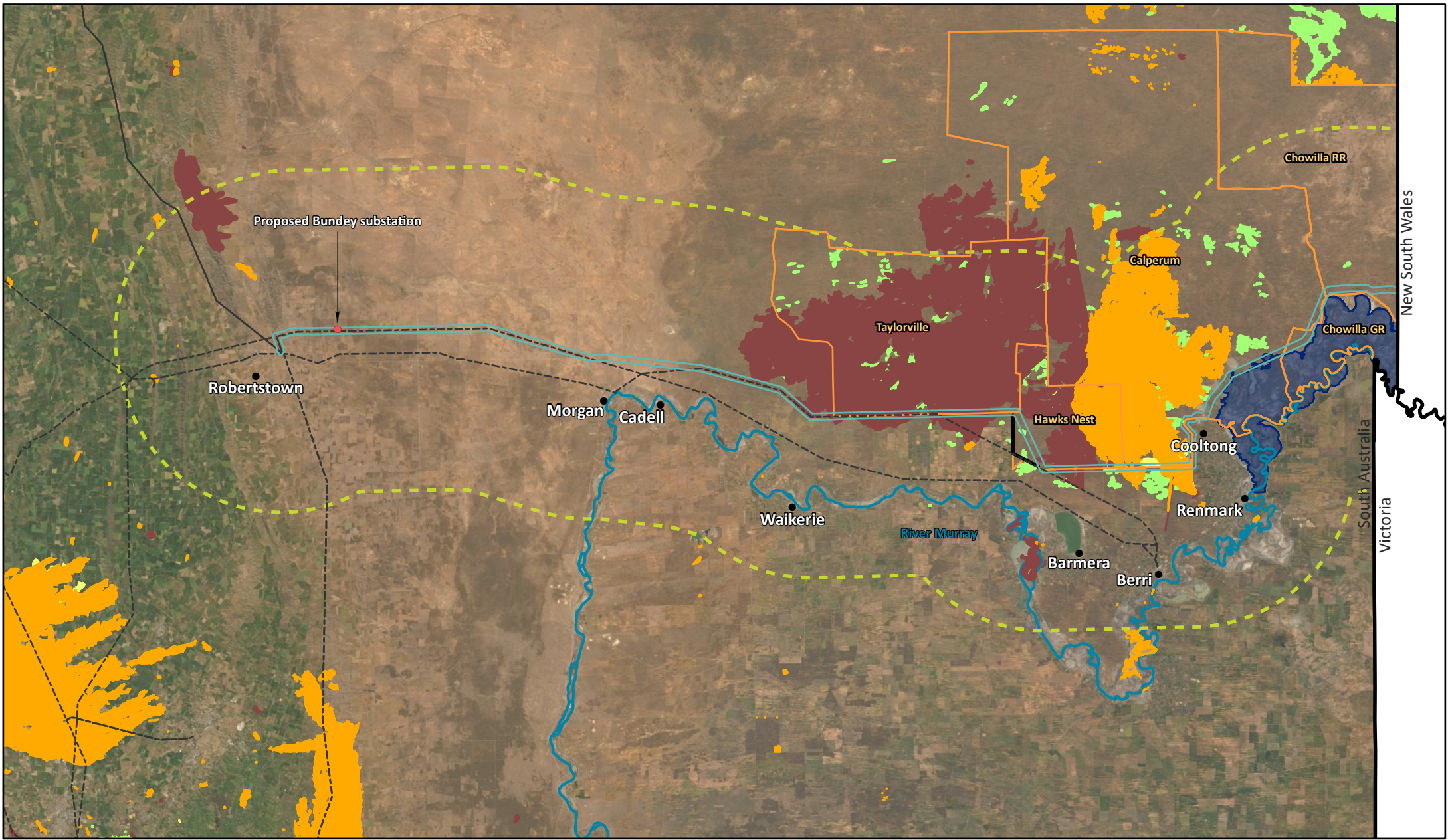


Figure 11-4
Fire history of the transmission line corridor and surrounds

<p>0 20 Kilometres</p>	<p>N</p>

Flora species

Over 700 flora species have been recorded in the ESA, including several species of conservation significance which are discussed further in 11.3.3 below. Over 130 flora species have records within the transmission line corridor, including 22 exotic species of which three are declared weeds (BDBSA 2020, refer Section 11.3.7 below). Of these 130 species, one is the EPBC listed Peep-Hill Hopbush (*Dodonaea subglandulifera*) and has State and regional ratings, one only has State rating Creeping Boobialla (*Myoporum parvifolium*), and 86 have regional ratings (refer Regional flora below). Appendix I-2 provides a summary of relevant database records.

Over 165 flora species were recorded in field assessments for the EIS study, of these 154 were at BAM sites in the transmission line corridor. Fifty-four of the species were only recorded from one site. The most common native species recorded at BAM sites are provided in Table 11-8. The only threatened flora species that were recorded within the transmission line corridor was Peep-hill Hopbush. In addition, Wilga (*Geijera parviflora*), a State listed Rare species, was recorded at two sites within the ESA in mallee areas avoided by the Project (e.g. west of Taylorville Station, north of the transmission line corridor). Refer Appendix K3 for further detail.

Table 11-8: Summary of most common flora species recorded within the transmission line corridor

Scientific name	Common name	No. of BAM sites from which species was recorded within the TLC
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush	36
<i>Eucalyptus oleosa</i> ssp.	Red Mallee	25
<i>Maireana sedifolia</i>	Bluebush	27
<i>Atriplex stipitata</i>	Bitter Saltbush	26
<i>Maireana pentatropis</i>	Erect Mallee Bluebush	26
<i>Maireana pyramidata</i>	Black Bluebush	26
<i>Austrostipa</i> sp.	Spear-grass	24
<i>Myoporum platycarpum</i> ssp.	False Sandalwood	23
<i>Maireana brevifolia</i>	Short-leaf Bluebush	18
<i>Alectryon oleifolius</i> ssp. <i>canescens</i>	Bullock Bush	19
<i>Sclerolaena patenticuspis</i>	Spear-fruit Bindyi	19
<i>Rhagodia ulicina</i>	Intricate Saltbush	18
<i>Acacia nyssophylla</i>	Spine Bush	17
<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush	16
<i>Rhagodia spinescens</i>	Spiny Saltbush	16
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindy	16

11.3.3. Conservation significant flora

EPBC listed threatened ecological communities

No threatened ecological communities have been located during any of the four flora surveys within the wider ESA or the transmission line corridor (refer Appendix I-2).

Desktop assessments highlighted the potential for three EPBC listed threatened ecological communities to occur within the ESA, based on EPBC PMST outputs. A search of the BDBSA indicated that one of these threatened ecological communities did not occur within the ESA and is not relevant to the Project: Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions. The location, extent and condition of the other two threatened ecological communities within the ESA is discussed below.

Iron-grass Natural Temperate Grassland of South Australia ecological community (EPBC Critically Endangered)

This threatened ecological community is assumed to not be present within the transmission line corridor.

Iron-grass (*Lomandra* spp.) Natural Temperate Grassland) is mapped as potentially occurring within the far western end of the ESA, with the majority of the threatened ecological community extent (over 17,000 ha) occurring approximately 20 km or more north of the western end of the transmission line corridor.

The areas mapped as potentially comprising this threatened ecological community are generally based on interpretation of aerial photography taken in the 1990s (only six areas have a floristic survey site within them) and they are mapped at a minimum scale of 1:40 000. Mapping of this threatened ecological community within the transmission line corridor and the broader ESA is therefore considered to have low resolution and may contain errors. There are two very small patches (3.5 and 5 ha) of the threatened ecological community mapped as occurring within the transmission line corridor at the western end (refer Figure 11-5). Results of aerial imagery interpretation suggest some of these areas are cropped and have been mapped incorrectly as a threatened ecological community. There are however other unploughed areas of limited extent rolling hills habitat where *Lomandra* grasslands is considered possible within the western end of the transmission line corridor.

Given the possibility that the threatened ecological community may occur at the very western end of the proposed alignment, field surveys undertaken in the transmission line corridor and surrounds in this area targeted potential occurrences of this threatened ecological community. This threatened ecological community was not located.

Peppermint Box (Eucalyptus odorata) Grassy Woodland (EPBC Critically Endangered)

This threatened ecological community is assumed to not be present within the transmission line corridor.

Peppermint Box Grassy Woodland is mapped as potentially occurring towards the far western end of the ESA, with the majority of the threatened ecological community extent occurring north-west to south-west of the western end of the ESA.

The areas that are mapped as potentially comprising the threatened ecological community have been mapped with relatively high confidence. No areas of the threatened ecological community are mapped as occurring within the transmission line corridor (refer Figure 11-5). Whilst there are records for Peppermint Box (*Eucalyptus odorata*) within the ESA, the records are within chenopod habitat rather than grassy habitat that is representative of the threatened ecological community (DEWHA 2008b).

No areas of this threatened ecological community have been observed during any of the four flora surveys within the wider ESA, or the transmission line corridor (refer Appendix I-2).

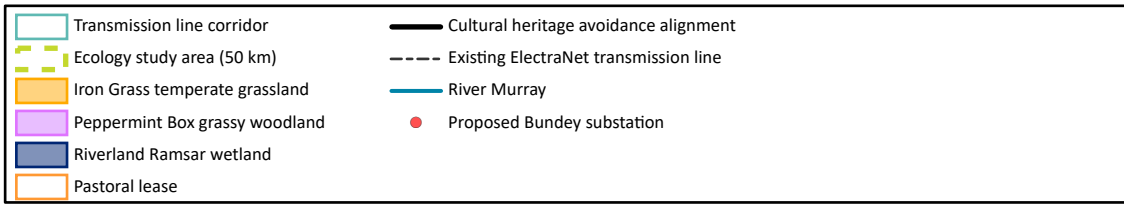
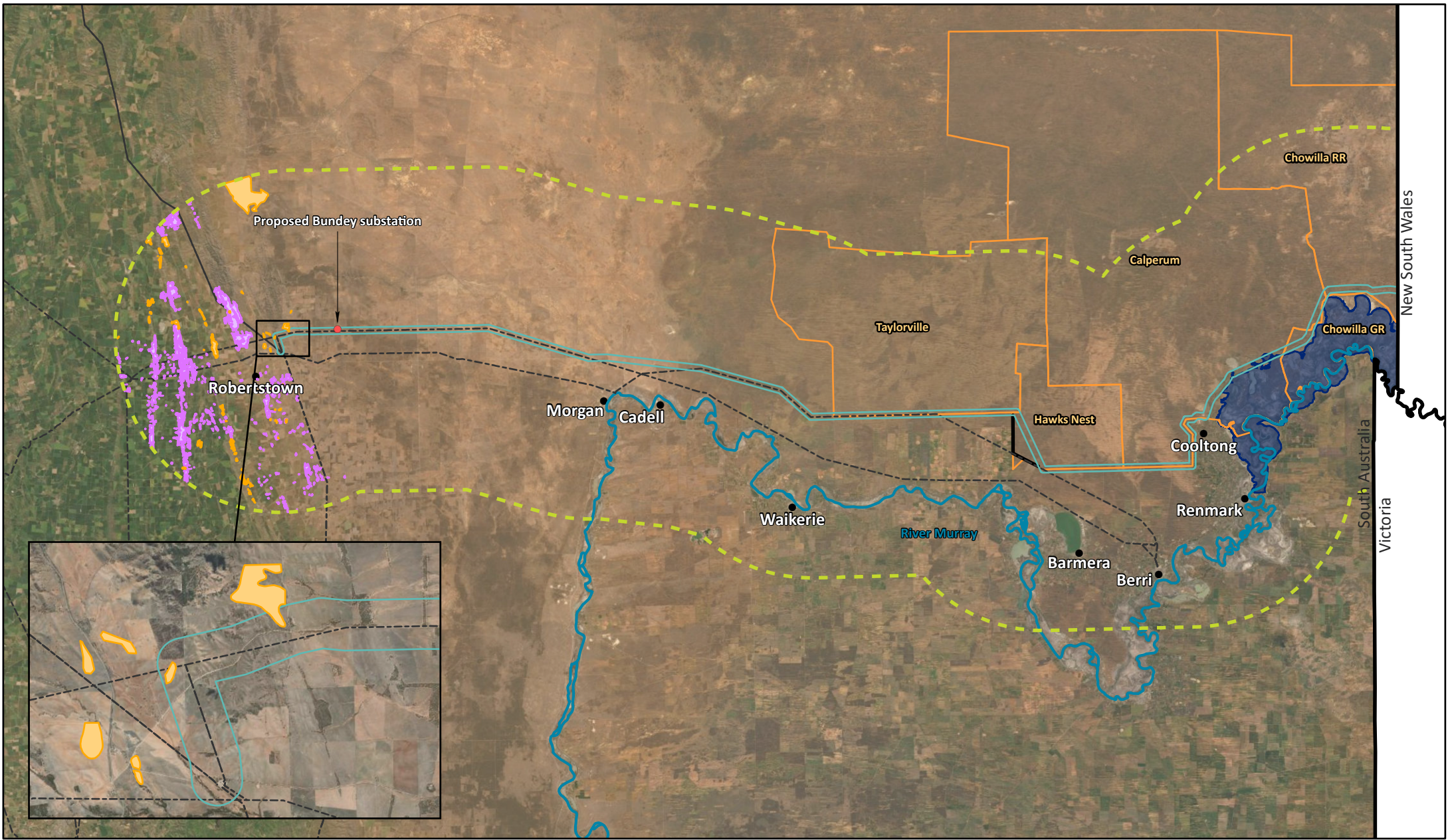


Figure 11-5
Nationally threatened ecological communities in the ecological study area

<p>0 20 Kilometres</p>	<p>N</p>

EPBC listed threatened flora

The desktop assessment (review of EPBC Act PMST, buffer of 5 km) highlighted 10 EPBC list flora species as potentially occurring within 5 km of the alignment. BDBSA records highlighted two additional EPBC species (Refer Figure 11-6). A likelihood of occurrence assessment for whether these species actually occur within the transmission line corridor or the broader ESA considered these results as well as recent (and historical where relevant) BDBSA records, current distribution information, survey results and regional information (e.g. Robertson and Clarke 2012, DEW 2021a, South Australian Seed Conservation Centre 2020).

It was determined that of the 12 flora species, one is present (Peep Hill Hop-bush, *Dodonaea subglandulifera*) within the transmission line corridor and the wider ESA. This species has recent BDBSA records and was located during field surveys (refer Figure 11-6). Of the remaining species, two are considered to possibly be present (Silver Daisy Bush and Yellow-Swainson Pea), and nine are considered unlikely to occur within either the transmission line corridor or the broader ESA (refer Table 11-9 and Appendix I-1). The nine unlikely species include: Hairy-pod Wattle (*Acacia glandulicarpa*), Menzel's Wattle (*Acacia menzeli*), Spiller's Wattle (*Acacia spilleriana*), Flinders Ranges White Caladenia (*Caladenia xantholeuca*), Rigid Spider Orchid (*Caladenia tensa*), Slender Bell-fruit (*Codonocarpus pyramidalis*), Trailing Hop-bush (*Dodonaea procumbens*), Spalding Blown-grass (*Lachnagrostis limitanea*) and Menindee Nightshade (*Solanum karsense*).

Table 11-9: Summary of likelihood assessment for potential EPBC listed flora species within the transmission line corridor (present and possible only)

Species name	Common name	Cth ¹	SA ²	Likely to occur?	Summary of justification for likelihood of occurrence within transmission line corridor ^{3,4}
<i>Dodonaea subglandulifera</i>	Peep Hill Hop-bush	E	E	Present	<p>PMST suggests known to occur. 23 recent records (2000 – 2013) within the western end of the ESA, including one within the transmission line corridor. Endemic to South Australia and occurs in the eastern Mount Lofty Ranges and on Yorke Peninsula, on low hills on loamy soils associated with rocky outcrops in open woodland (often <i>Callitris gracilis</i> and / or <i>Allocasuarina verticillata</i>), open shrubland (often <i>Acacia</i>) and mallee.</p> <p>Observed as part of Robertstown substation upgrade vegetation assessments of a separate ElectraNET alignment (F1846) which runs parallel, approximately 50 m south of the proposed alignment (i.e. within the transmission line corridor). One group of three plants is known within existing this infrastructure corridor and is avoided by track maintenance / upgrades as it occurs on a rocky slope. Another group observed 800 m east of this group (50 – 100 plants, Jan 2021). These plants are all within the transmission line corridor and near known records (in similar habitat, the 'Robertstown Subpopulation') (Moritz and Bickerton 2010).</p> <p>Given records, habitat and occurrence near Robertstown substation species is considered present within transmission line corridor, plants are spread out in proximity to each other at the western end of the transmission line corridor (refer to Figure 11-6).</p>

Species name	Common name	Cth ¹	SA ²	Likely to occur?	Summary of justification for likelihood of occurrence within transmission line corridor ^{3,4}
<i>Olearia pannosa</i> subsp. <i>pannosa</i>	Silver Daisy-bush	V	V	Possible	PMST suggests known to occur. Three records (2003) at the western end of the ESA near Hallelujah Hills, rocky habitats. These records are not within the transmission line corridor (> 4 km from the western end). Endemic to South Australia, scattered widely in the Mt Lofty Block, localised on eastern Eyre Peninsula, upper South East, Mid North and southern Flinders. Most populations are on roadsides and include few individual plants. Occurs in heath, mallee, woodland and forest communities on a range of soils (sandy, duplex) and terrains (slopes and plains). It is a long-lived perennial, often suckering. Whilst not observed during site surveys, given the wide range of landforms and soil types in which this species occurs, and records near the transmission line corridor, it is possible (but unlikely) that it occurs within the far western end of the corridor.
<i>Swainsona pyrophila</i>	Yellow Swainson-pea	V	R	Possible	PMST suggests likely to occur. Five historical records within the original ESA (1979, 1981). No recent records within current ESA or transmission line corridor. Suitable habitat occurs within the ESA. The species is short-lived, adapted to fire and widely distributed in SA. Germination is triggered by soil disturbance or fire. Although not observed during site surveys, given suitable habitat and species characteristics it is possible the species occurs within the ESA and transmission line corridor.

¹ Environment Protection and Biodiversity Conservation Act 1999 Status: Critically Endangered (CE) Endangered (EN), Vulnerable (VU)

² South Australian National Parks and Wildlife Act 1972 Status: Endangered (E); Vulnerable (V); Rare (R), EX (Presumed extinct)

³ Records from Biological Database of South Australia (BDBSA 2020, November)

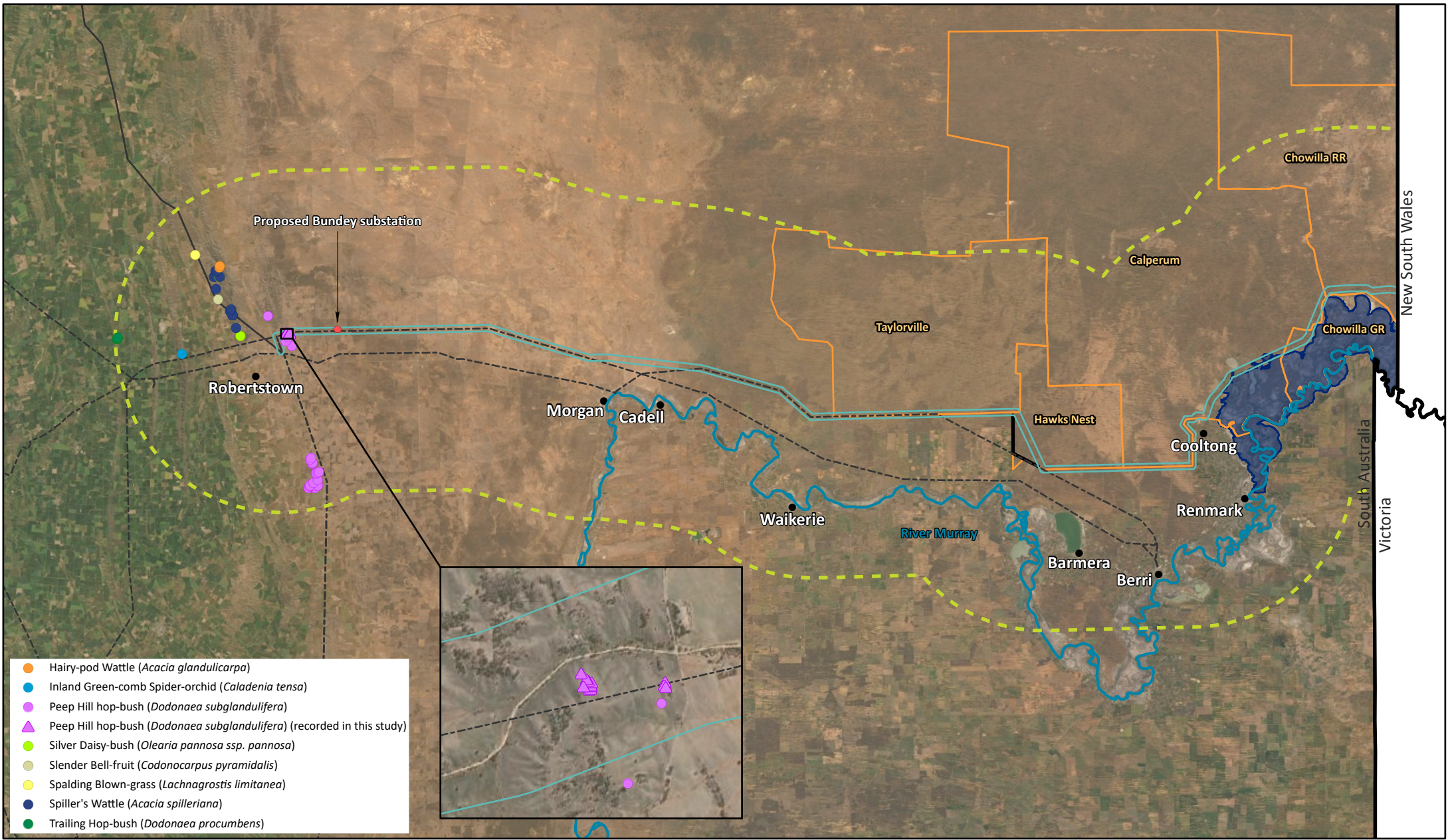
⁴ Protected Matters Search Tool (PMST) output for 5 km buffer on the alignment as at January 2021.

Peep Hill Hop-bush (*Dodonaea subglandulifera*) EPBC Endangered

This species is endemic to South Australia and found on the east side of the Mount Lofty Ranges and on Yorke Peninsula, growing on low hills on loamy soils associated with rocky outcrops in open woodland (often *Callitris gracilis* and / or *Allocasuarina verticillata*), open shrubland (often *Acacia*) and mallee (SASCC 2020). All records are near, or west of the western end of the proposed transmission line.

As noted in Table 11-9 above, the Peep Hill Hop-bush is present within the transmission line corridor at the western end. Two groups of plants are known to occur in within the corridor within an existing infrastructure corridor and are currently avoided by track maintenance upgrades. Three plants were found about 20 m WSW of an existing alignment during a survey in August 2019 (Jacobs 2019), approximately 50 m south of the proposed EnergyConnect alignment, i.e. within the transmission line corridor. Another 50 – 100 plants of mixed age were also located to the west of the first group. Both locations occur within the transmission line corridor (refer Figure 11-6). These plants occur on the edge of the extent of an important known ‘Robertstown’ subpopulation for the species which includes over 5,000 plants at 5 locations north to northeast of Robertstown (Moritz and Bickerton 2010). Further detail about this species is provided in Appendix I-2).

No other plants have been identified within the transmission line corridor to date. As discussed in Section 11.4.1 and 11.4.7, individuals of this species can be avoided where present.



- Hairy-pod Wattle (*Acacia glandulicarpa*)
- Inland Green-comb Spider-orchid (*Caladenia tensa*)
- Peep Hill hop-bush (*Dodonaea subglandulifera*)
- ▲ Peep Hill hop-bush (*Dodonaea subglandulifera*) (recorded in this study)
- Silver Daisy-bush (*Olearia pannosa* ssp. *pannosa*)
- Slender Bell-fruit (*Codonocarpus pyramidalis*)
- Spalding Blown-grass (*Lachnagrostis limitanea*)
- Spiller's Wattle (*Acacia spilleriana*)
- Trailing Hop-bush (*Dodonaea procumbens*)

- ▭ Transmission line corridor
- ▭ Ecology study area (50 km)
- ▭ Riverland Ramsar wetland
- ▭ Pastoral lease
- Cultural heritage avoidance alignment
- - - Existing ElectraNet transmission line
- River Murray
- Proposed Bunday substation

Figure 11-6
Nationally threatened flora records
in the ecological study area (since 1995)

0 20
 Kilometres

N

ElectraNet energy connect JBS&G

Silver Daisy – bush (*Olearia pannosa* subsp. *pannosa*) EPBC Vulnerable

This species is endemic to South Australia, scattered widely in the Mt Lofty Block, localised on eastern Eyre Peninsula, upper South East, Mid North and southern Flinders (DEW 2021a). Most populations are on roadsides with few individuals and the Murray-Darling Depression region is at the edge of its range (Seeds of South Australia 2020). Occurs in heath, mallee, woodland and forest communities on a range of soils (sandy, duplex) and terrains (slopes and plains). It is a long-lived perennial, often suckering (DEH 2008).

As noted in Table 11-9 above, it is possible that Silver Daisy-bush occurs within the transmission line corridor. Although the species has not been located within surveys of the transmission line corridor to date, and there are no records within the corridor, habitats where the species would occur are present.

As discussed in Section 11.4 below, this species can be avoided if present.

State listed flora

As above, in addition to Commonwealth listed species, there are records for threatened flora listed under the SA NPW Act within the ESA. There are 57 flora species with records since 1995 (excluding duplication of EPBC listed species from Table 11-9 above) (refer Table 2 in Appendix I-2 for species with no records in the transmission line corridor and considered unlikely to occur within the transmission line corridor). Note there was one record for Creeping Boobialla (*Myoporum parvifolium*) in the transmission line corridor, however this was in atypical habitat for the species, and was considered unlikely to occur (refer Table 11-10). Only one species was considered possible: Rohrlach’s Bluebush (BDBSA 2020 extract), refer Figure 11-7 and Table 11-10 below. None of these species was observed during site surveys of the transmission line corridor and surrounds (refer Appendix I-2).

In addition, it should be noted that records are not an indication of abundance since flora records have originated from a variety of sources (including standard flora surveys, regional wetland surveys, regional reserve surveys, roadside vegetation surveys) which range from collecting species presence data to estimates of numbers for repeat locations for long-term or regular surveys.

Table 11-10: State-listed threatened flora recorded in ESA / transmission line corridor from 1995 to present

Species	Common name	Status ¹	Records in ESA ²	Records in TLC	Likelihood of occurrence in the transmission line corridor (TLC)
<i>Maireana rohrlachii</i>	Rohrlach’s Bluebush	R	2	No	Possible. 3 records in the ESA > 5 km from alignment (10 – 15 km away), no records in transmission line corridor which have spatial reliability < 1 km and post 1995. Not recorded current surveys. Recorded as part of SNI surveys on rocky hills / remnant patch western end, but was avoided. Occurs on heavy soils, widespread. Records are from Cooltong CP and White’s Dam CP. Given widespread and alignment runs near these CPs, considered possible, although stock can graze heavily if present.
<i>Myoporum parvifolium</i>	Creeping Boobialla	R	32	1	Unlikely. 32 records in the ESA > 5 km from alignment, one record in transmission line corridor, but in roadside vegetation survey, in rocky habitat, atypical for the species. Not recorded previous or current surveys. Occurs on floodplains. Habitat not in transmission line corridor.

¹ Status as per National Parks and Wildlife Act 1972 E = Endangered, V = Vulnerable, R = Rare, R* = not evaluated, EX = Presumed Extinct

² BDBSA records since 1995, with < 1 km reliability unless stated otherwise. Records are from BDBSA purchased BDBSA extract Nov 2020, Regional record spread as per NatureMaps (DEW 2021a).

