EPBC Preliminary Documentation Report

EC.14172 Eyre Peninsula Link

November 2020

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Glossary of Terms

Term	Description
AER	Australian Energy Regulator
BDAC	Barngarla Determination Aboriginal Corporation
CEMP	Construction Environmental Management Plan
cm	Centimetre(s)
Cth	Commonwealth
DC	District Council
EEC	Endangered Ecological Community (as listed under the EPBC Act)
EMS	Environmental Management System
EOR	Environmental Operating Requirements
EP	Eyre Peninsula
EPA	South Australian Environmental Protection Authority
EPLink	Eyre Peninsula Link project
EP NRM	Eyre Peninsula Natural Resource Management Board
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPBG Woodland	Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland
ETC	Electricity Transmission Code
GIS	Geographic Information System
ha	Hectare(s)
HSEMP	Health, Safety and Environment Management Plan
km	Kilometre(s)
kV	Kilovolt
m	Metre(s)
MNES	Matters of National Environmental Significance
NEM	National Electricity Market
NRM	Natural Resource Management
OPGW	Optical ground wire
PMST	Protected Matters Search Tool
Project	ElectraNet Eyre Peninsula Transmission Line (Eyre Peninsula Link, EPLink) Project
Proposed Action	ElectraNet Eyre Peninsula Transmission Line (Eyre Peninsula Link, EPLink) Project
Project Area	The proposed Eyre Peninsula Transmission Line easement, impact footprint and surrounds from Cultana to Port Lincoln.
SEB	Significant Environmental Benefit
sp.	species

spp.	species plural
ssp.	subspecies
TEC	Threatened Ecological Community
THA	Threatened Habitat Areas
TNSP	Transmission Network Service Provider
TSMP	Threatened Species Management Plan
var.	variant

Executive Summary

National Electricity Market (NEM)-connected electricity supply to the Eyre Peninsula (EP) is currently provided via a single main radial electrical transmission system of 132 kV, with radial 132 kV transmission lines extending from the Cultana to Yadnarie substations and from Yadnarie substation west to Wudinna and south to the Port Lincoln substation.

The transmission line between Cultana and Port Lincoln was originally established in 1967 and is approaching an age and condition at which significant infrastructure maintenance and replacement works will be required. Further, in recent years, electricity demand has increased as a result of agricultural, residential, commercial, mining and industrial development, and is forecast to continue to increase as a result of the approval of a number of new mining projects on the EP, and the electricity demands associated with ancillary infrastructure such as processing and port facilities.

To maintain electricity supply to the EP, and ensure that sufficient capacity exists to allow for continued development of infrastructure in the EP, ElectraNet propose to construct a new electricity transmission line from Cultana to Port Lincoln (the Proposed Action, the Project). The Proposed Action will involve:

- a new double-circuit line from Cultana to Yadnarie that is initially energised at 132 kV (with the option to be energised at 275 kV if required in the future); and
- a new 132 kV double-circuit line from Yadnarie to Port Lincoln.

Approximately 265 km of transmission line will be constructed, generally parallel and in close proximity to the existing transmission line. The new transmission line will involve establishing an easement not wider than 100 m, to be located immediately west of the existing 40 m wide transmission line easement. It is intended that construction of the new line will commence in March 2021.

Following referral of the Proposed Action in April 2020 (EPBC Referral 2019/8583), the Proposed Action has been determined to be Controlled Action by the Commonwealth Department for Agriculture, Water and Environment under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth, EPBC Act) on the basis of the potential impacts of the Project on Matters of National Environmental Significance (MNES), to be assessed by preliminary documentation. The relevant MNES considered by the Commonwealth Government include the following listed threatened species and communities:

- Malleefowl (*Leipoa ocellate*) – Vulnerable
- Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland Threatened Ecological Community – Endangered
- Jumping-Jack Wattle (*Acacia enterocarpa*) – Endangered
- Fat-leaf Wattle (*Acacia pinguifolia*) – Endangered
- Large-club Spider-orchid (*Caladenia macroclavia*) – Endangered
- Tufted Bush-pea (*Pultenaea trichophylla*) – Endangered

In the time since the submission to the Referral, ElectraNet has undertaken significant additional work on the Project to inform this Preliminary Documentation report, including:

- Refinement of the project design to minimise potential impacts to MNES
- Additional in-field ecology surveys for the relevant MNES were undertaken in Winter and Spring, 2020
- Contractual discussions with the construction partner to determine realistic and achievable avoidance and mitigation measures to minimise impacts to relevant MNES
- Finalisation of EPBC offset requirements and commencement of discussions with potential offset delivery partners.

The additional in-field ecology surveys confirmed that observances of both the Fat-leaf Wattle (*Acacia pinguifolia*) and Large-club Spider-orchid (*Caladenia macroclavia*) within the Project Area were mis-identifications, and that these species will not be impacted by the proposed action.

An assessment of the significance of the potential impacts to the remaining four relevant MNES was undertaken in accordance with relevant Commonwealth guidance, with consideration to the general and species/community-specific avoidance and mitigation measures. The outcomes of this assessment indicate that the Proposed Action will not have a significant impact to MNES. Nevertheless, ElectraNet is proposing to establish an EPBC offset (or multiple offsets) in accordance with relevant Commonwealth guidance to offset any residual impacts on the nominated MNES.

1. INTRODUCTION AND CONTEXT

1.1 Proponent Background

ElectraNet Pty Ltd (ElectraNet) is the principal electricity Transmission Network Service Provider (TNSP) in South Australia, operating as part of the National Electricity Market under National Electricity Rules. The company's revenue is set by the Australian Energy Regulator (AER).

ElectraNet's role is to own and manage the high-voltage transmission lines and substations that connect this State's electricity generation system to multiple customer connection points, including SA Power Network's lower-voltage distribution network. The role of ElectraNet in the electricity supply chain is shown in Figure 1.

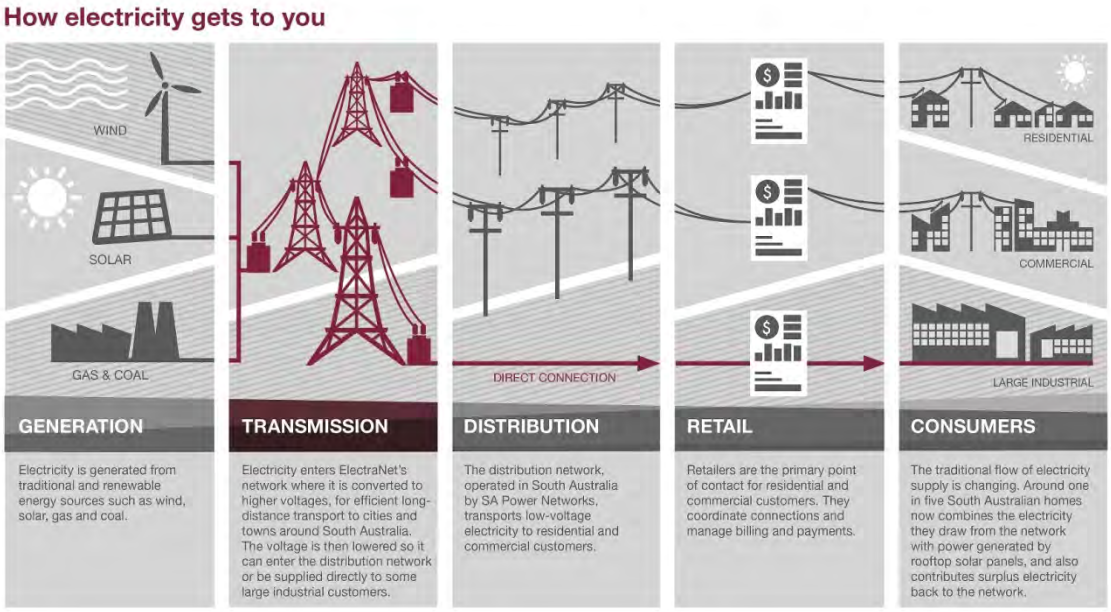

Figure 1: Role of ElectraNet in the electricity supply chain

ElectraNet's transmission network is one of the most extensive regional transmission systems in Australia, extending across some 200,000 square kilometres of the State. This network consists of transmission lines operating at 132,000 Volts (132 kV) and 275,000 Volts (275 kV), which are supported by both lattice towers and large stobie poles.

1.2 Summary of the Proposed Action

1.2.1 Project Industry Type

The Proposed Action is categorised under the EPBC Act as *Energy Generation and Supply (non-renewable).*

1.2.2 Proposed Action

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Approximately 265 km of transmission line will be constructed, generally parallel and in close proximity to the existing transmission line. The new transmission line will involve establishing an easement not wider than 100 m, to be located immediately west of the existing 40 m wide transmission line easement.

It is intended that construction of the new line will commence in March 2021.

1.3 Referral Under the EPBC Act 1999

Following referral of the Proposed Action in April 2020 (EPBC Referral 2019/8583), the Proposed Action has been determined to be Controlled Action by the Commonwealth Department for Agriculture, Water and Environment under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth, EPBC Act) on the basis of the potential impacts of the Project on Matters of National Environmental Significance (MNES), to be assessed by preliminary documentation. The relevant MNES considered by the Commonwealth Government include the following listed threatened species and communities:

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- Fat-leaf Wattle (*Acacia pinguifolia*) – Endangered
- Large-club Spider-orchid (*Caladenia macroclavia*) – Endangered

- Tufted Bush-pea (*Pultenaea trichophylla*) – Endangered

The Commonwealth Government have advised (via letter dated 15 May 2020) that information further to that provided in the Referral for the Project is required to enable an assessment of the impacts of the Project prior to the granting of approval. Specifically, the preliminary documentation for the Proposed Action must include:

- The information contained in the original referral
- The additional information provided on the impacts of the proposed action and the measures proposed to avoid, mitigate and/or offset those impacts
- Any other relevant information on the matters protected by the EPBC Act

This Report constitutes the preliminary documentation in accordance with the requirements detailed by the Commonwealth and summarised above. A reference table demonstrating where in this Report the additional requirements have been met is presented in Table 1.

Table 1: Preliminary Documentation Requirements Reference Table

Preliminary Documentation Requirement	Where Addressed
Description of the Action	
A summary of all components of the proposed action	Section 2.1
The activities associated with the proposed action	Section 2.2
The location, boundaries and size (in hectares) of the proposed action area, any discrete disturbance areas, and any adjoining areas which may be directly or indirectly impacted by the proposed action, including nearby habitat and areas for stockpiles, laydowns/storage, construction camps, substations, temporary transmission lines, vehicle access and associated activities.	Section 2.5
A layout plan (or plans) for the project, including but not limited to key infrastructure, laydown areas and construction camps, new access tracks, conservation areas and heritage agreements the project corridor passes through.	Section 2.5.2
The anticipated timing and duration (including start and completion dates) for construction and operation of the proposed action	Section 2.4
A description of operational requirements of the action including any anticipated maintenance works.	Section 2.3
A description and likely timing of rehabilitation activities associated with the proposed action.	Section 2.2.5
A discussion and details of any feasible alternatives to the proposed action that were considered, including the alternative of taking no action, a comparative description of the impacts of each alternative on MNES and detail to make clear why any alternative is preferred to another. Short, medium and long-term advantages and disadvantages of the options should be discussed.	Section 2.7
Description of the Environment and Matters of National Environmental Significance	
A description of the protected matters, including but not limited to those listed above, that are, or have the potential to be in the proposed action area and surrounds.	Section 3.2

A description of the current land use, topography, surface and groundwater bodies, waterways and vegetation communities within the proposed action area and surrounds	Section 3.1
For listed threatened species and communities that are known or have the potential to be present within the proposed action area and surrounds, and are likely to, or may be significantly impacted by the proposed action, a minimum of: • Information on the abundance, distribution, ecology and habitat preferences for each listed species or community. • Quantification of the extent of habitat and the number of individuals likely to be impacted, or historical patterns of use by those species, within the proposed action area and surrounds (including mapping identifying known and/or potential habitat). • Assessment of the quality and importance of known or potential habitat for the relevant listed species or communities within the proposed action area and surrounds. • Information detailing known occurrences of listed ecological communities within a 1 km radius of the proposed action area and the size of these occurrences. • Information detailing known populations or records of individuals of listed species within a 1 km radius of the proposed action area and the size of these populations, if available. For mobile species such as birds, population information and records of individuals must be considered at a relevant radius from the proposed action area. • An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the listed species or community and undertaken in accordance with relevant Departmental survey guidelines.	Section 3.2.2
Malleefowl (*Leipoa ocellate*). Detailed avoidance and mitigation information (e.g. in the form of a Malleefowl management plan) covering the following information. • All avoidance and mitigation measures previously proposed in referral information. • Avoidance and mitigation strategies to reduce impacts to Malleefowl mounds. Including buffers around both active and inactive mounds. Provide scientific justification for the buffer distances. • Avoidance and mitigation strategies to avoid disturbance to nesting Malleefowl and potential reduction in reproduction rates. • Clear mapping of all identified Malleefowl mounds (distinguishing active and inactive mounds) with associated buffers overlain with the final construction footprint. • Any other relevant avoidance and mitigation measures that will be implemented.	Section 3.3.2; Section 4.3
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland Threatened Ecological Community. • Undertake updated surveys to determine the current distribution of previously identified patches of Eyre Peninsula Blue Gum Woodland Threatened Ecological Community (TEC).	Section 3.3.3; Section 4.3

• Details regarding the floristic community type (FCT) and quality of each area of the TEC that will be directly and indirectly impacted by the proposed action. • The total area (in hectares) of the TEC that will be directly impacted by the proposed action. • The total area (in hectares) of the TEC that may be indirectly impacted (e.g. through spread of weeds or dieback, and hydrological change) by the proposed action. • The total size and quality of any larger contiguous patches of the TEC that may be fragmented or reduced by the proposed action, including the percentage by which patch size will be reduced and whether the reduction in extent will mean that remaining vegetation no longer meets listing criteria. • Discuss the impact of dieback caused by *Phytophthora cinnamomi* on the TEC and its impact upon the long-term viability of this ecological community. • Clear maps that identify all occurrences of the TEC within the project area (including any buffers listed in the Approved Conservation Advice for the Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland) overlain with the final construction footprint. • Final area of the TEC and its habitat that will be impacted by the proposal in hectares including any relevant buffers.	
Jumping-jack Wattle (*Acacia enterocarpa*) • Undertake updated surveys to determine the current distribution of previously identified occurrences of Jumping-jack Wattle. • Clear maps that identify all occurrences of Jumping-jack Wattle within the project area (including any buffers listed in the Recovery Plan for the Nationally Endangered Jumping-Jack Wattle *Acacia enterocarpa*) overlain with the final construction footprint. • Final area of Jumping-jack Wattle habitat and number of individuals that will be impacted by the proposal in hectares including any relevant buffers.	Section 3.3.4; Section 4.3
Fat-leaf Wattle (*Acacia pinguifolia*) • Provide updated desktop surveys for the distribution of Fat-leaf Wattle in the vicinity of the project, as the species reacts to fire and can change distribution rapidly. • Undertake updated surveys to determine the current distribution of previously identified occurrences of Fat-leaf Wattle. • Clear maps that identify all occurrences of Fat-leaf Wattle within the project area (including any buffers listed in the Recovery Plan for *Acacia pinguifolia* (Fat-leaved Wattle)) overlain with the final construction footprint. • Final area of Fat-leaf Wattle habitat and number of individuals that will be impacted by the proposal in hectares including any relevant buffers.	Section 3.3.5
Large-club Spider-orchid (*Caladenia macroclavia*) • Undertake updated surveys in accordance with the Department's Draft survey guidelines for Australia's threatened orchids (2013) in all suitable habitat within 500 m of the project corridor to	Section 3.3.6

determine the current distribution of Large-Club Spider-orchids. • Clear maps that identify all occurrences of Large-Club Spider-orchids within the project area (including any buffers listed in the Recovery Plan for Twelve Threatened Orchids in the Lofty Block Region of South Australia 2010) overlain with the final construction footprint. • Final area of Large-Club Spider-orchid habitat and number of individuals that will be impacted by the proposal in hectares including any relevant buffers.	
Tufted Bush-pea (*Pultenaea trichophylla*) • Undertake updated surveys to determine the current distribution of previously identified occurrences of Tufted Bush-pea. • Clear maps that identify all occurrences of Tufted Bush-pea within the project area (including any buffers listed in the Approved Conservation Advice for *Pultenaea trichophylla* (Tufted Bush-pea)) overlain with the final construction footprint. • Final area of Tufted Bush-pea habitat and number of individuals that will be impacted by the proposal in hectares including any relevant buffers.	Section 3.3.7; Section 4.3
Assessment of Impacts	
For each listed species and/or community, identify the amount and quality of habitat or vegetation likely to be impacted.	Section 5.2
Identify the number of affected individuals and/or habitat features (e.g. number of Malleefowl mounds, etc.) relevant to each listed species	Section 5.2
Characterise the nature of impacts, including timing and whether the impact is temporary or permanent	Section 5.2
Include a risk assessment of the potential impacts of the proposed action, including whether the nature and/or scale of the potential impacts are unknown, unpredictable or irreversible, and what confidence is placed on the predictions or relevant impacts	Section 5.2
Include details of any relevant policy guidelines, studies, surveys, management plans or consultations with subject-matter experts which were not included in the original referral.	Section 5.2
Avoidance and Mitigation Measures	
The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage impacts to the relevant protected matters from the proposed action. Documentation should clearly set out the following measures for each environmental issue and protected matter likely to be impacted by the proposed action. Measures including, but not limited to, the following items must be outlined in the documentation: • Address all project phases (pre-construction, construction and operation) of the proposed action. • State the environmental and conservation objectives, performance criteria, monitoring, reporting, corrective action, responsibility and timing for each environmental issue. • Describe contingencies for events, such as the identification of protected matters during pre-construction searches (e.g. translocation management protocols for specific species).	Chapter 4

• Include a description of any rehabilitation of temporarily disturbed areas. This should also address management, methodology, timing, duration and effort of rehabilitation works. • Include maps that illustrate the location of any proposed construction exclusion zones or buffer zones, and details on how these areas will be excluded, or protected. • Details of the vegetation or habitat to be retained must include the location and quantification of the total area, presence of protected matters, protection measures such as fencing and flagging, management measures. • Discussion of the likely residual impacts to the protected matter after proposed avoidance and/or mitigation measures are taken into account.	
Any action management plan submitted as part of the preliminary documentation must be prepared in accordance with the Action Management Plan Criteria.	Appendix D
Offsets	
The preliminary documentation must also provide details of the likely residual impacts on MNES that are likely to occur after all avoidance and/or mitigation measures are taken into account. If applicable, include the reasons why avoidance or mitigation of impacts cannot be reasonably achieved.	Section 5.3
The preliminary documentation must draw a conclusion on the need for an offset and, where an offset is required, include the following information: • An offset package consisting of an offset proposal (strategy) and key commitments and management actions for delivering and implementing a proposed offset (e.g. an Offset Management Plan). The proposed offset must meet the requirements of the Department's EPBC Act Environmental Offsets Policy (October 2012). • The package must include, but not be limited to, a description of the offset site(s) including location, size, condition and environmental values present, a justification of how the offset meets the EPBC Act Environmental Offsets Policy, an assessment (and justification for each input used) of the offset site(s) using the Department's Offset Assessment Guide, details on how the offset will be secured, managed and monitored, including management actions, responsibility, timing and performance criteria. This should include the specific environmental outcomes to be achieved from management measures, and the anticipated cost (financial and other) of delivery of the offset(s).	Section 6.2; Section 6.3
Economic and Social Matters	
The preliminary documentation must address the economic and social impacts (both positive and negative) of the proposed action. This may include: • An indication of the financial investment the project represents. • Details of any public and/or Indigenous stakeholder consultation activities, and their outcomes. • Projected costs and benefits of the proposed action, including the	Chapter 7

basis for their estimation through cost/benefit analysis or similar studies, e.g. employment opportunities expected to be generated by the project (including construction and operational phases). • Economic and social impacts should be considered at the local, regional and national level.	
Ecologically Sustainable Development	
The preliminary documentation should include a discussion of how the proposed action meets the principles of ecologically sustainable development, as defined in s. 3A of the EPBC Act.	Chapter 8
Environmental Record of the Person Proposing to Take the Action	
If the person proposing to take the action is a corporation, this extends to the executive officers of the corporation as well and details of the corporation's environmental policy and planning framework must also be included.	Section 9.1
The preliminary documentation must include details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against: • The person proposing to take the action. • For an action for which a person has applied for a permit, the person making the application.	Section 9.4
Other Approvals and Conditions	
The preliminary documentation must include information on any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. This must include: • A description of any approval that has been obtained or is required to be obtained from a state, territory or commonwealth agency or authority (other than an approval under the EPBC Act), including any conditions that apply (or are reasonably expected to apply) to the action. • A description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.	Section 10.1; Section 10.2
Outcomes-based conditions can provide approval holders with greater flexibility and autonomy while still holding them accountable for achieving sound environmental outcomes. The Department promotes the use of outcomes-based conditions where possible, in accordance with its Outcomes-based Conditions Policy (2016). If exercised, the preliminary documentation would need to: • Thoroughly document the baseline condition of the relevant protected matter(s). • Identify conservation objectives (outcomes) for the relevant protected matters, preferably with reference to any applicable conservation advices, recovery plans and threat abatement plans, and the likely impact the proposed outcome will address. • Detail the proposed management to achieve the outcome, including, but not limited to: performance indicators; periodic milestones; proposed monitoring and adaptive management and; record keeping, publication and reporting processes.	Not applicable

Relevant Policies and Publications	
For each protected matter, the preliminary documentation must include a statement explaining how the proposed action is not inconsistent with any relevant recovery plan or threat abatement plan.	Chapter 11
Information Sources	
The preliminary documentation must state for the information provided, the following: • The source and currency (date) of the information. • How the reliability of the information was tested. • The uncertainties (if any) in the information. • Guidelines, plans and/or policies considered.	Section 12.1

1.4 Optimisation of the Proposed Action

Since the submission of the Referral in April 2020, ElectraNet has continued to refine and optimise the project configuration as detailed design has progressed, and in keeping with ElectraNet's focus on minimising the potential for adverse social and environmental impacts. Whilst the resultant project remains consistent with the Referral, there are a number of areas where this optimisation has altered the project as referred. These are summarised in Table 2. The project, as proposed, is described in detail in Section 2 of this Report.

Table 2: Summary of Optimisations to the Proposed Action as Referred

Proposed Action Component / Activity	Optimisation of the Proposed Action
Transmission line alignment	The transmission line alignment has been modified, as a result of micro-siting activities, to avoid some areas of environmental significance, including some areas of Blue Gum Threatened Ecological Community.
Desktop micro-siting	The preliminary design has been reviewed using GIS to minimise impacts (predominantly structure pads, stringing pads and their associated spur tracks) on native vegetation, habitat and other environmental features.
In-field micro-siting	Where impacts could not be avoided during desktop micro-siting, in-field micro-siting has been undertaken by a qualified ecologist to provide recommendations to minimise impacts on native vegetation, habitat and other environmental features.
Structures / towers	The number of structures (and their associated land clearance requirements) have been reduced from 540 down to around 503 by increasing the span between towers to approximately 500-600 m (depending on the topography of the area).
Substation upgrades	The upgrade of the substations outside of their current footprint is no longer proposed as a component of these works.
Camps, offices and laydowns	All accommodation camps, offices and laydowns will be located to avoid impacts on native vegetation, habitat and

	other environmental features.
Stringing pads	Stringing pads are being preferentially located to avoid native vegetation. Stringing pads will only be located in native vegetation where they cannot be moved due to engineering requirements.
Stringing methods	In areas of Eyre Peninsula Blue Gum, ElectraNet is proposing the use alternative stringing methods to avoid the need for land clearance along a stringing track. This includes consideration of drone stringing and/or the use of hurdles.
Temporary transmission lines	The requirement for temporary transmission lines, and their disturbance requirements, has been reduced from three temporary lines to a single temporary line at Boston.
Access tracks	The number of spur tracks to tower locations proposed has been reduced, and these will be placed with greater consideration to the surrounding vegetation.
Towers	A decision has been made to use lattice towers for the line.
Permanent and temporary land disturbance	As a result of the above changes, there have been some changes (reductions) in the amount and nature of land clearance required to undertake the action.

2. DESCRIPTION OF THE ACTION

2.1 Project Components

ElectraNet propose to construct a new electricity transmission line from Cultana to Port Lincoln (see detailed transmission line alignment in Appendix A). The Proposed Action will involve:

- a new 137 km double-circuit line from Cultana to Yadnarie that is initially energised at 132 kV (with the option to be energised at 275 kV if required in the future) consisting of eight (8) separate lines (conductors and earthwires) and mounted on 60 m high lattice steel structures; and
- a new 128 km, 132 kV double-circuit line from Yadnarie to Port Lincoln consisting of eight (8) separate lines (conductors and earthwires) and mounted on 50 m high lattice structures for the main transmission line and monopoles for the temporary line.

There will be an average span of 500-600 m between each structure within the transmission line corridor to extend a total distance of 265 km, from the Cultana substation in the north to the Port Lincoln terminal substation in the south.

ElectraNet is in the process of securing a 100 m-wide easement adjacent to and on the western side of the existing 40 m-wide 132 kV transmission line easement in which to build the proposed transmission line. Generally, the proposed transmission line will be built approximately 30 m in from the western edge of the new easement, leaving a buffer of at least 70 m from the existing 132 kV transmission line.

The components of the transmission line are described in more detail in the following sections.

2.1.1 Structures

The proposed transmission line is to be supported by lattice structures of up to 60 m in height (see Figure 2). On average, it is proposed to erect one structure for every 500-600 m span of transmission line, requiring a total of around 503 structures along the entire alignment, with details as follows:

- In the northern section of the easement from Cultana to Yadnarie, the average span between structures will be approximately 550 m, necessitating 245 structures measuring approximately 60 m in height. Each structure will require a 40 m x 40 m (1600 m^2) construction footprint and a permanent footprint of 15 m x 15 m (225 m^2) in native vegetation, with a 50 m x 50 m (2500 m^2) construction footprint and a permanent footprint of 15 m x 15 m (225 m^2) in agricultural or other (non-native vegetation) land. Some structures will need slightly larger construction footprints where taller structures are required to clear topography, or where benching is required due to sloping ground. Structures in this section of the alignment have been designed at a height to clear native vegetation with minimal disturbance.
- In the southern section of the easement between Yadnarie and Port Lincoln where cropping activities dominate, the average span will be approximately 500 m,

necessitating 258 structures measuring approximately 50 m in height. These structures will have the same footprint requirements as the northern section.

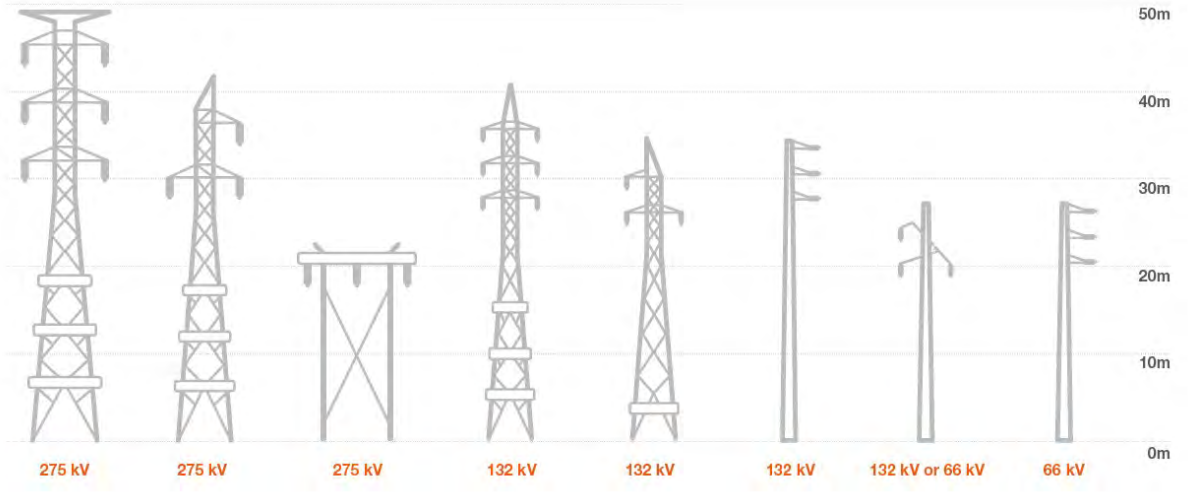


Figure 2: Examples of Transmission Line Structures

2.1.2 Concrete Batching Plants

Mobile (temporary) concrete batching plants are likely to be used to provide the foundation material for the structures and structure pads. The type, number and location of these plants are not yet known but will be confirmed on engagement of the construction contractor who will liaise with the EPA to obtain the necessary licences for the use of these plants. Sites would be confined to areas of existing disturbance.

2.1.3 Access Tracks

Access to each structure site will be required during construction and operation/maintenance activities. There are many existing access tracks used to maintain the current 132 kV transmission line and ElectraNet intends to use these as much as possible to access the proposed transmission line alignment.

Where new access tracks are needed, the following two options are currently being considered:

- Construction of new individual access tracks (referred to as spur tracks) from the existing transmission line access track to each new structure; and/or
- A temporary longitudinal access track along the length of some sections of the new transmission line easement (where an existing ElectraNet access track is not already available).

Within native vegetation, the only area that a longitudinal access track is required is in the Cultana Training Area from Cultana substation to the southern border of the Department of Defence land, where a 5 m wide access track is required to provide construction access to structures. This track would be temporary (i.e. for the construction period only) and would be rolled or simply driven over wherever possible. It will require more substantial preparation in some areas including the addition of road-base material to make some of the sandier sections trafficable for the larger construction equipment. At the completion of

construction activities, the road-base material will be removed in some sections, and those areas actively rehabilitated (i.e. revegetated) to remove the potential for the creation of a predator highway given the lack of existing vehicle access in these areas. Active rehabilitation will be focussed on sections of the access track either side of watercourses and drainage channels (which are preferred habitat for the Western Grasswren).For ongoing maintenance and inspections by ElectraNet, vehicles will drive through saltbush using the shortest route possible to access towers using the existing DoD tracks to enter the site.

Spur tracks will be used wherever possible to minimise the need for construction of new longitudinal access track sections and thereby minimise the impact (i.e. ground disturbance/clearance). It is likely that access to new structures will be achieved via a combination of existing access tracks, new spur tracks and sections with a new longitudinal access track. In all cases, new access tracks will be designed to take the shortest route and with as little impact as possible on existing cropping/grazing activities, native vegetation and sensitive areas. Spur tracks will be 5 m wide and of various lengths (generally less than 100 m), depending on the location of each new structure relative to the existing transmission line access track, necessitating approximately 500 m^2 of disturbance per spur track.

Temporary tracks (i.e. those required for construction only) may use vegetation rolling techniques, minimising clearance. Where permanent tracks are required, bulldozers and graders will be used to clear vegetation (as required) to provide a trafficable surface. In addition, some of the existing tracks will need to be upgraded to safely accommodate the type of vehicles and equipment required for the development, with upgrades similarly designed to minimise impacts.

2.1.4 Substations

Minor upgrades will be undertaken in the existing substations at:

- Cultana substation
- Yadnarie substation
- Port Lincoln Terminal substation; and
- Wudinna substation.

Works in the four substations as part of the Proposed Action will accommodate additional electricity infrastructure required to support the high voltage transmission line. No work is required outside of the existing disturbance footprint of the substations.

2.1.5 Temporary Transmission Lines

A temporary transmission line will be installed at one location during construction to maintain electricity supply to the EP while the new transmission line is being established. This temporary transmission line will be removed once it is no longer required. Approximately 3.8 km of temporary transmission line, with a corresponding 29 structures will be required. Each temporary structure will require a 30 m x 30 m (1600 m^2) construction footprint, which will also be used for stringing. Approximately 3.8 km of 5 m wide access track (18.9 ha) will also be required to support the temporary line.

2.1.6 Laydown Areas

The project requires the development of six to 10 main all-weather laydown areas, ranging in size from approximately 0.25 – 1.0 ha in size, within or close to the easement at locations close to Whyalla, Cowell, Cleve (Yadnarie) and Port Lincoln north. These areas will be used to store heavy vehicles, equipment and bulk materials (including large drums of conductor and earthwire cabling) needed to construct the transmission line with associated site offices and amenities housed within ATCO-style huts. Final siting of the proposed laydown areas will be determined by the construction contractor as part of the detailed design phase with site selection criteria as follows:

- Located close to alignment, relatively flat, stable, and capable of being secured and screened.
- Access for B-double trucks is available.
- No clearance of native vegetation is required.
- No listed flora and fauna species are present.
- Items or sites of cultural heritage significance are not affected.
- The site is located away from residences and other sensitive receptors.

These laydown areas will incorporate security fencing, gates and areas for storage of diesel fuel within integrated self-bunded tanks. As with the workers' camps (see following section), the construction contractor will obtain all necessary licences and approvals to establish and operate the laydown areas.

Contractors undertaking the works will access the main laydown areas to collect equipment and materials which will then be transported to specific construction sites along the alignment. Smaller temporary laydown areas will be set up on existing access tracks along the alignment to erect the structures and conductors.

All laydown sites will be rehabilitated immediately after use.

2.1.7 Workers Accommodation

Two temporary workers' camps, each approximately 2 hectares in size, will be developed as part of the project owing to the paucity of available accommodation facilities along the proposed alignment. Additional accommodation and site offices may be secured using established facilities in town centres such as Whyalla, Cleve and Port Lincoln. One of these camps will be located at Tumby Bay (approximately 13 km east of the project alignment) while the other will be located on the periphery of the Sheoak Hill Conservation Park (approximately 35 km north-west of Cowell). While the precise siting of these camps is to be determined by the construction contractor as part of the detailed design phase, ElectraNet requires that they be sited in areas already disturbed by development of access tracks or maintenance activities, or in areas with limited native vegetation using the following criteria:

- Located close to alignment, is relatively flat, stable and capable of being secured and screened;
- Access for B-double trucks is available;

- Has been previously cleared requiring no (or minimal) native vegetation clearance;
- No listed flora and fauna species are present;
- Items or sites of cultural heritage significance are not affected; and
- Located away from residences and other sensitive receptors.

Each camp will provide accommodation, amenities and kitchen (dry mess) facilities for around 100 workers and incorporate local power generation facilities (requiring integrated self-bunded diesel fuel storage tanks), wastewater treatment and stormwater management regimes. As noted, the construction contractor will obtain all licences and approvals for establishing and operating the camps from the relevant authorities.

Being of a temporary nature, the workers' camp sites will be rehabilitated immediately after use.

2.2 Construction Activities

A typical program of works to erect the transmission line will involve the following:

- Geotechnical investigations.
- Survey and pegging.
- Development of access tracks where required.
- Installation of gates for security reasons where required.
- Marking out the precise position of structures to be erected.
- Clearing and levelling the area where the structures are to be positioned to ensure a stable and safe surface for construction (see section 4.3 below for a description of the structure pads). Structure pads will be rolled where possible to minimise vegetation impacts. Where required, clearing will take the form of 'scraping' the vegetation and associated soil materials with a bulldozer, stockpiling these materials until construction is complete, and returning the materials as close as possible to their original state to facilitate self-seeding of the vegetation (i.e. rehabilitation).
- Drilling and concreting of structure footings.
- Erection of the structures.
- Stringing of the conductor cabling, usually undertaken in sections of 5-10 km at a time. ElectraNet is currently working with the construction contractor to determine how stringing will minimise on-ground impacts. In most cases stringing will be undertaken within a stringing track using equipment such as winches and purpose-built stringing machines. There is a possibility that some aerial stringing could be undertaken using a drone, but this method requires further feasibility investigation and safety assessment by ElectraNet and may not be available in time to be rolled out for this project.
- Rehabilitation of temporarily cleared areas.

The key activities are described in more detail in the following sections.

2.2.1 Access Track Development

Where new access tracks and/or upgrades to existing access tracks are required, tracks are typically constructed by light grading using bulldozers and/or graders to a width of approximately 5 m. Greater track widths may be required in some areas (e.g. if a passing area or wider turning area is required, or where the track is established through very sandy dunes). Capping with imported material is typically only required in limited areas where the surface cannot support construction traffic (e.g. sand dunes or boggy areas) or where all-weather access for ongoing maintenance is required. If required, material for capping would be obtained from appropriately authorised sources (e.g. existing borrow pits and/or local quarries).

Access track creek crossings are normally established at the natural surface level, with minimal earthworks undertaken. At some watercourses (e.g. where a narrow, defined channel is present), temporary or permanent crossings (e.g. using pipes or culverts) may be required to be installed to allow access for cranes and deliveries and ongoing maintenance access.

The final access track location will be determined by ElectraNet and the construction contractor in the detailed design phase, when final tower locations have been selected, cultural heritage clearances have been undertaken and agreement has been reached with landowners.

2.2.2 Structure Development

Structure development consists of a number of smaller steps, detailed in the following sections.

2.2.2.1 Clearance of Structure Locations

The structures will be constructed on temporary structure pads with a maximum construction area of 50 m x 50 m to allow space for positioning large equipment (cranes, piling rigs and winches) required to erect the structures and string the transmission line. The construction footprint will be minimised wherever possible, with structure pads of 40 m x 40 m achievable in most locations in native vegetation. Examples of typical structure pad layouts are provided in Figure 3 and Figure 4. After construction, the permanent tower footprint will measure approximately 15 m x 15 m and the balance of the construction pad will be rehabilitated.

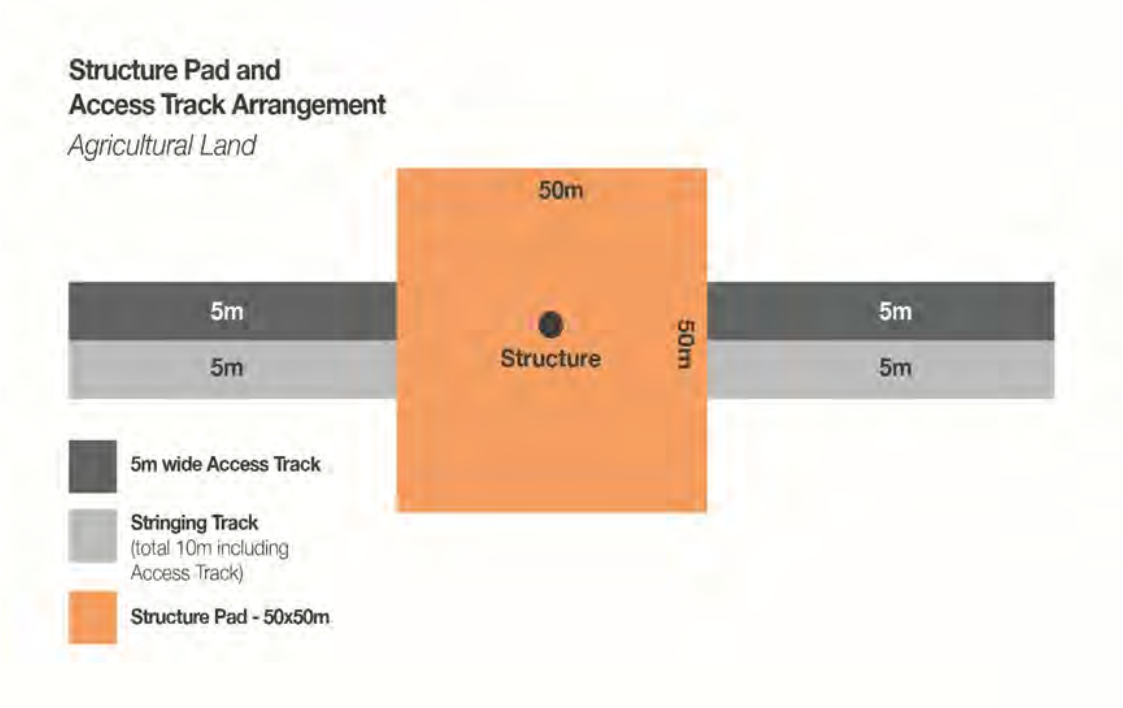


Figure 3: Typical Structure Pad Arrangement for Non-Sensitive Areas

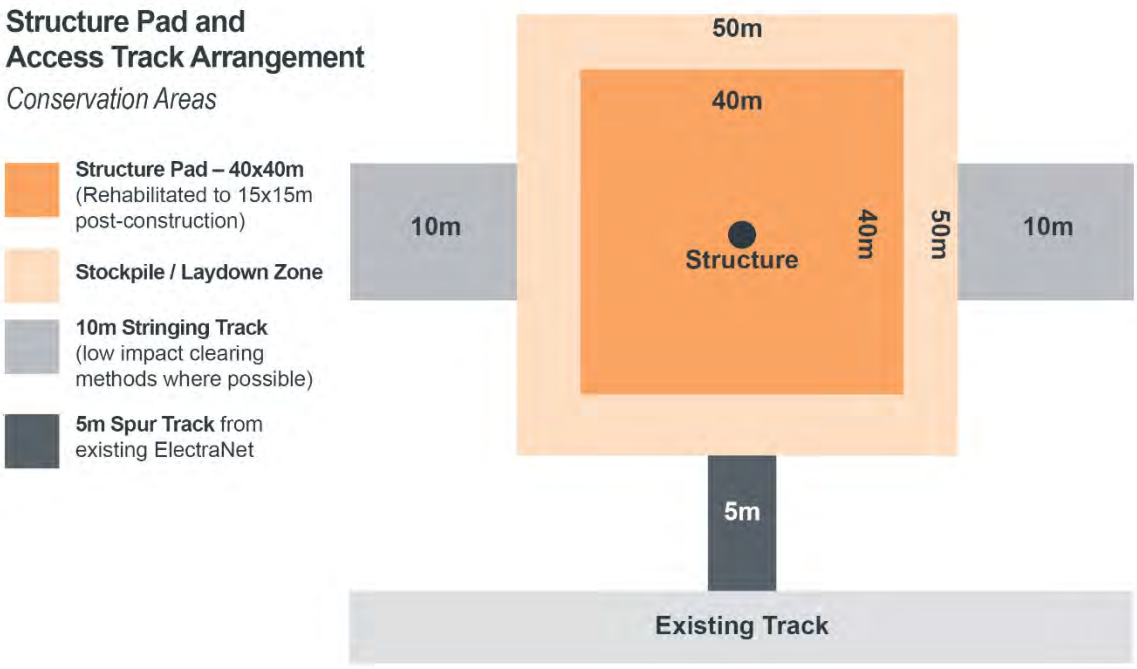


Figure 4: Typical Structure Pad Arrangement for Sensitive Areas

2.2.2.2 Foundations

Excavations for tower foundations are typically dug using equipment such as excavators or borers to a depth of 10 m - 15m. Auger drilling will be used, although variations to this may sometimes be used in areas where it is dictated by the geology (e.g. hard rock), however these are not expected to be extensively required.

The aim is for all foundations activities to be undertaken outside of breeding season

Where hard rock is encountered 'pepper drilling' will be used to weaken the rock. A pattern of smaller holes will be drilled in the circumference of the footing weakening the rock allowing for the main auger to penetrate the rock easier. A normal drilling auger will be used to drill into the weakened rock. This has far less impact that blasting or driving piles with a diesel hammer.

Sites with collapsing sand over rock will be drilled using micro-piling (10-30cm piles) which involve multiple small diameter piles instead of one large pile per footing (tower leg).

Soil from excavations for foundations is typically spread at the tower site if suitable, or it may be used off site (e.g. for capping or used by the landowner).

2.2.2.3 Structure Assembly and Erection

Lattice towers are expected to be assembled on site into sections prior to erection. Mobile cranes are used to lift tower sections into place for final assembly. Insulators and fittings would be attached to the tower and sheaves attached to the crossarms for stringing.

2.2.3 Stringing

The Proposed Action will require around 1,800 km of conductor and earthwire (OPGW) cabling to be delivered to various sites along the alignment. Each involves slightly different land disturbance requirement. Generally, a stringing pad approximately 150 m x 30 m (4,500 m^2) will be located mid-span with stringing undertaken in either direction before the conductor is jointed mid-span (floating method). An alternate arrangement will also be used, with two stringing pads approximately 50 m x 50 m (2,500 m^2) each in size located either side of a structure with stringing undertaken in either direction and jointed at or near the structure (strain to strain method). Approximately 141 stringing areas will be required along the 265 km alignment. A 10 m wide stringing access corridor will also be required along the length of the alignment. In native vegetation or sensitive habitat areas, the stringing access corridor will be established using low-impact clearing methods (e.g. trees and overhanging vegetation will be trimmed rather than cleared wherever possible and larger trees and shrubs will only be removed where impact is necessary and unavoidable. All grasses and groundcovers, as well as topsoil and seedstock, will remain in place with vehicular access limited to the minimum number of passes required to install the draw-wire needed to allow stringing of conductor and optical ground wires.

Stringing may occur via a number of methods, to be determined by the construction contractor upon contract award. The 'strain to strain' method involves the use of 'pullers' and 'tensioners' set up on level pads (see Figure 5) to pull the conductor wire under tension from one strain structure (tensioner) to another strain structure (puller). On completion of stringing, the conductor wire is then anchored with rigging gear to the strain cross-arm at one end, with the conductor measured, cut, terminated and connected to the

strain insulator assembly. At the other end, the conductor wire is pulled to final required tension, measured, cut, terminated and connected to the strain insulator assembly. This process is repeated for all six conductor wires and the two earthwires before installation of insulator/clamp assemblies.