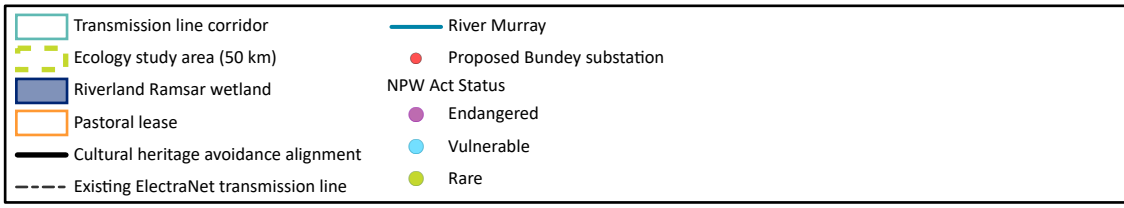
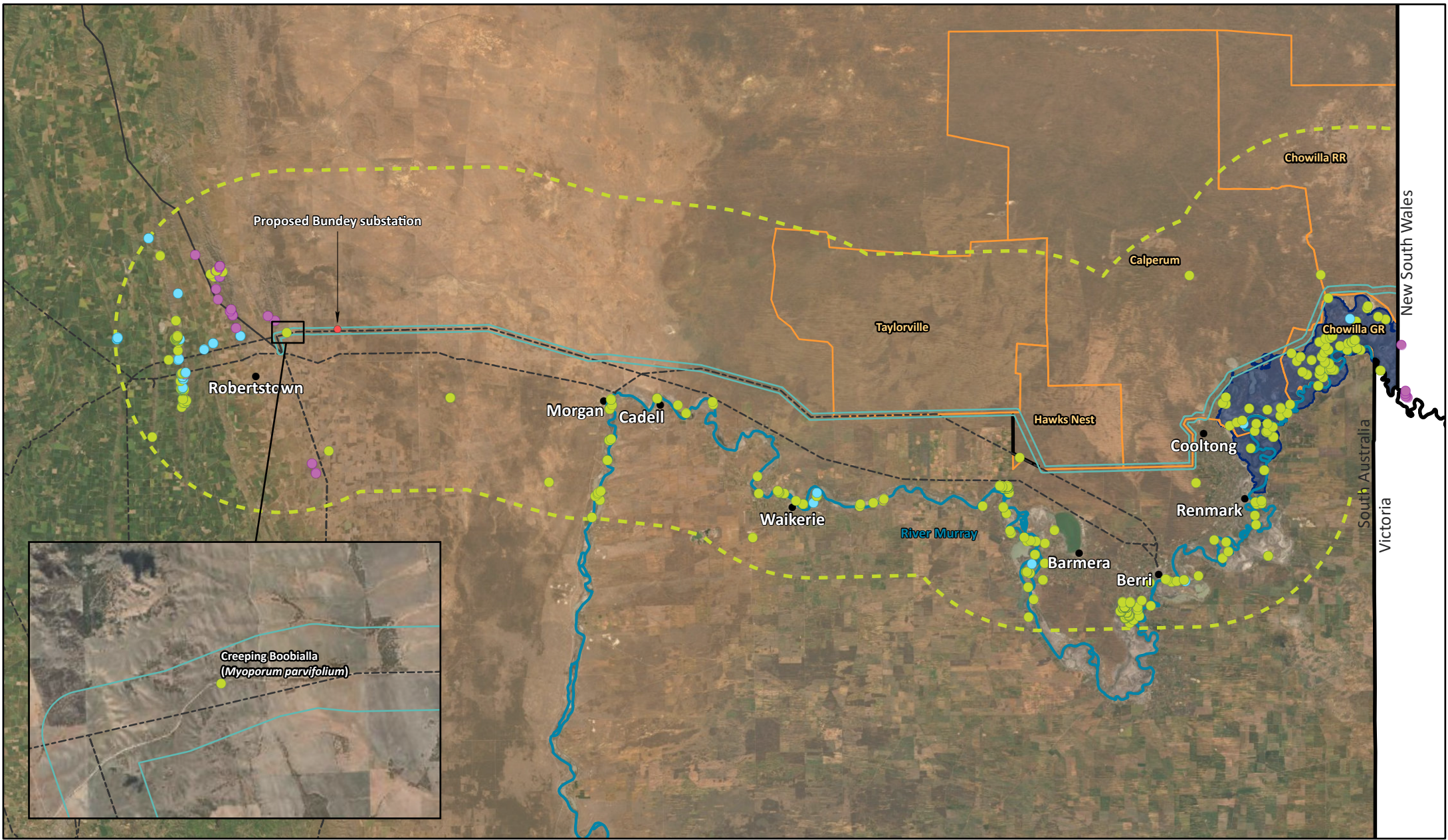


Figure 11-7
State-listed flora records in the ecological study area (since 1995)

0 20
Kilometres

N

Regionally threatened communities

Whilst there are no threatened ecosystems with official State ratings in South Australia, there is a list of threatened ecosystems of the agricultural region (DEH in progress in NVC 2020b). Blue-leaf Mallee (*Eucalyptus cyanophylla*) on loamy sand dunes (where it occurs as the overstorey dominant) is listed as a regionally Rare Ecosystem in South Australia, although this is an unofficial rating outside of any legislation. This ecosystem occurs in narrow, linear examples, primarily in Heritage Agreements, and mainly south of the River Murray. The ecosystem is considered to occur in 'unknown' extent in Cooltong CP (DEH in progress in NVC 2020b) which is traversed along its northern boundary by the transmission line corridor.

Blue-leaf Mallee was observed as present in lower numbers within White Mallee (*Eucalyptus dumosa*) / Beaked Red Mallee (*Eucalyptus socialis*) Mallee over Spinifex (*Triodia*) Hummock Grassland at flora site 16c along an existing track on the boundary of Calperum Station north of Cooltong CP. Given the vegetation at this site was not dominated by Blue-leaf Mallee, it is unlikely to qualify as the Rare ecosystem.

Regionally listed flora

Of the over 700 flora species recorded within the wider ESA, regional conservation status is as follows: 4 Critically Endangered, 23 Endangered, 63 Vulnerable, 185 Rare, 60 Near Threatened, 349 Least Concern, 2 Regionally Extinct and the remainder are listed as Data Deficient or Not Evaluated. Most of the Critically Endangered, Endangered and Vulnerable species have been considered, given they also have State and or national conservation status. There are records for 86 of these species with regional conservation status in the transmission line corridor (2 Vulnerable, 8 Rare, remainder are Near Threatened or Least Concern). A list of these species is provided in Appendix I-1.

11.3.4. Habitat

Section 11.3.2 above describes native vegetation type, extent and condition within the transmission line corridor. The relative BCM communities and sub-communities have also been grouped into broad habitats which include vegetation communities of varying conditions (refer Section 11.3.2 and Appendix I-2) for further detail. These broad habitats support a range of common fauna (and flora) and have potential to support threatened fauna that potentially occur within the transmission line corridor (see Sections 11.3.5 and 11.3.6 below). Table 11-11 summarises the broad habitats in relation to BCM community and potential fauna types that are supported. Figure 11-8 shows the extent of broad habitats across the transmission line corridor.

Table 11-11: Broad habitat type across the transmission line corridor

Broad Habitat Type	BCM Communities / sub communities	Habitat use and fauna support	Length in TLC (km)
Spear-grass (<i>Austrostipa</i>) and / or sparse shrub regrowth of previously cropped paddocks – western end of alignment	1, 3, 9, 10 (Degraded 1.1, 9.1, 3.1)	Primarily very low to low condition BCM 1 and 3 where present within the corridor. Provides habitat for several common bird and reptile species e.g. Bluebonnet (<i>Northiella haematogaster</i>), Singing Honeyeater (<i>Lichenostomus virescens</i>), and Australasian Pipit (<i>Anthus novaezeelandiae</i>). Due to the absence of trees, low plant species diversity and abundance, lack of plant life forms and absence of litter, this habitat has limited potential for threatened fauna (e.g. potentially suitable, but limited / marginal habitat for Blue-winged parrot (<i>Neophema chrysostoma</i>), Elegant parrot (<i>Neophema elegans</i>) Australian Bustard (<i>Ardeotis australis</i>), Pygmy Bluetongue (<i>Tiliqua adelaidensis</i>) and Flinders Ranges Worm-Lizard (<i>Aprasia pseudopulchella</i>).	17
Chenopod Open Shrubland	2, 4, 10, 11 (2.2, 4.3, 10.11, 11.6)	Primarily low condition BCM 2 where present within the corridor. Provides habitat for several common bird and reptile species, e.g. Bluebonnet, Australasian Pipits. Due to the absence of trees, reduced vegetation cover and density, this habitat at the Western End of Alignment has limited potential for threatened fauna (e.g. Blue-winged parrot, Elegant parrot, Slender-billed Thornbill (<i>Acanthiza iredalei</i>), Peregrine Falcon (<i>Falco peregrinus macropus</i>), Chestnut Quailthrush (<i>Cinclosoma castanotum</i>).	49
Low Open Woodland over chenopod understorey	1, 2, 10, 11 (2.1, 1.1, 11.6)	Primarily medium condition BCM 2 where present within the corridor. In addition to those species for which chenopod open shrubland provides potentially suitable habitat, the presence of trees provides extra habitat structure for some threatened larger bird species that do not require a heavy litter layer or complex habitat structure (including dense shrub layer). At the western end of the corridor vegetation provides potentially suitable habitat for threatened fauna (e.g. Blue-winged parrot, Elegant parrot, Slender-billed Thornbill, Striped Honeyeater (<i>Plectorhyncha lanceolata</i>) and Peregrine Falcon). However, habitat at the eastern end of the corridor is more suitable for Elegant parrot, Bush Stonecurlew (<i>Burhinus grallarius</i>), Gilbert's Whistler (<i>Pachycephala inornata</i>), Striped Honeyeater, White-winged Chough (<i>Corcorax melanorhamphos</i>), Common Brushtail Possum (<i>Trichosorus vulpecula</i>) and tree roosting bat species. Regent Parrots may also utilise these areas for foraging.	25
Old growth mallee over open sclerophyll and chenopod shrub understorey	1, 2, 3, 4 (1.1, 2.1, 3.1, 4.2, 1.2)	Comprises primarily medium to high condition BCM 3 where present within the corridor. At the western end of the corridor this habitat occurs in more fragmented, smaller blocks, where there is likely higher grazing pressure. Mallee is more open and has less structural complexity. Fauna species ranges also coincide with habitat. This habitat is considered to provide potentially suitable habitat for threatened fauna, e.g. Chestnut Quailthrush, Hooded Robin (<i>Melanodryas cucullata cucullata</i>), Restless Flycatcher (<i>Myiagra inquieta</i>), Striped Honeyeater and White-winged Chough. Mallee in the central and eastern end of the corridor occurs as larger blocks, with more floristic diversity and structural complexity, as well as a mosaic of fire history, providing greater opportunities for nesting and foraging. This habitat is considered to provide potentially suitable habitat for threatened fauna; e.g. Black-eared Miner (<i>Manoria flavigula melanotis</i>), Bush Stonecurlew, Chestnut Quailthrush, Gilbert's Whistler, Hooded Robin, Major Mitchell's Cockatoo (<i>Lophochroa leadbeateri</i>), Malleefowl (<i>Leipoa ocellata</i>), Regent Parrot (<i>Polytelis anthopeplus monarchoides</i>), Red-lored Whistler (<i>Pachycephala rufogularis</i>), Restless Flycatcher, Striped Honeyeater and White-winged Chough.	47
Post-fire regrowth mallee over sclerophyll	3 (3.1)	Comprises high condition vegetation where present within the corridor.	3

Broad Habitat Type	BCM Communities / sub communities	Habitat use and fauna support	Length in TLC (km)
and chenopod shrub understorey		Provides potentially suitable habitat for threatened fauna that require a dense shrub understorey, moderate to heavy leaf litter, and do not require hollows or large trees, e.g. Chestnut Quailthrush, Malleefowl, Red-lored Whistler (<i>Pachycephala rufogularis</i>), Restless Flycatcher, Scarlet-chested Parrot (<i>Neophema splendida</i>), Shy Heathwren (<i>Hylacola cauta</i>), and Striated Grasswren (<i>Amytornis striatus striatus</i>). State threatened raptors may also utilise this habitat for foraging and roosting (e.g. Black Falcon, <i>Falco subniger</i> , Square-tailed Kite, <i>Lophoictinia isura</i>). Would also provide foraging habitat for Regent Parrot and post-fire regenerating mallee of 5 – 10 years or older may provide occasional foraging habitat for Black-eared Miner (not optimal essential habitat).	
Mallee over Spinifex (<i>Triodia</i>) dominated understorey	4 (4.1, 4.2)	Primarily medium condition BCM 4 where present with the corridor. Considered to provide potentially suitable habitat for threatened fauna that require a dense ground layer, and in particular dominated by Spinifex; and don't require hollows or large trees. All habitat along the transmission line is at least 7 years post fire, but ranges to old growth mallee with no recorded fire history. Even 5+ year regrowth mallee may provide foraging habitat for the following species: Black-eared Miner, Chestnut Quailthrush, Gilbert's Whistler, Malleefowl, Red-lored Whistler, Restless Flycatcher, Scarlet-chested Parrot, Shy Heathwren and Striated Grasswren.	58
Hopbush (<i>Dodonaea viscosa ssp angustissima</i>) Tall Open Shrubland – eastern half of alignment	3, 4 (4.3)	Primarily low condition BCM 4 where present within the corridor Considered to provide potentially suitable habitat for threatened fauna that require a tall open shrub structure and do not require, a moderate to heavy litter layer, hollows or large trees (e.g. Bush Stonecurlew, Lace Monitor (<i>Varanus varius</i>)).	7
Non-native vegetation		Limited habitat for common and threatened fauna	0.80 km

Note: Potential fauna listed here are examples. Further assessment has been undertaken as part of the vegetation assessments required for native vegetation clearance approval.

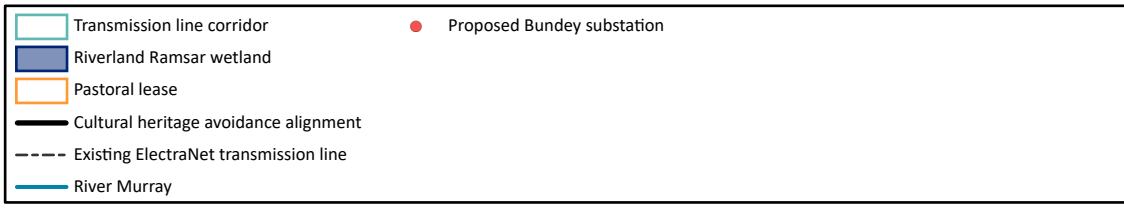
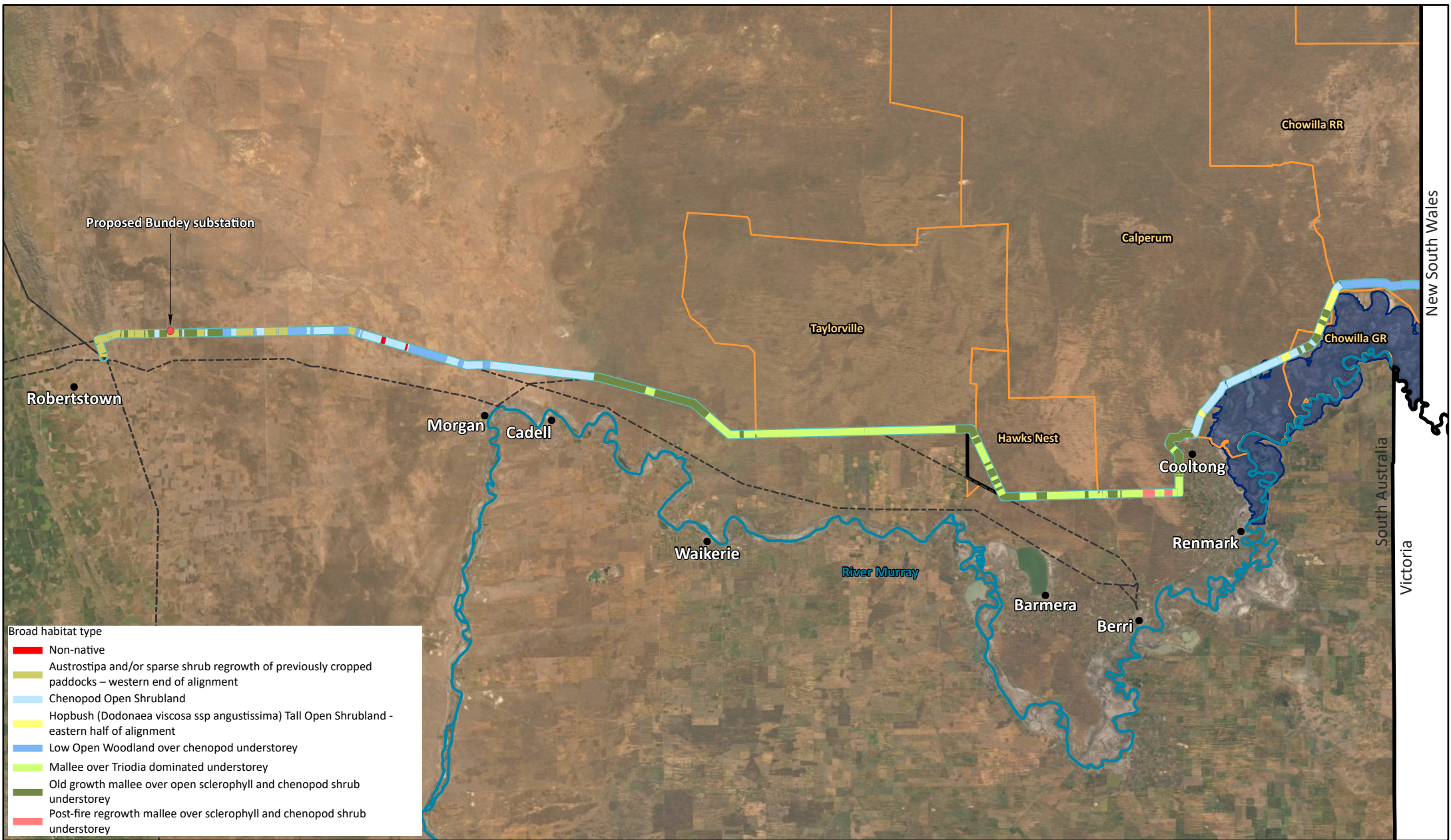


Figure 11-8
Vegetation by broad habitat types
along the transmission line corridor

0 20
 Kilometres

ElectraNet energy connect JBS&G

11.3.5. Native fauna

As noted previously, remnant vegetation, wetland areas, and particularly land managed for conservation within the ESA provide habitat for common and threatened fauna. Notable habitats include old growth mallee and intact mallee habitats, predominantly towards the centre and eastern end of the ESA (which are avoided or skirted by the transmission line corridor where possible). These habitats take many years to develop to a point where mallee trees support hollows and deep litter cover, and are characterised by a mosaic of fire history (refer 11.3.2). In general, they represent important habitat for native fauna species, including a number of conservation significant species discussed below. Threatened fauna are discussed further in Section 11.3.6.

Listed Critical Habitat for the Black-eared Miner (*Manorina melanotis*) is located within the Riverland Biosphere region, within Gluepot Reserve, Taylorville Station and Calperum Station. The transmission line corridor traverses the southern margin of this area, and this is discussed further below in Section 11.3.6. The wetlands of the Riverland Ramsar site are located to the south of the eastern part of the transmission line corridor (south of the Wentworth-Renmark Road) as discussed in Section 11.3.1. This area is known to support large numbers of waterbirds, including migratory species protected under the EPBC Act (see Section 11.3.6).

11.3.6. Conservation significant fauna

EPBC listed threatened fauna

Assessment of fauna with potential to occur

The desktop assessment (review of EPBC Act PMST with a 5 km buffer) initially highlighted 15 nationally threatened fauna species (11 birds, one frog, one mammal, two reptiles) and one threatened fauna population as potentially occurring in the transmission line corridor. Fish were excluded from the assessment, given lack of habitat that would be impacted by the Project. There was also a single BDBSA record for an additional EPBC listed species, Hooded Plover, which is considered in Table 4 of Appendix I-1. In addition, to the desktop assessment a targeted survey for mallee bird species was also undertaken (Nature Advisory 2021, provided in Appendix I-4). The targeted survey also considered an additional species, Mallee Striated Grasswren (*Amytornis striatus striatus*), which is currently State rare, but may be listed under the EPBC Act in the future (Nature Advisory 2021). This subspecies is considered with the State rated species in Section 11.3.6 below. Records for EPBC listed fauna (BDBSA and Birdlife) are shown in Figure 11-9, including recent records from the mallee birds survey (Nature Advisory 2021).

The likelihood of occurrence assessment for EPBC listed species considered desktop results as well as recent and historical BDBSA and Birdlife records, current distribution information, survey results and regional information (refer Table 11-12). It was determined that of the 17 species, three are present (Malleefowl, Black-eared Miner, Red-lored Whistler) and one is likely (Regent Parrot) within the transmission line corridor and the broader ESA. Of the remaining species, eight are considered possible (of which four are only possible in nearby water / riverine habitats, but some may fly over) and five are considered unlikely to occur within the transmission line corridor. Justification for the following species considered unlikely to occur is presented in Table 4 of Appendix I-1: Grey Falcon (*Falco hypoleucos*), Hooded Plover (*Thinornis cucullatus cucullatus*), Eastern Curlew (*Numenius madagascariensis*), Plains-wanderer (*Pedionomus torquatus*) and Night Parrot (*Pezoporus occidentalis*).

An EPBC listed Koala population (*Phascolarctos cinereus*) (combined populations of Qld, NSW and the ACT) was included in the PMST output, however this is not relevant to the current Project given the listed populations occur on the east coast of NSW and not in the vicinity of the Project. The Koala is not rated in SA. There are only two records for Koala within the broader ESA, one historical and one recent (scats from 2003). Given the EPBC status is not relevant for the location and considered unlikely to occur, this species is not considered further.

Table 11-12: Summary of EPBC listed fauna species that have potential to occur within the transmission line corridor

Species Name	Common Name	Cth ¹	SA ²	Likelihood	Justification for likelihood of occurrence within transmission line corridor
<i>Botaurus poiciloptilus</i>	Australian Bittern	E	V	Possible	<p>EPBC PMST suggests known to occur. Widespread, but uncommon over south-eastern Australia. Shy elusive species that favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.</p> <p>There are 8 recent BDBSA records (2010) within the ESA (all at the same location), records are in the River corridor southwest of Berri and 7 km south of the alignment near Morgan. One Birdlife record (2017) 17 km from the proposed alignment (near Berri). No records within the transmission line corridor. Possible within riverine environments south of the corridor, potential flyover.</p>
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE	Not rated	Possible	<p>EPBC PMST suggests likely to occur. A common summer migrant from northern hemisphere, found in many Australian coastal sites and may also be seen inland in suitable habitats. Most common in the far southeast and northwest of Australia. Found on intertidal mudflats of estuaries, lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters.</p> <p>Core habitat does not occur within the ESA, but the species may be an occasional visitor to inland water habitats. Within the ESA, there is one recent BDBSA record, 22 km from alignment (2011), 4 recent BDBSA records > 25 km from the alignment and there are 3 historical records in proximity to the transmission line corridor (Lake Merreti). There are 5 Birdlife records (1999 – 2013), 13 – 17 km from the alignment. None of the records are within the transmission line corridor, but the historical records are close to the corridor. Species is considered possible in riverine environments adjacent the transmission line corridor, and flyover potential.</p>
<i>Grantiella picta</i>	Painted Honeyeater	V	R	Possible	<p>EPBC PMST suggests may occur. Endemic to mainland Australia, primarily occurring in Queensland and New South Wales and Victoria. It is also found occasionally in the Northern Territory and may be a vagrant to South Australia. It is rare throughout its range. There are few records in South Australia and these are outside of the known range. Occurs in dry open forests and woodlands, and is strongly associated with mistletoe. It may also be found along rivers, on plains with scattered trees and on farmland with remnant vegetation. It has been seen in urban parks and gardens where large eucalypts are available.</p> <p>There are no recent BDBSA records within the ESA. There are 3 Birdlife records within the ESA (from 2000, 2011, 8 – 24 km from the alignment). There are 6 birdlife records 29-32 km north of the transmission line corridor near Gluepot Homestead in Mallee Vegetation. Given the limited records within the ESA and its status as a vagrant in South Australia, but presence of habitat its occurrence within the transmission line corridor is considered possible.</p>
<i>Leipoa ocellata</i>	Malleefowl	V	V	Present	<p>EPBC PMST suggests known to occur. Ground-dwelling species which makes large conspicuous nesting mounds. Preferred habitat is semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and / or acacias.</p> <p>There are over well 2000 recent (1995 – 2018) BDBSA and Birdlife records in the ESA and an additional 267 BDBSA records within the transmission line corridor. Many of these records are duplicate records of regularly surveyed mound locations, and there are no recent records for active nests in the transmission line corridor. Records are widespread in mallee habitat with concentrations around CPs (e.g. Pooginook and Cooltong) and Stations within the</p>

Species Name	Common Name	Cth ¹	SA ²	Likelihood	Justification for likelihood of occurrence within transmission line corridor
					Biosphere Reserve. The boundaries of these CPs and Taylorville are traversed by the transmission line corridor, and a (30 km) section of the corridor runs along the southern boundary of the Biosphere Reserve and through Calperum Station north of the Murray River NP. No Malleefowl mounds / nests or Malleefowl were observed during site surveys for the Project, however Malleefowl footprints were observed during targeted survey in spring 2019 on the boundary of Calperum Station (Nature Advisory 2021). Whilst Malleefowl have not been observed in the transmission line corridor, there are numerous records and presence of habitat, therefore they are considered as present within the corridor and would occur in mallee habitats of the central transmission line corridor, but are also known to traverse along tracks and forage in cropped / stubble areas.
<i>Manorina melanotis</i> / <i>Manorina flavigula melanotis</i>	Black-eared Miner	E	E	Present	<p>EPBC PMST suggests known to occur. Endemic to the Murray Mallee region of Victoria, South Australia and New South Wales where the majority of records are from the Riverland Biosphere Reserve, South Australia and the Murray-Sunset National Park, Victoria.</p> <p>Preferred habitat is large tracts old-growth mallee (over Spinifex, Saltbush or Bluebush) that has not been burnt for at least 45 years, and not degraded by grazing (Clarke et al. 2005 cited in TSSC 2016b, Nature Advisory 2021). A wildfire in 2006 in the Riverland Biosphere Reserve reduced the largest remaining area of long unburnt habitat by about a third. A subsequent fire in 2014 also burnt large areas of available habitat in the southern portion of the biosphere reserve (TSSC 2016b, DEW 2021a).</p> <p>The transmission line traverses the very southern margins of Taylorville Station and Calperum Station which are part of a block of EPBC listed Critical Habitat for the Black-eared Miner (refer below table for further discussion). The Critical Habitat area is not bisected or fragmented by the Project.</p> <p>There has been taxonomic controversy over this species, whether considered a full species or a subspecies of Yellow-throated Miner, hence listed as either <i>Manorina melanotis</i> or <i>Manorina flavigula melanotis</i> (DAWE 2020c).</p> <p>One Birdlife record for <i>Manorina flavigula melanotis</i> in the transmission line corridor (2000) in Taylorville Station (10 km NNW of Hawks Nest). There are approximately 200 records (BDBSA and Birdlife) within the ESA, and 800 recent records north of the ESA boundary. The majority of records in the ESA are in Calperum and Taylorville Stations as well as Gluepot Reserve. There are also 8 recent records for the common Yellow Throated Miner in the transmission line corridor, and over 400 recent records within the ESA, as well as 60 records within the ESA for hybrids (<i>Manorina flavigula x melanotis</i>), indicating frequent interbreeding with Yellow-throated Miners already occurs in the ESA (refer Figure 11-10 and Figure 11-11).</p> <p>Targeted surveys (Nature Advisory 2021) located the species (pure and hybrids) at 3 sites within / immediately adjacent the transmission line corridor (Taylorville Station and Calperum Station), therefore given numerous regional records and presence of habitat, is considered present within mallee habitats of the centre of the transmission line corridor.</p>
<i>Pachycephala rufogularis</i>	Red-lored Whistler	V	R	Present	EPBC PMST suggests likely to occur. Occurs in the Murray Mallee both north and south of the Murray River, with isolated populations in central-western New South Wales, and on the Eyre Peninsula (which is likely extinct following fire in 2005). The core population occurs in the South Australia near the Victoria border. Distribution within the range is patchy as large areas are not utilised because they are not suitable (e.g. grazing, fire impacts). Whilst previously had