The 'floating' method involves using pullers and tensioners to pull the conductor wire under tension from the middle of a span (see Figure 6). On completion of stringing, the conductor wire is then anchored with rigging gear to a ground anchor. The conductor tails are jointed using a mid-span joint with the conductor wire then pulled sideways until tension is taken up by a sideways pulled winch. The conductor is then allowed to float until all tension is off the anchors and they can be disconnected. By pulling the other end back the conductor can be taken to final tension, measured, cut, terminated and connected to the strain assembly, or jointed to a previously installed section. This process is repeated for all six conductor wires before installation of insulator/clamp assemblies

The optical ground wire (OPGW) method involves stringing a thinner wire used for both communications and grounding to the top of the structure. As this wire cannot be jointed without bringing it to ground level, additional pads are required along the alignment during the stringing process (see Figure 7).

Where necessary (with consideration to the mitigation and management strategies described in Chapter 4), a separate stringing track will be established to accommodate the stringing process using a bulldozer with blades raised to remove larger trees while keeping shrubs, grasses and top soil largely intact. On completion of stringing, the site will be rehabilitated. Measures will be implemented to prevent stringing tracks becoming access tracks. Stringing of the transmission line will typically proceed in a linear fashion along the easement, concurrently at several different sites to be determined by the construction contractor.

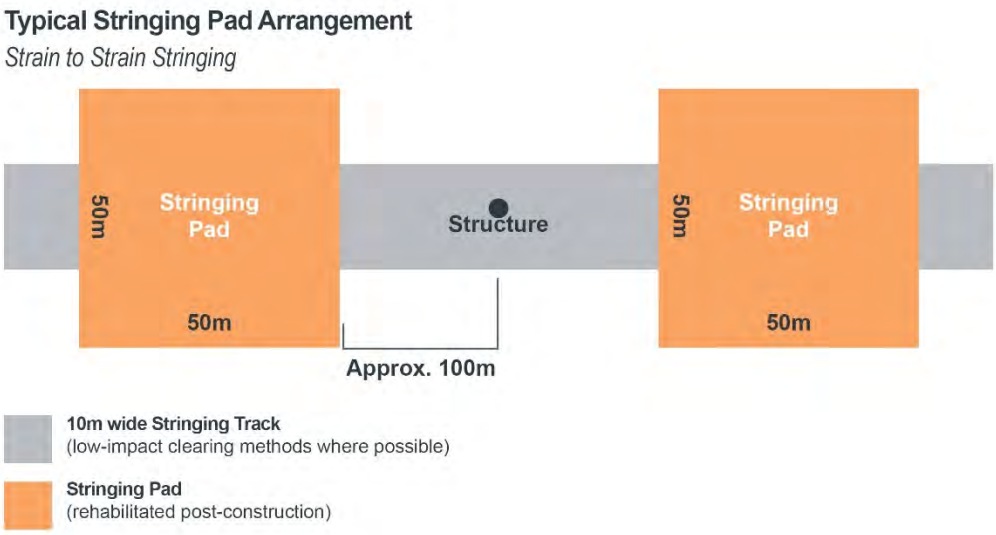


Figure 5: Strain-to-Strain Conductor and Earthwire Stringing Method

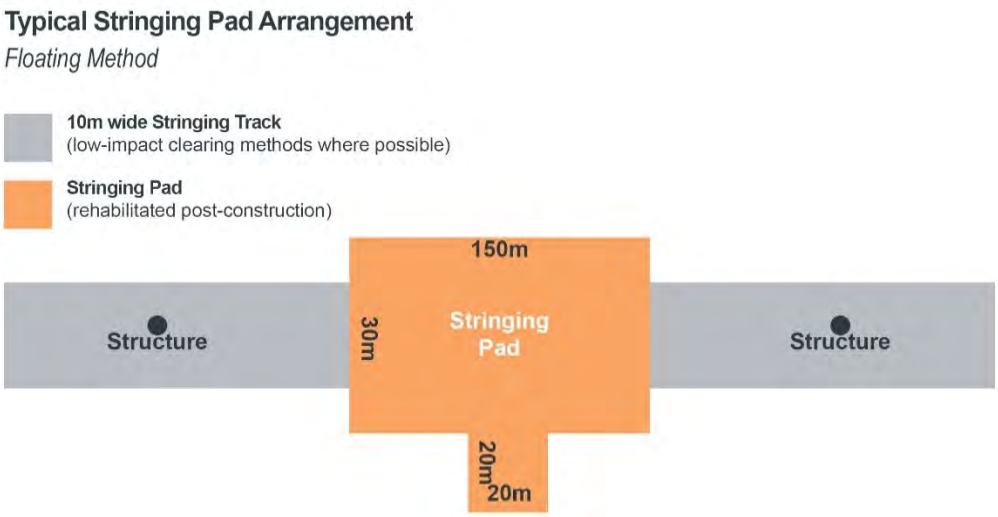


Figure 6: Floating Conductor Stringing Method

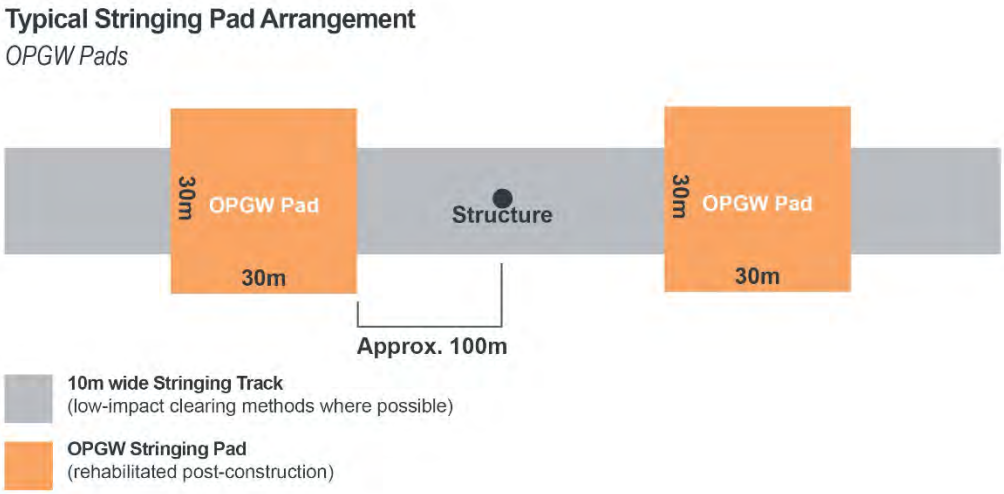


Figure 7: OPGW Stringing Method

2.2.4 Temporary Transmission Line Construction, Operation and Removal

The temporary lines will consist of a steel monopole using a direct embedment footing (i.e. without concrete), some structures will also have guy wires, supporting cross-arms with the required insulators. The temporary line would be strung with new conductor cable, and ultimately tied into the existing line during a short transmission line outage. These temporary transmission lines will be removed once they are no longer required, undertaken in reverse of the construction methodology.

2.2.5 Rehabilitation

Areas of temporary disturbance such as stringing pads, laydowns and the balance of structure pads do not form part of the permanent footprint will be cleaned up and rehabilitated. Rehabilitation would involve removal of construction material and waste, surface contouring and scarifying where required, and respreading of topsoil and cleared vegetation to encourage natural recruitment of vegetation. Rehabilitated sites are monitored during operations for soil stability, presence of weeds and vegetation recruitment success and remedial measures undertaken where required, including active reseeding should this be required.

2.3 Operational Requirements

Ongoing maintenance will be required for the transmission line. Spur tracks from the existing ElectraNet access track will be retained for inspection and maintenance activities, predominantly by light 4WD vehicles. Maintenance programs would typically involve two visual inspections per year for signs of unusual wear, corrosion or damage and a pre-bushfire season inspection. Bird nest removal is undertaken where required, in accordance with permits obtained under the *National Parks and Wildlife Act 1972* (SA). Helicopter-based inspections would be undertaken annually. A more detailed inspection by vehicle would occur about every four years. Insulators would typically be replaced every 25 years.

Vegetation assessments, including canopy height measurement, are used during the detailed engineering phase to design the line profile. Conductor heights have been designed to avoid the mature canopy height of existing native vegetation and therefore minimise vegetation clearance both during construction and ongoing maintenance.

Where vegetation clearance is unavoidable and to minimise the risk of power outages, damage to transmission lines or fire starts, vegetation management works are undertaken to make sure that clearance distances between vegetation and transmission lines are established and maintained in accordance with the Electricity (Principles of Vegetation Clearance) Regulations 2010 (SA) (see Figure 8). It is anticipated that very limited tree trimming will be required across the length of the line (limited to the occasional outlier tree growing taller than the average mature canopy height) to maintain the require electrical clearances.

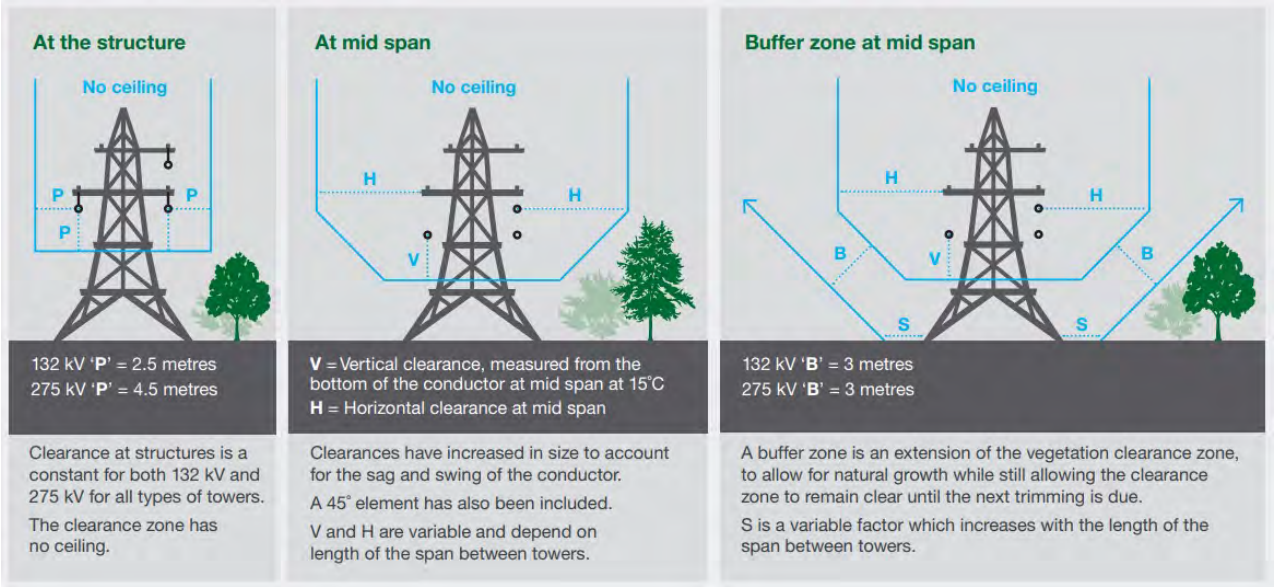


Figure 8: Vegetation Clearance Requirements for 132 and 275 kV Transmission Lines

2.4 Decommissioning

The electricity transmission line has a nominal life of 50 years, however may undergo relevant and appropriate life extension-related works and upgrades to continue operation beyond this timeframe (perhaps to 60 years).

Upon decommissioning, the conductors would be removed for recycling, and the towers toppled and cut up for transport offsite. Tower foundations would be excavated to approximately 500 mm below ground level and removed, leaving the remaining foundation in-situ.

Because this transmission line provides the single radial energy source to the Eyre Peninsula, and electricity will be required to service people, communities and businesses on the Eyre Peninsula in perpetuity, it is unlikely that permanent clearance would be rehabilitated, but rather a new electricity transmission line would be constructed within this proposed easement to continue to supply electricity to the area. Should, for whatever reason, this not be required, cleared areas would be scarified and left to naturally revegetate.

2.5 Project Schedule

Development of the proposed transmission line, including rehabilitation activities, will take up to three years from the commencement of construction, with early works anticipated to begin in March 2021 and line energisation scheduled to occur in late 2022.

2.6 Location of Proposed Action

2.6.1 Overview

The proposed action is located on the eastern side of the Eyre Peninsula in South Australia, and occurs over a distance of approximately 270 km from the existing Cultana electricity substation just north-west of Whyalla, to Port Lincoln. The new transmission line passes to the west of the townships of Cleve and Tumby Bay and passes through the following Local Government Areas:

- City of Whyalla
- District Council (DC) of Franklin Harbour
- DC of Cleve
- DC of Tumby Bay
- DC of Lower Eyre Peninsula
- Pastoral Unincorporated Area.

2.6.2 Proposed Transmission Line Route

The planning study to identify the preferred route for the new replacement transmission line began in 2014 with an assessment of a corridor spanning 200 metres either side of the existing line. The study looked at the opportunities and constraints for a replacement within this corridor and any drivers for deviation, and included a geo-spatial multi-criteria analysis, which assessed various alignment options to identify the route that best balances environmental, cultural, social, land use, engineering and cost criteria. The proposed transmission line route will follow (i.e. be within 100 m of) the existing transmission line route with the exception of a number of areas of diversion, necessitated by constraints posed by the proximity of dwellings, difficult terrain and/or environmentally and culturally sensitive areas, specifically:

- Cultana substation to Structure 30, a change in the alignment has been made to minimise the length of the transmission line on Defence land where access restrictions are in place, and to avoid identified cultural heritage sites, EPBC-listed fauna, the Whyalla Conservation Park and Wild Dog Hill. This section of the easement will be located east of the existing 132 kV line and will require the construction of a new 5 m wide in-easement access track.
- Line deviation approximately 150m to the west near Managlo to avoid an area of significant cultural heritage and steep terrain
- Line deviation approximately 150 m to the west at “Nyllow Hill” to avoid an area of significant cultural heritage, steep terrain and native vegetation.
- Line deviation at Whites Flat to avoid several residences, several areas of significant cultural heritage and steep terrain
- The proposed transmission line passes over two dams north-east of the Middleback area and while no deviation is envisaged, further siting work is required to ensure there are no ongoing operational issues.

- The new line will not pass over the “Claypan”, a cultural heritage site to the west of the Middleback substation.
- The line passes through Wharminda Conservation Park with spur tracks to be established from existing tracks on the eastern side of the park.
- A structure is required in an area of significant vegetation near Pillaworta Hill. While the line is unlikely to be deviated, the structure will be sited to minimise clearance using a single spur access track and local clearance only.
- The line passes near a large tree in a valley on the north side of McAvany Lane with structures to be carefully sited to ensure the tree is not impacted.
- The line will be built in the existing easement at Boston to minimise impact on residences.

The chosen route has the least net environmental impact as it enables the use of existing access tracks to minimise vegetation clearance and reflects detailed flora and fauna studies that have mapped ecological communities to enable effective structure micro-siting, further minimising potential impact. It also minimises impacts on culturally sensitive sites by managing and protecting identified Aboriginal heritage values within the proposed line corridor, before, during and after construction. The Project reflects community preferences to contain the new and old infrastructure within the same corridor and be located on the western side of the existing line and achieves the lowest cost for consumers as it is the shortest, most direct route between its fixed connection points.

The proposed route is shown in detail in Appendix A (Transmission Line Alignment). The locations of associated infrastructure (i.e. workers camps, substations, laydown areas, temporary transmission lines, access tracks, stringing pads) are also shown. Coordinates delineating the extent of the Proposed Action were presented in original Referral (see Appendix H, EPBC Referral (Main Document)).

2.7 Land Disturbance

The Project involves clearance of native vegetation (and associated habitat) together with the use of existing cleared (grazing/cropping) land to accommodate transmission structures, access tracks, temporary construction areas including laydown and accommodation camps, and to permit ongoing access during construction and operation phases.

The construction disturbance footprint is influenced by factors to be determined in detailed design, including structure size, location and spacing, access track details (e.g. extent of use of existing ElectraNet tracks and location of new tracks) and construction methodology (e.g. stringing methods). Existing tracks and other disturbed areas will be used where possible, however for assessment purposes, land disturbance for construction has been derived based on a conservative land disturbance scenario as detailed in Table 3. The estimate of land disturbances for the project are subsequently provided in Table 4.

Based on the current design and the assumptions outlined above, the total construction footprint of the Proposed Action has been calculated as 1286.1 ha, of which 117.2 ha would be permanent. Of this, 61 ha of the total disturbance footprint occurs in native vegetation, of which 21.8 ha is permanent.

The actual clearance is likely to be significantly less than this, as the existing access track along the existing ElectraNet transmission line is expected to be used to provide access across a significant portion of the transmission line. As noted in Section 2.3, it is possible that some clearance or lopping of trees may be required under the conductors in areas of taller woodland to ensure that required clearance distances between vegetation and transmission lines are established and maintained. Where possible, conductor heights will be set to avoid or minimise vegetation clearance both during construction and ongoing maintenance.

Table 3: Land Disturbance Estimate Basis (Shading Denotes Clearance in Agriculture Land, No Native Vegetation Clearance).

Component	Structures	Pad Size	Initial Disturbance	Description of Rehabilitation	Permanent Clearance (per structure)	Temporary Clearance (per structure)
Structures						
Structures (Cultana to Yadnarie, ~136 km)	1 - 26	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (plus 20 m x 20 m low impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	27 - 73	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	74 - 77	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	78 - 139	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (plus 20 m x 20 m low impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	140 - 142	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	143 - 167	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (plus 20 m x 20 m low impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	168 - 177	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2

Component	Structures	Pad Size	Initial Disturbance	Description of Rehabilitation	Permanent Clearance (per structure)	Temporary Clearance (per structure)
	178 - 179	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	180 - 227	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	228 - 230	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	231 - 238	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
Structures (Yadnarie to Port Lincoln, ~126 km)	1 - 60	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	61 - 62	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	63 - 94	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	95	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2

Component	Structures	Pad Size	Initial Disturbance	Description of Rehabilitation	Permanent Clearance (per structure)	Temporary Clearance (per structure)
	96 - 156	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	157 - 159	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	160	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	161	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	162	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	163 - 168	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	169 - 170	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	171 - 174	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2

Component	Structures	Pad Size	Initial Disturbance	Description of Rehabilitation	Permanent Clearance (per structure)	Temporary Clearance (per structure)
	175	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	176	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	177 - 191	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
	192 - 193	40 m x 40 m (50 m x 50 m pegged area for structure laydown)	1600 m^2 structure pad (20 m x 20 m impact within pegged area)	1375 m^2 of structure pad (low-impact disturbance for additional 400 m^2 structure laydown)	15 m x 15 m (225 m^2 pad under tower)	1775 m^2
	194 - 255	50 m x 50 m	50 m x 50 m	2,275 m^2 of agricultural land returned to use	15 m x 15 m (225 m^2 pad under tower)	2275 m^2
Access Tracks and Stringing Corridor						
Other	Turnouts	N/A	20 m x 20 m zones	None	All	None
	Passing Lanes	N/A	15 m x 5 m	None	All	None
Spur Tracks	Spur Tracks	N/A	5 m track	None	All	None
Centreline Track	Permanent 5 m centreline track (Cultana Substation to Structure 25)	N/A	5 m permanent track from Cultana substation to Structure 25 (low impact where possible, some fill may be required)	None	All	None
	Temporary 5 m	N/A	5 m track	5 m temporary tracks	None	All

Component	Structures	Pad Size	Initial Disturbance	Description of Rehabilitation	Permanent Clearance (per structure)	Temporary Clearance (per structure)
	centreline track (all other locations)		(low impact where possible, some pockets of vegetation in agricultural land may be impacted).			
Stringing Access Corridor	Temporary 10 m stringing track	N/A	10 m track (low impact clearance will be applied)	All 10 m tracks will be temporary in native vegetation	None	All
Stringing Pads						
	Conductor Pads	N/A	100 m x 30 m	All	None	All
	OPGW Pads	N/A	50 m x 50 m m	All	None	All
Tree Trimming						
275 kV transmission line (Cultana to Yadnarie)	Tree trimming	N/A	Trimming of branches and some total removal for electrical clearance, stringing and/or clearing adjacent access tracks - assume 2HA	None	All	None
132 kV transmission line (Yadnarie to Port Lincoln)		N/A	Trimming of branches and some total removal for electrical clearance, stringing and/or clearing adjacent access tracks - assume 2HA	None	All	None
Laydown Areas, Accommodation Camps and Batching Plants						
	All	Will not be located in native vegetation				

Table 4: Land Disturbance Estimates for the Proposed Action.

Component	Total Construction Disturbance (ha)	Total Permanent Disturbance (ha)	Construction Disturbance in Native Vegetation (ha)	Permanent Disturbance in Native Vegetation (ha)
Structures (Cultana to Yadnarie)	446.118	55.125	27.47	3.91
Structures (Yadnarie to Port Lincoln)	470.85	58.050	5.32	0.69
Stringing Pads	20.25	0	7.53	0
Stringing Access Corridor	248.23	0	107.47 (including 3.48 ha of avoided stringing impact and 7.20 ha of low impact stringing)	0
Centreline Access Tracks	76.16	All	9.64	6.23
Spur Tracks	8.29	All	6.35	6.35
Turnouts and overtaking lanes	1.04	All	0.66	0.66
Temporary Transmission Lines	4.5	0	0	0
Laydown Areas	2.7	0	0	0
Workers Accommodation	4	0	0	0
Tree Trimming	4	4	4	4
TOTALS (rounded)	**1287**	**118**	**61**	**22**

2.8 Alternatives to the Proposed Action

2.8.1 Justification for the Proposed Action

The existing Eyre Peninsula 132 kV radial transmission line is almost 50 years old is approaching the end of its operational life. Since its inception, demand on the Eyre Peninsula's electricity transmission system has continued to grow steadily due to the ongoing expansion of primary production, residential, industrial and commercial activities within the EP. This demand is considered likely to continue to grow as evidenced by the growth in mining and associated infrastructure on the EP, such as new ports and processing facilities. Supporting this demand are five formal connection enquires made to ElectraNet by mining companies covering six separate spot load developments, reflecting various resource tenements under multiple ownerships; and the growth in renewable energy developments along the EP.

The potential increase in electricity demand is beyond the capacity of the existing transmission network and mean that the relevant Electricity Transmission Code (ETC) standards at the Port Lincoln connection point will not be met unless the existing infrastructure is upgraded. This will also optimise the social, economic and environmental benefits arising from expansion of primary production, mining and renewable energy activities.

2.8.2 Alternatives to the Proposed Action

The alternatives to the Proposed Action include doing nothing (refer to Section 2.7.1 for a discussion on the potential impacts of the do-nothing scenario) and the upgrade/maintenance of the existing 132 kV transmission line.

As discussed previously, the existing 132 kV transmission line is approaching the end of its operational life. This will necessitate the replacement of various time-expired components, including conductors, over the next 10 years or so, requiring either significant rolling power outages and significant ongoing costs just to maintain the existing line capacity, or construction of a temporary line to allow reconductoring of the existing line. To resolve the forecast line capacity limitations, augmentation of the existing line would be required, necessitating the replacement or some or all of the existing structures along this line. When considered in the context of the simplicity of construction of an adjacent line, the ongoing maintenance and augmentation of the existing line is not considered feasible.

With respect to the chosen alignment, a significant body of work was undertaken in the early stages of the Project (2011-2014) to determine the optimum route for the Project, including:

- ElectraNet: Route Investigations Report (May 2011)
- ElectraNet: Route Selection Analysis (April 2012)
- Parsons Brinkerhoff: Pre-Statutory Approvals Investigations (Desktop) Report (September 2012)
- ElectraNet: Land Assessment & Options Strategy – Eyre Peninsula Land and Easement Acquisition (October 2012)

- ElectraNet: Communications and Community Engagement Report (June 2013)
- ElectraNet: Land Assessment & Options Recommendation (April 2014)

These studies looked at the opportunities and constraints for a replacement within this corridor and any drivers for deviation, and included a geo-spatial multi-criteria analysis (MCA), which assessed various alignment options to identify the route that best balances environmental, cultural, social, land use, engineering and cost criteria. These studies, including those undertaken by third parties, consistently recommended an alignment that generally follows to the immediate west of the existing transmission line alignment.

Further, ElectraNet is the principal electricity Transmission Network Service Provider in South Australia, operating as part of the National Electricity Market under National Electricity Rules (NER). The company's revenue, including funding for projects, is set by the Australian Energy Regulator (AER) and as a component of the Project, the AER is required to consider ElectraNet's application to approve the funding for the Project. In doing so, the regulatory framework within which the AER operates states that the Project must result in the maximum economic benefit to the electricity market during design and implementation, and that the Project must represent the maximum value to the public prior to the approval of public expenditure. Because the length of the line is fundamental to the overall cost of the Project, minimising the length of the line is necessary to achieve the maximum economic benefit from the Project (estimated at $50 million and $59 million compared to a 'business as usual' base case which involves reconductoring sections of the existing transmission line and establishing a new backup generation network support arrangement at Port Lincoln, and depending on whether a new SA-NSW interconnector was assumed to be constructed). Analysis of alignment alternatives suggests that the transmission line would be, at a minimum, an additional 19 km in length, necessitating at least an additional $29M in expenditure, which is likely sufficient to render the Project unviable.

3. DESCRIPTION OF THE ENVIRONMENT AND MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

3.1 Existing Environment

These sections detail the existing environment along the Proposed Action corridor to provide context to the assessment of impacts that follow. Discussion of Listed Threatened Species and Communities are provided in Section 3.2.

3.1.1 Land Use and Tenure

3.1.1.1 Land Use

The project area is to be contained within a (generally) 100 m wide easement located immediately to the west of the existing transmission line easement. This area extends through both the Myall Plains and Eyre and Yorke Block IBRA Subregions, with the latter accommodating approximately 80% of the proposed alignment.

The northern, drier portion of the project area contains largely native vegetation (including some native grasslands) with grazing activities being the predominant land use. Towards the wetter, southern portion of the project area, cropland dominates alongside grazing activities with low density stands of trees scattered across the landscape. Land uses surrounding the easement are predominantly agricultural and/or contain native vegetation.

The size of property on the Eyre Peninsula varies depending on their location, with larger properties occupying the inland areas and then decreasing in size as properties get closer to the coast and regional centres. In the northern section there are several pastoral leases with large rural landholdings radiating out from Whyalla to the north, north-west, west and south-west. In the southern section the landholdings consist of smaller, privately-owned farming properties.

The main industries on the Eyre Peninsula are agriculture, manufacturing and mining, fishing and aquaculture, retail, health and community services, and tourism. Nearly 80% of Eyre Peninsula's land area is used for agricultural production of cropping and grazing and the area produces approximately 40% of South Australia's wheat exports and over 20% of barley exports. Grazing enterprises are predominantly wool and lamb, and some beef cattle.

Mining is an important regional industry, and Iron Knob and surrounding iron ore deposits have driven industrial development and manufacturing in Whyalla. Numerous historical mining and production tenements (Mineral Claims / Extractive Mineral Leases) surround the project area, while the following four mines are located within up to 15 km from the project area:

- Middleback Range mine – approximately 11 km north-west of the alignment corridor and 40 km west of Whyalla, consisting of multiple open-cut mines in the Middleback Ranges producing magnetite ore for steel manufacturing at Whyalla Steelworks and production and hematite ore for export.
- Campoona mine – approximately 6 km north-west of the alignment corridor and 18 km north of Cleve, consisting of a conventional open-cut mine producing graphite.

- Siviour mine - approximately 15 km south-east of the alignment corridor and 12 km west of Arno Bay, consisting of an open-cut mine producing graphite.
- Kookaburra Gully mine – immediately adjacent the western extent of the corridor, approximately 15 km west of Tumby Bay and 35 km north of Port Lincoln, consisting of a conventional open-cut mine producing high grade graphite.

The broader Eyre Peninsula region also has significant mineral and renewable energy resources and over the next few decades mining investment and outputs are expected to grow substantially.

3.1.1.2 Land Tenure

The transmission line corridor between Cultana Substation and Yadnarie Substation predominantly comprises large freehold pastoral landowners and farmers, as well as South Australian Government Crown Land (conservation parks and reserves) and Federal Government properties (Department of Defence).

The transmission line corridor between Yadnarie Substation and Port Lincoln Substation consists of more landowners on smaller landholdings, with the main land use being freehold pastoral landowners and farmers, as well as South Australian Government properties (Crown Land).

3.1.1.3 Native Title

The project area is located wholly within the land of the Barngarla people. The Barngarla Determination Aboriginal Corporation RNTBC (BDAC) were granted Native Title to a large part of the Eyre Peninsula including the project area in 2018. Native Title exists (i.e. has not been extinguished) on some land parcels within the project area. ElectraNet are currently negotiating with BDAC regarding Native Title consent for the project.

3.1.1.4 Conservation Areas

The Proposed Action crosses a number of areas of conservation significance, divided between private (freehold) land parcels under Heritage or Conservation Agreements and State conservation areas, as described in Table 5.

Table 5: Conservation and Heritage Agreement Areas Intersected by the Proposed Action

Conservation Area	Details
Ironstone Hill Conservation Park	13,968 ha in area, covered under the Eastern Eyre Peninsula Parks Management Plan (2014) and managed to conserve remnant areas of mallee vegetation and contribute to the conservation of critical wildlife habitats on the Eyre Peninsula.
HA 1398	Secret Rocks Nature Reserve (privately owned). Heritage Agreement area across two land parcels, both of which are intersected by the Proposed Action.
HA 774	Significant Environmental Benefit (SEB) native vegetation clearance offset area. Established under a Heritage Agreement area across two land parcels, both of which are intersected by the Proposed Action.
Sheoak Hill Conservation Park	2,427 ha in area, covered under the Eastern Eyre Peninsula Parks Management Plan (2014) and managed to conserve

	remnant areas of mallee vegetation and contribute to the conservation of critical wildlife habitats on the Eyre Peninsula.
HA 137	Heritage Agreement area across two land parcels, both of which are intersected by the Proposed Action.
HA 381	Heritage Agreement area across a single land parcel
HA 833	Heritage Agreement area across two land parcels, one of which is intersected by the Proposed Action
HA 528	Heritage Agreement area across five land parcels, three of which are intersected by the Proposed Action.
HA 729	Heritage Agreement area across two land parcels, one of which is intersected by the Proposed Action
Wharminda Conservation Park	269 ha in area, dedicated to conserve remnant vegetation, dominated by mallee and shrubland. The conservation park is classified as an IUCN Category III protected area.

3.1.1.5 Threatened Habitat Areas

The Proposed Action intersects two of Eyre Peninsula's five Threatened Habitat Areas (THAs).

The Cleve Hills THA occupies an area of approximately 322,000 ha and is located within the northern part of the Eyre Hills IBRA sub-region (see Section 3.1.5). The area is known to possess a high number of national and State threatened flora species, including the State Endangered *Eucalyptus cretata* (Darke Peak Mallee) Mallee and *Eucalyptus petiolaris* (Eyre Peninsula Blue gum) Low Woodland vegetation associations, both endemic to the Eyre Peninsula. A number of regionally threatened communities also occur within the area. Nationally threatened flora species include *Acacia cretacea* (Chalky Wattle), *Swainsona pyrophila* (Yellow Swainson-pea), *Acacia enterocarpa* (Jumping-jack wattle), *Limosella granitica* (Granite Mudwort), *Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush), *Acacia rhetinocarpa* (Neat Wattle), *Pterostylis aff despectans* (Lowly Greenhood), *Pterostylis xerophila* (Desert Greenhood) and *Arachnorchis brumalis* (Winter Spider-orchid). The nutrient and water poor mallee communities within this area, particularly the larger continuous tracts of high-quality mallee also provide important refuge areas to a large number of fauna species. They include nationally threatened species such as the Malleefowl and the Sandhill Dunnart.

The Koppio Hills THA occupies an area of approximately 96,000 ha and is located within the Eyre Hills IBRA Subregion. The area contains highly significant, but highly fragmented vegetation, including the nationally Endangered *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Low Woodland and *Eucalyptus peninsularis*, *E. dumosa* complex Woodland. A number of regionally threatened communities also occur within the area, including *Eucalyptus cladocalyx* (Sugar Gum) Woodland which is regarded as a regionally threatened vegetation community and covers approximately 13,000 ha. It is considered to support a large number of fauna species, including the State listed Brush-tailed Possum, Shining Bronze-Cuckoo, Scarlet Robin, Western Gerygone, Painted Button-quail and Yellow-tail Black Cockatoo, Diamond Firetail, Restless Flycatcher, Jacky Winter and Carpet Python. Approximately half of the vegetation association was burnt in January 2005, resulting in severe impacts on the fauna, however it has since been reported that most of the species have reinhabited the area and their populations recovering.

3.1.1.6 European Cultural Heritage

There are no Commonwealth Heritage Places within or adjacent to the project area.

There is one State Heritage Place, the Tod Reservoir (State Heritage ID 14213; Heritage Number 16602) located approximately 1.14 km west of the proposed corridor. The Proposed Action will not impact upon the Tod Reservoir.

There are three Local Heritage Places located in proximity to the Proposed Action as described in Table 6. None of the identified heritage places will be impacted by the Proposed Action and consultation has been undertaken with both Councils within the heritage sites are located, with both confirming that they have no concerns that the heritage values of these places will be impacted (see Appendix H, EPBC Referral (Eyre Peninsula Reinforcement Project: Aboriginal Cultural Heritage Survey Report)).

Table 6: Local Heritage Places

Local Heritage Place	Details
Old Pillaworta Homestead	
Type	Dwelling
Heritage Number	16579
Address	Sec 126 Hd Koppio, Suburb of Yallunda Flat; Tumby Bay Council
Parcel ID	F216604 A355
Title/Volume/Folio	CT/6204/53
Status	• Has played an important part in the lives of local residents • Displays aesthetic merit, design characteristics or construction techniques of significance to the local area
Cottage and Outbuilding Behind School House	
Type	Cottage
Heritage Number	20957
Address	689 White Flat Road, Part Section 201, Hundred Louth, Whites Flat. Lower Eyre Peninsula Council
Parcel ID	F199758 Q95
Title/Volume/Folio	CT/5955/875
Status	• Displays historical, economic or social themes that are of importance to the local area • Represents customs or ways of life that are characteristic of local area
Altocha (Beecroft) Cottage	
Type	Cottage
Heritage Number	16625
Address	Part Section 341, Hundred Louth, Green Patch. Lower Eyre Peninsula
Parcel ID	F8545 A1
Title/Volume/Folio	CT/5331/215

Status	• Displays historical, economic or social themes that are of importance to the local area • Represents customs or ways of life that are characteristic of local area • Notable landmark in the area

3.1.1.7 Aboriginal Cultural Heritage

The Barngarla have a demonstrated complex attachment to the survey area that incorporate a series of physical sites interrelated through Dreaming stories and song cycles which ultimately create responsibilities between the Barngarla and their country. As part of the project planning process, ElectraNet have undertaken Aboriginal cultural heritage assessments, including field survey, to understand the presence and significance of Aboriginal heritage within the project area and across the greater EP region. This report cannot be reproduced to respect confidentiality of BDAC.

An initial survey of the proposed transmission line corridor was conducted between 14 - 17 October 2013 by a combined team of three (consultant) heritage specialists, two ElectraNet personnel and six Barngarla field representatives.

A number of cultural heritage sites were identified during the survey, including Women's sites, Men's sites and archaeological sites consisting of an artefact scatter and an isolated stone artefact. Identified Men's and Women's sites consist exclusively of Barngarla Dreaming sites, with five out of seven Men's sites forming part of a larger site complex.

In addition to the cultural heritage sites, landscape features within and surrounding/outside the proposed transmission line corridor were identified by the BDAC field representatives during the survey as 'culturally sensitive areas'. These features were not specifically identified as sites but rather as areas warranting more detailed investigation and/or other specific management actions. Alongside mapped higher-order watercourses and associated surrounding banks (<200 m), key landform elements identified as culturally sensitive include:

- Elevated areas with significant viewlines to other important cultural areas;
- Hill tops and peaks;
- Ridgelines and exposed rock outcrops;
- Large low-lying boulders, particular those associated with the Secret Rocks geological formation;
- Claypans and the surrounding banks (<200 m);
- Lakes and the surrounding banks (<200 m);
- Soaks; and
- Saltflats.

The Barngarla field representatives involved in the survey described their Dreaming stories and song cycles and how these relate to identified sites within the study area. These intangible stories and songs manifest in physical sites and places, including rock outcrops, hills and other geological formations, clay pans and waterways. The Dreaming

stories and song cycles and the links they provide between people, places and things are well documented.

ElectraNet undertook an additional Cultural Heritage Survey with BDAC in January 2020. This survey:

- Surveyed areas of the alignment that have not been previously surveyed (due to micro-siting-related changes between the 2013 alignment and the current alignment);
- Re-visited Cultural Heritage sites identified in the 2013 survey to negotiate structure and access track placement based on the current alignment;
- Requested endorsement for use of existing tracks through Cultural Heritage sites; and
- Determined management arrangements for the project Aboriginal Cultural Heritage Management Plan.

ElectraNet, in coordination with BDAC, will undertake a further heritage survey immediately prior to construction.

3.1.1.8 Commonwealth Land

A portion of the corridor associated with the Proposed Action traverses land owned by the South Australian Government and leased to the Commonwealth Department of Defence. ElectraNet is currently negotiating an easement through this property for the purposes of the Proposed Action. The property details are detailed in Table 7.

Table 7: Commonwealth Land Intersected by the Proposed Action

Particular	Details
Title ID: CR6140/89	
Lot Plan (Plan/Allotment or Hundred/Section)	D85850AL33
Property Address	IRON KNOB RD WHYALLA BARSON
Title ID: CL6164/360	
Lot Plan (Plan/Allotment or Hundred/Section)	D85850QP32
Property Address	1178 EYRE HWY CULTANA 5700
Title ID: CL6164/360	
Lot Plan (Plan/Allotment or Hundred/Section)	D93251AL67
Property Address	EYRE HWY CULTANA 5700
Title ID: N/A	
Lot Plan (Plan/Allotment or Hundred/Section)	H835200 B1146
Property Address	N/A

This property is the Department of Defence Cultana Training Area, which is primarily used for Defence training activities or operations including:

- Combined arms manoeuvring training

- Live firing of ammunition, including small arms, field and medium artillery weapons and air-delivered weapons
- Air mobile and airborne operations including air to ground live firing
- Unmanned aerial system training activities; and/or
- Electronic warfare training activities.

The nature and extent of the impact of the Proposed Action on Commonwealth Land is limited to a small amount of land clearance that is not expected to result in a material environmental impact in the context of the existing land use.

3.1.2 Topography

The landforms spanning the project area are dominated by undulating limestone plains overlain by longitudinal dune systems in the more arid northerly sections, shallow, low hills and ranges and shallow freshwater creeks and drainage lines through the Cleve Hills and Koppio Hills. Over the 265 km long alignment, elevation ranges from a minimum of approximately 40 m (metres above sea level) to a maximum of approximately 350 m. A topographic projection of the Proposed Action is presented in Figure 9.

Figure 9: Topography Associated with the Proposed Action.

3.1.3 Surface Water and Waterways

3.1.3.1 Surface Water Setting

The Eyre Peninsula is dominated by a vast plain with many isolated peaks and low, discontinuous ranges to the north, east and south. The climate in the region consists of long, dry and hot summers and cooler, moderately wet winters. Mean annual rainfall ranges from about 250 mm in the Gawler Ranges in the north to about 500 mm south of Port Lincoln.

The only permanent surface water resource in the region is the Tod River, located to the north of Port Lincoln, rising north of Yallunda Flat before flowing in a southerly direction to Louth Bay in the Spencer Gulf, with a catchment area of about 395 km^2.

Most streams in the region are seasonal (dry during the summer months), occupying the eastern side of the peninsula, with the larger streams, including the highly saline Dutton River and Salt Creek, located north of Arno Bay. Surface water quality generally ranges from saline to brackish.

The rainfall patterns and low topography create a range of different stream habitats. Despite the lack of flow and surface water during summer, many streams flow for several months during autumn and spring, including Pillaworta Creek, parts of Tod River, Mine Creek and Salt Creek near Mangalo. Other creeks, including Meadows Creek, Rock Valley Creek, parts of Tod River, and Salt Creek, have low flows in autumn and are only isolated pools in spring. The other major stream type in the region consists of still water pools in autumn and spring, including Coonta, Yeldulknie, Salt, Minniribbie, Waterfall, Pokalalie and Millalee creeks and the Dutton River.

The project corridor traverses the Tod River Wetland System and crosses the Tod River and other un-named upper reaches of the Tod River, while the Tod River Reservoir is approximately 1.2 km west of the alignment. The Tod River and Tod River Reservoir are the terminal water bodies of the catchment, which is fed by rainfall and water runoff. While the reservoir is managed by SA Water, it is not used for potable water supply due to the water's high salinity levels, but may be used for relevant construction or maintenance-related activities such as dust suppression.

The Tumby Bay wetlands are located approximately 8.5 km south-east of the project corridor and cover an area of approximately 1,000 ha around the Tumby Bay Township. They consist of marine waters, seagrass meadows, sandbars, estuarine waters, intertidal mud and sand flats, intertidal marshes and mangrove swamps.

Aquatic ecosystem monitoring at ten sites on the Eyre Peninsula in 2015 (including the Tod River, Rocky Valley Creek, Driver River), found the sites to be in Fair to Very Poor condition. No sites were assigned to either the Excellent, Very Good or Good condition classes and it is considered that sites of this quality may no longer exist in the region given the scale of vegetation clearance, salinisation and nutrient enrichment. Similar results were obtained in 2010 from 30 sites, supporting the view that streams throughout the region are in a degraded condition. Most streams considered to be saline (e.g. salinity > 3000 mg/L). All ten sites showed evidence of significant nutrient enrichment, including high concentrations of nitrogen and/or phosphorus and large growths of either filamentous algae, phytoplankton or aquatic plants such as reeds, sedges and rushes.

Most streams had significantly disturbed riparian zones with cropping or other introduced grasses and weeds often dominating the plants growing on banks that lacked extensive tree and shrub cover. Surface runoff from agricultural lands and bank erosion from stock (cattle and sheep) accessing riparian zones were also significant stressors affecting the condition of many streams in the region.

3.1.3.2 Interaction with the Proposed Action

The project corridor traverses eight surface water catchments, as described in Table 8.

Table 8: Surface Water Catchments

Surface Water Catchment	Details
Salt Creek – Franklin Harbour	Within the Salt Creek – Franklin Harbour catchment, the project corridor traverses the Salt Creek, which is highly saline and the largest stream on the Eyre Peninsula, rising about 20 km west of Mangalo and flowing in an easterly direction before eventually draining onto the Uteralitera Plain to the north of Franklin Harbour. This catchment also contains a number of ephemeral creeks which drain from Cleve Hills toward Franklin Harbour and the coast.
Driver River	The Driver River catchment contains the Driver River, which is a small stream that rises between Verran and Rudall, and flows in a south-easterly direction before discharging into an intermittent coastal swamp about 12 km south-west from Arno Bay.
Dutton River	The Dutton River, within the Dutton River Catchment, is highly saline and one of the larger creeks (or smaller rivers) on the Eyre Peninsula. It reaches the coast 6 km north of Port Neill.
Salt Creek	Within the Salt Creek catchment, the project corridor traverses Salt Creek, Chinmina Creek and Oolanta Creek. Salt Creek is a large stream, that unlike the much larger Salt Creek located within the Salt Creek - Franklin Harbour catchment, rises north of Uranno, flows north and then east before eventually discharging into Spencer Gulf at Salt Creek Beach in Tumby Bay.
Tumby Bay	Further south, the project corridor traverses the very upper reaches of Waterfall Creek, a small, saline stream within the Tumby Bay catchment, that rises east of Yallunda Flat and flows in an easterly direction before discharging into Mine Creek.
Tod River	Within the Tod River catchment, the project corridor crosses the Pillaworta Creek, Rock Valley Creek, Pernalla Creek and the Tod River. The Tod River is the only permanent flowing stream on the Eyre Peninsula. It rises north of Yallunda Flat and flows in a southerly direction before discharging into Spencer Gulf at the southern end of Louth Bay.
Boston Bay	While the project corridor traverses a very small section of the Boston Bay catchment, there are no watercourses in this section.
Little Swamp	After the Tod River catchment, the project corridor enters the Little Swamp catchment and terminates at the Port Lincoln substation, which is located approximately 450 m south east

	of Little Swamp wetland.

3.1.4 Groundwater

A geotechnical investigation of the project corridor was undertaken in late 2017 (see Appendix H, EPBC Referral (Geotechnical Investigation Report)), incorporating both desktop review and geotechnical drilling to confirm the outcomes of the desktop studies, divided into northern (Cultana to Yadnarie) and southern (Yadnarie to Port Lincoln) sections.

Groundwater information from SARIG for the northern section indicates that groundwater is predominately greater than 10 – 20 m from ground level in most geological units, particularly in the northernmost areas, with depth reducing to greater than 5 m in units as the corridor progresses south. No groundwater was encountered during geotechnical drilling in the northern section of the Proposed Action.

Groundwater levels in the southern section are highly variable, but generally shallower than those in the northern section, with groundwater levels of less than 5 m in some areas, and levels generally between 2.5 – 10 m below ground level. Groundwater was intersected at one geotechnical drill hole at a depth of 2.3 m below ground level in the southern section.

It should be noted that groundwater levels may fluctuate due to seasonal variations, as well as the possibility of perched water tables occurring throughout soils that include impermeable clay layers, and localised elevated groundwater levels associated with surface water features. Thus, groundwater may be encountered locally during drilling of specific foundations/footings.

Further geotechnical investigations prior to construction are currently scheduled for late 2020. These will inform the detailed engineering design for the project, and assist in the development of a groundwater and dewatering management plan.

3.1.5 Vegetation Communities

3.1.5.1 Landscape and Vegetation Characterisation

The Interim Biogeographic Regionalisation of Australia (IBRA), administered by DotEE provides a framework for describing the environment, including soil and vegetation characteristics.

The project traverses two IBRA bioregions and three sub-regions, which are summarised in Table 9. Numerous environmental associations occur within these sub-regions, and are described in detail in Appendix H (EPBC Referral (Biodiversity Assessment Report)).