Species Name	Common Name	Cth ¹	SA ²	Likelihood	Justification for likelihood of occurrence within transmission line corridor
					<p>wide-spread occurrence in the Riverland Biosphere Reserve, landscape-scale fires have reduced numbers substantially in these areas.</p> <p>Breeds in areas of open mallee over a fairly dense, but patchy, shrub layer. Species prefers Spinifex (<i>Triodia</i>) mallee, shrubland or mallee heath shrubland (e.g. <i>Melaleuca uncinata</i>) where canopy is sparse and shrubs at high densities (DELWP 2016, Nature Advisory 2021). It is considered to have strict habitat requirements with distribution in mallee and mallee heath, limited by presence of <i>Triodia scariosa</i>, often nesting in Spinifex hummock grasslands. Feeds mainly on the ground or in low shrubs. They have large home ranges and occur at low densities within these ranges.</p> <p>The Riverland Biosphere Reserve population, estimated to be about 1000 birds in 2011, is considered to be one of the largest populations. In that reserve they are known to occur > 6 km from water points and associated grazing impacts and predominantly in areas of long-unburnt mallee. Landscape scale fires have caused substantial declines of populations in recent years, particularly in Billiatt and Ngarkat Conservation Parks and the Riverland Biosphere Reserve (DELWP 2016).</p> <p>There are 6 recent BDBSA records 43 Birdlife records in the ESA (1995 – 2010), no records in the transmission line corridor). The majority of these records are north of or on the edge of areas burnt by wildfire in 2006, 2014 ~ 30 km north of the transmission line corridor. Although there are limited records in the ESA, 4 of the records were <5 km from the alignment near Pooginook CP, the species was also observed near that CP during targeted surveys (Nature Advisory 2021). Based on the above considered, present in the un-burnt / old growth mallee habitats of the transmission line corridor, however likely to occur in low abundance (Nature Advisory 2021).</p>
<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot	V	V	Likely	<p>EPBC PMST suggests breeding likely to occur. Nest within River Red Gums forests. Typical nest trees are large, mature healthy trees with many hollows (though dead trees are used) and are usually located close to watercourses.</p> <p>Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands. Mallee woodland within 20 kilometres of nesting sites is considered critical foraging habitat for breeding birds (Baker-gabb and Hurley 2011).</p> <p>They may utilise cereal crops and will feed on spilt grain. Birds move between the riverine nesting habitat and foraging sites along corridors of natural vegetation. They also forage widely in mallee areas / agricultural land, but generally up to 20 km from nesting habitats along the River Murray.</p> <p>The ESA includes both breeding and foraging habitat, breeding habitat does not occur in the transmission line corridor, but rather south of the corridor in riverine environments. There are over 620 recent BDBSA records and 335 Birdlife records within the broader ESA (1995 – 2020), most along the River Murray corridor, but there are also records in mallee vegetation to the north of the ESA in Taylorville and Calperum Station and the species has been recorded in Pooginook CP, Cooltong CP, most likely associated with foraging behaviour rather than breeding. There are two recent BDBSA records (2012, 2013), and no Birdlife records in the transmission line corridor. The species was not observed during targeted surveys of the corridor. Based on the above, species is considered likely within the transmission line corridor, in mallee habitats (foraging habitat). Noting that nesting habitat does not occur in the transmission line corridor.</p>

Species Name	Common Name	Cth ¹	SA ²	Likelihood	Justification for likelihood of occurrence within transmission line corridor
<i>Rostratula australis</i>	Painted Snipe	E	V	Possible	<p>EPBC PMST suggests likely to occur. Endemic to Australia, widespread over much of north and eastern Australia, and localised around Perth, but rarely observed. Prefers inland swamps and temporary water regimes, marshes with moderate cover.</p> <p>Inhabits many different types of shallow, brackish or freshwater terrestrial wetlands, especially temporary ones which have muddy margins and small, low-lying islands. Suitable wetlands usually support a mosaic of low, patchy vegetation, as well as lignum and cane-grass.</p> <p>Preferred habitats occur within the wider ESA and adjacent the eastern end of the transmission line corridor. There is one recent BDBSA record (2001 at Berri Sewage works) and 3 Birdlife records within the ESA. There are also 2 recent records outside the ESA near Berri and the Noora Disposal Basin, but no records in the transmission line corridor. Given limited records and preferred habitat adjacent the eastern end of the transmission line, occurrence is possible in nearby suitable habitats, with potential flyover of the transmission line corridor.</p>
<i>Litoria raniformis</i>	Southern Bell Frog / Growling Grass Frog	V	V	Possible	<p>EPBC PMST suggests known to occur. Occupies a variety of natural and artificial wetland habitats including swamps, lakes, streams, riverine floodplains, farm dams and irrigation channels. Occupied waterbodies are typically still to slow-flowing and may be permanent or ephemeral. Submergent, floating and / or emergent vegetation is often present. In South Australia, occurs along the length of the River Murray corridor, Lower Lakes, and the South East region. For populations bordering the River Murray, breeding is triggered by flooding of ephemeral waterbodies during spring or summer. In this area the frogs are concentrated in refugia prior to flooding, then disperse across the landscape during flooding / breeding events. Species is highly mobile and can move at least one km in 24 hrs. There is evidence that its persistence in many areas is dependent upon the movement of adults between particular waterbodies, and between breeding and non-breeding habitats. At least some populations may be dependent upon a small number of waterbodies in which successful breeding occurs.</p> <p>Fences and roads may be barriers to frog movement and may compromise the viability of many populations. There are 402 recent records (1995 – 2017) within the ESA, with <1 km spatial reliability, no records in the transmission line corridor and no suitable habitat. These records occur along the River Murray corridor with occasional records from nearby evaporation ponds.</p> <p>Given the number of records, it is considered possible this species may occur in the transmission line corridor, but it is more likely to occur in the River Murray and associated wetlands that are avoided by the Project.</p>
<i>Nyctophilus corbeni</i>	South-eastern Long-eared Bat	V	V ⁴	Possible	<p>EPBC PMST suggests likely to occur. Microbat previously referred to as <i>Nyctophilus species 2</i> (South-eastern long-eared Bat) (Churchill 2008). Species has scattered distribution in the Murray-Darling basin. Occurs within a wide range of inland woodland vegetation types. More commonly associated with Box, Ironbark and Cypress Pine Woodland on the western slopes and plains of inland northern NSW. Has a stronghold with core populations located in the Pilliga Scrub in NSW. Roosts in tree hollows, crevices and under loose bark. Generally roosting solitary or in groups of 10 – 20. Slow flying, but agile and hunts for flying prey, foliage gleaning or foraging on the ground, foraging very close to vegetation.</p> <p>In South Australia, records are all confined to mallee shrubland. Commonly recorded in extensive stands of vegetation, old-growth vegetation, and areas with a dense understorey. Bushfires are a likely threat, causing direct mortality and through loss of foraging habitat and roosting sites.</p> <p>There is one recent record within the ESA, 20 km from the alignment (1998 Calperum Station) and no recent records</p>

Species Name	Common Name	Cth ¹	SA ²	Likelihood	Justification for likelihood of occurrence within transmission line corridor
					in the transmission line corridor. All records are within a large tract of intact mallee. Given recent record in the ESA, aerial nature and habitat present within the ESA and transmission line corridor, it is possible this species occurs in mallee habitats within the corridor.
<i>Aprasia pseudopulchella</i>	Flinders-ranges Worm-lizard	V	Not rated	Possible	EPBC PMST suggests likely to occur. Endemic to South Australia, occurs in open woodland, native tussock grassland, riparian habitats and rocky isolates. Species prefers stony soils or clay soils with a stony surface and has been found sheltering in soil beneath stones and rotting stumps. All species of <i>Aprasia</i> are known to burrow freely in loose soil or litter and in root systems below shrubs. Has been recorded from the Southern Flinders, Clare Hills, rocky slopes north and south of Burra, and northern suburbs of Adelaide (Cobbler Creek Recreation Reserve), which are all west of the Project. There are 5 recent records (from 2003, 15 – 24 km from alignment) within the western end of the ESA, none located within the transmission line corridor. Records were from Lomandra and / or Triodia grassland (4 sites) and Sheoak woodland (one site). The nearest record (from 2011) is ~ 10 km northwest of the transmission line corridor, but has low spatial reliability (> 1 km). Record was from 'gullies near a homestead'. The western margins of the ESA are at the eastern limit of the known range. Only the far western end of the transmission line corridor may contain suitable habitat. Based on the above, the species is considered as a possible occurrence in the transmission line corridor.
<i>Tiliqua adelaidensis</i>	Pygmy Blue-tongue Lizard	E	E	Possible	EPBC PMST suggests known to occur. Preferred habitat is unploughed grassland, commonly Lomandra grassland (with spider holes). It has been recorded from the Mid North of South Australia with most records between Burra and Jamestown. There are 2 recent records (2008) in the ESA, no records in the transmission line corridor, nearest records (>500) all from same location ~ 31 km northwest of the western end of the transmission line corridor. Records are in an unploughed grassland. The transmission line corridor is east of all known records. Only the far western end of the study area may contain suitable habitat, however no preferred or suitable habitat observed in the corridor during site surveys to date. Based on the above occurrence in the transmission line corridor is considered possible.

¹ Environment Protection and Biodiversity Conservation Act 1999 Status: Critically Endangered (CE); Endangered (EN), Vulnerable (VU); Migratory Marine (MM); Migratory Terrestrial (MT); Migratory Wetland (MW)

² South Australian National Parks and Wildlife Act 1972 Status: Endangered (E), Rare (R), Vulnerable (V)

³ Records from Biological Database of South Australia (BDBSA), Purchased September 2019 extract (which includes records from multiple bird monitoring associations), Protected Matters Search Tool (PMST) (species or species habitat potential unless stated, e.g. breeding, Atlas of Living Australia)

⁴ Listing is for a different species name, nomenclature update

⁵ See Appendix I-3 for further justification and references including Menkhorst et al. 2017, Simpson and Day 2010, Geering et al . 2008, SPRAT profile).

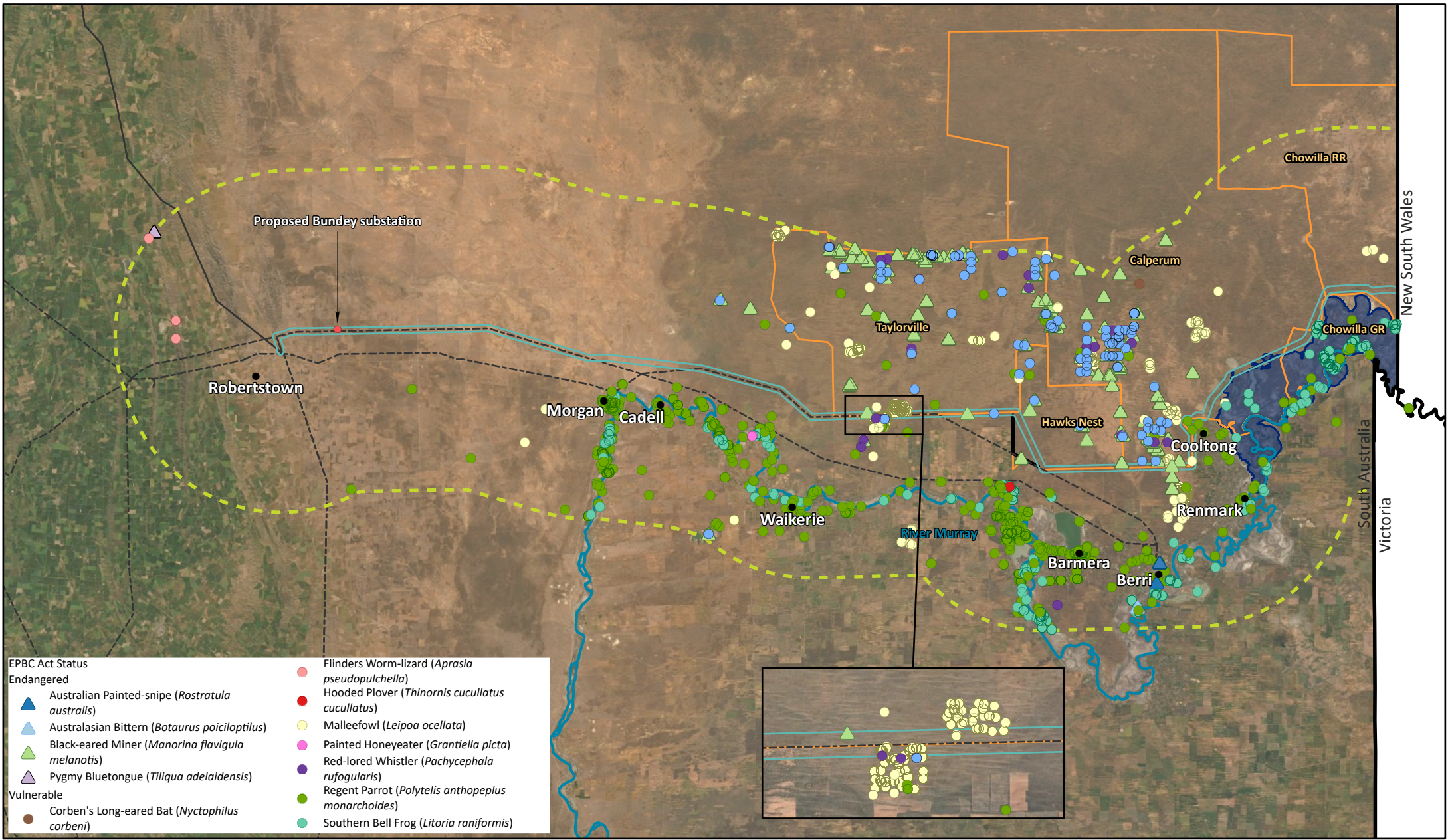


Figure 11-9
Nationally threatened fauna records
in the ecological study area (since 1995)

0 20
 Kilometres

ElectraNet energy connect JBS&G

Black-eared Miner (*Manorina melanotis*) EPBC Endangered

The Black-eared Miner is a sedentary inhabitant of dense, unburnt mallee vegetation. It has hybridised extensively with the common Yellow-throated Miner *M. flavigula* in areas where the mallee has become fragmented by vegetation clearing (Carpenter 2002). Historical surveys suggested that the last remaining Black-eared Miners occur in the extensive unburnt mallee areas north of the River Murray, particularly in the Gluepot – Calperum Station area (Garnett & Crowley 2000). More recently, BDBSA and Birdlife records indicate Black-eared Miners, Yellow-throated Miners and hybrids continue to occur in the vicinity of the transmission line corridor (refer Table 11-13 and Figure 11-10). This has been confirmed by recent surveys with pure and hybrids recorded at Taylorville, Hawks Nest and Calperum Stations, the Hawks Nest records being well north of the current transmission line corridor (Nature Advisory 2021).

An interrogation of the records also shows that the majority of pure Black-eared Miners occur greater than 25 km north of the transmission line corridor and that all three bird types as well as the common Noisy Miner occur within the wider ESA (refer Figure 11-10). The majority of recent records are also concentrated within the Listed Critical Habitat area / Riverland Biosphere Reserve (refer Figure 11-11) in areas of mallee unburnt for 15 years and up to 40 years or more (DEW 2021a).

The main threats to this species are loss and modification of habitat (e.g. as a result of past vegetation clearance and disturbance, and destruction or degradation of habitat cause by fire and / or grazing pressure) and hybridisation with the Yellow-throated Miner. The survival of the Black-eared Miner population has been attributed to the presence of extensive areas of undisturbed mallee in the South Olary Plains region, of which vast areas occur within the northern half of the Listed Critical Habitat area, well north of the transmission line corridor (over 30 km north). It is noted that further clearing and disturbance of mallee in this area could be detrimental to the species (Carpenter 2002).

It is acknowledged that Black-eared Miners are present within sections of the transmission line corridor, specifically in dense mallee areas, however it is noted that the majority of the population occurs further north, over 15 to 25 km away from the transmission line corridor, all within core habitat of the Listed Critical Habitat area that will be avoided by the Project.

Table 11-13: Summary of Miner status within and surrounding the transmission line corridor

Species	Cth	SA	Regional	Location	Pre 1995 records > 1 km reliability ¹	Pre 1995 records < 1 km reliability ²	1995 – present records < 1 km reliability ³
Black-eared Miner <i>Manorina flavigula melanotis</i>	E	E	E	TLC	0	0	1 (Birdlife)
				ESA	0	3	91 (BDBSA), 105 (Birdlife)
				Over 25 km away	0	1	371 (BDBSA), 427 (Birdlife)
Yellow-throated Miner <i>Manorina flavigula</i>	ssp	ssp	LC	TLC	0	0	1 (BDBSA), 7 (Birdlife)
				ESA	59	22	133 (BDBSA), 303 (Birdlife)
				Over 25 km away	19	8	130 (BDBSA), 284 (Birdlife)
Yellow-throated x Black-eared Miner hybrid <i>Manorina flavigula x melanotis</i>				TLC	0	0	0
				ESA	0	0	60
				Over 25 km away	0	0	148

¹ Historical records (BDBSA and Birdlife) with low spatial reliability ² Historical records with spatial reliability; ³ Recent records (post 1995) with spatial reliability as accepted by SA Department for Environment and Water for determining offsets as part of Native Vegetation Clearance Approvals process (NVC 2020a,b,c,d).

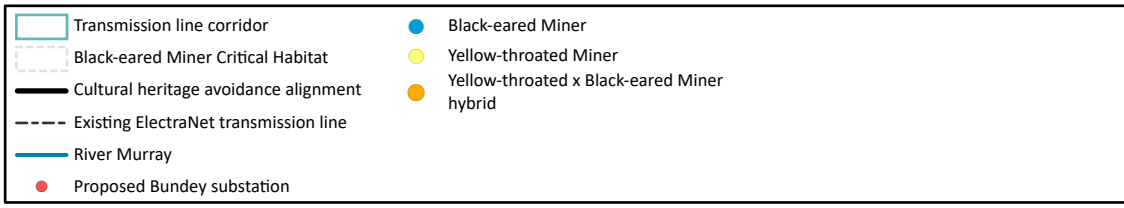
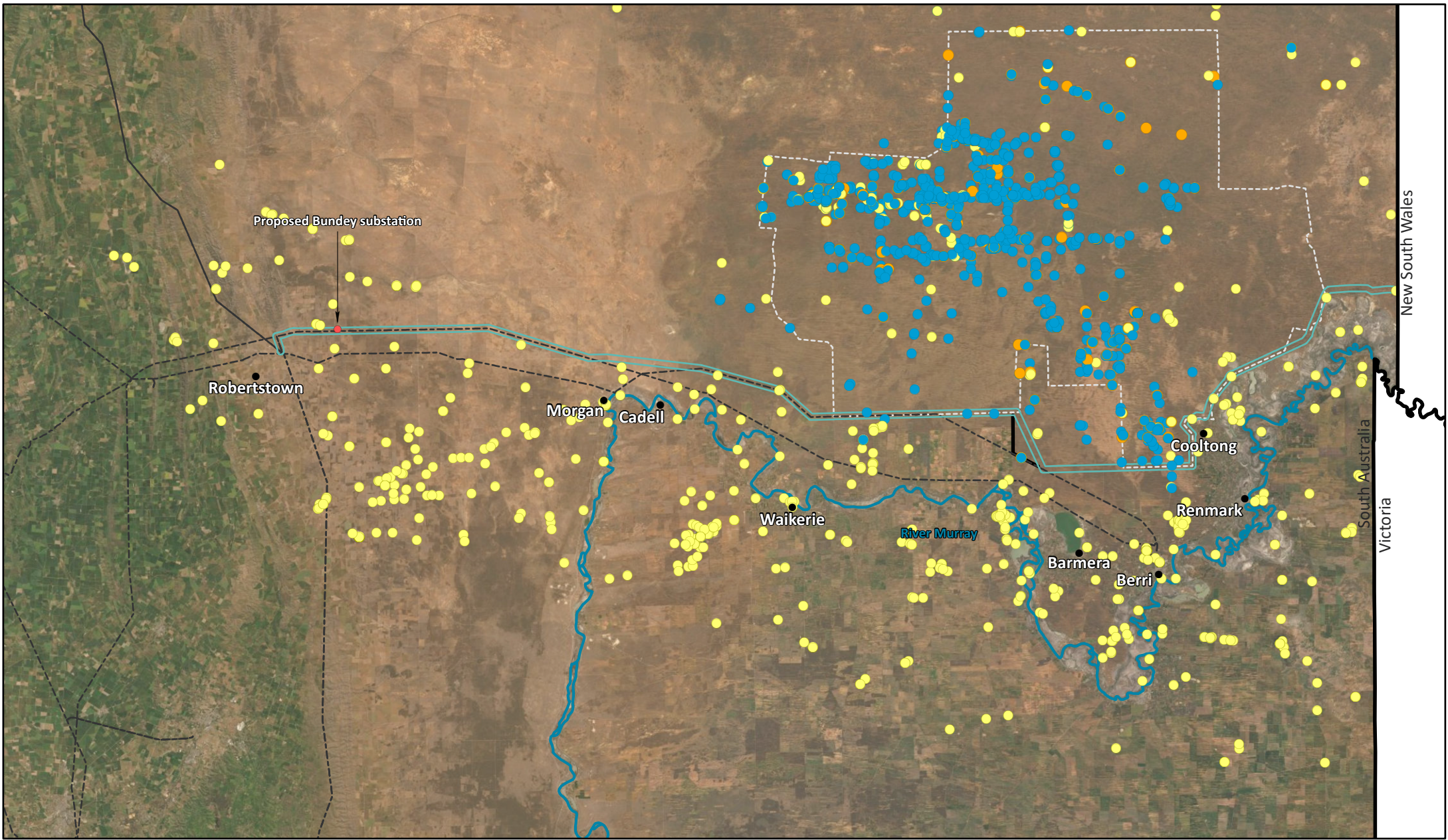


Figure 11-10
Black-eared and Yellow-throated
Miner records

<p>0 20 Kilometres</p>	

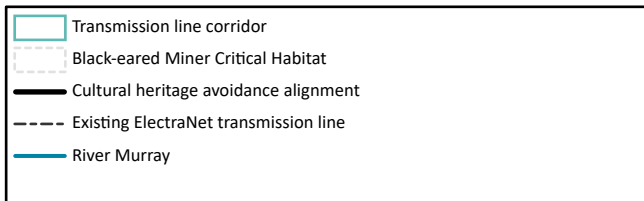
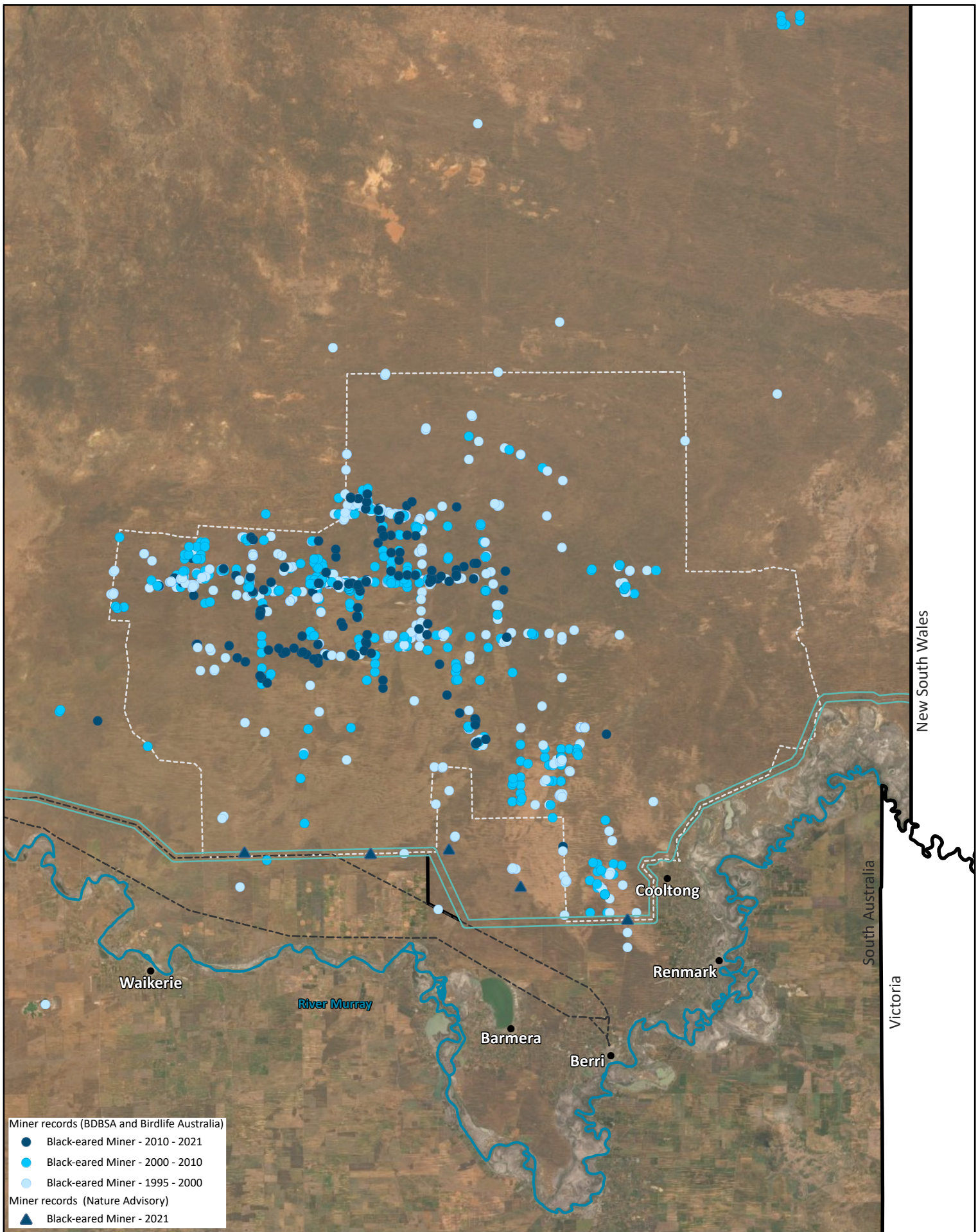
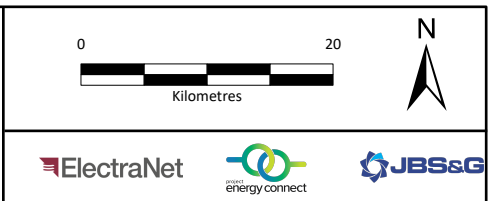


Figure 11-11
Black-eared Miner records



Red-lored Whistler (*Pacycephala rufogularis*) EPBC Vulnerable

The Red-lored Whistler occurs in the Murray Mallee both north and south of the Murray River, with isolated populations in central-western New South Wales. A small, isolated population in northern Eyre Peninsula appears to have become extinct (DELWP 2016).

The Red-lored Whistler is sedentary or territorial in dense mallee, Broombush (*Melaleuca uncinata*) or Cypress Pine vegetation (Menkhorst et al. 2017). The species has a very large territory of around 100 ha in Spinifex mallee and 20 ha in mallee heath with about 30% overlap with neighbouring territories. The species generally occurs solitarily, with a low population density – about one bird per 50 ha (DELWP 2016). The species mainly forages on the ground or in low shrubbery (Menkhorst et al. 2017).

In South Australia the species occurs in the upper South East, lower Murray Mallee and is widespread in and around the Riverland Biosphere Reserve in an area bounded by Calperum, Sandleton and Canegrass Stations. The population in the Biosphere Reserve was estimated to be about 1000 birds (in 2011), making this probably one of the largest populations (DELWP 2016). In the Riverland Biosphere Reserve Red-lored Whistlers occur over 6 km from water points and their associated grazing impact. However, landscape-scale fires have reduced numbers substantially in recent years in the Riverland Biosphere Reserve as well as Billiatt and Ngarkat Conservation Parks (DELWP 2016).

The majority of the current records in the Riverland Biosphere Reserve are north of or on the edge of areas burnt by wildfire in 2006 and 2014, approximately 15 – 25 km north of the transmission line corridor. However, individuals were observed at one site in Pooginook Conservation Park in recent targeted surveys (Nature Advisory 2021). They are considered to be present in the un-burnt / old growth mallee habitats of the transmission line corridor (including habitat in Taylorville Station), however likely to occur in low abundance at these sites, given the amount of mallee within the transmission line corridor that has been burnt in the last 6 – 14 years (refer Figure 11-4).

Regent Parrot (eastern) (*Polytelis anthopeplus monarchoides*) EPBC Vulnerable

The Regent Parrot has declined throughout the eastern mallee region of Australia over the last 100 years, due to disruption of breeding habitat in red gums along the River Murray and clearing of adjacent feeding areas (Carpenter 2002, Baker-Gabb and Hurley 2011). Threats to breeding habitats include direct clearing and disturbance of nesting sites (which can be in live or dead trees primarily River Red Gums), competition for nest hollows (e.g. cockatoo and other bird species, possums, feral bees), deliberate killing of birds (e.g. perceived as crop pests), road kill and accidental poisoning (Baker-Gabb and Hurley 2011).