Table 9: Landscape and Vegetation Characterisation for the Proposed Action

Gawler IBRA Region
Semi-arid to arid, flat topped to broadly rounded hills of the Gawler Range Volcanics and Proterozoic sediments, low plateaux on sandstone and quartzite with an undulating surface of aeolian sand or gibbers and rocky quartzite hills with colluvial footslopes, erosional and depositional plains and salt encrusted lake beds, with black oak and myall low open woodlands, open mallee scrub, bluebush/saltbush open chenopod shrublands and tall mulga shrublands on shallow loams, calcareous earths and hard red duplex soils.

Myall Plains IBRA Subregion (GAW1)	
Gently undulating calcrete plains and occasional quartzite or granite hills. Includes a zone of salt lakes and gypsum dunes at Lake Gillies and steep strike ranges at the Middleback Ranges. To the east out cropping conglomerate occurs with mangrove flats along the coastal margin. *Acacia papyrocarpa*/*Casuarina pauper* low woodland is found on grey brown calcareous earths, red calcareous earths and dense brown loams on the plains. Rocky outcrops support *Eucalyptus incrassata*/*Melaleuca uncinata* open scrub and *Allocasuarina verticillata* low woodland on dense brown loams. The lowest areas support chenopod shrubland of *Halosarcia halocnemoides* on grey calcareous loams. Light grazing occurs in most areas.	
Landform	Gently undulating calcrete plains and occasional hills. Includes a zone of salt lakes and gypsum dunes at Lake Gilles and steep strike ranges at the Middleback Ranges.
Geology	Calcrete development; gypsum dunes; playa lakes with silt and clay deposits and evaporites.
Soil	Red calcareous earths, sandy soils with mottled yellow clayey subsoils
Vegetation	Arid and semi-arid acacia low open woodlands and shrublands with chenopods
Remnant Vegetation	97% (948,908ha) of the subregion is mapped as remnant native vegetation
Protected Areas	11% of the subregion is protected (92,695ha in formal reserves and conserved in private Heritage Agreements under the *Native Vegetation Act 1991*(SA)). This is 10% of the mapped native vegetation.
Eyre and Yorke Block IBRA Bioregion	
Archaean basement rocks and Proterozoic sandstones overlain by undulating to occasionally hilly calcarenite and calcrete plains and areas of aeolian quartz sands, with mallee woodlands, shrublands and heaths on calcareous earths, duplex soils and calcareous to shallow sands, now largely cleared for agriculture.	
Eyre Hills IBRA Subregion (EYB3)	
This subregion consists of the southern section of the uplands along the east coast of the Eyre Peninsula, and the undulating to low hilly plains to the west. The uplands rise abruptly from a narrow coastal foreland to altitudes of between 200 m and 400 m then slope gradually to the west where they merge into the undulating plain. The eastern and highest section of the uplands is formed of metasediments, predominantly quartzite, and is mainly hilly while the slightly lower-lying western part constitutes a dissected laterite plateau. Moderately deep yellow duplex soils with lateritic concretions occur on the uplands and support low open woodland of *Eucalyptus cladocalyx*, *E. odorata* and *E. leucoxylon*. The plains to the south and west are formed predominantly on old alluvium, or on calcarenite near the coastal fringe where some dunes and cliffs occur. Shallow reddish loams with rock outcrops support *E. incrassate* / *Melaleuca uncinata* mallee on the plains or *Melaleuca lanceolata* woodland along the coastal fringe. Lincoln National Park occupies the south eastern tip of the subregion and consists of 15,971 ha of coastal mallee. The majority of this subregion is cleared for winter cereal cultivation and grazing livestock.	
Landform	Low limestone dune ridges: small granitic islands with dunes.
Geology	Ripon Calcrete; Loveday Soil in aeolian sand sheets, dune sand, red soils (terra rossa).
Soil	Sands soils of minimal pedologic development, brown calcareous earths, brown sand soils, shallow red brown sandy soils, with yellow

	clayey mottled subsoil.
Vegetation	Mallee heath and shrublands
Remnant Vegetation	30% (350,795 ha) of the subregion is mapped as remnant native vegetation
Protected Areas	11% of the subregion is protected (124,693 ha in formal reserves and conserved in private Heritage Agreements under the *Native Vegetation Act 1991* (SA)). This is 36% of the mapped native vegetation.
Eyre Mallee IBRA Subregion (EYB5)	
This subregion is distinguished climatically by being more arid than regions to the south. The mallee that once dominated this subregion has been cleared for wheat cultivation. The northern margin is formed by the dunefields of the Great Victoria Desert and the eastern margin of the Gawler Ranges. The region consists of an undulating plain with an extensive cover of dunes and sand sheets. A mallee association of *Eucalyptus socialis* and *E. gracilis* occurs on the shallow calcareous earths or deeper duplex soils of the plains with *E. incrassata*/*Melaleuca uncinata* mallee on the dune sands. To the east the subregion includes hilly uplands on metasediments small intramontane basins. Isolated quartzite ranges and granite outcrops form prominent inselbergs such as Darke Peake and Wudinna Hill which occur throughout the region. Livestock grazing and cereal cropping has resulted in the clearance and/or degradation of much of the native vegetation in this subregion.	
Landform	Stable NW-SE longitudinal dunes, locally broken by granite hills and ridges of metamorphic rocks. Dunes closely spaced.
Geology	Vast dune sand and interdune corridors of clay, silt and very fine sand; evaporite deposits in numerous salt lakes (gypsum, halite); kopi ridges and dunes; some silcrete and calcrete (rare).
Soil	Sand soils with weak pedologic development, red calcareous earths, red siliceous sands.
Vegetation	Mallee heath and shrublands
Remnant Vegetation	35% (811,497 ha) of the subregion is mapped as remnant native vegetation.
Protected Areas	20% of the subregion is protected (437,121 ha in formal reserves and conserved in private Heritage Agreements under the *Native Vegetation Act 1991* (SA)). This is 54% of the mapped native vegetation.

3.1.5.2 Remnant Native Vegetation

Since European settlement, approximately 55% (2,783,000 ha) of the original native vegetation on Eyre Peninsula has been cleared primarily for agricultural purposes. Vegetation remnancy within the more arid pastoral country characterised in the Myall Plains IBRA subregion is at 97%, where land use is almost exclusively stock grazing and conservation.

Remnant vegetation across the Eyre and Yorke Block IBRA bioregion, where the majority of the proposed alignment is located, is calculated at 33% (2,011,646.26 ha). Likewise, with both IBRA sub-regions, Eyre Hills and Eyre Mallee, where approximately 80% of the proposed alignment is located, remnant vegetation is calculated at 29% (1,168,057.59 ha) and 38% (2,308,972.67 ha) respectively. Most of this remaining vegetation is concentrated

in areas less suitable for agriculture, such as on hilly country, deep sands, saline soils or sheet limestone.

Further south where rainfall is higher and land is better suited to agriculture, lower remnancy figures are observed. A number of the more southern IBRA Environmental Associations exhibit remnancy figures of less than 10%.

3.1.5.3 Vegetation Condition

Almost 7,095 ha of native vegetation was recorded within the assessment corridor (120 m width), representing approximately 45% of the Project Area (see Appendix H, EPBC Referral (Biodiversity Assessment Report)). A total of 75 vegetation associations have been described and mapped across the project area and each has been assigned a condition rating which primarily reflects indigenous cover and weed invasion levels in the understorey.

Most of the tracts of intact vegetation communities occupying the northern sections of the project area were found to be in excellent condition (5,345.2 ha or 94%). The remaining 6% (292.7 ha) varied between moderate to poor condition. Within the southern sections, 32.7% (567 ha) was recorded in good to excellent condition, 32% (571.3 ha) in moderate condition and 34.4% (596.5 ha) in poor to very poor condition. Condition ratings were based on the vegetation structure, quality of the understorey and level of weed invasion and do not necessarily represent the value of the area as fauna habitat.

The majority of the large intact tracts of mallee in the northern zone, and the Acacia low woodlands in the pastoral areas, contained high diversities of native species coupled with very few weeds. The continuous and undisturbed nature of the communities has led to fewer overall disturbances such as weed invasion from edge effects and over grazing from domestic and native herbivores. Some of the larger patches of intact vegetation within the central and southern zones also possess high species richness and low levels of degradation from weeds and grazing, mainly due to the size of the patches and responsible management practices. Many are also located within close proximity to other large remnants, helping to bolster habitat value. Larger blocks of native vegetation, and those occurring near other vegetation patches, are better able to maintain ecological integrity. Conversely, smaller patches of vegetation throughout the southern zone have frequently suffered significant degradation from edge effects, grazing, inappropriate fire regimes and other factors such as firewood collection and rubbish dumping. This has often contributed to high levels of modification of the understorey strata, leaving only the overstorey intact. They are also often isolated from other remnants, further reducing their viability and overall habitat value, particularly for less mobile fauna species.

3.1.5.4 Weeds

Twenty-four weed species were recorded during the field surveys, including five weed species declared under the *Natural Resources Management Act 2004* (SA) and eleven species recognised as environmental weed species (see Table 10).

Table 10: Weeds Observed within the Project Area

Scientific Name	Common Name	Status
Aira sp.	Hair-grass	
Asphodelus fistulosus	Onion Weed	Declared plant (*Natural Resources Management Act 2004* (SA)) - Not

		declared in local council areas relevant to the Proposed Action
Austrocylindropuntia cylindrica	Cane Cactus	Declared plant (*Natural Resources Management Act 2004* (SA)). *Austrocylindropuntia* listed as a Weed of National Significance
**Avena barbata*	Bearded Oat	Environmental weed (DPTI)
Brassica tournefortii	Wild Turnip	Environmental weed (DPTI)
Bromus madritensis	Compact Brome	
Carrichtera annua	Ward's Weed	Environmental weed (DPTI)
Carthamus lanatus	Saffron Thistle	Environmental weed (DPTI)
Chamaecytisus palmensis	Tree Lucerne	Environmental weed (DPTI)
Citrullus lanatus	Bitter Melon	
Cucumis myriocarpus	Paddy Melon	
Ehrharta calycina	Perennial Veldt Grass	Environmental weed (DPTI)
Galenia pubescens var. *pubescens*	Coastal Galenia	Environmental weed (DPTI)
Geranium dissectum	Cut-leaf Geranium	
Limonium lobatum	Winged Sea-lavender	Environmental weed (DPTI)
Lycium ferocissimum	African Boxthorn	Declared plant (*Natural Resources Management Act 2004* (SA))
Marrubium vulgare	Horehound	Declared plant (*Natural Resources Management Act 2004* (SA))
Mesembryanthemum sp.	Iceplant	Environmental weed (DPTI)
Onopordum acaulon	Horse Thistle	
Petrorhagia dubia	Velvet Pink	
Reichardia tingitana	False Sowthistle	
Salvia verbenaca var.	Wild Sage	Environmental weed (DPTI)
Solanum elaeagnifolium	Silver-leaf Nightshade	Declared plant (*Natural Resources Management Act 2004* (SA))

Solanum linnaeanum	Apple of Sodom	Environmental weed (DPTI)

3.2 Matters of National Environmental Significance

3.2.1 Screening Assessment

The Proposed Action was considered in the context of all of the nominated Matters of National Environmental Significance in order to identify aspects requiring further assessment, as presented in Table 11.

Table 11: Matters of National Environmental Significance Screening Assessment Outcomes

Matter of National Environmental Significance	(Yes/No) and Reference
Is the proposed action likely to have any direct or indirect impact on the values of any World Heritage properties?	No (see Section 3.1.1)
Is the proposed action likely to have any direct or indirect impact on the values of any National Heritage places?	No (see Section 3.1.1)
Is the proposed action likely to have any direct or indirect impact on the ecological character of a Ramsar wetland?	No (see Section 3.1.3)
Is the proposed action likely to have any direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?	Yes (see Section 3.2 and Section 3.3)
Is the proposed action likely to have any direct or indirect impact on the members of any listed migratory species or their habitat?	No (see Section 3.2.2)
Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?	No (see Section 2.5)
Is the proposed action likely to be taken on or near Commonwealth land?	Yes (see Section 3.1.1.8)
Is the proposed action taking place in the Great Barrier Reef Marine Park?	No (see Section 2.5)
Is the proposed action likely to have any direct or indirect impact on a water resource from coal seam gas or large coal mining development?	No (see Section 1.2.1)
Is the proposed action a nuclear action?	No (see Section 1.2.1)
Is the proposed action to be taken by a Commonwealth agency?	No (see Section 1.1)
Is the proposed action to be undertaken in a Commonwealth Heritage place overseas?	No (see Section 2.5)
Is the proposed action likely to have any direct or indirect impact on any part of the environment in the Commonwealth marine area?	No (see Section 2.5)

3.2.2 Listed Threatened Species and Communities

3.2.2.1 Identification Methods

Identification of the potential for the presence of listed threatened species and communities was undertaken using the following methods:

- Review of historical area surveys and reports, specifically a number of assessments undertaken in 2013 and 2014 on the proposed transmission line corridor
- Review of the EPBC Protected Matters Search Tool (PMST) results for a 10 km buffer centred on the proposed transmission line corridor, undertaken in 2019
- Review of Biological Database of South Australia (BDBSA) results of areas within 10 km of the proposed transmission line corridor

An assessment of the likelihood of each threatened flora species, fauna species or ecological community occurring within the 10 km buffer was undertaken. A likelihood of occurrence rating was assigned to each threatened species or ecological community identified during the searches. Assessment of the likelihood of occurrence and application of a rating involves consideration of the following criteria:

- Date of the most recent record (taking into consideration the date of the last surveys conducted in the area);
- Proximity of the records (distance to the Project Area);
- Landscape location of the records, vegetation remnancy and vegetation type of the record location (taking into consideration the landscape, remnancy and vegetation type of the Project Area, with higher likelihood assigned to species that were found in similar locations/condition/vegetation associations); and
- Knowledge of the species' habitat preferences, causes of its decline and local population trends.

A summary of the likelihood rating and criteria is presented below in Table 12.

Table 12: Likelihood rating and criteria for the presence of threatened species.

Likelihood Category	Criteria
Unlikely	• No records despite survey effort considered adequate, or • No records and survey effort is considered not adequate, and no suitable habitat is known to occur in the area, or • No records and survey effort is not considered adequate, and no suitable is known to occur in the area, and species of similar habitat needs have no records either.
Possible	• No records, survey effort is considered not adequate, suitable habitat does occur (or isn't known if it does occur) and species of similar habitat needs have been recorded in the area, or • Records within the last 40 years, and the area is not largely intact, or • Records in the last 10 years, the habitat is not largely intact but the species does not have highly specific needs.
Likely	• Records in the last 10 years, the species does not have highly specific habitat needs and the habitat is largely intact, or • Records in the last 10 years, the species does have highly specific habitat needs and these needs occur in the area.
Highly likely / known	• Records in the last 10 years, the species does not necessarily have highly specific needs, and the habitat is

	largely intact

3.2.2.2 Potential of Occurrence of Listed Threatened Ecological Communities

The search identified three threatened ecological communities, of which one (Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland) is known to occur in the Project area. Table 13 details the identified communities and the likelihood of occurrence.

Table 13: Threatened Ecological Communities Potentially Occurring within the Project Area

Threatened Ecological Community	EPBC Status	Likelihood of Occurrence	Description of TEC in a Project Context
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland	Endangered	Known	EP Blue Gum Woodland is endemic to the Eyre Peninsula and a number of patches were mapped along the alignment during the initial surveys (EBS Ecology 2014), but were not assessed under the Approved Conservation Advice (TSSC, 2013) at the time. Approximately 8.5 ha of the community, which was mapped within the 120 m wide assessment corridor, was recorded in moderate condition and considered to possibly qualify as the TEC. During the proposed native vegetation clearance field assessment undertaken in September 2019, an assessment was conducted in a representative patch of *Eucalyptus petiolaris* +/- *Eucalyptus odorata* +/- *Allocasuarina verticillata* Open Grassy Woodland (EBS Ecology 2019). Based on the results of this assessment and the condition categories and thresholds for the EP Blue Gum Woodland TEC (TSSC 2013), the seven patches of this association intersected by the Project Area qualify as Category C1 of the EP Blue Gum Woodland TEC. Category C1 of this TEC describes communities of medium quality, with good native vegetation cover and diverse native species in the understorey. Indeed, all seven patches were greater than 0.2 ha in size, native vegetation cover in the mid and ground layers of the representative site comprised of greater than 50%, and seven native species from Appendix B, Table B1 in TSSC (2013) were recorded in the representative site. Furthermore, there were large hollows observed in more than 20 trees per hectare in the representative site.
Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia	Critically Endangered	Unlikely	Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia was identified in the PMST results. Although areas along the southern portion of the proposed transmission line corridor were mapped as *Eucalyptus odorata* Woodland during the initial surveys (EBS Ecology 2014), the EPBC listing advice excludes occurrences of Peppermint Box that are a part of Mallee Eucalyptus woodlands with a shrubby understorey, and grassy woodlands dominated by other eucalypt species, particularly *Eucalyptus leucoxylon* (SA Blue Gum), in which Peppermint Box is a sub-dominant species. These excluded ecological communities mainly occur in the northern Flinders Ranges, Eyre Peninsula and the south-eastern parts of South Australia (TSSC 2007). Therefore, this TEC is considered unlikely to occur within the Project Area.

Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Unlikely	Although Subtropical and Temperate Coastal Saltmarsh has been identified by the PMST, it is considered unlikely to occur within the Project Area, due to the distance of the Project Area from the coast, where this TEC usually occurs. In order to qualify as this TEC, there must be some form of tidal connection (which may be by groundwater) to this habitat, which does not occur within the Project Area.

3.2.2.3 Potential of Occurrence of Listed Threatened Flora Species

The search identified 27 listed threatened flora species with the potential to occur within the Project Area, of which six species are known to occur, specifically:

- *Acacia enterocarpa* (Jumping-jack Wattle)
- *Acacia pinguifolia* (Fat-leaf Wattle)
- *Caladenia macroclavia* (Large-club Spider-orchid)
- *Caladenia tensa* (Greencomb Spider-orchid/Rigid Spider-orchid)
- *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush); and
- *Pultenaea trichophylla* (Tufted Bush-pea).

A further three are considered highly likely to occur, specifically:

- *Acacia cretacea* (Chalky Wattle)
- *Acacia rhetinocarpa* (Resin Wattle) and
- *Swainsona pyrophila* (Yellow Swainson-pea).

Table 14 details all the identified threatened flora species and their assessed likelihood of occurrence.

Table 14: Listed Threatened Flora Potentially Occurring within the Project Area

Scientific Name (Common Name)	EPBC Status	Likelihood of Occurrence	Broad Habitat Requirements	Project Context
Acacia cretacea (Chalky Wattle)	Endangered	Highly Likely	Eyre Peninsula endemic species. Grows in low shrubland and mallee scrub dominated by *Eucalyptus incrassata* (Ridge-fruited Mallee), *Melaleuca uncinata* (Broombush), *Triodia irritans* (Spinifex), *Phebalium bullatum* (Silvery Phebalium), on deep red sand in gently undulating country, with low sand ridges.	Not detected during targeted surveys in 2013. The extremely restricted area where it occurs is approx. 10 km South East of the Project Area.
Acacia enterocarpa (Jumping-jack Wattle)	Endangered	Known	The species occurs as a disjunct population on the Eyre Peninsula, with other populations occurring on the Yorke Peninsula, South Eastern SA, and in western Victoria. Recorded from *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. socialis* (Beaked Red Mallee) Mallee woodland; *Eucalyptus calycogona* (Square-fruit Mallee), +/- *E. phenax* ssp. *phenax* (White Mallee) Mallee woodland; *Eucalyptus gracilis* (Yorrell) +/- *E. dumosa* (White Mallee) +/- *E. brachycalyx* (Gilja), +/- *E. oleosa* (Red Mallee) Mallee.	Twenty-eight individuals detected across three sub-populations during targeted surveys in 2013. The current layout can avoid impact to these sub-populations if a single structure and the construction compound are micro-sited. However, a small area of suitable habitat (100 m buffer from records) may be impacted.
Acacia pinguifolia (Fat-leaf Wattle)	Endangered	Known	Known from disjunct sub-populations on Eyre Peninsula, where it grows in undulating terrain with a westerly aspect in association with a range of Mallee species including *Eucalyptus odorata* (Peppermint Box) and *E. incrassata* (Ridge-fruited Mallee), *E. dumosa* (White Mallee), *E. foecundum* (Hooked Mallee), *E. calycogona* (Square-fruited Mallee), *E. cooperiana* (Coopers Mallee), *E. flocktoniae* (Merrit) and *E. pileata* (Capped Mallee) and occurs in *Melaleuca uncinata*	Five individuals detected in one sub-population during targeted surveys in 2013, although these are believed to have been mis-identified (see Section 3.3.5). The current layout can avoid impact to this sub-population if micro-siting techniques are applied to avoid the patch of roadside vegetation. However, a small

			(Broombush) shrubland. Sub-populations are known to occur near Cockaleechie, Ungarra and Butler, with many located on roadsides and rail reserves.	amount of suitable habitat (100 m buffer from records) may be impacted.
Acacia praemorsa (Senna Wattle)	Vulnerable	Likely	Endemic to the Eyre Peninsula where it occurs in localised populations in the ranges north-east of Cleve. Occurs in Mallee woodlands, open scrubs and open heath scrubs dominated by *Melaleuca uncinata* (Broombush), *Acacia calamifolia* (Wallowa), *Eucalyptus odorata* (Peppermint Box) and other Mallee species. Has been found on the lower slopes of small gullies in low, rocky ranges, on exposed north-facing slopes in thick, low scrub and in shady, sheltered sites in open Mallee woodlands at the base of steep gullies.	Not detected during targeted surveys in 2013. Almost entirely restricted to Yeldulknie Conservation Park and two unnamed heritage agreement areas approx. 10 km South East of the Project Area.
Acacia rhetinocarpa (Resin Wattle)	Vulnerable	Highly Likely	Grows in disjunct sub-populations on the Eyre Peninsula on dune crests and dunes/hills, plains and swales. It is also known to survive in degraded sites largely devoid of remnant vegetation. Normally associated with low Mallee of *Eucalyptus dumosa* (White Mallee), *E. foecunda* (Hooked Mallee), *E. calycogona* (Square-fruited Mallee), *E. incrassata* (Ridge-fruited Mallee) and *E. brachycalyx* (Gilja) Mallee associations. Occurs from Kimba to just north of Arno Bay, Cleve and Lock. Sub-populations are known to survive within roadside and rail reserve vegetation.	Not detected during targeted surveys in 2013. Closest subpopulation approx. 10 km north of Project Area in road reserve of Cleve Road.
Acacia whibleyana (Whibley's Wattle)	Endangered	Possible	Endemic to the Eyre Peninsula where it is restricted to near-coastal areas near Tumby Bay. Grows on limestone and loam, sometimes near salt swamps. Although records occur within 5 km, the current extent	Not detected during targeted surveys in 2013. Restricted to near-coastal areas near Tumby Bay, with the closest records approx. 5 km South

			of occurrence is southeast of Project Area, towards Tumby Bay.	East of the Project Area.
Caladenia brumalis (Winter Spider-orchid)	Vulnerable	Possible	Endemic to South Australia. Found in association with Mallee-Broombush associations, *Allocasuarina verticillata* (Drooping Sheoak) woodland, *Eucalyptus diversifolia* ssp. *diversifolia* (Coastal White Mallee) mallee woodland and *Eucalyptus cladocalyx* (Sugar Gum) woodlands.	Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
Caladenia conferta (Coast Spider-orchid)	Endangered	Unlikely	Endemic to South Australia. Currently known from two distinct localities in the upper south-east of SA and on Yorke Peninsula. There is one record from 1968 from Hincks (Western Australia), but this sub-population is now considered extinct. Another collection, from Carrappee Hill, may not be *Caladenia conferta* and is possibly a subspecies of *C. toxochila*.	None.
Caladenia macroclavia (Large-club Spider-orchid)	Endangered	Known	Endemic to South Australia and rare on the Eyre Peninsula. Also occurs on Yorke Peninsula and in Victoria. Records from Pt Lincoln and Pt Lincoln NP. Favours fertile shallow loams in Mallee-Broombush associations, usually where other orchids are numerous.	Three individuals detected in one sub-population during targeted surveys in 2013, however these are believed to have been mis-identified (see Section 3.3.6). The current layout can avoid impact to this population, regardless of identification, if one structure is micro-sited.
Caladenia tensa (Inland Green-comb Spider-orchid/Rigid Spider-orchid)	Endangered	Known	Widespread in SA from the west coast, throughout the Eyre Peninsula and adjacent pastoral zone, the Flinders Ranges, rare in the MLR, more common in the Murray and upper South-east. In dry woodland, Mallee-heath, low scrub and about rock outcrops in a variety of soil types. Recorded from a single	Twenty-five individuals detected in one sub-population during targeted surveys in 2013. Although current layout avoids this sub-population, a small area of suitable habitat (100 m buffer from records)

			location during targeted survey approximately 20 m from the western boundary of assessment corridor along the Ungarra – Yeelana Road reserve.	may be impacted.
Dodonaea procumbens (Trailing Hop-bush)	Vulnerable	Unlikely	Small, prostrate shrub, growing to about 1.5 m diameter and 20 cm tall. The tiny solitary or paired flowers appear in spring and summer. Endemic to south-eastern Australia. In SA, it occurs near Port Lincoln in the EYB bioregion, as well as other localities outside of the Eyre Peninsula. Grows in low-lying, often winter-wet areas in woodland, low open forests, heathland and grasslands, on sands and clays.	None
Frankenia plicata (Braided Sea-heath)	Endangered	Possible	Small, densely branched, hairy shrub. Flowering occurs between September and October. Occurs in SA, from north of Port Augusta along the Stuart Highway to the Northern Territory border and from Port Augusta north-east to Maree (outside Project Area). It is likely that the species has been under reported due to difficulty of identification of *Frankenia* spp. No records in Eyre Hills or Eyre Mallee. Grows in a range of habitats, including on small hillside channels, which take the first run-off after rain, and from swales of loamy sands to clay. Found in a wide range of vegetation communities that have good drainage.	Not detected during targeted surveys in 2013. Occurs north of Port Augusta and there are no BDBSA records within 10 km of the Project Area.
Haloragis eyreana (Prickly Raspwort)	Endangered	Possible	Endemic to the Eyre Peninsula. Nearly entirely restricted to roadsides and rail reserves. Mainly found in disturbed open grassland areas and only occasionally found growing in more intact habitat, where it is associated with *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. dumosa* (Dumosa	Not detected during targeted surveys in 2013, which were undertaken in appropriate flowering times. Occurs in roadside and rail reserves North West of the Project Area around Cummins and

			Mallee) or *Melaleuca decussata* (Totem-poles).	Yeelanna. Two records closest to Project Area approx. 7 km North East of Ungarra are not recent (1969).
Limosella granitica (Granite Mudwort)	Vulnerable	Unlikely	Endemic to EP, the species is confined to seasonally wet rock-pools (gnamma holes) on top of granite inselbergs and outcrops, across northern Eyre Peninsula, however one record from 2006 located in the Moody Tanks CP.	None.
Olearia pannosa ssp. *Pannosa* (Silver Daisy-bush)	Vulnerable	Known	A widespread but rare species occurring also on the Fleurieu Peninsula, South East SA, Yorke Peninsula, Kangaroo Island and MN. Two main sub-populations on the Eyre Peninsula occurring in the Cleve Hills to Coolanie Range area, north-west of Cowell, and in the Koppio Hills and Greenpatch area, Lower Eyre Peninsula. Southern population associated with *Eucalyptus cladocalyx* (Sugar Gum), *Allocasuarina verticillata* (Drooping Sheoak), *Melaleuca uncinata* (Broombush), and less often with *Callitris* sp. (Native Pine). Northern population associated with *Allocasuarina verticillata* (Drooping Sheoak), low woodland *Eucalyptus odorata* (Peppermint Box), +/- *E. phenax* ssp. *phenax* (White Mallee) mid Mallee woodland, *Eucalyptus porosa* (Mallee Box) mid open Mallee woodland, *Eucalyptus incrassata* (Ridge-fruited Mallee) mid Mallee woodland, *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. socialis* (Beaked Red Mallee) mid Mallee woodland.	One individual detected during targeted surveys in 2013, one individual detected during 2019 native vegetation clearance assessment and 25 individuals found in the Winter 2020 survey within the Project Area. Although current layout avoids these individuals, a small area of suitable habitat (100 m buffer from records) may be impacted and micro-siting of stringing will need to be considered.
Prasophyllum goldsackii (Goldsack's Leek-orchid)	Endangered	Possible	Endemic to SA. Found from 14 small populations on the Eyre Peninsula and Yorke Peninsula not exceeding 500-1000	Not detected during targeted surveys in 2013, which were undertaken in known flowering

			individuals. Occurs largely on limestone, in shallow soil pockets but also in calcareous sands. Found in *Eucalyptus cladocalyx* (Sugar Gum) forests, as well as *Allocasuarina verticillata* (Drooping Sheoak) low woodlands and *Melaleuca uncinata* (Broombush) tall open shrublands.	times in known suitable habitat.
Prasophyllum laxum (Lax Leek Orchid)	Critically Endangered	Possible	The Lax Leek Orchid is only known from one location in private property (Cockatoo Hill) near Koppio where it grows in sparse/open woodland, approximately 2.3 km from the proposed transmission line. There is a second (unconfirmed) record from Ungarra (approximately 1.5 km from the Project Area). Due to records within close proximity of the Project Area, it is possible that this species may occur in suitable habitat (i.e. woodland), particularly in the Koppio or Ungarra areas.	Only known from two locations (one unconfirmed). Although these are within 5 km of the Project Area, the species was not detected during targeted surveys for other nationally threatened orchid species in 2013, which were undertaken in appropriate flowering times and habitat for this species (species listed after 2013).
Prostanthera calycina (West Coast Mintbush)	Vulnerable	Possible	Endemic to the Eyre Peninsula where it is restricted to western coast from Pt Lincoln to Streaky Bay. The southern populations in close proximity to the Project Area grow in association with *Eucalyptus incrassata* (Ridge-fruited Mallee) mid Mallee woodland over *Melaleuca uncinata* (Broombush) and *Leptospermum coriaceum* (Dune Tea-tree) and *Eucalyptus diversifolia* ssp. *diversifolia* (Coastal White Mallee), +/- *Allocasuarina verticillata* (Drooping Sheoak) mid Mallee woodland over *Melaleuca lanceolata* (Dryland Tea-tree).	Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
Pterostylis mirabilis (Nodding Rufoushood)	Vulnerable	Possible	This species occurs in coastal areas to areas about 100 km inland, in the high country (75–200 m above sea level) between Cleve and Kimba. This species grows mostly among rocks on hilly slopes, in *Melaleuca uncinata*	Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable

			(Broombush) scrub, but it is also known to occur in Callitris and Eucalypt woodland, usually in stony brown loams (DEWHA 2008a). There are records for this species within close proximity to the Project Area (near Cleve) and therefore this species may occur within suitable habitat.	habitat.
Pterostylis sp. *Hale* (Hale Dwarf Greenhood)	Endangered	Unlikely	This species occurs in Mallee scrub, Broombush and Callitris communities. It also occurs in understorey dominated by heath (DEWHA 2008b). There are records over 10 km from the Project Area from 1993. Therefore, this species is unlikely to occur.	None.
Pterostylis xerophila (Desert Greenhood)	Vulnerable	Possible	Currently known from only eight populations containing about 150 plants from Eyre Peninsula and two locations in Victoria. The closest records to the Project Area are north of Cowell and Coolanie. Found in areas containing *Melaleuca uncinata* (Broombush), *Eucalyptus incrassata* (Ridge-fruited Mallee), *Eucalyptus socialis* (Beaked Red Mallee) and/or *Eucalyptus leptophylla* (Narrow-leaf Mallee).	Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
Ptilotus beckerianus (Ironstone Mulla Mulla)	Vulnerable	Possible	Endemic to SA. Disjunct populations on the Eyre Peninsula as well as Kangaroo Island. Found in association with *Eucalyptus cladocalyx* (Sugar Gum) forests, as well as *Allocasuarina verticillata* (Drooping Sheoak) low woodlands and *Eucalyptus diversifolia* ssp. *diversifolia* (Coastal White Mallee) +/- *E. incrassata* (Ridge-fruited Mallee) +/- *E. leptophylla* (Narrow-leaf Mallee), +/- *Eucalyptus peninsularis* (Cummins Mallee) Mallee woodland.	Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
Pultenaea trichophylla	Endangered	Known	Endemic to the Eyre Peninsula. Numerous	Several individuals detected

(Tufted Bush-pea)			recent records from 20 subpopulations in the Koppio Hills between Todd River Reservoir to just north of Ungarra, mainly along the western side to the Project Area. The species is commonly associated with *Eucalyptus cladocalyx* (Sugar Gum) Woodlands, *Eucalyptus peninsularis* (Cummins Mallee) Low Woodland/Mallee, *Allocasuarina verticillata* (Drooping Sheoak) Low Open Woodland over *E. odorata* (Peppermint Box) and *E. angulosa* (Coast Ridge-fruited Mallee) and *E. foecundum* (Hooked Mallee), mostly over *Melaleuca uncinata* (Broombush) understories. Also occurs in tall shrublands dominated by *Melaleuca uncinata* (Broombush) and Acacia spp.	across several sub-populations during targeted surveys in 2013. Although the current layout largely avoids these sub-populations, a small area of suitable habitat (100 m buffer from records) may be impacted and micro-siting of a single structure and consideration of the stringing method may be required.
Swainsona pyrophila (Yellow Swainson-pea)	Vulnerable	Highly Likely	Occurs across the Eyre Peninsula, Yorke Peninsula and Murraylands, in New South Wales and Victoria. It is known to occur on sandy or loamy soil in Mallee scrub and is usually found after fire.	Not detected during targeted surveys in 2013, which were undertaken in recently burnt areas (usually occurs following fire). Has not been detected in areas disturbed for existing transmission line maintenance and fire hazard reduction in mallee associations within the Project Area during any survey.
Tecticornia flabelliformis (Bead Samphire)	Vulnerable	Unlikely	Mainly confined to coastal habitats. Records from Arno Bay and historically from Todd Reservoir.	None.
Thelymitra epipactoides (Metallic Sun-orchid)	Endangered	Possible	Occurs on Lower Eyre Peninsula, parts of the Murraylands and South East regions of SA, and parts of Victoria. Approximately half of all known sub-populations, including the largest sub-population, are located on roadsides and rail reserves in Lower Eyre Peninsula.	Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.

			Habitat is mainly confined to *Allocasuarina verticillata* (Drooping Sheoak) low woodland, *Eucalyptus cladocalyx* (Sugar Gum) mid woodland, *Eucalyptus angulosa* (Coast Ridge-fruited Mallee), *E. diversifolia* ssp. *diversifolia* (Coastal White Mallee) mid Mallee woodland, +/- *Melaleuca lanceolata* (Dryland Tea-tree), +/- *Melaleuca uncinata* (Broombush) tall shrubs and *Melaleuca uncinata* (Broombush) tall open shrubland.	
Veronica parnkalliana (Port Lincoln Speedwell)	Endangered	Unlikely	This species is considered to be regionally extinct on the Eyre Peninsula (TSSC 2016) and is therefore considered unlikely to occur in the Project Area. More recent records (from 2008) are from the Southern Flinders Ranges.	None.

3.2.2.4 Potential of Occurrence of Listed Threated Fauna Species

The search identified 62 listed threatened fauna species with the potential to occur within the Project Area, of which four species are known to occur, specifically:

- Malleefowl (*Leipoa ocellata*)
- Sandhill Dunnart (*Sminthopsis psammophila*)
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) and
- Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*).

A further two migratory species are considered likely to occur as fly-over species, specifically:

- Fork-tailed Swift (*Apus pacificus*); and
- White-throated Needletail (*Hirundapus caudacutus*).

All other identified species are considered either possible or unlikely. Table 15 details all the identified threatened fauna species and their assessed likelihood of occurrence.

Table 15: Listed Threatened Fauna Potentially Occurring within the Project Area

Scientific Name (Common Name)	EPBC Status	Likelihood of Occurrence	Project Context
Actitis hypoleucos (Common Sandpiper)	Migratory	Possible	Fly-over during migration
Amytornis textilis myall (Western Grasswren (Gawler Ranges))	Vulnerable	Known	Recorded within Project Area
Apus Pacificus (Fork-tailed Swift)	Migratory	Likely	Aerial species, suitable habitat.
Ardenna carneipes (Flesh-footed Shearwater)	Migratory	Unlikely	Marine pelagic species
Ardenna tenuirostris (Short-tailed Shearwater)	Migratory	Unlikely	Marine pelagic species
Arenaria interpres (Ruddy Turnstone)	Migratory	Possible	Fly-over during migration
Botaurus poiciloptilus (Australasian Bittern)	Endangered	Unlikely	Unsuitable habitat
Calidris acuminate (Sharp-tailed Sandpiper)	Migratory	Possible	Fly-over during migration
Calidris alba (Sanderling)	Migratory	Possible	Fly-over during migration
Calidris canutus (Red Knot)	Endangered, Migratory	Possible	Fly-over during migration
Calidris cinereus (Terek Sandpiper)	Migratory	Possible	Fly-over during migration
Calidris ferruginea (Curlew Sandpiper)	Critically Endangered, Migratory	Possible	Fly-over during migration
Calidris melanotos (Pectoral Sandpiper)	Migratory	Possible	Fly-over during migration
Calidris pugnax (Ruff)	Migratory	Possible	Fly-over during migration
Calidris ruficollis (Red-necked Stint)	Migratory	Possible	Fly-over during migration
Calidris subminuta (Long-toed Stint)	Migratory	Possible	Fly-over during migration
Calidris tenuirostris (Great Knot)	Critically Endangered	Possible	Fly-over during migration
Charadrius bicinctus (Double-banded Plover)	Migratory	Possible	Fly-over during migration

Charadrius mongolus (Lesser Sand Plover)	Endangered	Possible	Fly-over during migration
Charadrius veredus (Oriental Plover)	Migratory	Possible	Fly-over during migration
Diomedea antipodensis (Antipodean Albatross)	Vulnerable	Unlikely	Marine pelagic species
Diomedea epomophora (Southern Royal Albatross)	Vulnerable	Unlikely	Marine pelagic species
Diomedea exulans (Wandering Albatross)	Vulnerable, Migratory	Unlikely	Marine pelagic species
Diomedea sanfordi (Northern Royal Albatross)	Endangered, Migratory	Unlikely	Marine pelagic species
Gallinago hardwickii (Latham's Snipe)	Migratory	Possible	Fly-over during migration
Halobaena caerulea (Blue Petrel)	Vulnerable	Unlikely	Marine pelagic species
Hirundapus caudacutus (White-throated Needletail)	Migratory	Likely	Aerial species, suitable habitat
Hydroprogne caspia (Caspian Tern)	Migratory	Possible	Fly-over during migration
Leipoa ocellate (Malleefowl)	Vulnerable	Known	Mounds recorded throughout mallee associations within the Project Area.
Limosa lapponica baueri (Bar-tailed Godwit (baueri))	Vulnerable, Migratory	Possible	Fly-over during migration
Limosa lapponica menzbieri (Bar-tailed Godiwt (menzbieri))	Critically Endangered, Migratory	Unlikely	Outside distribution
Limosa limosa (Black-tailed Godwit)	Migratory	Possible	Fly-over during migration
Macronectes giganteus (Southern Giant Petrel)	Endangered, Migratory	Unlikely	Marine pelagic species
Macronectes halli (Northern Giant Petrel)	Vulnerable, Migratory	Unlikely	Marine pelagic species
Macropus eugenii (Tammar Wallaby)	Extinct	Unlikely	Locally extinct
Motacilla cinereal (Grey Wagtail)	Migratory	Unlikely	Very rare vagrant to South Australia
Motacilla flava (Yellow Wagtail)	Migratory	Unlikely	Very rare vagrant to South Australia

Numenius madagascariensis (Far Eastern Curlew)	Critically Endangered, Migratory	Possible	Fly-over during migration
Numenius phaeopus (Whimbrel)	Migratory	Possible	Fly-over during migration
Pachyptila turtur subantarctica (Fairy Prion (Southern))	Vulnerable	Unlikely	Marine pelagic species
Pandion haliaetus (Osprey)	Migratory	Possible	Fly-over during migration
Pedionomus torqatus (Plains-wanderer)	Critically Endangered	Unlikely	Unsuitable habitat
Pezoporus occidentalis (Night Parrot)	Endangered	Unlikely	Unsuitable habitat
Phaethon rubricauda (Red-tailed Tropicbird)	Migratory	Unlikely	Coastal species, outside distribution
Phalaropus lobatus (Red-necked Phalarope)	Migratory	Possible	Fly-over during migration
Phoebetria fusca (Sooty Albatross)	Vulnerable, Migratory	Unlikely	Marine pelagic species
Pluvialis fulva (Pacific Golden Plover)	Migratory	Possible	Fly-over during migration
Pluvialis squatarola (Grey Plover)	Migratory	Possible	Fly-over during migration
Psophodes nigrogularis leucogaster (Western Whipbird (Eastern))	Vulnerable	Unlikely	Unsuitable habitat
Pterodroma mollis (Soft-plumaged Petrel)	Vulnerable	Unlikely	Marine pelagic species
Rostratula australis (Australian Painted Snipe)	Endangered	Unlikely	Unsuitable habitat
Sminthopsis psammophila (Sandhill Dunnart)	Endangered	Known	Recorded within Project Area
Sterna hirundo (Common Tern)	Migratory	Possible	Fly-over during migration
Sternula nereis nereis (Australian Fairy Tern)	Vulnerable	Unlikely	Coastal species, outside distribution
Stipiturus malachurus parimeda (Southern Emu-wren (Eyre Peninsula))	Vulnerable	Possible	Potential habitat present inland from Louth Bay
Thalassarche cauta cauta (Shy Albatross)	Vulnerable, Migratory	Unlikely	Marine pelagic species

Thalassarche cauta steadi (Campbell Albatross)	Vulnerable, Migratory	Unlikely	Marine pelagic species
Thalassarche melanophris (Black-browed Albatross)	Vulnerable, Migratory	Unlikely	Marine pelagic species
Thinornis rubricollis rubricollis (Hooded Plover (Hooded Dotterel))	Vulnerable	Possible	Fly-over during irregular inland movements to salt lakes
Tringa brevipes (Grey-tailed Tattler)	Migratory	Possible	Fly-over during migration
Tringa nebularia (Common Greenshank)	Migratory	Possible	Fly-over during migration
Tringa stagnatilis (Marsh Sandpiper)	Migratory	Possible	Fly-over during migration

3.3 Relevant Matters of National Environmental Significance

Based on the information available in the Referral, the Commonwealth Government determined that the Proposed Action is likely to, or may, have a significant impact on the following matters of national environmental significance:

- Malleefowl (*Leipoa ocellate*) on the basis that the proposed action involves potential impact to 72.63 ha of Malleefowl habitat.
- Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland Threatened Ecological Community (TEC) on the basis that the Proposed Action involves clearing of seven patches of Eyre Peninsula Blue Gum TEC that classify as habitat critical to the survival of the TEC.
- Jumping-Jack Wattle (*Acacia enterocarpa*) on the basis that the Proposed Action will impact 1.68 ha of habitat suitable for the Jumping-jack Wattle. All occurrences of Jumping Jack Wattle are considered critical to the survival of the species.
- Fat-leaf Wattle (*Acacia pinguifolia*) on the basis that the Proposed Action will impact 0.04 ha of suitable for the Fat-leaf Wattle. All occurrences of Fat-leaf Wattle are considered critical to the survival of the species.
- Large-club Spider-orchid (*Caladenia macroclavia*) on the basis that the Proposed Action will impact at least 0.40 ha of suitable habitat for the Large-club Spider-orchid. All native vegetation within a 500 m buffer of known population of the species is considered critical to the survival of the species.
- Tufted Bush-pea (*Pultenaea trichophylla*) on the basis that the Proposed Action will impact 1.55 ha of habitat suitable for the Tufted Bush-pea. All occurrences of the of the Tufted Bush-pea are considered critical to the survival of the species.

3.3.1 Survey Effort

Since the submission of the EPBC Referral for the project, two further threatened species surveys have been undertaken, one in winter 2020 (June-July 2020) and one in spring (September 2020). The outcomes of these surveys are summarised in the following sections and reported in detail in Appendix B (EPBC Act Flora Survey - Winter 2020) and Appendix C (EPBC Act Flora Survey – Spring 2020), respectively. The detailed Malleefowl baseline environment is presented in the Malleefowl Management Plan, Appendix D to this document.

3.3.2 Malleefowl (*Leipoa ocellate*)

3.3.2.1 Species Overview

The malleefowl (*Leipoa ocellata*) is a stocky ground-dwelling Australian bird about the size of a domestic chicken. It is notable for the large nesting mounds constructed by the males and lack of parental care after the chicks hatch.

The Malleefowl belongs to the family *Megapodiidae*, the megapodes or mound builders. The group is usually considered amongst the Galliformes, or as a sister group to this order and is unique amongst birds in that its members use external sources of heat to incubate

their eggs. The family comprises only seven genera and 22 species, all of which are confined to the islands of south-east Asia and the south-west Pacific, and Australia.

The Malleefowl is the most southerly distributed of three species of megapode that occur in Australia. It is restricted to the mainland and differs from all other extant megapodes in that it inhabits semi-arid and arid habitats rather than damp forests. These dry regions are not conducive to the incubation methods typically employed by megapodes, such that the Malleefowl has developed the most sophisticated and elaborate technique of incubation of the family.