This species is restricted to a single population occurring in inland south-eastern Australia, which ranges across the lower Murray-Darling basin region of South Australia, New South Wales and Victoria. Within this range the Regent Parrot occurs in riverine and mallee woodlands and forests (Baker-Gabb and Hurley 2011). There are three separate breeding areas known across the range: in Victoria (Wimmera River Drainage System), Victoria and NSW (mid Murray River between Red Cliffs and Piangil) and in South Australia (lower River Murray from Swan Reach to north-western Victoria (Lindsay Island) (Baker-Gabb and Hurley 2011).

Sub-populations of Regent Parrot in South Australia have been well surveyed and there are detailed counts of colonies and the number of active nests, with data collected two yearly for a number of years (Smith 2001, 2004, 2009 and 2011, all cited in Baker-Gabb and Hurley 2011).

In SA all known breeding colonies are located along the River Murray and feeding sites (within large blocks of intact mallee) are within 5 – 20 km (usually 5 – 10 km) of these areas. Favoured mallee includes Beaked Red Mallee (*E. socialis*) and Ridge-fruited Mallee (*E. incrassata*). Males make 2 – 3 trips per day to feed females on the nest during breeding, using corridors of vegetation (e.g. roadside vegetation) for dispersal to avoid raptors. Between Morgan and the NSW border the transmission line corridor ranges varies in distance from the River Murray (e.g. Morgan 5 km, east of Morgan 4 km,

Overland Corner 6 km, Berri 17 km). Hence suitable foraging habitat occurs within the ESA and areas of the transmission line corridor towards the centre and eastern end.

These parrots are known to disperse into the mallee of the Riverland Biosphere Reserve during non-breeding periods. Large aggregations (200 – 500 birds) have previously been observed flying near Berri and Gluepot Reserve (Baker-Gabb and Hurley 2011).

There are records in Pooginook, throughout riverine environments south of the transmission line corridor and some in Gluepot Reserve in mallee habitats north of the transmission line corridor. Whilst not observed in targeted surveys of the transmission line corridor, the species has potential to occasionally forage in mallee habitats in the vicinity of the transmission line corridor (Nature Advisory 2021).

Malleefowl (Leipoa ocellata) EPBC Vulnerable

Malleefowl core habitat is semi-arid to arid zone shrublands and low woodlands dominated by mallee. Chenopod mallee is one of the least preferred Malleefowl habitats. Sandy soils and abundant leaf litter are required for breeding. Over the course of a year the birds may range over one to several square kilometres; home-ranges overlap considerably. (National Malleefowl Recovery Team 2019). The largest Malleefowl populations occur WA and SA, but they also occur in NSW and Victoria. Given the large distribution of Malleefowl across Australia, no particular populations have been described as of greater importance for the long-term survival of the species in the Malleefowl Recovery Plan, but there are declines across the range and ongoing objectives to conserve the species (Benshemesh 2007).

This species was previously widely distributed throughout the mallee areas of southern Australia, but is now restricted due to clearance, overgrazing, competition with introduced species and feral predators. Two thirds of the transmission line corridor occurs at the southern extent of the South Olary Plains IBRA bioregion. Mallee in the South Olary Plains IBRA subregion has been less fragmented than that further south. Historically, Forward & Robinson (1996) considered the region to be very important for the species. In this bioregion, Malleefowl are known to occur throughout the extensive areas of open Beaked Red Mallee and Red Mallee (SKM 2002, Carpenter 2002). Malleefowl occur throughout the Cooltong Conservation Reserve and Stony Pinch paddock of Calperum Station. A census of nesting mounds conducted in the early 2000s suggested the area supported a robust population of Malleefowl (Carpenter 2002).

Only Malleefowl footprints were observed during targeted survey for the Project (Nature Advisory Trust 2021), however given numerous records they are considered to be present within the transmission line corridor and would persist in vast areas of habitat that are adjacent the corridor.

EPBC listed migratory fauna

The EPBC PMST output highlighted 16 EPBC listed Migratory bird species of which two species (Eastern Curlew and Curlew Sandpiper) are also listed as threatened species and assessed in Table 11-12 above. An additional Migratory species, Caspian Tern (*Hydroprogne caspia*), was also identified as having multiple recent BDBSA records in the ESA, with records in and immediately adjacent to the transmission line corridor. BDBSA and Birdlife records for listed migratory species within transmission line corridor and ESA and are shown in Figure 11-12. Note these are records post 1995 with >1 km spatial reliability.

Table 11-14 below presents the Listed Migratory species with an assessment of the likelihood of their occurrence (or suitable habitat occurring) in or immediately adjacent the transmission line corridor (excluding the two Migratory species which are also threatened, which are covered above). Of the 12 species presented here, three are considered likely and nine are possible to occur within or immediately adjacent (e.g. potential flyover) the transmission line corridor. Further details for three unlikely species are provided in Appendix I-1 (Table 4): Grey Wagtail (*Motacilla cinerea*), Yellow Wagtail (*Motacilla flava*) and Satin Flycatcher (*Myiagra cyanoleuca*).

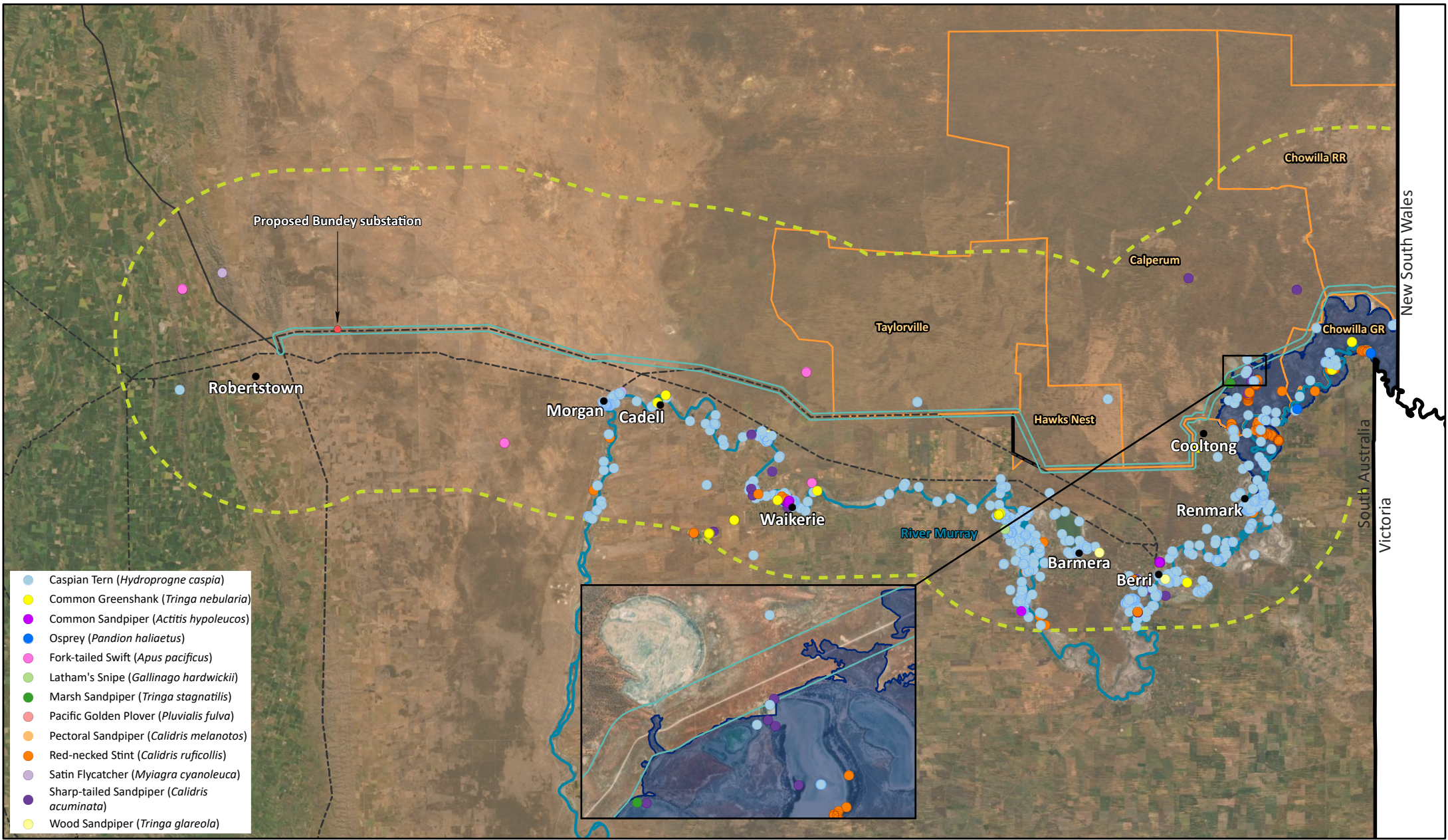


Figure 11-12
EPBC-listed migratory species records
in the ecological study area (since 1995)



Table 11-14: Likelihood assessment of EPBC listed migratory species that have potential to occur within the transmission line corridor

Species name	Common name	Cth ¹	SA ²	Likelihood	Summary of justification for likelihood of occurrence within transmission line corridor
<i>Apus pacificus</i>	Fork-tailed Swift	MM	Not rated	Possible	EPBC PMST suggests likely to occur within area. Highly mobile, almost entirely aerial species, flying < 1 m to 1000 m above the ground – seldom recorded on the ground. Occurs above a wide range of habitats, which vary from rainforests to treeless plains. Numerous records from much of inland and coastal Australia. One recent BDBSA record (2006), 4 Birdlife records (2002, 2003, 2006) within the ESA, no recent records within transmission line corridor. Species unlikely to utilise terrestrial habitat within the transmission line corridor, but may occur as an overfly visitor, given aerial nature.
Migratory Terrestrial (MT)					
<i>Actitis hypoleucos</i>	Common Sandpiper	MW	R	Possible	EPBC PMST suggests may occur within area. Visits Australia from late July to March, solitary or in small groups. Uses a wide variety of habitats with varying levels of salinity. Mostly found around muddy margins or rocky shores and rarely on intertidal mudflats, occurs in coastal wetlands, some inland wetlands, steep sided sewage ponds, shallow muddy edges of inland farm dams, mangrove-lined inlets. Non-core habitat exists adjacent the transmission line corridor and within water habitats of the ESA. There are 4 BDBSA and 9 Birdlife records within the ESA near Waikerie and Berri (Sewage treatment works), no records from the transmission line corridor. Given suitable habitat in the Riverland wetlands and local dams within / adjacent the transmission line corridor, species is considered possible in suitable habitats and potential flyover species.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	MW	Not rated	Possible	EPBC PMST suggests known to occur within area. Migratory wader / shorebird. Breeds in Siberia, migrates to New Guinea and Australia. Occurs in coastal and inland areas, but prefers non-tidal fresh or brackish wetlands. Recorded from wetlands throughout Australia. One of the most numerous migratory shorebirds to occur in fresh to saline inland wetlands, also forages in nearby damp grasslands, sometimes dams. There are 18 BDBSA and 30 Birdlife records within the ESA, from the River Murray and adjoining wetlands, Lake Merretti and no records from the transmission line corridor. Given records and preferred habitat south of the eastern end of the transmission line corridor, considered likely in suitable habitats and potential flyover species.
<i>Calidris melanotos</i>	Pectoral Sandpiper	MW	R	Possible	EPBC PMST suggests likely to occur within area. Breeds in northern North America and Siberia, and migrates (from late June) to South America and to a lesser extent Australasia. Occurs solitary or in small flocks on freshwater wetlands, grassy or lightly vegetated coastal and inland swamps. Habitat occurs south of the eastern end of the transmission line corridor in the Riverland Ramsar site. Two BDBSA and one Birdlife records and three historical records (1981 and 1987) within ESA (Lake Merretti). Given records and habitat adjacent corridor, considered possible in suitable habitats and potential flyover species.
<i>Calidris ruficollis</i>	Red-necked Stint	MW	Not rated	Likely	EPBC PMST suggests known to occur within area. Widespread throughout Australia. Occurs on the coast, in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. Can also occur in saltworks, sewage farms, saltmarsh, shallow wetlands including lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats, flooded paddocks or damp grasslands. Often occur in dense flocks, feeding or roosting. Widespread along the coast of SA and the River Murray, including within the ESA. There are 130 BDBSA and Birdlife records (1999 – 2017) within the ESA, all from the River Murray and Lake Merretti. Species is considered likely in riverine wetland environments and potential flyover species.

Species name	Common name	Cth ¹	SA ²	Likelihood	Summary of justification for likelihood of occurrence within transmission line corridor
<i>Gallinago hardwickii</i>	Latham's Snipe	MW	R	Possible	<p>EPBC PMST suggests likely to occur within area. Migratory wader / marsh dweller. Breeds in Japan and summer non-breeding migrant to Australia, primarily along the east coast. Prefers tussock grass and low dense sedges surrounding freshwater wetland, permanent and ephemeral wetlands. Can also occur in habitats with saline or brackish water, in any wetland vegetation (sedges, grasses, lignum, reeds and rushes), in saltmarsh and creek edges on migration and will use crops and pasture when inundated.</p> <p>Three recent records (2006 – 2009) within the ESA, from the River and adjoining wetlands, and historical record (Lake Meretti). Given suitable habitat occurs adjacent the eastern end of the transmission line corridor and limited records, considered possible and potential flyover species.</p>
<i>Hydroprogne caspia</i>	Caspian Tern	MM	Not rated	Likely	<p>Not suggested by PMST, but multiple recent records within ESA. Migratory marine species that is widespread along Australian Coastlines and inland northern to central-eastern Australia. Occurs in sheltered coastal waters, but also uses inland water bodies, including large rivers, fresh to saline lakes, reservoirs and temporary wetlands. Forages for fish, usually patrolling 15 – 30 m above the water (Menkhorst et al. 2017).</p> <p>Well over 700 BDBSA and Birdlife records in the ESA (1997 – 2019). No records in the transmission line corridor. Records are concentrated around riverine environments of the River Murray near Morgan, Waikerie, the Ramsar Wetland and Lake Merreti. Species is considered likely in riverine environments adjacent the transmission line corridor and potential flyover.</p>
<i>Pandion haliaetus</i>	Osprey	MW	E	Possible	<p>EPBC PMST suggests likely to occur within area. Raptor, prefers open water foraging habitat and tall woodland nesting habitat. Generally occurs on or near the coast, but also range inland along large rivers, bays, estuaries, along tidal stretches of large coastal rivers, mangrove swamps, terrestrial wetlands and coastal lands of tropical and temperate Australia and off shore islands. Nest in trees (often dead or with dead tops), rocky coastlines and on artificial structures such as telecommunication towers.</p> <p>Preferred habitat of open water bodies, lakes, rivers for foraging are present adjacent the transmission line corridor (eastern end). Will also nest on tall manmade structures, therefore have the potential to move into the corridor once towers are constructed.</p> <p>Majority of SA records are coastal or off-shore (3 Birdlife records (2010, 2012, 2013) within the ESA (Chowilla Game Reserve, homesteads)). Given limited records considered possible in water habitats, have the potential to nest in towers once constructed and potential flyover.</p>
<i>Pluvialis fulva</i>	Pacific Golden Plover	MW	R	Possible	<p>EPBC PMST suggests known to occur within area. Migratory shorebird. Breeds in Siberia and Alaska, migrates to a number of countries including Australia. Preferred habitat is intertidal sand and mudflat, coastal saltmarsh and rocky shores, will roost in pasture near these water habitats. Range is primarily coastal, with a small population inland, near wetland habitats. Within SA mainly coastal, but occasional inland records. One recent Birdlife record (2001) in ESA (Berri Sewage Pond), two historical records in ESA, no records in transmission line corridor. Given limited records and wetland habitats adjacent eastern end of corridor, considered possible in suitable habitats and potential flyover.</p>
<i>Tringa glareola</i>	Wood Sandpiper	MW	R	Possible	<p>EPBC PMST suggests known to occur within area. Migratory shorebird. Breeds in Europe to Siberia, migrates to Africa, southern Asia and Australia. Generally occurs in northern Australia (Aug – April). Prefers inland freshwater wetlands with emergent sedges and other small plants, with taller fringing vegetation and rarely on intertidal mudflats. Often occurs solitary or in small clusters near shorelines in mud or shallow water of wetlands. When disturbed will fly very high before wheeling and gliding back to ground.</p> <p>The majority of SA records are from the coast off Gulf St Vincent, Spencer Gulf, and the Coorong region. However,</p>

Species name	Common name	Cth ¹	SA ²	Likelihood	Summary of justification for likelihood of occurrence within transmission line corridor
					there are 7 Birdlife records within ESA (near Berri / Waikerie), no records within the transmission line corridor. Given limited records and wetland habitats adjacent eastern end of corridor, considered possible in wetland habitats and potential flyover.
<i>Tringa nebularia</i>	Common Greenshank	MW	Not rated	Likely	EPBC PMST suggests known to occur within area. Migratory wader / shorebird. Breeds in northern hemisphere from Europe to Siberia, summer migrant to Australia, Africa and Asia. Prefers intertidal mudflats, fresh and saltwater wetlands of coast and inland. Widespread in SA, including coastal and inland in estuaries and mudflats, mangrove swamps and lagoons, as well as billabongs, swamps, sewage farms and flooded crops. ESA occurs within known regularly occupied range. Over 30 BDBSA and Birdlife records from the ESA. No records in the transmission line corridor. Given multiple records and habitats adjacent eastern end of corridor, considered likely in suitable habitats and potential flyover.
<i>Tringa stagnatilis</i>	Marsh Sandpiper, Little Greenshank	MW	Not rated	Possible	EPBC PMST suggests known to occur within area. Migratory shorebird. Breeds in Europe and Asia, migrates to Africa, Southern Asia and Australia. Preferred habitat includes coast and inland fresh or saltwater wetlands, avoids intertidal wetlands, but large numbers can occur along the northern Australian coast (Geering et al. 2008, Menkhorst et al. 2017). Study area occurs in regularly used range (Menkhorst et al. 2017). Records are south of the corridor in riverine habitats. Five Birdlife records within ESA, 5 BDBSA records south of ESA (>25 km). Given limited records and habitat adjacent eastern end of corridor, considered possible in wetland habitats and potential flyover.

¹ Environment Protection and Biodiversity Conservation Act 1999 Status: Critically Endangered (CE); Endangered (EN), Vulnerable (VU); Migratory Marine (MM); Migratory Terrestrial (MT); Migratory Wetland (MW)

² South Australian National Parks and Wildlife Act 1972 Status: Endangered (E), Rare (R), Vulnerable (V)

³ Records from Biological Database of South Australia (BDBSA) / Birdlife Australia September 2019 / 2020 extract, Protected Matters Search Tool (PMST) (species or species habitat potential unless stated, e.g. breeding),

⁴ See Appendix I-3 for further justification and references.

EPBC listed critical habitat

The ESA includes an area listed on the Register of Critical Habitat (maintained by the Minister under the EPBC Act). This Critical Habitat is listed as ‘*Manorina melanotis* (Black-eared Miner) – Gluepot Reserve, Taylorville Station and Calperum Station, excluding the area of Calperum Station south and east of Main Wentworth Road’ (DEH 2004a) (see Figure 11-11). This large area of habitat is over 380,000 ha and occurs within / adjacent the species area of occupancy. The criterion of for listing of this area includes: habitat meets essential life cycle requirements, habitat is used by important populations, habitat is necessary for maintaining genetic diversity (DAWE 2021a).

The transmission line corridor traverses the southern margin of the Critical Habitat area, paralleling existing disturbance corridors along the boundary (i.e. it follows the south-eastern boundary of the defined critical habitat area along Wentworth-Renmark Road and the southern boundary along the Taylorville southern boundary track and the Cooltong boundary track). A previous alignment option traversed the defined Critical Habitat area for approximately 12 km along the Stony Pinch Road north of Cooltong Conservation Park, this area has been avoided by aligning the transmission line further to the south, on the southern boundary of Calperum.

EPBC Eastern Mallee Bird Community (nominated)

The ‘Eastern Mallee Bird Community’ has been nominated for Endangered conservation status under the EPBC Act. The assessment process for this community is still in progress (with advice due to the Minister for the Environment by 30 July 2021) and the community is currently not listed.

The bird assemblage associated with this community includes 52 terrestrial native birds that are identified as being dependent on, or strongly associated with, mallee habitats in south-eastern Australia. Iconic species include the Black-eared Miner, Mallee Emu-wren, Malleefowl, Red-lored Whistler and Western Whipbird. The distribution of the community is from south-west New South Wales, north-west Victoria, and from south-east South Australia to the Eyre Peninsula and includes the Murray-Darling Depression IBRA bioregion (DAWE 2021a).

It is expected that the bird community present in mallee habitats in the central and eastern part of the transmission line corridor would qualify as the Eastern Mallee Bird Community.

State listed fauna

In addition to Commonwealth listed species, there are records for threatened fauna listed under the SA NPW Act within the ESA. Species with records within the last 25 years (excludes EPBC listed species from Table 11-10 and Table 11-12 above) are provided below in Table 11-15 below (likely and possible species) and Table 6 of Appendix I-1 (all species). It should be noted that there were records for several species of fauna that have subspecies with conservation ratings, but the known range of these subspecies is well outside the ESA. As the records are likely to be for the common subspecies, the records have not been included as a listed species (for example, Bluebonnet (Western Subspecies) (*Northiella haematogaster narethae*), rated Rare; Grey Currawong (north western subspecies) (*Strepera versicolor plumbea*) rated Endangered; Jacky Winter (south east subspecies) (*Microeca fascinans fascinans*)).

Of the 61 State listed fauna considered here, 8 are likely, 20 are considered possible and 33 are considered unlikely (of which 20 or so have potential in nearby wetland / riverine habitats). Recent records (1995 onwards) for State listed fauna with less than 1 km reliability are shown in Figure 11-13 below (note that records are concentrated in known conservation areas with higher survey intensity). In addition, it is noted that records are not an indication of abundance since fauna records have originated from a variety of sources (e.g. standard fauna surveys, bird count surveys, nest monitoring) which range from collecting species presence data to estimates of breeding or estimates of abundance, nest activity and some are in repeat locations for long-term / regular surveys).

Table 11-15: State listed fauna that have potential to occur within the transmission line corridor

Species name	Common name	Cth ¹	SA ²	Likelihood	Summary of justification for likelihood of occurrence within transmission line corridor
Birds					
<i>Ardeotis australis</i>	Australian Bustard		V	Possible	Limited recent records. Occurs in open country, dry grasslands, sand plains with spinifex, pasture stubble.
<i>Falco subniger</i>	Black Falcon		R	Possible	Wide-ranging. Records from Murraylands and Riverland and Northern and Yorke.
<i>Neophema chrysostoma</i>	Blue-winged Parrot		V	Possible	Limited recent records in the ESA, 12 – 24 km from the transmission line corridor. Records spread across eastern SA from the north east to the South East, but records concentrated around the SE. Nests in coastal and subcoastal eucalypt forest and woodland, forages on grassland, saltmarsh, rough pasture. Post-breeding dispersal into semi-arid inland areas.
<i>Burhinus grallarius</i>	Bush Stonecurlew		R	Likely	Likely in open mallee over <i>Atriplex</i> or Chenopod). Numerous records concentrated in wetland areas adjacent transmission line corridor within Chowilla Game Reserve, and HA 1544. More common in northern Australia, tropics. Occurs in pairs or singly, in grassy woodlands, open forests and grasslands pasture.
<i>Cinclosoma castanotum</i>	Chestnut Quailthrush		R	Likely	Multiple records scattered throughout region in reserves and other areas. Inhabits a variety of semi-arid, scrubby habitats in the Murray Mallee, with sandy substrate (e.g. Mallee over Spinifex). Recorded in SNI surveys (SKM 2002).
<i>Neophema elegans</i>	Elegant Parrot		R	Possible	Recent records in the ESA. Occurs in a variety of habitats including open woodland, grassland, saltmarsh and rough pasture.
<i>Petroica phoenicea</i>	Flame Robin			Possible	Record 22 km from the transmission line corridor. Core range is southeastern SA an eastern NSW, most of Victoria. Transmission line corridor occurrence is irregular range. Habitat is present that would be used by the species; open forest woodland, farmland grasslands, burnt areas.
<i>Pachycephala inornata</i>	Gilbert's Whistler		R	Likely	Multiple recent records across the ESA, concentrated mainly in reserves. Occurs in a wide range of habitats, dry scrub and woodland and open <i>Callitris</i> woodland <i>Acacia</i> thicket.
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (SE, MM, MLR, AP, YP, MN)		R	Likely	Records scattered from just north of western end of transmission line corridor to the South East of SA. Occurs in lightly timbered habitats. Recorded in SNI surveys (SKM 2002).
<i>Hieraaetus morphnoides</i>	Little Eagle		V	Possible	Possible in transmission line corridor, possible in adjacent wetland habitats. Several records in the ESA.
<i>Lophochroa leadbeateri</i>	Major Mitchell		R	Likely	Given transmission line corridor is within species range, likely in semi-arid mallee Mulga habitats. Several records in the ESA.
<i>Falco peregrinus</i>	Peregrine Falcon		R	Likely	Wide-ranging, inhabits most environments, prefers cliff face for nesting. Records scattered across ESA.
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater (mainland SA)		R	Possible	Possible, although little known, uses tall heath / mallee habitats. Records are primarily south of the transmission line corridor and concentrated in conservation areas of the Murray.
<i>Myiagra inquieta</i>	Restless Flycatcher		R	Possible	Records scattered across the region from north of the transmission line corridor to the MLR, Fleurieu and South East. Widespread in open eucalypt woodland, treed farmland and mallee. Recorded in SNI surveys (SKM 2002).
<i>Petroica boodang boodang</i>	Scarlet Robin (SE, MLR, FR, EP)		R	Possible	Records in the ESA are concentrated west of the transmission line corridor. Occurs in open sclerophyll forest and woodland.

Species name	Common name	Cth ¹	SA ²	Likelihood	Summary of justification for likelihood of occurrence within transmission line corridor
<i>Neophema splendida</i>	Scarlet-chested Parrot		R	Possible	Recent records in the ESA in habitats near the River Murray and habitats north of the transmission line corridor. Prefers arid mallee and Acacia woodland with low shrub understorey or recently burnt areas, feeds on ground in low vegetation.
<i>Calamanthus (Hylacola) cauta cauta</i>	Shy Heathwren (EP, MM, upper SE, YP, FR)		R	Possible	Uncommon species that occurs in dense understorey, including regrowth. Possible in Black Oak Woodland, dense mallee. Recorded in SNI surveys (SKM 2002).
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (Western)		ssp (R)	Possible	Limited records, some habitat, most of SA range is Eyre Peninsula and Far west in Chenopod and Samphire habitat. Not recorded in SNI surveys or recent surveys (SKM 2002, Nature Advisory 2021). Some suitable habitat at the western end.
<i>Amytornis striatus</i>	Striated Grasswren		R	Possible	Known from Murray Mallee region. ESA records are mostly concentrated around Cooltong CP and Pooginook CP, north of Old Calperum and also within HA 1543 and 1544. Occurs in spinifex and Eucalypt open scrub. Considered in recent targeted fauna surveys, given subspecies Mallee Striated Grasswren (<i>Amytornis striatus striatus</i>) has potential to be EPBC listed in the future. Species not located during targeted assessments and considered to be declining in the region, but may occur in mallee on sand dunes or mallee with dense <i>Beyeria opaca</i> with Spinifex absent (Nature Advisory 2021).
<i>Lophoictinia isura</i>	Square-tailed Kite		E	Possible	Limited records, but is wide ranging and suitable habitat would occur. Alignment is in irregular occurrence range, not core range.
<i>Plectorhyncha lanceolata</i>	Striped Honeyeater		R	Likely	Records in the ESA concentrated along River Murray habitats conservation areas north and south of the transmission line corridor. Inhabits tall open woodlands and open mallee. Recorded in SNI surveys (SKM 2002).
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	LM	E	Possible	Most known nesting pairs occur along the Australian coast. SA nesting sites area coastal SA (e.g. Eyre Peninsula, Kangaroo Island) (Dennis et al. 2011, Menkhorst 2017). Records in ESA are primarily from riverine environments or flying over adjacent habitats. Considered as possible to occur foraging in riverine environments and habitats adjacent the transmission line corridor.
<i>Climacteris affinis superciliosa</i>	White-browed Treecreeper (FR, LNE, MM)		SP (R)	Possible	Records in northern part of ESA and beyond. Prefers semi-arid woodlands, tall shrublands, Mulga, Native Pine and Sheoak, uncommon in eucalypt woodlands. Known to occur in Blackoak Woodlands of Chowilla Station near the NSW border not recorded in SNI surveys (SKM 2002) or mallee bird report (Nature Advisory 2021).
<i>Corcorax melanorhamphos</i>	White-winged Chough		R	Likely	Records spread across the ESA and in transmission line corridor. Occurs in open forest, woodland, mallee where understorey is sparse and leaf litter is productive. Recorded in SNI surveys (SKM 2002).
Mammals					
<i>Chalinolobus picatus</i>	Little Pied Bat		E	Possible	Possible in Riverland Biosphere Reserve habitats. Few records in the ESA, records in SA are primarily from Riverland Biosphere Reserve (northern Calperum Station) in the Chowilla (RR), which is at the south-western extent of the range. Roosts in trees, caves, abandoned mines and buildings. Prefer hollows in large mature trees with dead limbs, or dead fallen trees with hollowed stump. Can roost in small or large colonies and have been known to travel 35 km round trip to foraging sites (Churchill 2008). Possible in <i>E. gracilis</i> to <i>E. oleosa</i> low woodland and / open woodland (SKM 2002).

Species name	Common name	Cth ¹	SA ²	Likelihood	Summary of justification for likelihood of occurrence within transmission line corridor
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tailed Bat		R	Possible	Possible, but unlikely given few records in SA, one record in ESA. Wide ranging through northern WA, NT, Qld, NSW, Vic and eastern SA. Prefers tropical habitats, but also extends into temperate areas. Roosts in large tree hollows or wet and dry sclerophyll forest to open woodland, Acacia shrubland, mallee, grasslands and desert (Churchill 2008).
<i>Trichosurus vulpecula</i>	Common Brushtail Possum		R	Possible	Multiple records across SA in urban built-up areas, MLR and KI, but less common in natural environments. Records concentrated along the River Murray. Utilises hollows in live and dead eucalypt trees. Records in the ESA primarily south of the transmission line corridor.
Reptiles					
<i>Morelia spilota</i>	Carpet Python		R	Possible	Possible in transmission line corridor, but more likely in adjacent riverine environments. Occurs across multiple habitats from rainforest to semi-arid coastal and inland habitats. ESA records in riverine habitats along the River Murray corridor.

Note where there are large numbers of records there is potential for duplicate BDBSA / Birdlife records, records have not been checked for duplication, hence conservative numbers are provided

¹ Environment Protection and Biodiversity Conservation Act 1999 Status: Critically Endangered (CE); Endangered (EN), Vulnerable (VU); Migratory Marine (MM); Migratory Terrestrial (MT); Migratory Wetland (MW);

² South Australian National Parks and Wildlife Act 1972 Status: Endangered (E), Rare (R), Vulnerable (V);

³ Records from Biological Database of South Australia (BDBSA) and Birdlife, Recordset number DEWNRBDBSA190902-2, September 2019; Recordset number DEWNRBDBSA201201-1, November 2020, Protected Matters Search Tool (PMST) (species or species habitat potential unless stated, e.g. breeding, Atlas of Living Australia

⁴ References generally from Menkhorst et al. 2017, Simpson and Day 2010, Geering et al. 2008, SPRAT profiles.

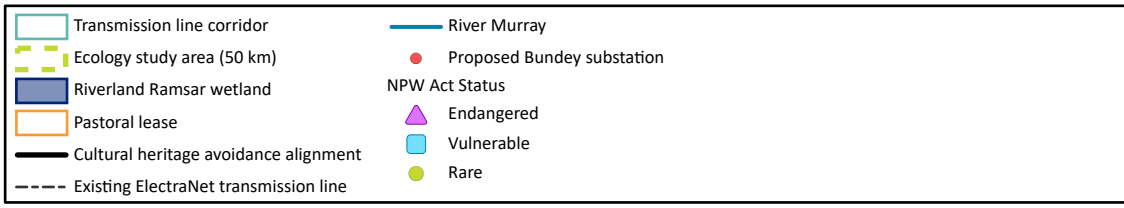
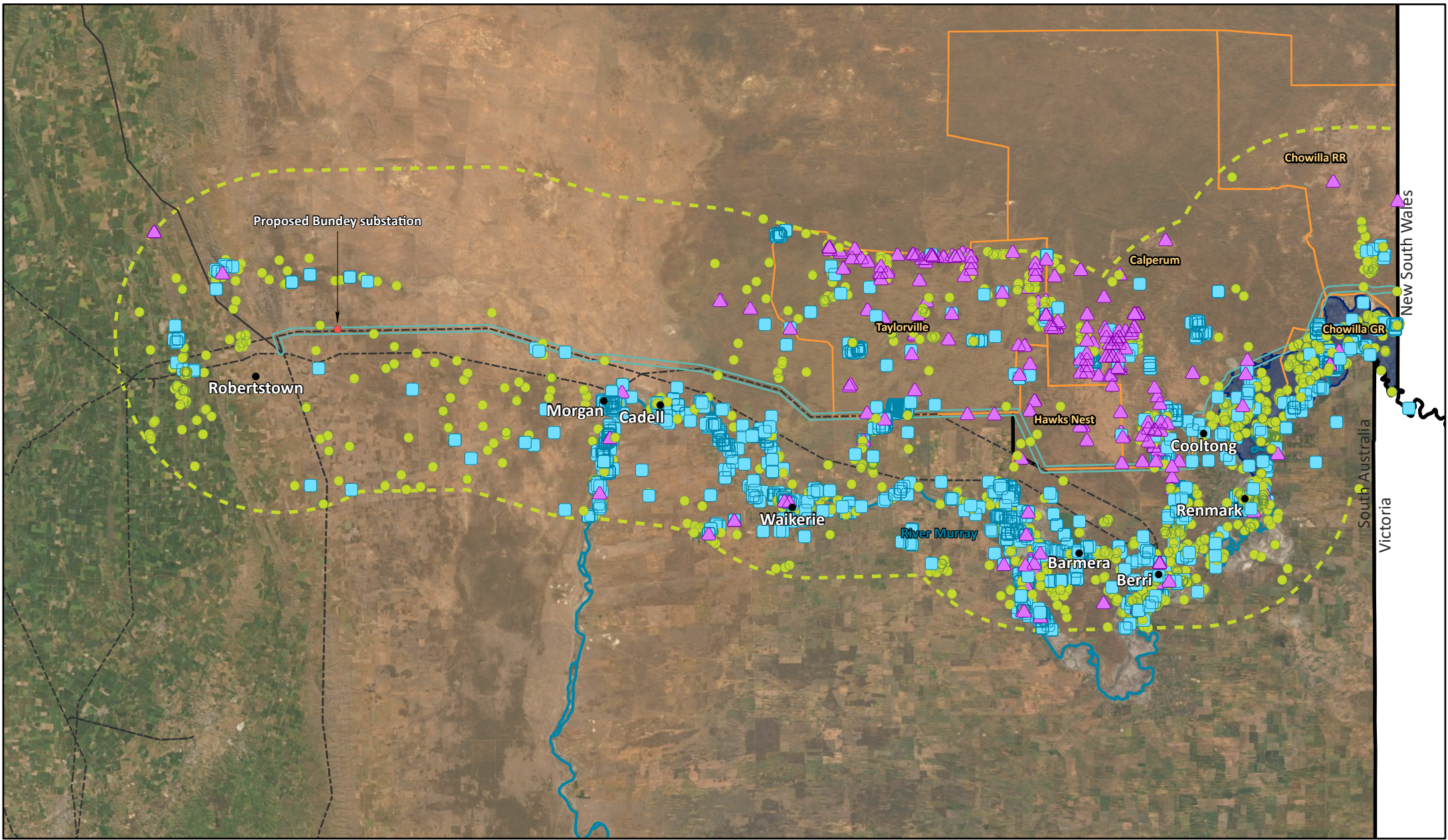


Figure 11-13
State-listed fauna records in the
ecological study area (since 1995)

Regional / local threatened species

There are records for approximately 57 species with regional conservation status in the ESA. Some of these species are also EPBC listed as threatened and / or migratory, and State conservation status under the NPW Act. This includes species with regional status as follows: 16 Critically Endangered, 10 Endangered, 4 Vulnerable, 23 Rare, 5 Near Threatened, 2 Least Concern and 3 Data Deficient. These species and their various conservation ratings are summarised in Table 7 of Appendix I-1. Where these species also have State or migratory ratings, likelihood of occurrence is considered in Table 11-14 above and Table 11-15 below, with further detail in Tables 4-6 of Appendix I-1.

Wetland Birds

As noted earlier in Chapter 10 Physical Environment and above in Section 11.3.1, wetlands that form part of the Riverland Ramsar site are located south of the eastern extent of the transmission line corridor. Two studies have described the avifauna values of the Riverland site wetlands and considered the likelihood and consequences of potential impacts to wetland birds as a result of Project EnergyConnect (Carpenter 2002, Jacobs 2021, provided in Appendix I-5).

Of the 74 species considered most recently by Jacobs (2021), 38 species are regularly recorded during monthly count surveys within the Riverland wetlands. Bird types that occur at the wetlands include common waterbirds (ducks, swans, grebes, cormorants, pelicans, egrets and herons, ibis and spoonbills, crakes, rails and waterhens. There are also threatened waterbirds that are known to utilise wetland habitats (e.g. Nationally Endangered Australasian Bittern and Australian Painted Snipe) as well as migratory and resident shorebirds, and raptors. Wetlands can support significant numbers of waterbird species (primarily common species), depending on seasonal conditions or management conditions that alter the hydrological regime (e.g. wet and dry cycles) of the wetland resulting in preferable conditions.

Colonial nesting waterbirds (e.g. egrets, ibises, pelicans, cormorants and herons) require substantial floods or inundation to support large breeding events in floodplain wetlands. Non-colonial waterbirds (e.g. waterfowl, grebes, crakes, rails and waterhens) do not generally congregate to breed, but are still dependent on wetland habitat for foraging and nesting habitat to raise young (NSW OEH 2018).

Migratory shorebirds that disperse to non-tidal wetlands (inland systems) tend to show more dispersive behaviour than species that refuge in coastal mangrove areas during high tide (e.g. Whimbrel, Terek Sandpiper and Grey-tailed Tattler). Inland wetlands and grasslands that are important for migratory shorebirds are generally ephemeral, hence occupation varies depending on recent climate and rainfall. Some of these areas may not be used for several years, but are then very important and productive following rain (e.g. Lake Eyre in northern South Australia) (DoEE 2017).

Table 8 of Appendix I-5 summarises species, records and maximum counts at the Riverland wetlands from 2000 to 2015. This information was used to conduct a high-level risk-based assessment considering both likelihood and consequence factors for individual species.

11.3.7. Pest flora and fauna

Regional weeds

Similar to other regions of South Australia, historical vegetation clearance and impacts of prolonged grazing and altered fire regimes are key threatening processes to biodiversity (e.g. flora, fauna and habitats) of the region. Weed (exotic species) further contribute to degradation processes within native habitat. The transmission line corridor spans two Landscape Management Regions: Northern and Yorke and Murraylands and Riverland. In these regions pest plants that pose a significant threat to agriculture, the natural environment and public health and safety are listed as declared plants under the *Landscape South Australia Act 2019*, and there are legal obligations for their control.

In the Northern and Yorke region priority weeds are outlined in factsheets and Weed Action Plans for three districts; the western end of the transmission line corridor occurs in the Southern Flinders Upper North District. Priority plants of this region include Weeds of National Significance (WoNS) (e.g. Silverleaf nightshade *Solanum elaeagnifolium*), Bridal creeper *Asparagus asparagoides*, Wheel cactus *Opuntia robusta*, African Boxthorn *Lycium ferocissimum*), Wild olives *Olea europaea*) and Declared Weeds (e.g. Buffel Grass *Cenchrus ciliaris*, Caltrop *Tribulus terrestris*, Horehound *Marrubium vulgare*, Lincoln weed *Diplotaxis tenuifolia*, Innocent weed *Cenchrus longispinus* and *C. incertus* and Creeping Knapweed *Rhaponticum repens* (Landscapes South Australia 2020a).

Priority weeds in the Murraylands and Riverland region include 41 Declared Weeds, 3 State Alert Weeds (Broomrape *Orobanche spp.*, Salvinia *Salvinia molesta*, Water Hyacinth *Eichhornia crassipes*) (notify immediately if found, and one Alert Weed (Buffel Grass, to be Declared for this region within 12 months). Buffel Grass is currently controlled as soon as it is found in the region and presents a significant and ongoing risk to the region. Buffel grass is a pasture plant that forms a continuous flammable ground layer. It can carry intense and extensive fires at much shorter intervals than the native understory, altering native plant communities over time (Landscapes South Australia 2020b). Buffel Grass has not been detected during the surveys of the transmission line corridor to date.

Transmission line corridor weeds

As mentioned earlier there are records for 22 exotic species within the transmission line corridor (BDBSA 2020). Three of the exotic species are Declared weeds: Salvation Jane (*Echium plantagineum*), African Boxthorn (*Lycium ferocissimum*) and Horehound (*Marrubium vulgare*).

Two declared weeds were observed within the transmission line corridor (African Boxthorn *Lycium ferocissimum* and Horehound *Marrubium vulgare*). African Boxthorn, which is also a Weed of National Significance (WoNS) was recorded at three sites (isolated plants at each site). These sites are all at the far western end of the transmission line corridor (road reserve adjoining the Robertstown Substation, and within a formerly cropped paddock 3 km away from the Substation). Horehound was recorded at three sites, in low densities at the western end of the alignment in paddocks that were intermittently cropped.

In addition to African Boxthorn and Horehound, another 23 weed species were recorded within the transmission line corridor (Table 11-16). The most frequently recorded weeds were Ward's Weed (*Carrichtera annua*) (17 sites) and Medic species (*Medicago spp.*) (13 sites), with Wild Sage (*Salvia verbenaca*) and Onion Weed (*Asphodelus fistulosus*) the next most frequent (9 sites and 6 sites respectively). Whilst these weeds were common and widespread weeds they are considered to be of relatively low threat to intact areas of native vegetation, and were largely associated with areas of past clearance and / or higher grazing pressures.

In general weed diversity and abundance within the transmission line corridor and adjacent areas was low. Weeds were recorded in 40 of the total 94 BAM sites surveyed and in 35 of the 72 BAM sites located within the transmission line corridor.

Weed abundance was greatest at the western end of the alignment, which traversed areas of intermittently cropped paddocks. Common weeds at the western end included the aforementioned four species of widespread weeds. Weeds confined to the far western end were typically agricultural weeds (e.g. Horehound, Wild Oats (*Avena fatua*), Brome Grass (*Bromus sp.*), Saffron Thistle (*Carthamus lanatus*) and Stemless Thistle (*Onopordum acaulon*)). These weeds are not considered to be of high threat to areas of intact native vegetation.

The middle third of the transmission line corridor contains large tracts of mallee on sandy or sandy loam soils, much of which is not grazed by domestic stock. Weeds in this section were either absent or largely confined to existing vehicle tracks and of low environmental threat, particularly Wild Sage.

The eastern third of the corridor is dominated by large areas of Blackbush (chenopod) shrubland, and Hopbush (*Dodonaea viscosa ssp. angustissima*) shrubland on dunes, interspersed with smaller areas

of mallee, Black Oak Woodland. At the time of survey, weed diversity and abundance was generally low, primarily including Medic species and Wild Sage.

Table 11-16: Weeds recorded from BAM sites within transmission line corridor and ESA

Species Name	Common Name	Number of BAM sites recorded at in TLC	Number of BAM sites recorded at in TLC / ESA	Environmental threat Rating ³
<i>Lycium ferocissimum</i> ^{1,2}	African Boxthorn	3	3	4
<i>Hordeum vulgare</i>	Barley	2	2	1
<i>Hordeum</i> sp.	Barley-grass	1	1	1
<i>Bromus</i> sp.	Brome Grass	0	1	2
<i>Erodium cicutarium</i>	Cut-leaf Heron's-bill	1	1	2
<i>Erodium</i> spp.	Heron's-bill	2	4	2
<i>Marrubium vulgare</i> ¹	Horehound	2	2	3
<i>Mesembryanthemum crystallinum</i>	Iceplant	1	1	2
<i>Centaurea melitensis</i>	Maltese thistle	1	1	2
<i>Psilocalon granulicaule</i>	Match-head Plant	2	2	2
<i>Medicago</i> sp.	Medic	9	13	2
<i>Asphodelus fistulosus</i>	Onion Weed	6	6	2
<i>Heliotropium europaeum</i>	Potato Weed	3	3	1
<i>Carthamus lanatus</i>	Saffron Thistle	3	4	2
<i>Hordeum marinum</i>	Sea Barley-grass	1	1	1
<i>Limonium</i> sp, including <i>Limonium lobatum</i>	Sea-lavender	4	4	2
<i>Medicago minima</i>	Small Burr-medic	1	1	2
<i>Hypochaeris glabra</i>	Smooth Cat's Ear	1	1	2
<i>Onopordum acaulon</i>	Stemless Thistle	2	3	3
<i>Moraea setifolia</i>	Thread Iris	3	3	2
<i>Rostraria pumila</i>	Tiny Bristle-grass	5	5	
<i>Nicotiana glauca</i>	Tree Tobacco	2	2	2
<i>Carrichtera annua</i>	Ward's Weed	16	17	1
<i>Sisymbrium</i> sp.	Wild Mustard	4	4	1
<i>Avena fatua</i>	Wild Oat	2	2	2
<i>Salvia verbenaca</i> var.	Wild Sage	9	9	2
<i>Brassica</i> sp.	Wild Turnip	0	1	2

¹ Declared Weed, ² Weed of National Significance, ³Environmental threat rating as per Appendix 11 of NVC 2020b.

Regional pest animals

Additional threats to the region's biodiversity include the presence of introduced animals as well as some native animals that occur in high numbers. Impacts include directly preying on native animals, displacing native animals or competition for food and habitat resources, land degradation and removal of palatable plant species (DEH2001, Foulkes and Gillen 2000). The distribution of some weed species can also be exacerbated by the activities of introduced species, further impacting the degradation of areas of native vegetation.

In the SA Murray-Darling Basin region the main introduced animals that impact biodiversity in terrestrial areas and are listed as key threatening processes include Feral Rabbit (*Oryctolagus cuniculus*), Feral Goat (*Capra hircus*), European Red Fox (*Vulpes vulpes*) and Feral Cat (*Felis catus*) (DEH 2001).

Other pest animals common in the ESA include House Mouse (*Mus musculus*), Black Rat (*Rattus rattus*), Feral Sheep (*Ovis aries*), Feral Cattle (*Bos taurus*), House Sparrow (*Passer domesticus*), Eurasian Skylark (*Alauda arvensis*), European Goldfinch (*Carduelis carduelis*), Feral Pigeon (*Columbia livia*), Spotted Dove (*Spilopelia chinensis*), Common Starling (*Sturnus vulgaris*) and Common Blackbird (*Turdus merula*). There are also small numbers of records (i.e. less than 10 in the last 20 years) for Feral Dog / Dingo (*Canis lupus*), Fallow Deer (*Cervus dama*), European Brown Hare (*Lepus europaeus*) and Feral Pig (*Sus scrofa*) (BDBSA 2019).

Native animals that occur in large numbers in the region and impact the environment through grazing and intensive foraging include the Western Grey Kangaroo (*Macropus fuliginosus*), Galahs (*Macropus fuliginosus*) and Little Corellas (*Cacatua sanguinea*) (DEH 2001).

Pests

Evidence of rabbit presence were observed from the western and eastern portions of the transmission line corridor. At the western end, rabbit scats were recorded only in paddocks that were intermittently cropped. However, evidence of rabbit density and extent was relatively high at the eastern end of the transmission line corridor. In this area rabbits were commonly associated with red dunes supporting Blackbush (*Maireana pyramidata*), Native Pine (*Callitris gracilis*) and / or Hopbush (*Dodonaea viscosa* ssp *angustissima*). At the eastern end of the alignment rabbits were also recorded in areas of Red Mallee (*Eucalyptus oleosa*) and *E. gracilis* (Yorrell) Mallee and in Black Oak (*Casuarina pauper*) Woodland on red loams or sandy loam soils.

Goats were only observed once during surveys of the transmission line corridor, in the centre third, in a large tract of mallee. Goat scats were rarely recorded throughout the surveys. Fox scats were recorded only from the western end of the transmission line corridor in a cropping paddock. Kangaroos were present throughout the alignment with kangaroo scats being an obvious presence at all sites.

At the western and eastern end of the transmission line corridor, large areas were grazed by domestic stock, kangaroos and rabbits. The area was surveyed during a prolonged period of low rainfall, hence total grazing pressure at sites in these areas was generally high. The relative grazing impact by individual vertebrates was not assessed during the survey. In general, grazing impacts were not significant in the middle of the transmission line corridor and vertebrate pest presence was less obvious.

11.3.8. Pathogens

Phytophthora ('root rot') is a plant disease that is caused by many species of soil fungus; *Phytophthora cinnamomi* is the most destructive and common species that occurs in South Australia. There are a range of susceptible plants, particularly in higher rainfall areas (e.g. Mount Lofty Ranges, lower South East of SA). Common susceptible plants include some Eucalypts (e.g. *Eucalyptus baxteri* and *E. obliqua*), Grass-trees (*Xanthorrhoea* species), some Banksias (*Banksia* spp.) and some Wattles (*Acacia* spp.). Activities that can spread the pathogen or introduce it to an area include earthworks, movement of machinery or livestock from infected areas, recreational activities, revegetation activities and fire management activities (Landscape South Australia 2006).

There are no *Phytophthora* records within the transmission line corridor or the ESA (DEW 2021a). The nearest unconfirmed records are in the Mount Lofty Ranges in Kaiserstuhl Conservation Park. Given the average annual rainfall of the region is less than 400 mm, and the lack of records *Phytophthora*, it is unlikely to occur. The ESA occurs in an area mapped as 'no apparent risk of infestation' in the *Phytophthora Management Guidelines* (Phytophthora Technical Group 2006). Similarly, the ESA is also mapped as nil or very low risk in DPTI Phytophthora (Dieback) Control documentation (DPTI 2017).

Mundulla Yellows is a fatal tree disease that was first observed in the vicinity of Mundulla, South Australia in the 1970's and has now been identified in all States, including Tasmania (DAWE 2021b). The dieback disease has been observed in a range of Eucalypt species, particularly in modified

landscapes, and also occurs in Sheoaks (*Allocasuarina spp.*), Banksias and Wattles. To date areas that have undergone significant disturbance such as farmland, roadsides and urban parks support vegetation with symptoms of the disease. A multi-disciplinary study on Mundulla Yellows found that it is caused by a complex interaction of soil properties (texture and parent material), nutrients, soil compaction, water availability, increased alkalinity and salinity, and the accumulation of bicarbonate in the soil solution (DEH 2004b).

Field surveys for Project EnergyConnect have not detected evidence of Mundulla Yellows. Whilst dieback is known for the Landscape Regions of the transmission line corridor, it has not currently been associated with Mundulla Yellows. For example, dieback of River Red Gums in the Northern Yorke is localised and considered to be related to lerp (insect) attack and climatic conditions (Landscapes South Australia 2016).

11.4. Impact Assessment

The following Project aspects have been identified as sources of ecological impacts:

- vegetation clearance and land disturbance required for construction and operation of the Project
- construction activities including vehicle and machinery movement and the presence and activity of personnel
- the presence of the transmission line within the environment following construction
- operational activities associated with the Project including inspection and maintenance activities along the easement.

The potential impact events resulting from these aspects of the Project are discussed below. Predicted impact categories and an evaluation of uncertainty of each impact event are also provided.

11.4.1. Clearance of vegetation and habitat

Vegetation clearance

Approximately 413 hectares of native vegetation will be cleared during construction (based on upper estimates of 135 ha permanent and 278 ha temporary disturbance). This represents a very small proportion of native vegetation in the region traversed by the Project, and will be offset by achieving a 'Significant Environmental Benefit' in accordance with the *Native Vegetation Act 1991*

Construction

Vegetation clearance will be required for the construction of towers, the Bunday substation, new access tracks and temporary facilities (e.g. temporary laydown areas / staging sites and worker construction camps). Upper estimates for land disturbance in Chapter 7 Project Description indicate that approximately 413 ha of land may be disturbed, with 135 ha of permanent disturbance and 278 ha of temporary disturbance that will be rehabilitated following completion of construction. Vegetation clearance in vegetation communities along the transmission line has been conservatively estimated at 2 hectares per kilometre of the transmission line, using these upper estimates and based on the assumption that all land disturbed contains some native vegetation.

It is noted that this clearance estimate is likely to be higher than the final vegetation clearance required, as it uses upper estimates for all Project components, and does not take into account the preferential use (where feasible) of disturbed areas with no or poor quality native vegetation (e.g. existing access tracks and firebreaks and the Bunday substation site). Some components (e.g. temporary facilities) have greater flexibility in placement and are likely to be able to utilise disturbed areas to a large extent. Vegetation clearance for temporary facilities will only occur if there are no suitable existing cleared areas in proximity to the work areas and access tracks.

As noted in Chapter 7 Project Description, existing access tracks are present along much of the alignment (generally along fences or existing transmission lines) and will be utilised where feasible. However, the use of these existing tracks has not been assumed for estimates of permanent clearance, as there may be constraints in some locations (e.g. height clearance limitations under existing transmission lines) that restrict their use. Also, in most locations there will be a requirement to maintain suitable offset distances from adjacent transmission lines where present (to meet safety requirements) or from property boundaries (to avoid both the easement and the required electrical clearance zone around the conductors overlapping into adjacent properties). This will result in tower pads (and the centreline of the alignment) generally being offset from the existing tracks and fence lines (as shown in Figure 7-11). As these aspects will not be refined until the detailed design phase, the upper estimate of clearance has been used. Measures that will be implemented to minimise and mitigate vegetation clearance are discussed further below.

Primary access to the easement will preferentially utilise existing public and private roads and tracks on the properties traversed by the Project and adjacent properties (including the access tracks and easement used to maintain ElectraNet’s existing 132 kV transmission lines) as noted in Section 7.5.5. Some of these tracks may require maintenance or upgrade (in consultation with the landholder) to facilitate construction access, however it is expected that vegetation clearance requirements will be very limited (and within the scope of clearance permitted for existing roads and tracks under the Native Vegetation Regulations).

The vegetation communities traversed by the transmission line corridor and the upper estimate of clearance in each community is summarised in Table 11-17. The impacted vegetation is representative of seven Bushland Condition Monitoring (BCM) communities. Further detail is provided in Appendix I-6 (Native Vegetation Clearance Data Report). Table 11-18 shows the estimated condition of the vegetation that would be cleared (based on field assessments using the NVC Bushland Assessment Method (BAM) (NVC 2020b)). Compared to the extent of regional remnant vegetation, the estimated clearance for the Project represents a very small proportion, as summarised in Table 11-19.

The proposed Bunday substation site will require clearance of heavily grazed low open shrubland and grassland with sparse native ground cover. The site is in relatively poor condition, with condition scores at BAM sites across the land parcel of 25.7, 33.3 and 41.4 (scores in the ‘low’ and lower end of ‘medium’ categories).

Cultural Heritage Avoidance Alignment

The proposed alignment traversing Hawks Nest Station was adjusted late in the preparation of this EIS to avoid Aboriginal cultural heritage sites, as discussed in Chapter 4 Route Selection and Chapter 12 Cultural Heritage. The new alignment traverses the same vegetation communities as the transmission line corridor, however it is slightly longer (by approximately 1.3 km). Consequently, it may result in a marginal increase in the area of land disturbance and vegetation clearance, dependent on the extent that existing access tracks can be utilised. However, as it follows existing disturbance to a greater extent (along the station boundary fence and the ElectraNet transmission line), the overall level of impact to vegetation and habitats is expected to be lower.