It occupies semi-arid mallee scrub on the fringes of the relatively fertile areas of southern Australia, where it is now reduced to three separate populations: the Murray-Murrumbidgee basin, west of Spencer Gulf along the fringes of the Simpson Desert, and the semiarid fringe of Western Australia's fertile southwest corner

3.3.2.2 Project Context

Several desktop investigations and field surveys targeting Malleefowl have been undertaken in the period 2014 to date, including two LiDAR surveys used to identify Malleefowl mounds prior to ground truthing.

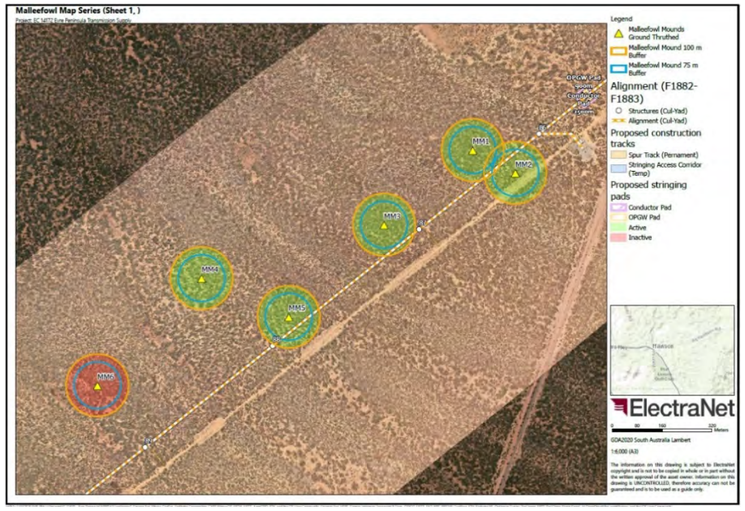
The 2014 survey and subsequent ground-truthing confirmed 41 mounds, and the 2019 survey and subsequent ground-truthing confirmed 36 mounds. Of the 36 mounds, 21 had previously identified in 2014 and 16 were newly identified mounds (Appendix D). The 56 Malleefowl mounds identified during LiDAR and ground-truthing are described in Appendix D.

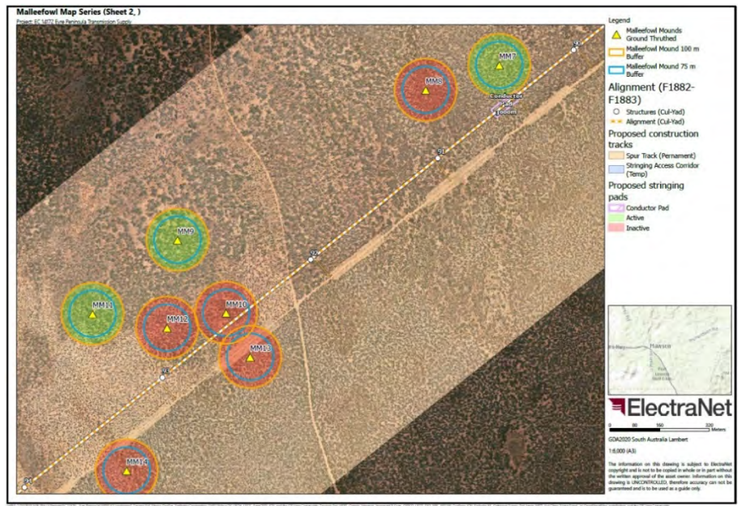
Of the 56 identified Malleefowl mounds, 17 Malleefowl mound buffers are predicted to be impacted by the project. Of these:

- For 3 Malleefowl mound buffers, the temporary stringing track will be inside the 100 m buffer
- For 14 Malleefowl mound buffers, the temporary stringing track will be inside the 75 m buffer
- For the Malleefowl buffers for MM44 and MM45 (see Appendix D), a portion of the temporary structure pad will be inside the 100 m buffer (but outside the 75 m buffer)

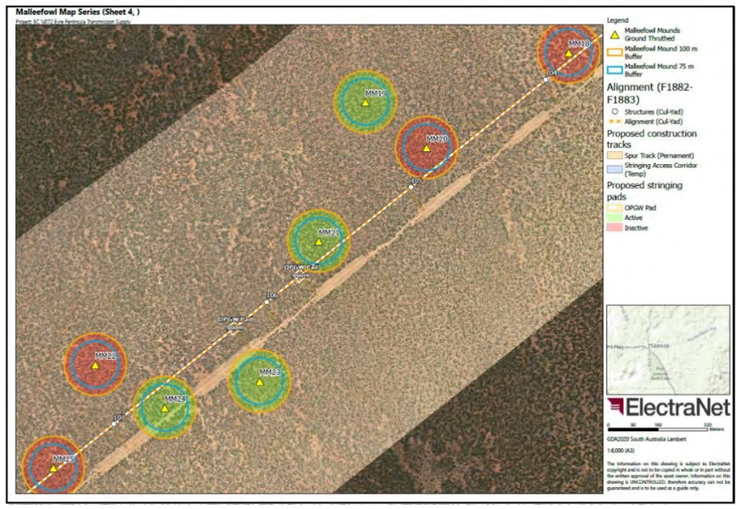
Further, of the 56 mounds, 32 mounds were assessed as being active during either the 2014 or 2019 surveys, the remaining 24 mounds found to be inactive. Of the 32 mounds that were observed to have been active between 2014 and 2019, 8 occur within the mound buffers referred to above.

Mapping of all identified active and inactive Malleefowl mounds with associated buffers in the context of the proposed transmission line infrastructure is presented in Figure 10.

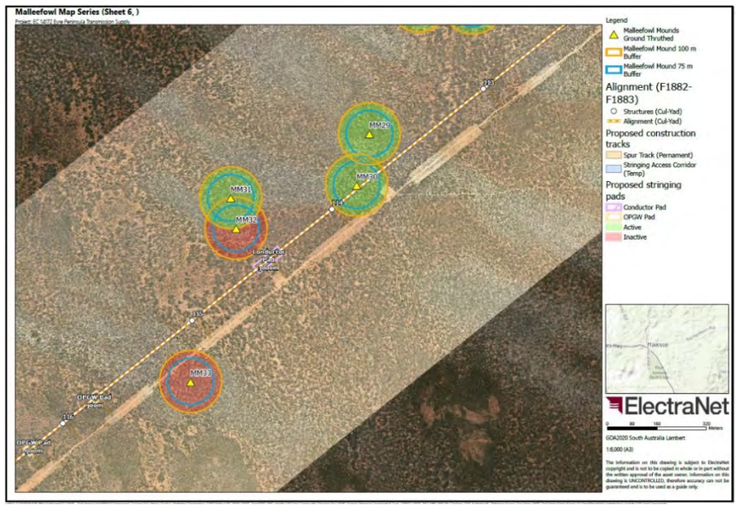

Malleefowl Map Series (Sheet 1,)
Legend
Malleefowl Mounds Ground Thrufted
Malleefowl Mound 100 m Buffer
Malleefowl Mound 75 m Buffer
Alignment (F1882-F1883)
Structures (Cul-Yad)
Alignment (Cul-Yad)
Proposed construction tracks
Spur Track (Pernament)
Stringing Access Corridor (Temp)
Proposed stringing pads
Conductor Pad
OPGW Pad
Active
Inactive
MM1
MM2
MM3
MM4
MM5
ElectraNet


Malleefowl Map Series (Sheet 2,)
Legend
Malleefowl Mounds Ground Thrufted
Malleefowl Mound 100 m Buffer
Malleefowl Mound 75 m Buffer
Alignment (F1882-F1883)
Structures (Cul-Yad)
Alignment (Cul-Yad)
Proposed construction tracks
Spur Track (Pernament)
Stringing Access Corridor (Temp)
Proposed stringing pads
Conductor Pad
Active
Inactive
MM6
MM7
MM8
MM9
MM10
MM11
MM12
MM13
MM14
ElectraNet


Malleefowl Map Series (Sheet 3,)
Legend
Malleefowl Mounds Ground Thrufted
Malleefowl Mound 100 m Buffer
Malleefowl Mound 75 m Buffer
Alignment (F1882-F1883)
Structures (Cul-Yad)
Alignment (Cul-Yad)
Proposed construction tracks
Spur Track (Pernament)
Stringing Access Corridor (Temp)
Active
Inactive
MM15
MM16
MM17
ElectraNet


Malleefowl Map Series (Sheet 4,)
Legend
Malleefowl Mounds Ground Thrufted
Malleefowl Mound 100 m Buffer
Malleefowl Mound 75 m Buffer
Alignment (F1882-F1883)
Structures (Cul-Yad)
Alignment (Cul-Yad)
Proposed construction tracks
Spur Track (Pernament)
Stringing Access Corridor (Temp)
Proposed stringing pads
OPGW Pad
Active
Inactive
MM18
MM19
MM20
MM21
MM22
MM23
MM24
MM25
ElectraNet


Malleefowl Map Series (Sheet 5,)
Legend
Malleefowl Mounds Ground Thrufted
Malleefowl Mound 100 m Buffer
Malleefowl Mound 75 m Buffer
Alignment (F1882-F1883)
Structures (Cul-Yad)
Alignment (Cul-Yad)
Proposed construction tracks
Spur Track (Pernament)
Stringing Access Corridor (Temp)
Active
Inactive
MM26
MM27
MM28
ElectraNet


Malleefowl Map Series (Sheet 6,)
Legend
Malleefowl Mounds Ground Thrufted
Malleefowl Mound 100 m Buffer
Malleefowl Mound 75 m Buffer
Alignment (F1882-F1883)
Structures (Cul-Yad)
Alignment (Cul-Yad)
Proposed construction tracks
Spur Track (Pernament)
Stringing Access Corridor (Temp)
Proposed stringing pads
Conductor Pad
OPGW Pad
Active
Inactive
MM29
MM30
MM31
MM32
MM33
ElectraNet

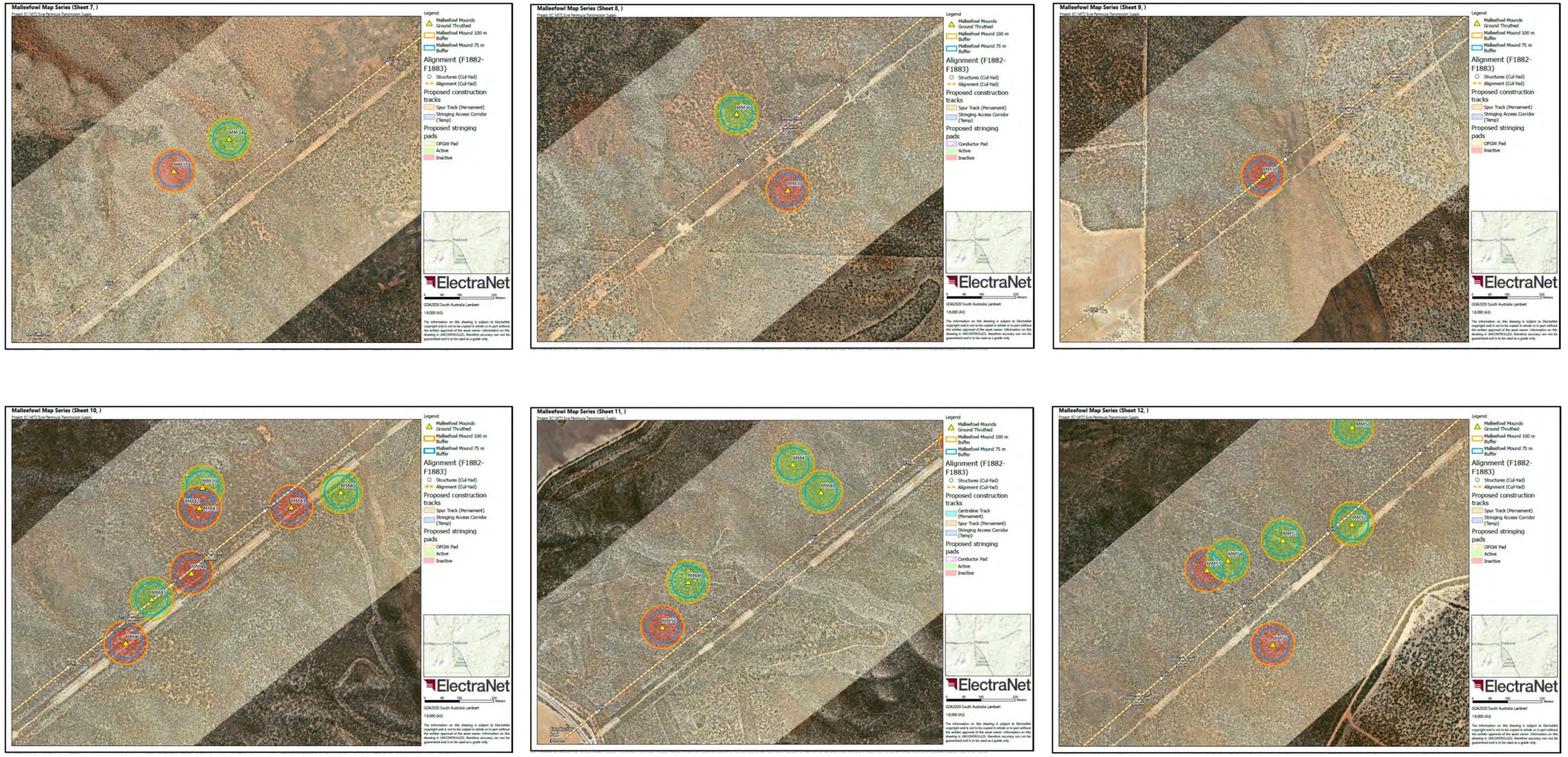


Figure 10: Presence of Potentially Active and Inactive Malleefowl Mounds in Proximity to the Transmission Line

3.3.3 Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland

3.3.3.1 Community Overview

The typical structure of the Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland is a woodland but may form open forest. The mid and ground layer can show considerable variation in floristic composition and structure, being greatly influenced by the history of disturbance and management of remnant patches.

The canopy of the ecological community is dominated or co-dominated by *Eucalyptus petiolaris* (blue gum). Other tree species that may be present in the canopy include *Allocasuarina verticillata* (drooping sheoak), *E. camaldulensis* (river red gum), *E. cladocalyx* (sugar gum) and *E. odorata* (peppermint box). The canopy height of the ecological community typically ranges up to 15 metres.

The mid layer varies from open to dense, mainly consisting of a layer of sclerophyllous shrubs or small trees including *Bursaria spinosa* (sweet bursaria), *Hakea rugosa* (dwarf hakea) and *Xanthorrhoea semiplana* (yakka). In low-lying areas and along creeklines, other species such as *Callistemon rugulosus* (scarlet bottlebrush), *Melaleuca brevifolia* (short-leaf honey-myrtle) and *M. decussata* (totem-poles) may dominate the midstorey. The density of the midstorey can influence the ground layer (for example, a dense midstorey leads to a sparse understorey).

The ground layer of the Eyre Blue Gum Woodland is typically open, low and dominated by a variety of grasses and sedges, such as *Rytidosperma* (formerly *Austrodanthonia*) spp. (wallaby grasses), *Austrostipa* spp. (speargrasses), *Carex* spp. (sedge) and *Lepidosperma viscidum* (sticky sword-sedge); and/or rushes such as *Chorizandra enodis* (black bristle-rush) and *Juncus subsecundus* (finger rush). Seasonal herbaceous species diversity tends to increase during spring and may include *Chamaescilla corymbosa* var. *corymbosa* (blue squill), *Geranium retrorsum* (common cranesbill) and *Lagenophora huegelii* (coarse bottle-daisy). Low shrubs also occur in the understorey and may be locally dominant, such as *Dampiera rosmarinifolia* (rosemary dampiera).

Where the ecological community occurs near creeklines and low-lying areas, species adapted to occasional inundation, such as sedges and rushes, may dominate. However, the ecological community does not respond well to prolonged waterlogging.

The Eyre Blue Gum Woodland occurs south of the Gawler Ranges mainly in the Koppio Hills, Cleve Hills and west of the Marble Range where the annual rainfall is high (above 370 mm) relative to some other parts of the Peninsula. The ecological community is predominantly restricted to well-drained, moderate to high fertility soils associated with sheltered valleys, lower hill slopes and watercourses

3.3.3.2 Project Context

EP Blue Gum Woodland is endemic to the Eyre Peninsula and a number of patches were mapped along the alignment during the initial surveys (EBS Ecology 2014), but were not assessed under the Approved Conservation Advice (TSSC, 2013) at the time. Approximately 8.5 ha of the community, which was mapped within the 120 m wide assessment corridor, was recorded in moderate condition and considered to possibly qualify as the TEC.

During the proposed native vegetation clearance field assessment undertaken in September 2019, an assessment was conducted in a representative patch of *Eucalyptus petiolaris* +/- *Eucalyptus odorata* +/- *Allocasuarina verticillata* Open Grassy Woodland (see Appendix H, EPBC Referral (EPBC Assessment)). Based on the results of this assessment and the condition categories and thresholds for the EP Blue Gum Woodland TEC (TSSC 2013), the seven patches of this association intersected by the Project Area qualify as Category C1 of the EP Blue Gum Woodland TEC. Category C1 of this TEC describes communities of medium quality, with good native vegetation cover and diverse native species in the understorey.

Further survey of the Eyre Peninsula Blue Gum Woodland Threatened Ecological Community occurred in September 2020 (see Appendix C (EPBC Act Flora Survey – Spring 2020)) and is considered to be the baseline against which impacts as a result of the project were assessed. The outcomes of this survey found:

- Ten patches of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland (EPBG Woodland) occur within the 500 m wide Project Area.
- The total area of EPBG Woodland anticipated to be impacted by the project is 1.352 ha. Of this, 1.022 ha of impact will be in Blue Gum woodlands which are considered an Endangered Ecological Community (EEC). The remaining 0.33 ha of impact will be in Blue Gum woodlands which do not meet the criteria for EPBC listing. Of the 1.352 ha impacted by the project, only 0.035 ha (350 m^2) will be permanent. The remaining 1.317 ha of proposed disturbance is temporary and will be rehabilitated.
- The ten patches of EPBG Woodland within the 500 m wide study area total 50.09 ha in extent. Of this, 39.51 ha meets the criteria for listing as the EPBC Act listed EEC. This includes:
    - 19.43 ha of Category A woodland (exceptional quality).
    - 1.4 ha of Category B woodland (very high quality).
    - 18.68 ha of Category C2 woodland (medium quality).
- The remaining 10.58 ha does not meet the criteria for EPBC listing and is therefore not considered an EEC under the EPBC Act.

The locations of the presently identified patches of the TEC in the context of the proposed infrastructure are presented in Figure 11.

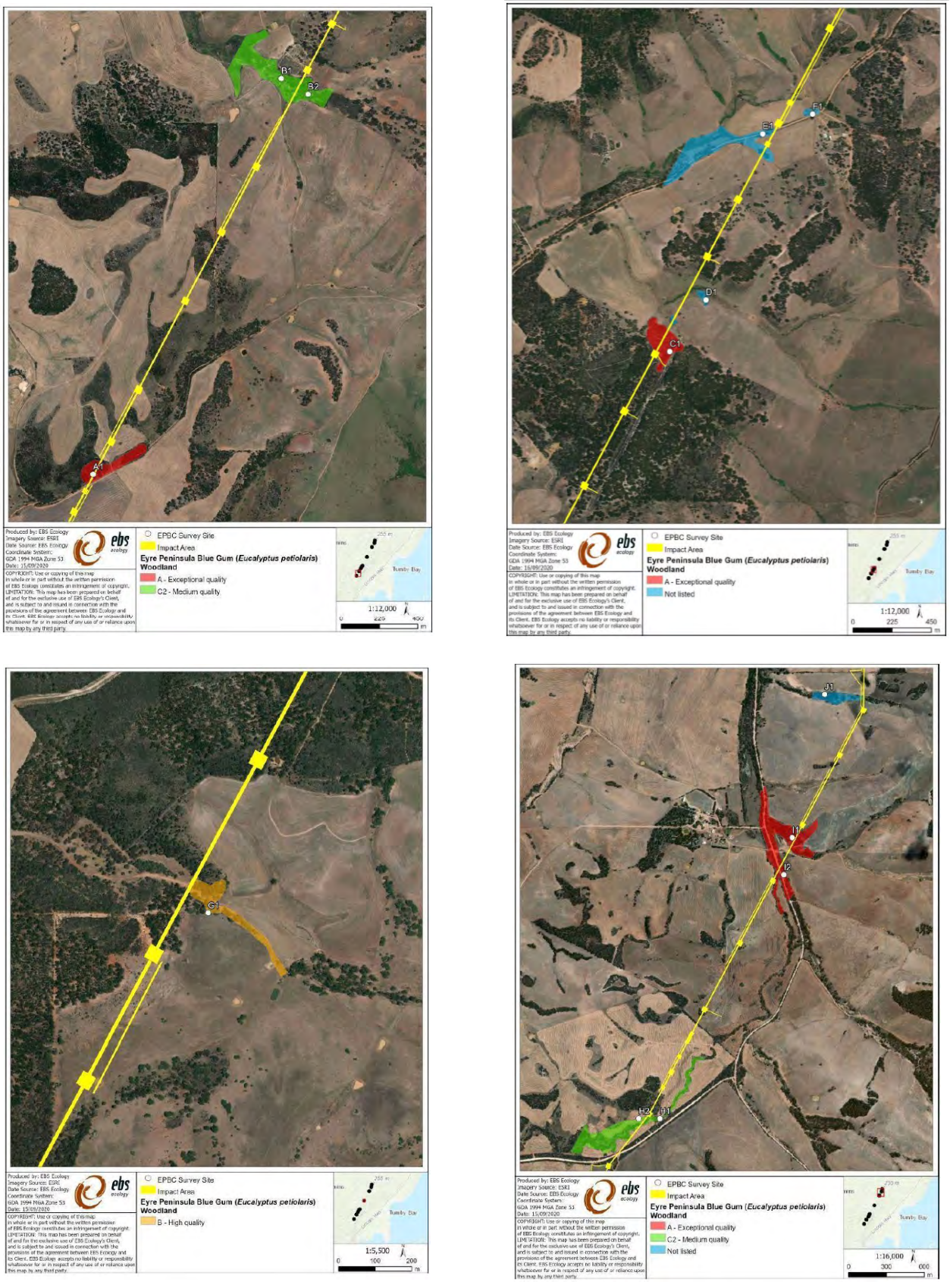


Figure 11: Presence of Eyre Peninsula Blue Gum Woodland in Proximity to the Transmission Line

3.3.4 Jumping-Jack Wattle (*Acacia enterocarpa*)

3.3.4.1 Species Overview

Acacia enterocarpa, commonly known as jumping jack wattle, is a shrub species that is endemic to eastern Australia. The shrub has a dense spreading habit and typically grows to a height of less than 1.5 m. It has ribbed, red to brown coloured branchlets that are asperulate. It blooms between May and October and produces simple inflorescences simple in groups of one to four situated in the axils. The spherical flower-heads have a diameter of 3.5 to 4.5 mm (0.14 to 0.18 in) and contain over 20 bright yellow flowers.