Table 11-17: Estimates of clearance of vegetation communities

Bushland condition monitoring community		Approx. area of clearance (ha) ¹
MDBSA 1.1	Open woodland with arid adapted shrubland on limestone	15.8
MDBSA 1.1	<u>Degraded forms</u> of MDBSA 1.1 (e.g. primarily present as Spear-grass Grassland with emergent shrubs / trees)	28.0
MDBSA 1.2	Tall Shrubland with Open Arid adapted Understorey on Limestone Plains	3.4
MDBSA 2.1	Open mallee / low open woodland with Chenopod shrub understorey	42.4
MDBSA 2.2	Chenopod Open Shrublands	91.1

Bushland condition monitoring community		Approx. area of clearance (ha) ¹
MDBSA 3.1	Mallee with Very Open Sclerophyll / Chenopod Shrub understorey	71.3
MDBSA 3.1	<u>Degraded forms</u> of MDBSA 3.1 (e.g. primarily present as Spear-grass Grassland and / or Short-leaved Bluebush Low (very) Open Shrubland	12.0
MDBSA 4.1	Mallee with open shrub understorey on tall red-sand dunes or deep sand flats	4.8
MDBSA 4.2	Mallee with understorey dominated by Triodia on moderate / low sand dunes	114.6
MDBSA 4.3	Shrublands on low and / or isolated red-sand dunes	12.7
MDBSA 9.1	<u>Degraded forms</u> of MDBSA 9.1 Woodlands with an open grassy understorey	7.1
MDBSA 10.8	River Box Woodlands with Saline Tolerant chenopod Understorey	0.5
MDBSA 10.11	Low Woodlands / Shrublands of River Terraces / Inland Drainage Lines	0.5
MDBSA 11.6	Semi-saline shrublands of river cliffs, floodplains, depressions and drainage lines	5.0

¹Based on upper estimate land disturbance of 2 ha/km

Table 11-18: Condition of vegetation that will require clearance

Condition Category	BAM Condition Score	Total length within TLC (km)	Approx. area of Clearance ¹ (ha)
Very Low	<20	8.7	17.4
Low	20 – 35	62.4	124.8
Medium	36 – 55	71.1	142.2
High	56+	62.5	125

¹Based on upper estimate land disturbance of 2 ha/km

Table 11-19: Estimates of IBRA subregions that would be cleared

IBRA Bioregion	IBRA Subregion	Remnancy (ha) ²	Approx. Area of Clearance (ha) ³	Clearance % of IBRA Subregion Remnant Vegetation
Murray-Darling Depression (MDD)	South Olary Plain ¹	1,182,461 (97%)	219.7	0.02%
	Braemer ¹	966,276 (100%)	42.8	0.004%
	Murray Mallee	445,437 (21%)	97.1	0.02%
Flinders Lofty Block (FLB)	Broughton ¹	103,292 (10%)	10.2	0.01%
Riverina (RIV)	Murray Scroll Belt ¹	93,218 (56%)	40	0.04%

¹Areas not updated to IBRA version 7, as per NatureMaps (DEW 2021a)

²Remnancy % from Bushland Score Sheet version 2020, hectares derived from IBRA mapping layer NatureMaps (DEW 2021a)

³Based on upper estimate land disturbance of 2 ha/km.

Operation

As discussed in Section 7.8.7, vegetation management will be required during operation to maintain access to specific locations such as towers, and in areas where vegetation will encroach on the clearance zone underneath the transmission line conductors (as required under the Electricity (Principles of Vegetation Clearance) Regulations, which will need to be amended to account for 330 kV lines, as discussed in Section 7.8.7). It is planned to design the line to span across mature vegetation with minimal clearance required where feasible, however clearance or lopping of trees under the conductors may be required in some areas.

Preliminary calculations have indicated that trees up to a height of approximately 8 m may be able to be spanned without trimming. Field observations have indicated that mallee on the transmission line corridor was rarely greater than 8 – 9 m maximum height, indicating that trimming requirements may be very limited in most areas. Local topography between towers (e.g. sand dune ridges) may result in

the need for some vegetation trimming mid-span. This will be confirmed when detailed line design is undertaken.

Significance and mitigation

The vegetation communities present on the proposed alignment are common and widespread in the region and extensively represented in areas managed for conservation. As indicated in Table 11-19, the estimated vegetation clearance represents a very small proportion of remnant vegetation in the region. As noted below, the mallee vegetation present along the central part of the transmission line corridor provides valuable habitat, particularly for threatened mallee birds, however the potential impacts are mitigated as far as practicable by the route selected as well as the very small proportion of habitat that will be impacted.

As discussed in Chapter 4 Route Selection, a comprehensive route selection process has been undertaken to ensure that technical, engineering, environmental, social, land access, and economic factors have been appropriately considered. The Project has used the mitigation hierarchy as a driving principle throughout the route selection process to minimise impacts on flora and fauna. The resulting alignment predominantly follows existing disturbance corridors and follows the boundary of the mallee habitats and the Riverland Biosphere Reserve, which will minimise potential impacts as a result of clearance and fragmentation. A range of measures will be implemented during detailed design and construction to minimise vegetation clearance, including the following:

- detailed design of the alignment will aim to avoid traversing isolated patches of vegetation where feasible (e.g. at the western end of the transmission line corridor)
- pre-clearance surveys will be undertaken to 'micro-site' tower locations and other infrastructure to avoid occurrences of threatened plants or other significant features (e.g. active Malleefowl mounds)
- areas where native vegetation is degraded or has been previously cleared will be utilised in preference to clearing vegetation wherever practicable
- existing access tracks will be used for access along the easement as far as possible
- tracks will be designed to take the shortest route (with the potential to use short spur tracks off existing roads or access tracks) and with as little impact as possible to native vegetation, existing land uses and landholders
- tracks will be restricted to the minimum width necessary to allow safe access (typically 5 m)
- temporary worker camps will be sited in disturbed / cleared areas or in areas with limited native vegetation
- other temporary facilities (e.g. temporary laydown areas / staging sites) will be sited in disturbed areas or in areas with limited native vegetation as far as practicable
- where feasible, vegetation will be rolled or trimmed rather than being completely removed
- preparation of the stringing access corridors between tower locations will typically be undertaken using a dozer with blades raised to remove larger trees while keeping shrubs, grasses and topsoil largely intact, or rolled where possible
- larger trees in the stringing access corridors may be cut off above ground level with rootstock left intact to allow regeneration rather than being removed where practicable
- removal of larger trees (e.g. trunk diameter over 30 cm) will be avoided where possible (noting that sites such as access tracks, tower locations, helicopter staging sites and some brake and winch sites will require complete removal of vegetation)
- pads for tower assembly will be restricted to the minimum size necessary
- the line will be designed to span across mature vegetation (with minimal clearance required) where feasible.

In addition, use of helicopters during construction will be considered during detailed design and may be used through sensitive areas with difficult access, such as Calperum Station and Taylorville Station, subject to health and safety, commercial and technical feasibility. It is expected that this method would reduce construction footprints and required vegetation clearance.

Following the completion of construction activities, areas of temporary disturbance will be rehabilitated. Pads used for tower construction would be reduced in size, as a much smaller cleared area (typically 25% or less) is required around towers for operation. Topsoil and subsoil would be re-spread over cleared areas with cleared vegetation, and sites allowed to naturally revegetate. The areas of mallee in the middle third of the transmission line corridor are expected to regenerate well, particularly if rootstock is left in place, based on the low levels of weeds present and level of regeneration observed in field surveys. Control of exotic vegetation (particularly grasses) may be required around towers in other areas. Habitat regeneration is site specific and would depend on the degree of disturbance and composition of seed bank at the site. For example, mallee regrowth habitats and post-fire habitats observed in field surveys exhibited regeneration of species from all strata, which varied depending on disturbance (e.g. fire history and historical clearance for access tracks and fire breaks). In contrast, sites with previous grazing disturbance exhibited less diversity in regrowth or regeneration of flora species, represented by lower plant diversity scores and presence of weed species. Ultimately vegetation restoration is an adaptive process and will depend on a combination of factors including degree of disturbance, existing seedbank, threats (e.g. native and exotic grazing), species competition, climate change and drought influences.

Clearance of native vegetation requires approval under *Native Vegetation Act 1991* and *Native Vegetation Regulations 2017*. A vegetation clearance application is being prepared for the Project and a draft Native Vegetation Clearance Data Report is contained in Appendix I-6. The Project will require a Level 4 application to be approved by the Native Vegetation Council and will need to provide a Significant Environmental Benefit offset as per the Significant Environmental Benefit Policy and Guide (NVC 2020c,d).

ElectraNet will either implement an on-ground SEB, or fulfil the SEB requirement by a payment into the Native Vegetation Fund.

A preliminary estimate of the SEB requirement is contained in the draft Native Vegetation Clearance Data Report (Appendix I-6). It is expected that a formal application under the Native Vegetation Regulations and an accompanying Data Report will be submitted following submission of the EIS. The Data Report may be updated to incorporate refinements in clearance estimates at the time (e.g. resulting from the EIS process or the progression of detailed design). As is standard for large linear infrastructure projects, it is expected that the clearance areas will remain as estimates in the application and final clearance will be confirmed following construction with in-field audits against approved clearance areas, with the SEB adjusted as necessary to reflect the final clearance.

ElectraNet will incorporate vegetation management requirements in the Construction Environmental Management Plan (CEMP), which will detail the requirements for pre-clearance micro-siting and post clearance audits, exclusion zones and NVC approved clearance areas. Monitoring will be undertaken during and following construction to ensure that vegetation management measures are effective and remediation will be undertaken if required.

The predicted impacts are in the **Minor** category, particularly when the offset provided by the SEB is taken into account. Uncertainty in the predicted impact (based on uncertainty in final definition of clearance areas and the potential for excursions outside designated clearing areas) has been evaluated in Appendix O and the level of risk is **Low**.

Clearance of habitat for threatened species

Clearance of habitat for threatened species will be minimised and is not expected to result in a significant impact to listed flora or fauna species

As discussed in Section 11.3.3, conservation significant flora and fauna are known, or have the potential, to occur within the transmission line corridor. However, the corridor does not provide core habitat or the only remaining habitat for the majority of the species. Core habitat for the majority of species predominantly occurs in conservation areas across the region that have been avoided by the route, including properties in the Riverland Biosphere Reserve to the north of the transmission line corridor and the Riverland Ramsar site to the south.

The area of threatened species' habitat that will be cleared represents a very low proportion of available habitat in the region. In particular, the proportion of the area of listed Critical Habitat for Black-eared Miner that will be impacted by traversing the southern boundary of this area (i.e. Taylorville, and the section of Calperum north of Wentworth-Renmark Road) is extremely low. Estimated clearance is 143 ha, which is approximately 0.04% of the total area (over 380,000 ha) of listed Critical Habitat, along 71 km of its southern-most fringe). As it traverses the edge of this Critical Habitat area, follows existing disturbance and is not in the most important areas of mallee habitat where the vast majority of Black-eared Miners have been recorded, it is not considered that it constitutes a significant impact to the critical habitat².

Pre-construction surveys and micro-siting will be undertaken to 'micro-site' towers and other infrastructure to avoid occurrences of any potentially present threatened plant species and other significant features (e.g. any identified Malleefowl mounds).

Further discussion on potential impacts to threatened species is provided in Sections 11.4.7 and 11.4.8.

Decommissioning at the end of the design life of the Project (approximately 100 years as discussed in Section 7.6.9) would not be expected to result in significant impacts to fauna habitat as access tracks in place for operations would be used to access tower sites.

The predicted impacts are in the **Negligible** category for listed flora and **Minor** for listed fauna. Uncertainty in the predicted impact (based on uncertainty in species' occurrence or the potential for excursions outside designated clearing areas) has been evaluated in Appendix O and the level of risk is **Low** for listed flora and **Medium** for listed fauna.

Impact to listed threatened ecological communities

The Project is not expected to impact any listed Threatened Ecological Communities

No threatened ecological communities have been located within the transmission line corridor. Two threatened ecological communities listed under the EPBC Act (Iron-grass (*Lomandra*) Natural Temperate Grassland of South Australia and Peppermint Box (*Eucalyptus odorata*) Grassy Woodland) were considered to have a low potential to occur at the western end of the corridor but have not been detected, despite multiple targeted searches during field surveys. If present, any patches are assumed to be very small, given they have not been located to date during multiple vegetation assessments along the transmission line corridor. Small patches may not meet the defined criteria for the threatened ecological community.

Micro-siting of the location of towers, pads and other infrastructure (e.g. access tracks) will be undertaken prior to construction to confirm that these communities are not present. In the unlikely event that they are detected, infrastructure would be positioned to avoid or minimise impacts from direct clearance, and weed hygiene measures in the CEMP would be implemented to prevent the

² The Critical Habitat listing (DAWE 2021a) states: *In general, actions are more likely to lead to significant damage if they occur within the most important areas of open mallee bushland. Actions within disturbed areas of the properties of little or no direct relevance to the survival of the species would generally be unlikely to cause significant damage to critical habitat.*

indirect introduction or spread of weeds that could impact the quality and extent of the threatened ecological communities if present. Given the implementation of proposed mitigation measures and the small relative footprint for tower foundations and access tracks, the Project is expected to have negligible impacts to these threatened ecological communities even if they are present.

The nominated Eastern Mallee Bird Community (which is not currently listed as a threatened ecological community) would not be significantly impacted as the Project will not reduce the community extent, increase fragmentation to any significant extent, adversely affect critical habitat or cause a substantial change in species composition of this or any other ecological community (refer to discussion of these aspects in Sections 11.4.2 to 11.4.8).

The predicted impacts are in the **Negligible** category. Uncertainty in the predicted impact (based on uncertainty in community occurrence or potential ineffective implementation of controls) has been evaluated in Appendix O and the level of risk is **Low**.

Impact to conservation areas

The route has been selected to minimise impacts to conservation areas; vegetation clearance in these areas will be minimised and will not result in significant impact to their conservation value

As discussed in Section 11.3.1 and Table 11-3, the Project traverses a number of properties managed primarily for conservation. The route has been selected to minimise potential impacts to the vegetation, habitats and conservation values of these properties. In particular, it has been aligned along the southern boundary of Taylorville and Calperum stations and to follow existing disturbance corridors, including tracks, fencelines, firebreaks, existing transmission lines and the Wentworth-Renmark Road. Vegetation clearance will primarily occur adjoining existing disturbance corridors.

The area impacted by the Project generally represents a very small proportion of the total area of the properties managed for conservation that it intersects. Given the presence of existing disturbance, the Project will have a very limited impact on the vegetation, habitat or conservation value of these conservation areas.

White Dam Conservation Park is a small and linear park, and a greater proportion of its total area will be impacted by the installation of several towers. Existing tracks will be used as far as possible to minimise disturbance. The low height of the vegetation present (Bluebush Shrubland) and the presence of the existing 132 kV transmission line, towers and access track will limit the significance of impact from the Project to this area.

Additional loadings are included in SEB offset calculations to compensate for vegetation loss in any conservation areas, as per the SEB guidelines under the Native Vegetation Act (NVC 2020a,b,c,d).

The predicted impacts are in the **Negligible to Minor** category. Uncertainty in the predicted impact (based on uncertainty in final definition of clearance areas) has been evaluated in Appendix O and the level of risk is **Low**.

Impact to the Riverland Ramsar site

The Project will not impact the ecological character of the Riverland Ramsar site

As discussed in Chapter 10 Physical Environment, the transmission line corridor passes predominantly north of the Riverland Ramsar site boundary and River Murray floodplain, on higher ground on the northern side of the Wentworth-Renmark Road. It does not cross any areas that are regularly inundated, and crosses three areas of upper floodplain (totalling approximately 2 km in length) that were flooded in the 1956 flood and could be inundated again in extreme flood events. Several towers will be constructed in these areas of upper floodplain.

The Project will not significantly impact the ecological character of the Riverland Ramsar site. It will not alter the hydrology of the wetland or result in a substantial and measurable change in the water quality, as discussed in Chapter 10 Physical Environment. It will not result in areas of the wetland being

destroyed or substantially modified, the habitat or lifecycle of native species dependent on the wetland being seriously affected or in the introduction of invasive species harmful to the ecological character of the wetland being introduced or spread. In addition, impacts to wetland avifauna (an important aspect of the ecological character) are considered low risk as discussed in Section 11.4.4 below).

The predicted impacts are in the **Negligible** category. Uncertainty in the predicted impact (based on the potential for extreme weather events or ineffective implementation of erosion controls) has been evaluated in Appendix O and the level of risk is **Low**.

11.4.2. Habitat fragmentation

The Project follows existing infrastructure corridors and diverts around key habitat areas and will not significantly increase habitat fragmentation.

Remaining native vegetation in the broader region is already highly fragmented within an agricultural environment (particularly at the western end of transmission line corridor) and concentrated in areas which are usually less suited to agriculture. Small patches persist along roadsides or remain as scattered trees within farmland. Remnant vegetation which provides key habitats for threatened species (e.g. old growth mallee) is largely conserved within the reserves of the region (e.g. Pooginook Conservation Park, Cooltong Conservation Park, Taylorville and Calperum Stations and other Vegetation Heritage Agreement areas).

The size of many of the vegetation fragments that are scattered across the western end of the transmission line corridor are too small to support a number of conservation significant species and unlikely to sustain viable populations of many species in the long term. These vegetation patches are already subject to ongoing edge effects with notable impacts from weeds and pest animals, and ongoing degradation processes likely. However, it is noted that such small and narrow blocks, including road-side vegetation, can facilitate movement for small mammals and reptiles and act as 'stepping stones' between larger viable vegetation blocks for a range of species, particularly in environments subject to large areas of historical clearing.

The fragmented landscape along the western end of the transmission line corridor is in contrast to the large tracts of vegetation that are part of the Riverland Biosphere Reserve, primarily north of the central to eastern end of the transmission line corridor, where there are few edge effects and less fragmentation. These habitats take many years to develop where mallee trees support hollows and deep litter cover, and are characterised by a mosaic of fire history (e.g. north of the transmission line corridor the fire history ranges from long-unburnt to burnt in the last 10 – 20 years) (see Figure 11-4). These larger blocks north of the eastern end of the corridor provide higher quality unfragmented habitats for sensitive species or species with large home range requirements.

The Project avoids key habitats (refer 11.3.1) including the majority of the Riverland Biosphere Reserve and conservation areas. Where boundaries of conservation areas are intersected, they are traversed alongside existing tracks and existing infrastructure corridors. As discussed in Chapter 4 and Section 11.3.1, there has been a detailed route selection process to avoid key biodiversity areas, utilising existing cleared infrastructure corridors, roads and tracks wherever practicable to minimise further impacts and further fragmentation, rather than bisecting large tracts of vegetation.

Where the transmission line corridor meets higher quality mallee vegetation at the central / eastern portion of the alignment, the route has been diverted southwards (following engagement with Australian Landscape Trust and DEW) to avoid bisecting this vegetation as far as possible by following the southern boundary of the Biosphere Reserve (Taylorville / Calperum Stations) which is also the southern boundary of the Listed Critical Habitat area for the Black-eared Miner. The cultural heritage avoidance alignment on Hawks Nest Station also follows the station boundary and the existing transmission line in this section of the route. Existing fragmentation is present along the alignment in these areas due to the presence of roads, tracks, fence lines and the existing transmission line. This

alignment reduces the risk of further increasing the existing fragmentation and hybridisation impacts that occur in the region. Mallee habitats in the eastern end of the transmission line corridor are largely avoided and existing tracks / road corridors are used where possible.

Vegetation clearance as part of the Project will marginally increase the long-term fragmentation of some vegetation blocks across the landscape. Fragmentation impacts may include increased risk of weed incursion and increased access to predators, however new or upgraded tracks in this area will also improve access for fire management and weed and pest management. The relatively narrow width of the clearance required for the transmission line corridor is not expected to hinder movement of the majority of fauna species within the landscape. Smaller patches of mallee at the western end of the transmission line corridor can generally be spanned and avoided, and there are existing tracks and infrastructure corridors that can be used to minimise vegetation clearance and habitat fragmentation.

Given the very limited increase in habitat fragmentation that is expected and the presence of existing disturbance corridors, it is not considered that vegetation clearance or disturbance in the central to eastern end of the transmission line corridor will lead to further hybridisation of the Black-eared Miner beyond the extent of hybridisation that is already known for the species. The Black-eared Miner, Yellow-throated Miner and hybrids of the two species already occur within and immediately south and north of the transmission line corridor and interbreeding is ongoing (refer Figure 11-10 and Section 11.4.9 below).

As discussed in Chapter 7, design and construction measures can be used to minimise impacts to sensitive areas and smaller areas of mallee, for example by spanning small patches where feasible and careful placement of towers. Helicopter construction techniques are being considered during detailed design, subject to health and safety, commercial and technical feasibility. If feasible, these aerial techniques are expected to reduce the amount of on-ground temporary clearance that would be required.

In addition, whilst clearance of some vegetation may have short-term impacts in the region, the commensurate offset activities (either on-ground offsets or via payment into the Native Vegetation Fund) present an opportunity to increase the quality of remaining vegetation or the quantity of vegetation under conservation agreement to support flora and fauna and provide positive long-lasting benefits to the region. The Significant Environment Benefit for the Project as required by the Native Vegetation Clearance Approval, will contribute targeted resources to the ecological values and conservation objectives of the region.

Based on the above, the impacts of habitat fragmentation associated with construction and operation of the transmission line are summarised below:

- Large portions of the alignment, particularly along the western end, traverse already highly fragmented and largely cleared / degraded agricultural landscapes.
- The proposed alignment has been selected to minimise fragmentation by utilising existing tracks and existing infrastructure corridors where present.
- Remnant vegetation of higher condition providing better quality habitat within the transmission line corridor is avoided wherever possible as part of the route design process to reduce impacts (refer Figure 11-3).
- Remnant vegetation within the transmission line corridor that will be cleared ranges in condition and does not provide a significant portion of critical habitat or resources for threatened flora and fauna species, but provides habitat for common species and fringe areas of habitat for threatened species.
- The transmission line corridor avoids the vast majority of the Black-eared Miner Listed Critical Habitat area (only traversing parts of the southern boundary following existing disturbance) (see Section 11.4.8).

It is noted that habitat values are present within and adjacent the transmission line corridor, and there are some areas of the corridor where the Project will result in some fragmentation. Any additional habitat fragmentation that occurs as part of construction and operation will result in a negative, but below measurable changes.

Decommissioning activities at the end of the design life of the Project (approximately 100 years as discussed in Section 7.6.9) would not be expected to result in additional fragmentation as access operational tracks would be used.

The predicted impacts to ecological values from fragmentation are in the **Minor** category. Uncertainty in the predicted impact (based on uncertainty in the prediction of fragmentation impacts) has been evaluated in Appendix O and the level of risk is **Low**.

11.4.3. Indirect effects on vegetation and fauna habitats

Indirect impacts to vegetation and fauna habitats will be short term and limited in extent

There is potential for vegetation and fauna habitats adjacent to construction areas to be indirectly impacted by Project activities. The potential significance of this 'edge effect' is reduced by the proposed alignment, as it predominantly follows existing disturbance corridors or follows previously cleared agricultural land. Control measures will be implemented during construction and operation to ensure that these impacts are minimised and are short term.

Dust emissions resulting from land clearing, vehicle movement and helicopter operation, that can potentially reduce vegetation health, will be managed by implementing dust control measures during construction and rehabilitating of areas of temporary disturbance, as discussed in Chapter 14 Air Quality. These impacts will be short term, as construction is temporary and maintenance vehicle movements during operations are limited, and will be localised to the vicinity of the alignment and access tracks. Rainfall is expected to remove any dust which settles on vegetation during construction and therefore dust is unlikely to result in long term reduction of vegetation health.

Erosion and sedimentation from disturbed areas or alteration of surface water flows are expected to have a very low level of impact and will be managed by a range of design measures and management controls, as discussed in Chapter 10 Physical Environment. Any impact to vegetation and habitats would be very localised and short term.

Activities that could result in reduction in soil or water quality, such as wastewater management, dewatering, dust suppression using saline water and spills that have the potential to affect vegetation and habitats are discussed in Chapter 10 Physical Environment. With the control measures outlined in Chapter 10 in place, the impact to vegetation and habitats would be localised and short term.

The introduction of, or spread of weeds, pests or pathogens can also result in impacts to biodiversity at the interface between the powerline easement and existing vegetation. These are discussed in Section 11.4.5.

Increased public access during operations via new unmanaged access tracks could also result in fauna disturbance and habitat degradation from unmanaged recreation or poor waste management (or an increase in weeds or predatory pests, as discussed in Section 11.4.5). Access to the operational easement will be restricted by locked gates where required and appropriate signage. As the transmission line corridor predominantly follows existing tracks and infrastructure corridors where the risk of increased public access already exists, the Project is not expected to result in a significant increase in public access.

The predicted impacts are in the **Negligible to Minor** category. Uncertainty in the predicted impact (based on uncertainty in the implementation of management measures or unplanned events) has been evaluated in Appendix O and the level of risk is **Low**.

11.4.4. Disturbance to fauna

Lighting

Lighting effects at camps and other sites during construction will be short term and localised and will not have a significant impact on any species

Lighting will be required at temporary worker camps during construction and emergency lighting will be installed at the Bunday substation for operations. This emergency lighting will only be utilised when operational or maintenance crews need to attend the site in the event of a fault and do not remain illuminated at night and will be designed and installed to minimise light spill outside of the substation site boundary.

Artificial lighting from temporary worker camp sites can result in localised impacts to behaviour of fauna, including displacement of some species and attraction of fauna such as insects, geckos and insectivorous microbats and potentially larger aerial nocturnal predators. Given the limited use of lighting for the Project at a small number of temporary worker construction camps, impacts to fauna associated with lighting would be localised and short-term.

The predicted impacts are in the **Negligible** category. Uncertainty in the predicted impact (based on uncertainty in camp locations) has been evaluated in Appendix O and the level of risk is **Low**.

Noise

Noise disturbance will be temporary and localised and will not have a significant impact on fauna

Local fauna may be directly influenced by noise and vibration associated with construction, increases in traffic, operation and maintenance activities and presence of construction vehicles / plant equipment. This would also include the use of helicopters that are under consideration as a construction method.

The impact of noise on fauna can range from physiological or behavioural responses at lower noise levels to masking (interference with detection of biologically significant sound), temporary threshold shift (temporary loss of hearing) or permanent threshold shift (permanent loss of hearing) as noise levels increase. The most common behavioural response for birds is flight, as they perceive the noise as a threat. Changes to existing noise levels can potentially affect breeding behaviour, foraging behaviour and social interactions.

As discussed in Chapter 14 Noise and Vibration, the noise assessment undertaken for the Project (Appendix J) identified that the noise level at which a temporary threshold shift occurs (93 dB(A)) was a suitable criteria for evaluating noise impacts on fauna. It considered that masking is acceptable as it is unavoidable and will only occur temporarily or the Project. The noise assessment indicated that during construction, land clearing and tower construction activities would only reach 93 dB(A) within 5 m of the source. Most fauna would be unlikely to approach or remain within this distance and would avoid the noise source.

Modelling indicated that helicopter operations have the potential to reach 93 dB(A) within a 20 m radius of the noise source. However, due to the helicopter operating at heights of approximately 50 m, this is unlikely to result in a temporary threshold shift in ground-dwelling fauna. There is the potential for birds to fly within 20 m, however it is expected that birds would avoid the helicopter as a behavioural response and therefore not be impacted by a temporary threshold shift. The assessment concluded that Project noise is unlikely to result in a temporary threshold shift for fauna.

Behavioural impacts of construction noise from the Project will be localised and temporary. It may result in temporary displacement of individuals from the immediate vicinity of the construction area, however this is not expected to result in significant impacts to local populations.

During operation the main noise source would be related to annual helicopter maintenance, which will occur along the entirety of the Project alignment. There will also be ground-based visual inspections,

however the noise impact from this maintenance is expected to be minimal. The other significant noise that occurs during operation occurs during rainy periods, where Corona discharge is heard as a hissing or crackling noise from the transmission lines. It is estimated that this noise reaches a maximum of 53 dB(A) (for 400 kV line at a distance of 15 m) (see Appendix J) and would not have a significant impact on fauna.

The predicted impacts are in the **Minor** category. Uncertainty in the predicted impact (based on uncertainty in fauna occurrence and construction methods) has been evaluated in Appendix O and the level of risk is **Low**.

Fauna injury or mortality

The incidence of fauna injury or mortality will be localised and short term and will not have a significant impact on any species

Fauna injury or mortality can occur through collision with vehicles or vegetation clearance machinery or entrapment in excavations, predominantly during the construction phase. Once construction begins, larger or more mobile local fauna would move away from the local areas during disturbance, however smaller species (e.g. small reptiles) may remain. Local populations of species present within the transmission line corridor are likely to be small, particularly given the extensive use of existing disturbance corridors and the extent of habitat outside the transmission line corridor. Therefore, impacts to overall species and populations are likely to be small and at the local level. Whilst there are known threatened species in the region, core habitats and core populations are avoided by the Project (see Section 11.4.7). If there are impacts to individuals or local fauna populations, the impacts on populations are likely to be short-term.

Measures will be implemented to minimise fauna injury or mortality during construction, including:

- regular monitoring of excavations for trapped fauna and use of temporary fences where appropriate
- pre-clearance surveys in areas of key fauna habitat (e.g. for threatened mallee bird nests during the breeding season)
- use of wildlife handler where appropriate (e.g. when retrieving fauna from excavations or removing nests of threatened mallee birds in critical habitat during breeding season)
- speed limits to reduce fauna strike.

The predicted impacts are in the **Negligible** category. Uncertainty in the predicted impact (based on uncertainty in the frequency of collision / entrapment or implementation of management measures) has been evaluated in Appendix O and the level of risk is **Low**.

Bird strike

Low numbers of birds (or bats) are expected to be impacted by collision with transmission line infrastructure, and this is not expected to have a significant impact on any species

Bird strike can occur as a result of collision with vehicles (as discussed above) or the transmission line itself. Historically, the highest mortality rates occur where transmission lines pass directly through wetlands and lower rates may occur when transmission lines pass within proximity to wetlands. It is acknowledged that flight patterns and behaviours of birds that occur in the region, including waterbirds, are variable and can influence mortality rates. Waterbirds are known to move between local wetlands (e.g. between Lake Merreti and Lake Woolpolool) and some species will also fly to inland wetlands (e.g. Blackbox swamps or lakes north of Danggali Conservation Park and Darling River anabranch areas) during stopovers as part of migration routes. Similarly, Regent Parrots are known to migrate inland from riverine habitats to forage on mallee habitats. Other key factors known to impact bird strike risk include bird size and species specific behaviours such as flying in tight flocks (e.g. Australian Shoveler, Pink-eared Duck, Hardhead), recruitment events (e.g. Pink-eared Duck, Grey Teal,

Red-necked Avocet, Hardhead, Coot, Black-tailed Native Hen, Freckled Duck) flying at high speeds (e.g. Hardhead) and flocks with a high proportion of juveniles present (e.g. Regent Parrot) (Willard and Willard 1978, Scott et al. 1972, Frith 1982 all cited in ALT 2002). It is noted that there are no records for deaths of these particular species that have been attributed to powerlines in Australia (see Appendix I-5).

Seventy three species with previous records of occurrence at the Riverland Ramsar site that occurs adjacent the transmission line corridor, plus an additional State-rated raptor with records of deaths attributed to powerlines, were considered in supporting assessments (Jacobs 2021, Appendix I-5). Of these species, 38 species have been regularly recorded during monthly count surveys at key lakes within the Riverland Ramsar site. These species are considered to be more likely to be at risk of collision (bird strike) with the Project as a result of their regular presence, however given there are a number of factors involved in collision risk, a high-level risk assessment was undertaken which considered the likelihood and consequences of collision to these species using a risk-based approach (refer Appendix I-5).

Factors considered to influence the likelihood of risk of collision / bird strike included body size (wingspan and weight), dispersal timing, flight type, maximum local counts within the wetland lakes and historical evidence of collision with powerlines within Australia and South Australia. Factors which influence the consequences of any collisions were also considered by species, including conservation status and population estimates (based on International Union for Conservation of Nature (IUCN) criteria). In addition to these species-specific features, further factors considered to influence the likelihood of collision include inundation frequency of wetland habitat within the site, and distance to the powerline. Infrequent inundation and larger distances to the line are considered to reduce the likelihood that birds that inhabit the wetland will be at risk of collision (refer further detail in Appendix I-5).

Species with both elevated likelihood and elevated consequence factors represent those species at an overall elevated risk of collision with powerlines. Of the threatened species that were considered to have some risk of collision with the transmission line, no threatened species were considered at high risk, two State-listed species were considered to have moderate risk (Freckled Duck and White-bellied Sea-eagle) and five threatened species were considered to have low risk (Curlew Sandpiper, Australian Bittern, Painted Snipe, Banded Stilt, Peregrine Falcon).

Consequences to individual species from the Project, particularly migratory species are not considered to be significant when overall population numbers are considered. Of the listed migratory species that were considered to have some risk of collision with the transmission line, none were considered to have high or moderate risk and four species were considered to have low risk: Curlew Sandpiper, Sharp-tailed Sandpiper, Caspian Tern, Crested Tern.

Other risk factors also relate to the distance of the species to the transmission line (which is influenced by inundation extent), inundation frequency of water habitats which influences fluctuation in bird numbers as well as regional habitat availability. Likelihood of collision has been documented to be reduced when mitigation measures are applied to transmission lines, including line markers (reflective and non-reflective), line design / configuration features and spacing of towers are implemented. A number of these mitigation measures are available to ElectraNet for Project EnergyConnect and are expected to be effective at reducing potential impacts from the line.

In addition, wetland areas closest to the alignment do not hold water in most years and therefore, waterbirds will not be present year-round, lowering the overall risk and impacts to species as a whole through reduced likelihood of collision. The majority of the wetland waterbird habitat south of the transmission line corridor is more than 1 km from the alignment. Less than 1.5 km of the alignment is within 500 m of a wetland boundary (based on the indicative 1 in 10 year inundation extent – see Appendix I-5).

As with the previous study undertaken for transmission lines in this location (Carpenter 2002), it is concluded that with the implementation of effective mitigation measures, the likelihood of collision with the transmission line is considered to be relatively low. Regardless, collision remains a possibility, given that portions of the line run within 1 km of the wetland habitat which can be expected to be inundated with reasonable frequency through managed inundation or 'natural' flows within the regulated river system. However, consequences to individual species are not considered to be significant when overall population numbers are considered. There is minimal evidence of substantial mortality directly attributed to transmission lines, rather, the data suggests a very low incidence of death. Species present within the Riverland wetland complex are generally present in relatively low numbers compared with regional, national and global populations estimates, and overall, Project EnergyConnect is not expected to significantly impact any species.

The transmission line will be designed to reduce the potential for bird strike, including installation of bird diverters in sections of the line when in close proximity to wetland habitats (e.g. within 500 m of the indicative 1 in 10 year inundation extent). Whilst there is still a low risk of bird strike to individuals, the Project is not expected to result in significant impacts to wetland avifauna, migratory bird species or threatened bird species.

The predicted impacts are in the **Negligible to Minor** category. Uncertainty in the predicted impact (based on uncertainty in future inundation events and bird numbers present) has been evaluated in Appendix O and the level of risk is **Low**.

11.4.5. Pests and weeds

Incurion of predators or pests

Project activities and the presence of access tracks are not expected to result in an increase in the existing level of pest species present in the transmission line corridor.

Project activities and presence of access tracks can result in increase in predatory pest species, particularly if waste is not managed effectively. Desktop and field assessments to date have identified an existing level of predator and pest presence in the region (see Section 11.3.7). The construction of the Project is not expected to significantly increase the access of predatory pests to habitats on the transmission line corridor, as existing tracks are present along the majority of the proposed alignment. The CEMP and OEMP will include mitigation measures to avoid introduction or increase in abundance of predators and pests.

Waste will be managed and transported appropriately (e.g. in covered bins) to avoid increasing or facilitating predators and pests in the region. Adaptive pest management, monitoring and control would be undertaken where required, particularly during construction. Management would be undertaken in consultation with Landscape Management Board staff and with consideration of regional conservation objectives.

There are some areas of the transmission line corridor where access for predator and pest maintenance and monitoring activities are limited and provision or upgrade of tracks will assist in providing increased opportunities for regional predator and pest control activities.

The predicted impacts are in the **Negligible** category. Uncertainty in the predicted impact (based on uncertainty in the implementation of management measures) has been evaluated in Appendix O and the level of risk is **Low**.

Introduction or spread of weeds

Project activities and the presence of access tracks are not expected to result in an introduction, increase or spread of weeds above the existing level present in the transmission line corridor.

As noted in Section 11.3.7 above, exotic flora species, including declared and environmental weeds occur with the ESA and within the transmission line corridor. Given poorer condition vegetation and

existing cleared areas will be targeted for tower footprints and temporary construction areas (e.g. camps and laydown areas), interaction with exotic species is inevitable. Introduction of new weeds or spread of existing weeds could degrade better quality vegetation within and adjacent the transmission line corridor and enable / harbor predator pest species (e.g. foxes and cats).

During construction indirect impacts would be managed via standard practices in the CEMP. Pre-construction inspections would be undertaken to identify any areas of weed infestation requiring specific management measures. Vegetation clearance would occur in approved areas, no-go zones would be established and vegetative material containing declared weeds would not be moved from the site (unless appropriate permits are in place). Stockpiles will also be monitored for weed outbreaks. Awareness about key weed threats (e.g. Buffel Grass) would be included in induction programs.

During operation indirect impacts would be managed via standard practices in the OEMP. Adaptive weed management, monitoring and control would be undertaken where required if weeds are detected, particularly following rainfall events and disturbance events. Adaptive weed management, monitoring and control would be undertaken. Targeted management of key threat species (e.g. weeds of national significance or declared weeds including the declared / alert weed Buffel Grass) would be undertaken in consultation with Landscape Board staff and with consideration of regional conservation objectives. Buffel Grass (which is a pasture plant that can dominate plant communities and increase uncontrollable fire intensity) has not been located during the vegetation surveys to date.

The predicted impacts are in the **Negligible** category. Uncertainty in the predicted impact (based on uncertainty in the presence of weeds at the time of construction in the implementation of management measures) has been evaluated in Appendix O and the level of risk is **Medium**.

Pathogens

Project activities and the presence of access tracks are not expected to result in introduction or spread of pathogens.

The transmission line corridor occurs in an area considered as 'no apparent risk' for Phytophthora. Similarly, the Landscape Management Regions have not highlighted Mundulla Yellows (a tree dieback disease) as a priority concern. No evidence of either disease was observed during vegetation surveys of the transmission line corridor. While there is no evidence of these pathogens' presence, pathogens could potentially be transported to the region from high risk areas (e.g. where rainfall is over 400 mm) via imported fill or in revegetation tube stock, if revegetation is used for screening or rehabilitation purposes.

During construction, potential impacts would be managed by standard practices in the CEMP including standard vehicle hygiene protocols and ensuring importation of clean fill (if required). Awareness about key potential threats (e.g. dieback from soil pathogens) would be included in induction programs. Extensive revegetation is not planned, hence spread of pathogens is considered low risk.

During operation indirect impacts would be managed by standard practices in the OEMP. Adaptive management would be undertaken in the unlikely event that evidence of pathogens is detected. Management would be undertaken in consultation with relevant government agencies, if required.

The predicted impacts are in the **Negligible** category and the level of certainty in this prediction is high.

11.4.6. Fire

Uncontrolled fire has the potential for significant impact to native vegetation and fauna. The level of risk associated with fires during construction and operation can be appropriately managed with the implementation of risk treatment and mitigation measures.

Bushfires are a natural occurrence in the region. They often result from lightning, especially between September to December when dry lightning storms occur frequently (DEH 2009), but bushfires can

also occur as a result of other causes such as reignition or escape of prescribed burns, improperly extinguished or out of season campfires or arson.

As discussed in Chapter 18 Hazards and Risk Management, construction and operation of the transmission line involves a number of potential ignition sources. During construction, these include sparks from 'hot works' such as welding, ignition of dry grass by vehicle exhaust or vehicle collisions. During operation, potential sources of ignition include contact between vegetation and conductors, contact between conductors or damage to transmission lines during extreme weather events, bird strike or ageing or poorly maintained equipment.

Bushfires can have direct and immediate impacts, as well as ongoing impacts on the ecology of an area, particularly where the habitat is already fragmented through adjacent land practices such as farming. Fire can also have long-term impacts to threatened species that have a preference for long-unburnt habitats, such as Black-eared Miner, Red-lored Whistler and to a lesser extent Malleefowl.

Bushfire extent and frequency are amongst the most significant threats to mallee habitats and associated biodiversity. Periodic fires which are restricted in area create a mosaic of habitat age which is beneficial to many mallee fauna species that utilise resources in both long unburnt mallee and adjacent patches with more recent fire history. A natural mosaic of fire history also provides a mechanism for controlling fuel loads and potentially reducing the intensity of future fires across the landscape. However, if fires occur too frequently and cover large expanses, they can be deleterious to vegetation associations which contain plant species that do not have mechanisms to cope with fire, and there are implications to post fire seedling establishment, as species can die off before reaching maturity if there are too many fires in quick succession (e.g. less than 20 years) (DEH 2001). This impact on mallee vegetation in turn impacts fauna species that are reliant on the mallee habitats. The areas adjoining the 2014 fire scar (see Figure 11-4) are particularly vulnerable to impacts of a subsequent fire at this stage.

Fire intensity is also an important factor, as many mallee flora species are adapted to effectively regenerate after natural fires. Some plants are able to resprout from underground or ground level woody tissue that has been insulated from heat (such as the lignotubers of mallee Eucalypt species), and a number of plant species' seeds are well insulated in soils or within dense woody capsules which can be released following fire. However, if fires are too hot due to excessive fuel loads or catastrophic conditions, some species will not readily regenerate. In addition to reducing flora diversity, hollows and deep litter cover which take years to develop are impacted by severe fires. Mallee fauna species that are of particular risk are threatened species which occur in lower numbers and have more stringent habitat preferences (e.g. EPBC listed Black-eared Miner, Red-lored Whistler, Malleefowl).

Transmission lines are specifically designed to reduce the risk of fire, partially to protect the asset itself, but also to protect the surrounding environment, including potential impacts upon flora and fauna from fauna. Regardless, unplanned and unmanaged activities that can lead to bushfires can include:

- Failure of management controls during construction and operation
 - Unmanaged vegetation near transmission line towers and wires
 - Inadequate protection of assets (e.g. inadequate fire break widths, water points, signage)
 - Use of equipment that produces sparks, during fire ban season when risk is higher (e.g. hot works activities, petrol vehicles close to pasture stubble or grasses)
- System failure or ageing infrastructure
- Inadequate emergency response
- External weather conditions, lightning strike, recreational activities by members of the public.

Historical fires associated with transmission lines generally originate from the lower voltage distribution network where there is much greater potential for contact with vegetation. The Victorian

Bushfire Royal Commission identified Single Wire Earth Return lines as a particular concern, which differ greatly from the proposed voltage transmission line.

A bushfire risk assessment undertaken in the Project's Fire Hazard Management Plan (Appendix S) concluded that with line design measures and fire management measures outlined in Chapter 18 Hazard and Risk Management and Appendix S in place, the residual risk is expected to be Low to Medium. Residual risk was identified as being higher during the construction stage than at the operational stage of the Project. Experience elsewhere on the ElectraNet network indicates that transmission lines similar to the design proposed have not resulted in the ignition of bushfires.

Transmission lines offer some benefit with regards to fire risk in certain landscapes. In some areas of the Project, such as the Riverland, dry thunderstorms are common and the presence of a transmission line may actually reduce the risk of fires starting as a result of lightning strike. Transmission towers can act to dissipate lightning across the landscape, thereby reducing the risk of fire starting from lightning strike. Standard lightning protection (e.g. earthwires above conductors) offer shield protection from lightning strike and every transmission structure is earthed.

In the central region of the Project, the mallee of the Riverland Biosphere Reserve is known to be an "extremely difficult environment to combat fire. The size of the area, lack of access to water, steep sandy terrain and often rapid rate of fire spread all contribute to a volatile fire environment" (DEH 2009). Access through established mallee in the absence of tracks is also very difficult. Powerline easements can assist in regional fire management by serving as physical, maintained fire breaks and assist in providing alternate access for the emergency vehicles (however it is noted that the proposed extent of clearance for the Project will not be wide enough to be considered a fire break). The transmission line corridor follows the southern edges of Taylorville and Calperum Stations on existing access tracks, but also traverses areas of Hawks Nest Station where access is poor and requires upgrade. The proposed route and associated clearance / access tracks present an opportunity to increase the balance between property protection, energy security and conservation management objectives in this area. No formal fire break clearance is proposed by the Project however it is believed that any new access tracks will be considered as part of the next review of the CFS Bookmark Bushfire Management Plan.

Transmission line design measures adopted to reduce the risk of fire to an acceptable level include:

- route selection, avoiding or spanning high fire risk vegetation (e.g. dense mallee), using existing tracks
- pre-clearance micro-siting surveys to consider both environmental values and fire risk
- lightning masts to attract lightning away from sensitive environments / substation
- design to Australian and International Standard. Use of earth wires, optical ground wires and dampers to avoid electrical faults and damage to conductors. Use of fire protection systems, and increased conductor spacing to eliminate risk of 'conductor clashing'.

ElectraNet will update and implement the Project's Fire Management Plan (refer Appendix S) in the construction and operational phases to protect people, infrastructure and the environment. This will include:

- strategies as per consultation and collaboration with regional CFS and conservation managers (ALT and DEW). It is noted that the proposed land clearance activities will assist in improving CFS access to the region, but disturbance will not be wide enough to provide fire breaks.
- fire tracks and buffers as agreed with CFS
- transmission lines in designated bushfire or high bushfire rated areas to be inspected and cleared every year (in contrast to every three years for regular transmission lines).
- weed maintenance to ensure fuel load at the base of the towers is minimised

- vegetation clearance in accordance with *Electricity (Principles of Vegetation Clearance) Regulations 2010 (SA)* (refer Chapter 7). Maintenance of vegetation clearance buffers, particularly in high fire risk areas and in accordance with voltage and design requirements
- education of workforce about local bushfire risk during site inductions
- maintain awareness of seasonal restrictions, particularly regarding hot works during fire ban season.
- emergency response protocols and equipment in place and regularly checked
- restriction of high-risk fire activities during fire ban periods.

Further detail is provided in Chapter 18 Hazard and Risk Management and Appendix S.

ElectraNet will add this new transmission line to its extensive existing network monitoring program to ensure fire management control measures are inspected, and maintained if required, prior to the fire ban season each year. The monitoring programs will be implemented during the construction phase and continue during post construction with relevant aspects adopted into the operation and environment management plan that will be developed.

There is no impact expected as a result of fire initiated by the Project. The level of risk associated with an unplanned event occurring has been assessed in the bushfire risk assessment in Appendix S. It concluded that if risk treatment and mitigation measures are not implemented, the bushfire scenarios assessed pose a significant level of inherent risk to life, property and environmental assets. Following implementation of the recommended mitigation and management measures, the residual risk is expected to be reduced to lower levels of **Low** and **Medium**.

Consequently, with the mitigation strategies outlined in the Fire Hazard Management Plan in place, the fire risk can be reduced to an acceptable and manageable level.

11.4.7. Summary of impacts to listed flora

No significant or long-term impacts to listed flora are expected.

One nationally Endangered plant species (Peep Hill Hop-bush) is present in small numbers near the eastern end of the transmission line corridor, and a small number of nationally and State listed species are considered to be possibly present, but have not been identified in field surveys. These species are summarised in Table 11-20 below. The cultural heritage avoidance alignment (see Section 11.4.1) does not increase the likelihood of presence of any listed species³.

Threatened flora (if present) can potentially be impacted by direct clearance or indirect impacts (e.g. weeds, dust). As discussed in Section 11.4.1, pre-clearance surveys will be undertaken to 'micro-site' towers and other infrastructure and avoid impacts to individuals or populations of threatened plant species. Other plant species of conservation significance (e.g. State-listed Rare species or species of regional conservation significance), if present, would be avoided where feasible, and infrastructure would be sited to minimise impacts. Measures to minimise indirect impacts would be implemented through the Construction Environmental Management Plan, as discussed in Sections 11.4.3 and 11.4.5.

Given the low potential for threatened flora to occur within the final infrastructure footprint, the management measures that will be implemented (including micro-siting for threatened species) and the offset activities required under the Native Vegetation Regulations and Significant Environmental Benefit Offset Policy and Guide (NVC 2020c,d), it is considered that construction and operation of the proposed infrastructure corridor will result in negligible impacts to listed species.

³ There is a record for one species listed as Rare in South Australia (Sand Lily *Corynotheca licrota*) near the cultural heritage avoidance alignment. The species was considered unlikely on the transmission line corridor due to habitat preferences and the small number of records in the ESA (see Appendix I-1). Its presence on the proposed alignment is still considered unlikely.

Significant impacts to any species listed under the EPBC Act are not expected to occur. Further detail on predicted impacts for individual species and an assessment of residual impacts against EPBC Act significant impact guidelines (DoE 2013) are provided in Table 11-20 and Appendix I-5.

Table 11-20: Summary of impacts to listed flora

Species name	Cth ¹	SA ²	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual Impact
EPBC Act listed flora species							
Peep Hill Hop-bush	EN	E	Present	Shrub. Occurs on eastern MLR and Eyre Peninsula, associated with rocky outcrops. BDBSA records in transmission line corridor. Two groups of plants present within existing transmission line easement on rocky slopes, one group of three plants already avoided by regular track maintenance upgrades. Second group is 50 – 100 plants of mixed age. Both groups can be avoided with micro-siting and or spanning. Suitable habitat is only present at the western end of the corridor and is not critical to the species survival.	No direct impact expected. Clearance of individual plants where they occur will be avoided by micro-siting. Low potential for indirect impact via weed introduction or spread or habitat degradation within EIS transmission line corridor.	Avoid known groups of plants at the western end of the transmission line corridor. Micro-site to avoid impacts to other individuals (if present). Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to a population are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Silver Daisy-bush	VU	V	Possible	Shrub. BDBSA records in proximity to the western end of transmission line corridor. Suitable habitat present in the western end of transmission line corridor. No records in transmission line corridor, not detected during BAM surveys. The transmission line corridor is at the eastern margins of the species distribution, hence significant or populations are unlikely along the transmission line corridor.	No direct impact expected. Impacts to individual plants, if they occur, can be avoided with micro-siting. Unlikely key population occurs in transmission line corridor. If present, low potential for indirect impact via weed introduction or spread within EIS transmission line corridor.	Micro-site to avoid impacts to individuals (if present). Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to an important population are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Yellow Swainson-pea	VU	R	Possible	Small Shrub. No known populations identified within corridor, but suitable habitat occurs. Germination is triggered by soil disturbance or fire.	No direct impact expected. Seeds may be present and impacted by soil	Micro-site to avoid impacts to individuals (if present).	Negligible. Long-term impacts to an important population are not expected

Species name	Cth ¹	SA ²	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual Impact
					<p>disturbance, however the area of disturbance represents a very small proportion of suitable habitat in the region.</p> <p>Impacts to individual plants, if they occur, can be avoided with micro-siting.</p> <p>Unlikely key population occurs in transmission line corridor.</p> <p>If present, low potential for indirect impact via weed introduction or spread within EIS transmission line corridor.</p>	Implement CEMP / OEMP to manage indirect impacts.	Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
NPW Act listed flora species							
Rohrlach's Bluebush	-	R	Possible	Small shrub. One record in transmission line corridor from White's Dam and also recorded in Cooltong CP adjacent transmission line corridor.	<p>No direct impact expected.</p> <p>Impacts to individual plants may occur if present. Infrastructure would be sited to minimise impacts.</p> <p>Unlikely key populations occur in transmission line corridor.</p> <p>If present, low potential for indirect impact via weed introduction or spread within EIS transmission line corridor.</p>	Avoid where feasible. Locate infrastructure to minimise impacts. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Residual impacts to the species are not expected.

Species name	Cth ¹	SA ²	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual Impact
Other potential species							
Other regionally significant species that possibly occur.			Possible	Preferred habitat and multiple previous records in transmission line corridor, but not observed in field to date.	No direct impact expected. Impacts to individual plants may occur if present. Unlikely key populations occur in transmission line corridor. If present, low potential for indirect impact via weed introduction or spread within EIS transmission line corridor.	Avoid where feasible. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Residual impacts to these species are not expected.
EPBC Act and NPW Act species that have been assessed as unlikely to occur			Unlikely	Historical or limited records in transmission line corridor, but considered unlikely to occur due to current restricted range and / or lack of suitable habitat.	No direct impact expected. Potential minor impacts to individual plants, if they occur, can be avoided with micro-siting. Unlikely key populations occur in transmission line corridor. If present, low potential for indirect impact via weed introduction or spread within EIS transmission line corridor.	Micro-site to avoid impacts to individuals (if present). Implement CEMP / OEMP to manage indirect impacts.	Negligible. Residual impacts to these species are not expected.

1 Environment Protection and Biodiversity Conservation Act 1999 Status: Critically Endangered (CE) Endangered (EN), Vulnerable (VU)

2 South Australian National Parks and Wildlife Act 1972 Status: Endangered ®; Vulnerable (V); Rare ®, EX (Presumed extinct)

11.4.8. Summary of impacts to listed fauna

No significant or long-term impacts to listed fauna are expected.

Fifty two listed fauna (threatened and or migratory) with National and State conservation ratings are considered to occur, likely to occur or possibly occur within the EIS transmission line corridor (including four National listed species that are possible in water habitats / flyover), with a further 42 considered unlikely to occur (refer Table 11-12, Table 11-14 and Table 11-15 in Section 11.3 above). Of the 42 considered unlikely to occur, 20 State listed species have the potential to occur in nearby water habitats. The cultural heritage avoidance alignment (see Section 11.4.1) does not increase the likelihood of presence of (or impact on) any listed species.

Impacts to listed fauna (including threatened species and migratory species), as well as common fauna that may occur during construction and operation could be discussed in Sections 11.4.4 above, but briefly relate to direct mortality, habitat removal or alteration, increase in predation, changes to breeding regimes and sensitivities to disturbance. Increased fragmentation to suitable habitat areas could also result in increased hybridisation of the Black-eared Miner with the Yellow-throated Miner.

Most listed and protected species that occur in the broader ESA are concentrated in the adjacent reserves, are not located within the transmission line corridor and are highly mobile and will move away from an area during disturbance (e.g. as vehicles transport infrastructure to the areas for assembly / construction). If important breeding / nesting sites of listed fauna are located within the final footprint (e.g. active Malleefowl mounds, Black-eared Miner colony) they could potentially be avoided via micro-siting of tower locations. Avoidance buffers (e.g. 50 – 100 m) could potentially be applied where feasible, to minimise disturbance impacts if required.

A number of migratory species and or other fauna species may only occur as occasional visitors to the region, and occasionally. The transmission line corridor does not represent habitat and associated resources that are critical to the survival of individuals and local populations of species (see Table 11-14 above and Table 11-21 below). Impacts to Black-eared Miner the Listed Critical habitat area are not expected to be significant, as discussed in Section 11.4.1. Whilst some localised edge effects are possible (e.g. weed incursion, changes in pest levels) these would be relatively minor and would be managed by the CEMP / OEMP. Hybridisation is also a potential impact for Black-eared Miners, however Yellow-throated Miner and hybrids are already present in this area, therefore changes to the existing status (within the transmission line corridor) be minor are not considered to be significant.

As discussed above (Section 11.4.4) the eastern end of the transmission line corridor is located north of the wetlands of the Riverland Ramsar site. The majority of the transmission line corridor is located more than 1 km from wetlands in the Riverland Ramsar site, and no impacts to habitat quality of the Riverland Ramsar site are expected. Risk of bird strike from wetland bird visitors / residents is discussed in Section 11.4.4 above and in more detail in Appendix I-5.

It is acknowledged that common native fauna and fauna with regional ratings occur within the transmission line corridor and surrounds. The number of individuals and proportion of the species' populations present within the transmission line corridor are likely to be small, due to the size and condition of available habitat, noting that larger areas have been avoided, the route follows existing tracks, where available. Therefore, impacts to overall species populations are likely to be small.

Impacts to all fauna populations (including listed species) within the transmission line corridor are predicted to be low to negligible, based on the following assumptions:

- All vegetation clearance will be approved and offset in accordance with Native Vegetation Act and Regulation requirements to reduce impacts to listed and general fauna as a result of vegetation clearance.
- In key areas that support listed species (e.g. dense mallee, Listed Critical Habitat for Black-eared Miner, Riverland Biosphere Reserve), Project design and construction control measures

will ensure vegetation clearance is minimised, occurs in approved clearance areas, existing tracks and disturbed area are used as far as possible and micro-siting will occur at each tower location.

- To reduce impacts to critical habitats of listed species, access track widths and number of laydown areas will be minimised in areas of higher quality mallee habitat that require clearance. Laydown areas will be located in lower condition habitat.
- Habitat condition across the construction footprint is already degraded, resulting in reduced diversity of native fauna, particularly towards the western end and centre of the corridor where there is existing infrastructure and tracks present.
- Vegetation clearance measures are expected to ensure that, during construction and operation there is low risk of direct impacts to fauna, particularly threatened fauna.
- If there are impacts to individuals or populations, they are likely to be short-term (e.g. construction phase) as fauna will move away from the area and return when disturbance has reduced or offset habitat has been established.

Given the extensive availability of habitat near the transmission line corridor (which parallels existing, cleared access tracks and has been realigned to avoid higher quality habitats in the central part of the alignment) and the proposed control measures, Nature Advisory (2021) concluded that **the Project is unlikely to lead to unacceptable increased impacts to threatened mallee birds** (refer Appendix I-4).

Key species are discussed further below. Further detail on individual species and groups of species with a possible (or greater) likelihood of occurrence are provided in Table 11-21 below.

Black-eared Miner

Black-eared Miner (listed as Endangered Nationally and in SA) occurs in dense, long-unburnt mallee vegetation. It has hybridised extensively with the common Yellow-throated Miner in areas where the mallee has become fragmented by vegetation clearing; this is recognised as a key threat to the species as a whole. Historically they were known to occur in extensive unburnt mallee areas north of the River Murray, particularly in the Gluepot to Calperum Station area. More recently, BDBSA and Birdlife records, as well as recent surveys indicate Black-eared Miners, Yellow-throated Miners and hybrids continue to occur in the vicinity of the transmission line corridor. Both pure Black-eared Miners and hybrids were recently recorded at Taylorville, Hawks Nest and Calperum Stations, the Hawks Nest records being well north of the current transmission line corridor (refer Appendix I-4).

Potential impacts to the species relevant to the Project are habitat removal, fragmentation and degradation of habitat, predation, disturbance during construction and operation (e.g. vehicle collision, noise, activity) and as mentioned above, hybridisation. Clearance of vegetation can facilitate hybridisation via fragmentation of habitat, which allows Yellow-throated Miners to enter and hybridise with pure Black-eared Miners.

Vegetation clearance for the Project is expected to result in a minor to moderate level of impact of habitat fragmentation or increasing existing levels of hybridisation of the Black-eared Miner. The alignment has been modified to avoid localities where the species has been recorded recently as well as avoiding impacts to Critical Habitat to the north of the alignment where the majority of the pure Black-eared Miners occur. Whilst there are expected to be individuals present, the habitat in the transmission line corridor is considered to be less suitable, and the better habitat that is within the listed Critical Habitat area is well north of the corridor. There is a possibility Yellow-throated Miners may enter new cleared areas and hybridise with Black-eared Miners but evidence indicates hybrid birds are already present in the impact area (refer Appendix I-4).

Vegetation clearance during construction will result in a low risk of reducing the value of Black-eared Miner Critical Habitat, as the alignment only traverses the southern boundary of this habitat, following areas already disturbed rather than the essential mallee habitat that is well north of the corridor. The

Project will impact approximately 0.04% (143 ha along 71 km of alignment) of the total area (over 380,000 ha) of listed Critical Habitat, along its southern margin. The proportion of available mallee habitat that will be impacted by the Project is also very small. The Project will result in clearance of approximately 201 ha of non-core / less suitable mallee habitat (along approximately 100 km of the alignment)⁴. This is 0.03% of the more than 600,000 ha of mallee habitat in the Riverland Biosphere Reserve and other properties traversed by the proposed alignment. Standard fauna protection protocols (e.g. speed limits, dust suppression, fauna awareness during inductions and prevention of unauthorised access to tracks) are expected to minimise other construction and operation impacts.

Based on the above, significant impacts as per the EPBC Significant Impact Guidelines Endangered species criteria (DoE 2013) are not expected (see Table 11-21 and Appendix I-3).

Malleefowl

Malleefowl (listed as Vulnerable nationally and in SA) occur in semi-arid to arid zone shrublands and low woodlands dominated by mallee habitats. The largest populations occur WA and SA, but they also occur in NSW and Victoria. Given the large distribution of Malleefowl across Australia, no particular populations have been described as of greater importance for the long-term survival of the species in the Malleefowl Recovery Plan, but there are declines across the range and ongoing objectives to conserve the species (Benshemesh 2007). Preferred habitats include long-unburnt mallee on sand with deep litter and with a mosaic of fire history, for breeding and foraging. In SA, more than 600,000 ha of suitable habitat occurs north of the transmission line corridor in the Riverland Biosphere Reserve. Whilst Malleefowl have not been observed in the transmission line corridor (aside from tracks on the boundary of Calperum, Nature Advisory 2021), there are numerous records and presence of habitat, therefore they are considered as present within the corridor and would occur in mallee habitats of the central to eastern transmission line corridor, but are also known to traverse along tracks and forage in cropped / stubble areas.

Threats to the species include habitat removal, habitat degradation or fragmentation as a result of vegetation clearance or increased fire potential and weed incursion. Other potential impacts include increased predator access, collision with vehicles, particularly given ground-dwelling nature and size and disturbance during construction (noise, activity, dust) or operation. While juvenile Malleefowl are precocial (hatched in advance state) and have no post hatch parental care and can fend for themselves, they are particularly vulnerable to predation by foxes. The intent of the Project is to minimise vegetation clearance that could facilitate additional habitat fragmentation, degradation and predation and increased fire potential.

The species is known to persist near access tracks and fragmentation of the scale proposed is not likely to be of significant consequence for this species (Nature Advisory 2021). Vegetation clearance during construction will result in very low reduction in the area or value of Malleefowl habitat, as the alignment traverses areas already disturbed and avoids the extensive mallee habitat that is north of the corridor. The Project will result in clearance of approximately 201 ha of potentially suitable habitat (i.e. mallee) along approximately 100 km of the alignment⁴. This is 0.03 % of the more than 600,000 ha of mallee habitat in the Riverland Biosphere Reserve and other properties traversed by the proposed alignment. Standard fauna protection protocols (e.g. speed limits, dust controls, waste management, fauna awareness during inductions and prevention of unauthorised access) are expected to minimise other construction and operation impacts. In addition, whilst no Malleefowl mounds have been detected to date, micro-siting prior to vegetation clearance can be used to avoid impacts to active nesting mounds and breeding pairs if present.

⁴ Estimates of clearance are based on upper estimates for land disturbance of 2 ha per km. The length of potentially suitable habitat along the transmission line corridor is based on mapping of broad habitat types along the corridor (see Section 11.3.4).

Based on the above, significant impacts as per the EPBC Significant Impact Guidelines, Vulnerable species criteria (DoE 2013), are not expected (see Table 11-21 and Appendix I-3).

Red-lored Whistler

Red-lored Whistler (listed nationally as Vulnerable and Rare in SA) is considered present in the long-unburnt / old growth mallee habitats of the transmission line corridor (including habitat in Taylorville Station), however likely to occur in low abundance at these sites, given that amount of mallee within the transmission line corridor that has been burnt in the last 6 – 14 years. The species is known from Pooginook CP (previous records and survey results) which is traversed by the transmission line corridor (along the northern boundary) and abuts Taylorville Station (refer 11.3.6 above). The species occurrence is considered limited in this area that is already fragmented by existing track and existing ElectraNet infrastructure (Nature Advisory 2021).

Threats to the species include habitat removal, habitat degradation or fragmentation as a result of vegetation clearance or increased fire potential and weed incursion. Other potential impacts include increased predator access, collision with vehicles and disturbance during construction (noise, activity, dust) or operation. The intent of the Project is to minimise vegetation clearance that could facilitate additional habitat fragmentation, degradation and predation and increased fire potential. The known occurrence of this species within the transmission line corridor is primarily in areas with existing tracks present, i.e. already fragmented. Vegetation clearance during construction will result in a very low reduction in the area or value of Red-lored Whistler habitat, as the alignment traverses areas already disturbed and avoids essential mallee habitat that is well north of the corridor. The Project will result in clearance of approximately 201 ha of non-core / less suitable mallee habitat along approximately 100 km of the alignment⁵. This is 0.03 % of the more than 600,000 ha of mallee habitat in the Riverland Biosphere Reserve and other properties traversed by the proposed alignment. Standard fauna protection protocols (e.g. speed limits, dust suppression and noise controls, fauna awareness during inductions and prevention of unauthorised access to tracks) are expected to minimise construction and operation impacts.

Based on the above, significant impacts as per the EPBC Significant Impact Guidelines Vulnerable species criteria (DoE 2013) are not expected (see Table 11-21 and Appendix I-3).

Regent Parrot

Regent Parrot (listed as Vulnerable nationally and in SA) is restricted to a single population occurring in inland south-eastern Australia, which ranges across the lower Murray-Darling basin region of South Australia, New South Wales and Victoria. In SA all known breeding colonies are located along the River Murray and feeding sites (within large blocks of mallee) are within 5 – 20 km (usually 5 – 10 km) of these areas. Mallee further than 20 km from the River Murray can be utilised in the non-breeding season. Favoured mallee includes Beaked Red Mallee and Ridge-fruited Mallee. Roadside vegetation corridors are often used for dispersal to avoid raptors. Suitable foraging habitat occurs within the ESA and areas of the transmission line corridor towards the centre / eastern end (e.g. between the River Murray and Morgan, Overland Corner and Berri. Historical and current survey records show occurrence along the alignment is limited.

Potential impacts to the species as a result of the Project include impacts to foraging or flight path habitat (e.g. removal, degradation, fragmentation, weed invasion), impacts associated with collision (vehicles or the transmission line itself (see below) or impacts associated with disturbance (e.g. noise, dust, activity) during construction or operation. A number of areas on the transmission line corridor are within 6 – 17 km of the River Murray and have potential to interrupt movement patterns include

⁵ Estimates of clearance are based on upper estimates for land disturbance of 2 ha per km. The length of potentially suitable habitat along the transmission line corridor is based on mapping of broad habitat types along the corridor (see Section 11.3.4).

area between Stuart and Makaranka, areas near Pooginook CP, North of Lake Bonney and East from Cooltong CP to the NSW border (Nature Advisory 2021).

Major vegetation clearance along flight path corridors or in core foraging habitat is not expected. The Project would impact a very small proportion of available foraging habitat in the region. The Project will result in clearance of approximately 250 ha of potentially suitable foraging habitat (mallee / woodland) along approximately 125 km of alignment⁶. This is 0.04 % of the more than 600,000 ha of potentially suitable mallee / woodland habitat in the Riverland Biosphere Reserve and other properties traversed by the proposed alignment.

This species is also at risk of bird strike via vehicle collision and collision with transmission lines. During breeding season males are potentially at risk when foraging back and forth from nesting sites to feed females and juveniles are at risk during dispersal once they have fledged. However, as discussed in Appendix I-5 (and Section 11.4.4), likelihood of collision with the transmission line is considered to be low, given their size, small wingspan, wide spacing of conductors and flight height. There were also no deaths attributed to powerline for Regent Parrots or other parrots. Provided there is adequate gap between the canopy and the powerlines, Regent Parrots moving between the Murray River breeding and roosting sites and mallee shrubland foraging areas, which usually fly less than five metres above the tree canopy, are considered unlikely to collide with the powerlines (see Appendix I-4). Under typical operating conditions, the clearance between the conductors and the canopy would be more than 5 m, which would mean that collision with the transmission line is unlikely. Additional protocols as part of the CEMP and OEMP such as speed limits and fauna awareness protocols would also be implemented.

Based on the above, significant impacts as per the EPBC Significant Impact Guidelines Vulnerable species criteria (DoE 2013) are not expected (see Table 11-21 and Appendix I-3).

⁶ Estimates of clearance are based on upper estimates for land disturbance of 2 ha per km. The length of potentially suitable habitat along the transmission line corridor is based on mapping of broad habitat types along the corridor (see Section 11.3.4).

Table 11-21: Impacts to listed fauna

Species name	Cth	SA	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual impact
EPBC Act listed species							
Black-eared Miner	EN	E	Present	Present / likely in long unburnt mallee habitats. Listed Critical Habitat area occurs north of the Project and its southern boundary intersects the transmission line corridor. Core populations occurs in northern half of Listed Critical Habitat. Key threat to species is degradation / fragmentation / fire impacts to habitat and further hybridisation with Yellow-throated Miner (hybrids and YTM already present with the transmission line corridor, north and south of).	Clearance of very small proportion of available habitat (e.g. 0.04% of listed Critical Habitat, 201 ha clearance of non-core / less suitable mallee habitat compared to 600,000 ha in the surrounding areas). Localised disturbance during construction, affecting a very small proportion of available habitat. Low potential for individuals to be impacted by vehicle collision. Low potential for increase in predators as line follows existing disturbance corridors. Minor to moderate potential for increase in rate of hybridisation as hybrids and Yellow-throated Miners are already present.	Avoid BEM Critical Habitat Area. Minimise vegetation clearance that could facilitate additional fragmentation / rate of hybridisation / increased fire potential. Implement CEMP / OEMP to manage indirect impacts.	Negligible to low. Long-term impacts to the population and species as a whole are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Malleefowl	VU	V	Present	No nesting mounds identified to date within the transmission line corridor. Would move away from area if present, vast areas of suitable habitat present north of the eastern end of the transmission line corridor and in conservation areas that are avoided. Critical habitat is not limited to the transmission line corridor. Juveniles are vulnerable to fox predation.	Clearance of very small proportion of available mallee habitat (201 ha clearance of mallee habitat compared to 600,000 ha in the surrounding areas). Localised disturbance during construction, affecting a very small proportion of available habitat. Low potential for individuals to be impacted by vehicle	Avoid known nesting mounds. Micro-site to avoid impacts to mounds / breeding pairs (if present). Speed limits, awareness, predator control. Minimise vegetation clearance that could facilitate additional	Negligible. Long-term impacts to an important population are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).

Species name	Cth	SA	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual impact
				Ground dwelling bird that is vulnerable to vehicle collision. > 600,000 ha of more suitable habitat (mallee extent and mosaic of fire history in the Riverland Biosphere Reserve) is avoided.	collision, given relatively low densities and management controls. Low potential for impacts to nesting mounds within dense mallee given lack of mounds detected to date and micro-siting. Low potential for increase in predators as line follows existing disturbance corridors.	habitat fragmentation / predation. Implement CEMP / OEMP to manage indirect impacts.	
Regent Parrot	VU	V	Likely	Present / possible foraging in mallee habitats 20 km from nesting areas, less frequently north of the transmission line corridor. Nesting habitat is well south of the transmission line corridor (along the River Murray). Juveniles and males may be prone to strike with powerlines when flying to northern mallee areas to forage. Noting that the species usually fly less than five meters above the tree canopy / use treed corridors to move between breeding and foraging localities.	Clearance of very small proportion of available mallee foraging habitat (250 ha clearance of mallee/woodland habitat compared to 600,000 ha in the surrounding areas). Localised disturbance during construction, affecting a very small proportion of available foraging habitat. Low potential for individuals to be impacted by vehicle collision, when flying from southern nesting habitats to northern foraging habitats. Low potential for individuals to be impacted by collision with transmission line, when flying from southern nesting habitats to northern foraging habitats, particularly juveniles / males.	Speed limits, awareness. Fauna awareness protocols. Minimise vegetation clearance of foraging habitat and 'treed corridors' between nesting and foraging areas. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to an important population are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Red-lored Whistler	VU	R	Present	Known to occur in the Riverland Biosphere Reserve, prefers long-unburnt mallee habitats. Critical habitat is not limited to the	Clearance of very small proportion of available habitat (200 ha clearance of non-core / less suitable mallee habitat	Avoid clearing preferred habitats. Micro-siting to minimise vegetation clearance that	Negligible. Long-term impacts to an important population are not expected.

Species name	Cth	SA	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual impact
				transmission line corridor, but occurs 30 km north of the transmission line corridor. Species prefers Spinifex / mallee shrubland or mallee heath shrubland where canopy is sparse and shrubs at high densities. Observed near Pooginook Conservation Park (the transmission line corridor traverses northern border which abuts Taylorville Station), where occurrence is limited.	<p>compared to 600,000 ha in the surrounding areas).</p> <p>Localised disturbance during construction, affecting a very small proportion of available non-critical habitat.</p> <p>Low potential for individuals to be impacted by vehicle collision.</p> <p>Low potential for increase in predators as line follows existing disturbance corridors.</p>	<p>could facilitate additional habitat fragmentation / predation.</p> <p>Implement CEMP / OEMP to manage indirect impacts.</p>	Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Painted Honeyeater	V	R	Possible	<p>Nomadic mobile species that occurs at low densities throughout its range. Strongholds for the species and breeding areas occur on the inland slopes of the Great Dividing Range in NSW, Vic and Southern Queensland.</p> <p>Occurs in dry open forests and woodlands, strongly associated with mistletoe. Few records in South Australia.</p>	<p>Clearance of very small proportion of vegetation in the region that the species could potentially utilise (if present).</p> <p>Localised disturbance during construction (if present).</p> <p>Low potential for individuals to be impacted by vehicle collision (if present).</p>	<p>Minimise vegetation clearance.</p> <p>Implement CEMP / OEMP to manage indirect impacts.</p>	Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Australian Bittern / Painted Snipe / Latham's Snipe	EN / EN / MW	V / V / R	Possible	Possible occurrence in swampy well vegetated riverine / Ramsar wetland habitats immediately adjacent eastern end of the transmission line corridor. Limited suitable habitats occur immediately north of the transmission line corridor for these birds to move to if present, more likely to move to adjacent wetlands.	Low potential for individuals to be impacted by collision with transmission line, if flying from southern wetland habitats to northern wetland habitats.	<p>Buffer between corridor and wetland habitats.</p> <p>Bird reflectors on transmission line near wetlands in Ramsar site.</p> <p>Implement CEMP / OEMP to manage indirect impacts.</p>	<p>Negligible. Long-term impacts to populations or habitats critical to species survival are not expected.</p> <p>Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).</p>

Species name	Cth	SA	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual impact
Curlew Sandpiper	CE / MW	Not rated	Possible	Occurrence in riverine, wetland, artificial water habitats of or adjacent the transmission line corridor. Potential flyover species. Predominantly migratory birds that are not present all year round, breed outside of Australia. Habitats adjacent the transmission line corridor are not core habitats.	Low potential for individuals to be impacted by collision with transmission line, if flying from southern wetland habitats to northern wetland habitats.	Buffer between corridor and wetland habitats. Bird reflectors on transmission line near wetlands in Ramsar site. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to populations or habitats critical to migratory species survival are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Functional Group – Common Sandpiper, Sharp-tailed Sandpiper, Pectoral Sandpiper, Red-necked Stint, Pacific Golden Plover, Wood Sandpiper, Common Greenshank, Marsh Sandpiper	MW		Possible or likely (refer Table 11-11)				
Caspian Tern / Crested Tern	MM	Not rated	Likely	Likely / possible foraging above in riverine / wetland habitats adjacent the transmission line corridor, potential flyover species on route to and from wetland habitats. Evidence of tern deaths attributable to powerline bird strike, but mainly coastal species (Crested Tern) less likely to occur. Wetland review considered the overall risk to these species as low (based on likelihood and consequence factors).	Moderate potential for low numbers of individuals to be impacted by collision with transmission line, if flying from southern wetland habitats to northern wetland habitats.	Buffer between corridor and wetland habitats. Bird reflectors on transmission line near wetlands in Ramsar site. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to populations or habitats critical to migratory species survival are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Osprey	MW	E	Possible	Possible foraging in riverine / wetland habitats adjacent the transmission line corridor, or nesting in towers once established. Critical habitat is not limited to the transmission line corridor. Core populations and breeding areas occur along the coastline of	Low potential for individuals to be impacted by collision with transmission line, if flying from southern wetland habitats to northern wetland habitats. Low potential for individuals to be impacted by collision with	Buffer between corridor and wetland habitats. Bird reflectors on transmission line near wetlands in Ramsar site.	Negligible. Long-term impacts to populations or critical habitats are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).

Species name	Cth	SA	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual impact
				Australia, greater numbers to the north of Australia.	transmission line if nesting on towers.	Regular tower monitoring for nest development / removal. Implement CEMP / OEMP to manage indirect impacts.	
Fork-tailed Swift	MT	Not rated	Possible	Overfly species, uses aerial habitats to 1000 m. Habitat is not limited to the transmission line corridor or broader region.	Low potential for individuals to be impacted by collision with transmission line, if flocks fly near line.	Implement CEMP / OEMP to manage indirect impacts.	Negligible. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Southern Bell Frog	VU	V	Possible	Occurs in riverine / wetland habitats immediately adjacent eastern end of the transmission line corridor, but will move into adjacent areas during appropriate season / rainfall. Critical habitat is not limited to the transmission line corridor.	Low potential for individuals to be impacted by vehicle collision if present in transmission line corridor during seasonal conditions (e.g. winter, flooding events). Low potential for increase in predators as line follows existing disturbance corridors.	Speed limits, awareness, predator control. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to populations or critical habitats are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
South-eastern Long-eared Bat / Corben's Long-eared Bat	VU	V	Possible	Possible, but unlikely occurrence in mallee / woodland habitats. Would likely move to suitable habitat north of the transmission line corridor or to NSW if impacted by disturbance. No bat camps / roosts known to occur in the transmission line corridor. Core important population occurs in NSW (Piliga Scrub). Critical habitat is not limited to the transmission line corridor.	Low potential for individuals to be impacted by collision with transmission line, if flying near line or roosting in mallee habitat that is cleared. Localised disturbance during construction, affecting a very small proportion of available non critical habitat.	Avoid clearing preferred habitats. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to important population or critical habitats are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Flinders-ranges Worm-Lizard,	VU	Not rated	Possible	Possible in grassland, woodland, rocky loose soil and litter habitats toward western end of the transmission line corridor. Transmission line corridor is on the	Low potential for individuals to be impacted by ground disturbance if present in transmission line corridor.	Micro-site to avoid impacts to species (if present).	Negligible. Long-term impacts to populations or critical habitats are not expected.

Species name	Cth	SA	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual impact
				edge / outside the known range of where the species may occur. Marginal suitable habitat (if any) occurs at the very western extent. Habitat in the transmission line corridor is not critical to the species.	Low potential for increase in predators as line follows existing disturbance corridors. Low potential for temporary barriers to movement within transmission line corridor.	Implement CEMP / OEMP to manage indirect impacts.	Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Pygmy Blue-tongue Lizard	EN	E	Possible	Possible in unploughed grassland habitats toward western end of transmission line corridor, however targeted searches for habitat have not detected suitable habitat or species to date. Transmission line corridor is east of all known records. No habitat in transmission line corridor that is critical to the species or cannot be avoided by micro-siting or spanning if present.			
NPW Act listed species and other potential species							
Striated Grasswren	**	R	Possible	Possible occurs in mallee habitats in the region, although not detected in targeted surveys	Clearance of very small proportion of available habitat. Localised disturbance during construction, affecting a very small proportion of available habitat. Low potential for individuals to be impacted by vehicle collision. Low potential for increase in predators as line follows existing disturbance corridors	Minimise vegetation clearance that could facilitate additional habitat fragmentation / predation. Implement CEMP / OEMP to manage indirect impacts.	Negligible. Long-term impacts to populations or critical habitats are not expected. Residual impacts are not significant under EPBC significant impact guidelines (see Appendix I-3).
Other NPW species that possibly occur.			Possible	Species that possibly occur in the region (as per Appendix O, P). These are primarily highly mobile species, with limited records in or adjacent to the transmission line	Clearance of very small proportion of available habitat. Localised disturbance during construction, affecting a very	Buffer between corridor and wetland habitats. Minimise vegetation clearance that could	Negligible. Residual impacts to these species are not expected.

Species name	Cth	SA	Likelihood of occurrence	Background comments	Expected impact	Mitigation measures	Level and significance of residual impact
				corridor and not considered to be directly reliant upon habitat in the transmission line corridor. If they occur, they are infrequent visitors.	small proportion of available habitat. Low potential for individuals to be impacted by vehicle collision.	facilitate additional habitat fragmentation / degradation / predation. Bird reflectors on transmission line near wetlands in Ramsar site.	
EPBC and NPW species that are unlikely to occur			Unlikely	Species that are unlikely to occur in the region (as per Appendix I-1). These are primarily highly mobile species and not considered to be directly reliant upon habitat in the transmission line corridor. If they occur, they are very infrequent visitors.	Low potential for individuals to be impacted by collision with transmission line, if flying near line. Low potential for increase in predators as line follows existing disturbance corridors	Implement CEMP / OEMP to manage indirect impacts.	
Common Fauna			Likely	Locally common native reptiles, mammals and birds and exotic fauna			

¹ *Environment Protection and Biodiversity Conservation Act 1999* Status: Critically Endangered (CE) Endangered (EN), Vulnerable (VU); Migratory Marine (MM); Migratory Terrestrial (MT); Migratory Wetland (MW)

² *South Australian National Parks and Wildlife Act 1972* Status: Endangered [®]; Vulnerable (V); Rare [®], EX (Presumed extinct)

** Potential future listing as Endangered under the EPBC Act (Nature Advisory 2021).

11.4.9. Summary of key mitigation measures

Table 11-22: Key mitigation measures – flora and fauna

Mitigation measure	Construction	Operation
Undertake detailed design to avoid traversing isolated patches of vegetation where possible (e.g. at the western end of the transmission line corridor)	✓	
Design the line to span across mature vegetation (with minimal clearance required) where feasible.	✓	✓
Minimise vegetation clearance for conductor stringing tracks where possible subject to stringing method determined during detailed design	✓	
Undertake pre-clearance surveys to 'micro-site' tower locations and other infrastructure to avoid occurrences of threatened plants or other significant features (e.g. active Malleefowl mounds)	✓	
Establish no go areas (flagged / fenced where required) to protect sensitive vegetation / habitats where appropriate	✓	
Restrict vegetation disturbance, clearance or trimming to approved areas (as per NVC approval)	✓	✓
Locate temporary worker camps in disturbed / cleared areas or in areas with limited native vegetation	✓	
Locate other temporary facilities (e.g. temporary laydown areas / staging sites) in disturbed areas or in areas with limited native vegetation as far as practicable, avoiding areas of habitat for Black-eared Miner	✓	
Minimise clearance of vegetation, particularly dense mallee habitats	✓	✓
Roll or trim vegetation where feasible rather than complete removal	✓	
Retain groundcover and rootstock where possible (e.g. for the stringing access corridors)	✓	
Avoid removal of larger trees (e.g. trunk diameter over 30 cm) where possible	✓	
Utilise areas where native vegetation is degraded or has been previously cleared in preference to clearing vegetation wherever practicable	✓	
Use existing roads, tracks, fire breaks and other existing disturbed areas to minimise habitat removal wherever possible	✓	
Restrict tracks to the minimum width necessary to allow safe access (typically 5 m)	✓	
Design tracks to take the shortest route (e.g. short spur tracks off existing roads / tracks) and with as little impact as possible to native vegetation, existing land uses and landholders including following existing boundaries where possible	✓	
Restrict pads for tower assembly to the minimum size necessary	✓	
Offset vegetation clearance with a Significant Environmental Benefit in accordance with NVC approval.	✓	
Rehabilitate or allow natural regeneration in areas of disturbance where not required after construction	✓	
Restrict vehicle movements to defined tracks and work areas.	✓	✓
Implement speed limits on access tracks, particularly in key areas of mallee habitat, to reduce the risk of vehicle collisions with wildlife	✓	
Restrict unauthorized public access to access tracks	✓	✓
Install locked gates where required and appropriate signage once construction is completed		✓
Use dust suppression measures (e.g. water tankers) where required during construction.	✓	
Attach bird diverters to powerline conductors and / or the top-most earth / shield wire at regular intervals to increase visibility of the lines in close proximity to wetland habitats in the Riverland Ramsar site (e.g. within 500 m of the indicative 1 in 10 year inundation extent).		✓

Mitigation measure	Construction	Operation
Install temporary fencing to prevent stock or large fauna entrapment in excavations that are to be left open where appropriate.	✓	
Regularly check any open excavations for trapped fauna or provide measures to allow their escape	✓	
Use wildlife handler where appropriate (e.g. when retrieving fauna from excavations or removing nests of threatened mallee birds in critical habitat during breeding season)	✓	
Place construction camps near already disturbed areas where practicable and utilise lighting type that limits illumination away from the area.	✓	
Provide inductions to all contractors to ensure understanding of local and regional flora and fauna significance and sensitivities, construction method and work area restrictions	✓	
Implement protocols for management of waste during construction to avoid attracting feral pest animals	✓	✓
Undertake pre-construction inspection to identify any areas of weed infestation requiring specific management measures.	✓	
Implement weed hygiene procedures such as vehicle wash-downs and inspections where appropriate	✓	
Control weeds within the works area in accordance with the Landscape South Australia Act	✓	✓
Conduct post construction weed survey and control program (if necessary) with particular focus on any weed infestations identified in pre-construction surveys		✓
Appropriately dispose of any declared weeds cleared as part of the Project (with any necessary notification / permits under the Landscape South Australia Act in place for moving / relocating vegetation containing declared plants).	✓	✓
Undertake pest animal control if ground disturbance encourages pest animal (e.g. rabbit) activity.	✓	✓
Implement and maintain fire tracks and fire breaks in accordance with fire hazard management plan	✓	✓
Undertake weed maintenance to ensure fuel load at the base of the towers is minimised		✓
Ensure that all equipment is fitted with appropriate firefighting equipment.	✓	✓
Maintain awareness of local seasonal restrictions, particularly regarding hot works during fire ban season	✓	✓
Restrict high risk fire activities during fire ban periods.	✓	✓
Maintain clearance distances between vegetation and transmission lines in accordance with the Electricity (Principles of Vegetation Clearance) Regulations		✓

11.5. Conclusion

ElectraNet's key finding is that Project construction or operational activities will not lead to significant or long-term impacts to flora and fauna. Potential impacts can be readily managed with appropriate location of infrastructure and application of mitigation measures.