It has a disjunct distribution through parts of south eastern South Australia and western Victoria. It is found on the southern tip of the Eyre Peninsula and Yorke Peninsula from around Curramulka and near Bordertown extending eastwards as far as to Nhill in western Victoria. It is often found as part of woodland to open forest communities and grows in sandy alkaline soils as well as neutral yellow duplex to red porous loamy soils and grey cracking clay soils.

3.3.4.2 Project Context

The species occurs as a disjunct population on the Eyre Peninsula, recorded from *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. socialis* (Beaked Red Mallee) mallee woodland; *Eucalyptus calycogona* (Square-fruit Mallee), +/- *E. phenax* ssp. *phenax* (White Mallee) Mallee woodland; *Eucalyptus gracilis* (Yorrell) +/- *E. dumosa* (White Mallee) +/- *E. brachycalyx* (Gilja), +/- *E. oleosa* (Red Mallee) Mallee. This vegetation is present on site and a number of recent records occur in close proximity to the Project area.

Subpopulations are known from roadsides and rail reserves and amongst vegetation corridors along SA Water pipelines. The species was detected during previous targeted surveys from three separate locations, two from roadside reserve east of Ungarra and the third from south-east of Mount Hill. The vegetation associations were defined by *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricate* and *Melaleuca uncinata* and *Eucalyptus peninsularis* Mallee respectively.

The most recent (Winter 2020) survey found three populations of Acacia enterocarpa, totalling 34 plants, in the Project Area (Yadnarie and Port Lincoln) during the survey (see Appendix B, EPBC Act Flora Survey – Winter 2020). Two were found in road reserves between proposed Structures 120 and 121 and proposed Structures 121 and 122. The third was found in remnant mallee on private property near proposed Structure 95. All three locations were the site of historical records and occur over a total 0.397 ha. No previously unknown populations of *Acacia enterocarpa* were detected, despite searching all patches of suitable habitat in the Project Area. Results of the survey are summarised in Table 16.

The population near proposed Structure 95 comprises a single, mature plant only. Despite extensive searching throughout this vegetation patch, no additional plants were recorded at that location.

Twenty-six plants were found in a road reserve in the span between proposed Structures 120 and 121. All were healthy, mature plants. The seven plants recorded in span 121 – 122 were located on the Lipson-Ungarra Road reserve. These plants were in very poor health, possibly impacted by roadside spraying activities. No juvenile plants were detected.

Table 16: Summary of Winter 2020 Jumping-Jack Wattle Survey.

Location (Proposed Span / Structure)	Number of Individuals	Area of Occurrence within Project Area (m^2)	Vegetation Association	Individuals Impacted by the Project
Structure 95	1	308	*Eucalyptus peninsularis* +/- *Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual species.	*No – closest individual is located 23m from the nearest disturbance. Individuals to be flagged off during construction when 10m from construction activity zone.*
Span 120-121	26	2951	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata*.	*No – closest individual is located 26m from the nearest disturbance. Populations to be flagged off during construction when 10m from construction activity zone.*
Span 121-122	7	706	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata*.	*No – hurdles to be used to string over Lipson-Ungarra Road. Individuals to be flagged off during construction when 10m from construction activity zone.*
Totals	**34**	**0.397 ha**		Nil individuals

Identified occurrences of Jumping-Jack Wattle within the Project Area, including buffers, are presented in the context of the proposed transmission line in Figure 12.

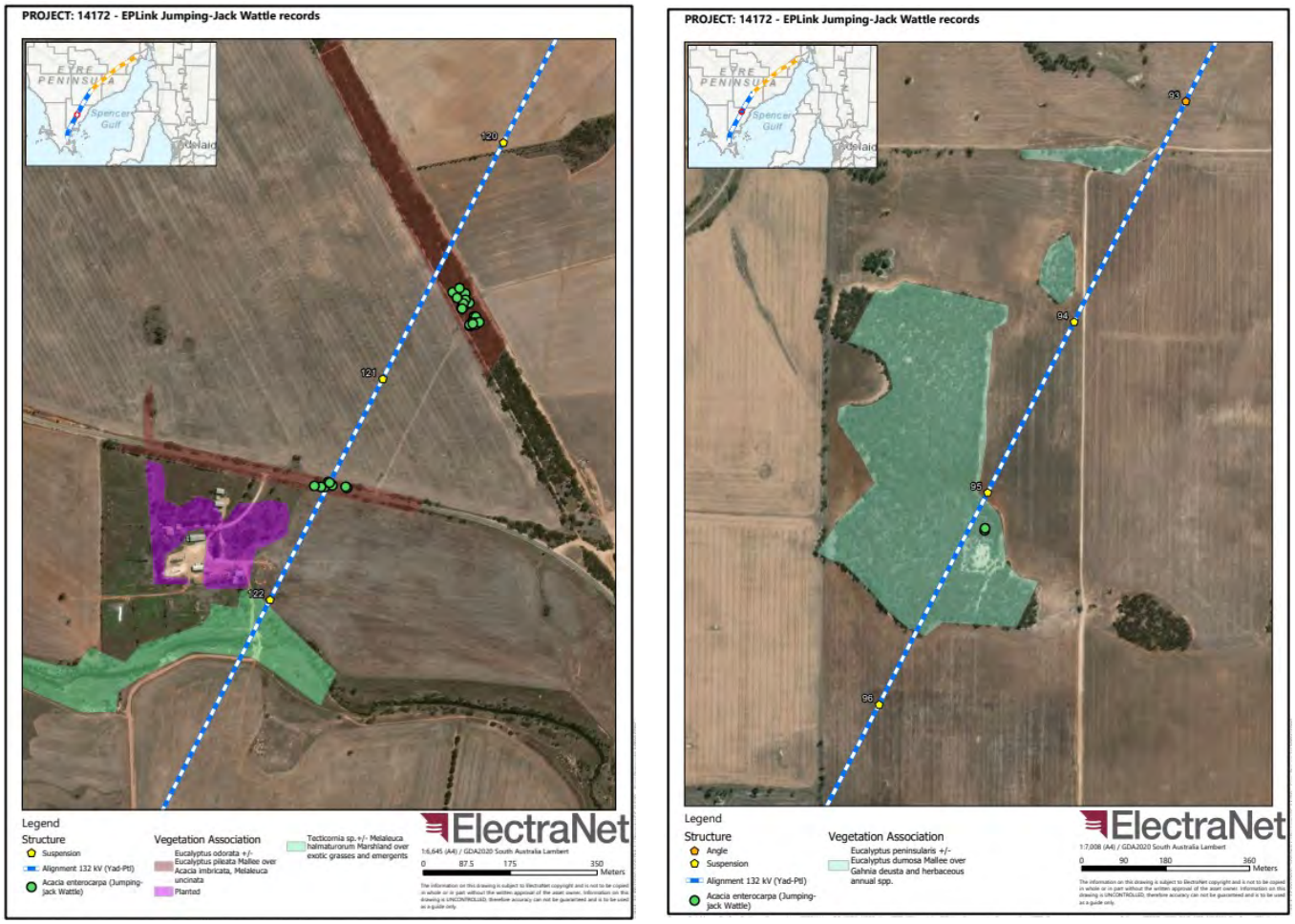


Figure 12: Presence of Jumping-Jack Wattle in Proximity to the Transmission Line

3.3.5 Fat-leaf Wattle (*Acacia pinguifolia*)

3.3.5.1 Species Overview

A dense spreading shrub, to two metres high with globular golden yellow flower heads. Considered a declining species in Eyre Hills IBRA subregion. Known from disjunct subpopulations across the Eyre Peninsula, where it grows in association with *Eucalyptus odorata* (Peppermint Box) and *E. incrassata* (Ridge-fruited Mallee), *E. dumosa* (White Mallee), *E. foecunda* (Hooked Mallee), *E. calycogona* (Square-fruited Mallee), *E. cooperiana* (Coopers Mallee), *E. flocktoniae* (Merrit) and *E. pileata* (Capped Mallee) in undulating terrain with a westerly aspect. Also occurs in *Melaleuca uncinate* (Broombush) shrubland.

In the northern Eyre Peninsula, sub populations are known to occur near Cockaleechie, Ungarra, Bulter and several recent records east of Cleve near the Yeldulknie CP. Many sub-populations are located on roadsides and rail reserves

3.3.5.2 Project Context

Previously, *Acacia pinguifolia* was recorded at one location within the Project Area, where five individuals were found (see Appendix H, EPBC Referral (Biodiversity Assessment Report)). This area was searched twice during the Winter 2020 survey by three EBS Ecologists. The area consists of roadside vegetation in poor condition, impacted by weeds and works associated with road and infrastructure maintenance. No *Acacia pinguifolia* plants were located.

Five individuals of *Acacia farinosa* (Mealy Wattle) were found growing at the location of the historical record. *Acacia farinosa* can appear similar to *A. pinguifolia* (see Plate 1), especially when the mealiness on young branches of the former species is absent.

To confirm identification, voucher specimens of the above plants were collected. These were compared to known *A. pinguifolia* plants in the field on Mine Hill Road, just south of the intersection of Ungarra – Stokes Road. Voucher specimens were also identified as *A. farinosa* using the following identification keys:

- Key to Acacias of South Australia (Government of South Australia, 2020)
- WATTLE, Interactive Identification of Australian Acacia, Version 3 (Maslin, 2018).

It is likely that records of *A. pinguifolia* at this location relate to misidentification of the five *A. farinosa* present. Areas of suitable habitat elsewhere within the Project Area were searched for *A. pinguifolia*. The plant was not detected, despite thorough searching that included:

- Parallel field transects by two observers, with transects spaced approximately 10 - 15 m apart. The transects followed entire length and width of vegetation patch within impact footprint.
- Small patches of vegetation (i.e. <50 m^2 or <20 m wide) were searched thoroughly using a random meander pattern, rather than transects.

These are in accordance with relevant state Government advices, given the lack of EPBC-specific survey advice. It is now considered unlikely that this species occurs in the Project Area, and thus this species is not considered further in this Report.

Plate 1: Comparison of *Acacia farinose* (left) and *Acacia pinguifolia* (right)

3.3.6 Large-club Spider-orchid (*Caladenia macroclavia*)

3.3.6.1 Species Overview

Caladenia macroclavia, commonly known as the Large-club Spider-orchid or Brown bayonets, is a plant in the orchid family *Orchidaceae* and is endemic to South Australia. It is a ground orchid with a single hairy leaf and a single green to yellowish-green flower with dark red central stripes. It is a rare species, and in 2006 the total population was estimated to be between 35 and 80 mature plants.

The Large-club Spider-orchid was previously thought to have a distribution that extended from the Eyre Peninsula to the Murray Region in South Australia. However, the species is now considered to be mostly confined to the Yorke Peninsula and is regarded as rare on central Eyre Peninsula, where it was last recorded (from Stamford Hill) in 1985 (Bickerton 2003). The species grows in fertile shallow loams in mallee-boom brush woodland in sandy loam over limestone.

3.3.6.2 Project Context

The orchid species was targeted during the known flowering times (September - October), within known habitat types. Three individuals believed to be this particular orchid were detected in one sub-population during targeted surveys in 2013.

Further targeted survey for the Large-club Spider-orchid occured in September 2020. The scope of this survey included a targeted survey in accordance with the DAWE's Draft survey guidelines for Australia's threatened orchids (2013) in all suitable habitat within 500 m of the project corridor to determine the current distribution of Large-Club Spider-orchids. The results of this survey, combined with analysis of survey data (locations, descriptions of habitat and photographic records) has found that the previously identified occurrences along the Project corridor are actually *Caladenia septuosa* (Koppio Spider Orchid) and not the EPBC-listed *Caladenia macroclavia* (see Plate 2). There were a number (50+) plants flowering at the time and although there was some slight variation, none had large, dark brown clubs, with the clubs instead being all yellow-brown and up to 6 mm long. The labellum was also larger and more 'spectacular' than the confirmed *C. macroclavia* flowers observed on Yorke Peninsula. Further, observations of the habitat suggest that this was also not ideal for *C. macroclavia*, the project sites are situated on a rocky ridge top with a shallow loam soil and rock outcrop in *Eucalyptus odorata* mallee over *Melaleuca uncinata* / *Acacia paradoxa*, which is quite different to the confirmed Yorke Peninsula site

As a result of the above, the species *C. macroclavia* is now considered unlikely to occur in the Project Area, and thus this species is not considered further in this Report. The species *C. septuosa* is neither state nor EPBC-listed as a threatened species and is therefore also not considered further in this report.

Plate 2: Comparison of *C. macroclavia* (Yorke Peninsula) and *C. septuosa* (Eyre Peninsula)

3.3.7 Tufted Bush-pea (*Pultenaea trichophylla*)

3.3.7.1 Species Overview

Pultenaea trichophylla, Family *Fabaceae*, also known as the Tufted Bush-pea, is a small, slender shrub. The species grows to approximately 30 cm high and has reddish coloured branches with small lance-shaped leaves which taper to a fine pointy tip. Long, soft hairs are present on the underside of the leaves. The species produces red and yellow pea flowers that are 7 mm long and attached to very short stalks that are situated on the end of small branches.

The Tufted Bush-pea is endemic to South Australia's Eyre Peninsula. The species is confined to the Eyre Hills sub-region of the Eyre Yorke Block bioregion, and the Eyre Peninsula Natural Resource Management (NRM) Region. The species has been recorded from 20 subpopulations within the Koppio Hills, between the Tod River Reservoir in the south to just north of Ungarra. Most subpopulations of the Tufted Bush-pea occur in small patches of remnant vegetation interspersed by cleared land. The species occurs alongside a variety of vegetation types

The total population size of the Tufted Bush-pea is approximately 10,500 plants. The species' current estimated extent of occurrence is 162 km^2 and its area of occupancy is estimated to be less than 1 km^2 (see Appendix H, EPBC Referral (Biodiversity Assessment Report).

3.3.7.2 Project Context

There are numerous recent records of the species from 20 subpopulations in the Koppio Hills between Tod River Reservoir to just north of Ungarra, mainly along the western side to the project area.

The 2007-2012 Draft Recovery Plan for 23 threatened flora taxa on Eyre Peninsula, South Australia (*SA Department for Environment and Heritage, 2007*) indicates that some of the most important populations of Tufted Bush-pea are located at:

- Tod River Reservoir (2km west of the project corridor) where 1200-5000 individuals are located in an extent of 150,000m2. This is the largest known population.

- Near Uranno (18km west of the project corridor where more than 500 individuals are located.

- Near Nyllow Hill (located to the west of the project alignment – a design change was implemented to avoid this remnant vegetation so no individuals or habitat affected by the project) where more than 500 individuals are located.

None of these populations will be impacted by the project.

The species is commonly associated with *Eucalyptus cladocalyx* (Sugar Gum) woodlands, *Eucalyptus peninsularis* (Cummins Mallee) low woodland/mallee, Drooping Sheoak (*Allocasuarina verticillata*) low open woodland over *E. odorata* (Peppermint Box) and *E. angulosa* (Coast Ridge-fruited Mallee) and *E. foecunda* (Hooked Mallee), mostly over *Melaleuca uncinata* (Broombush) understories. It also occurs in tall shrublands dominated by *Melaleuca uncinate* (Broombush) and *Acacia* spp.

During the targeted surveys the species was recorded as relatively widespread between north of the Bratten Way to just south of Ungarra. It was mainly associated with the Mallee /Broombush associations, *Melaleuca uncinata* Tall Shrubland and *Eucalyptus cladocalyx* Woodland and *Allocasuarina verticillata* Low Woodland.

Previous surveys have located *Pultenaea trichophylla* at 12 locations in the Project Area (see Appendix H, EPBC Referral (Biodiversity Assessment Report)). These areas were the subject of additional survey in Winter 2020, as well as other patches of suitable Vegetation Associations that had not previously been targeted.

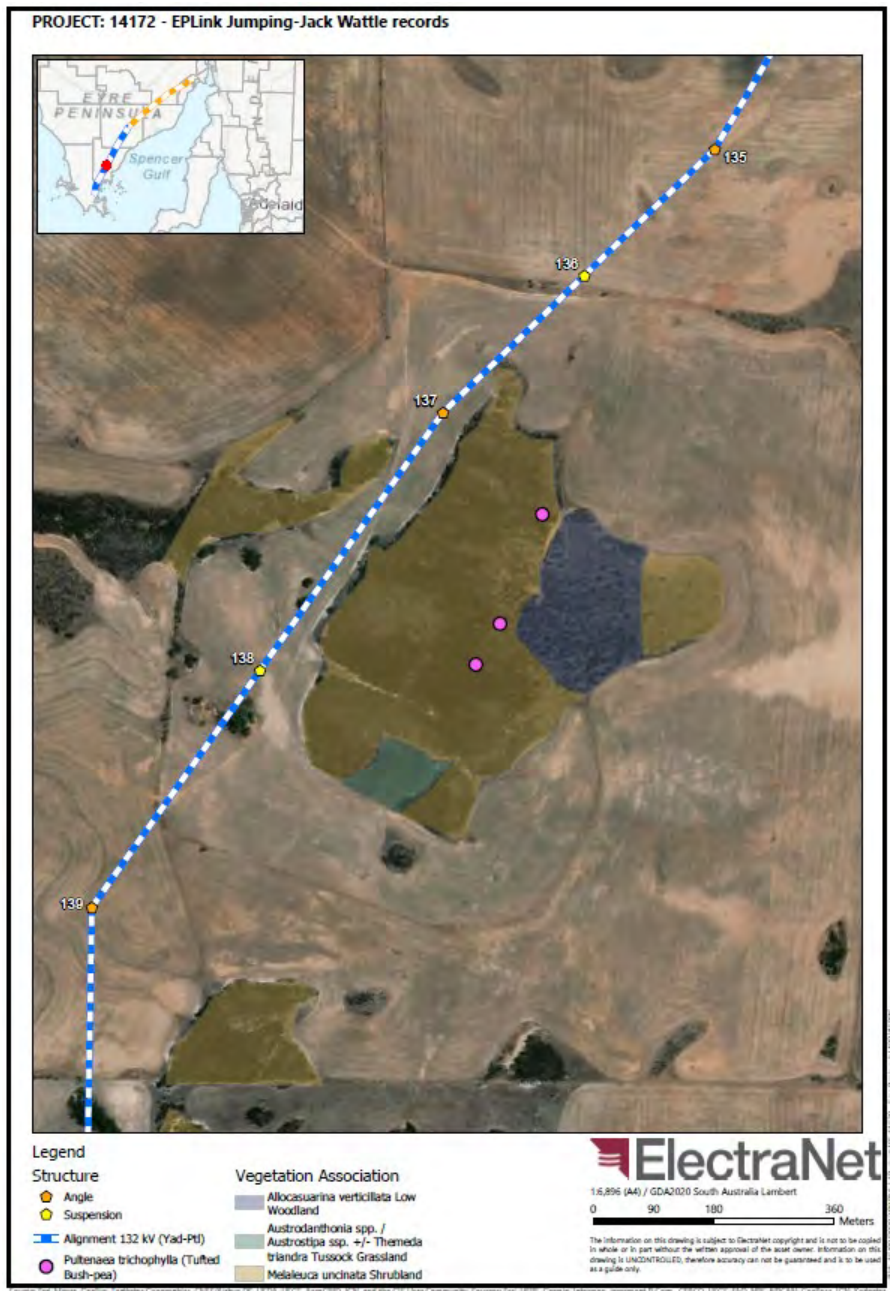
This additional survey effort has consolidated previous records into five populations, as indicated in Table 17.

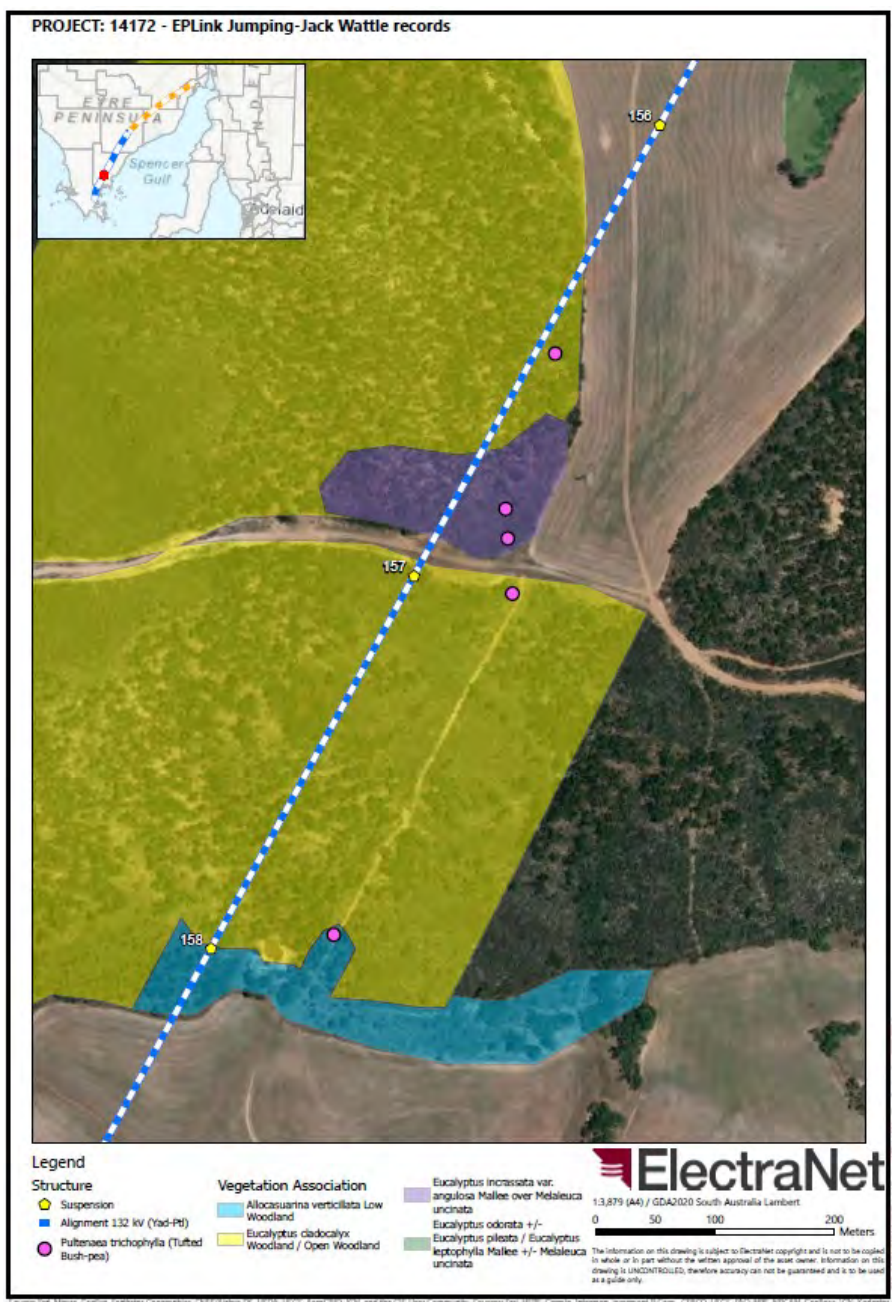
Identified occurrences of Tufted Bush-pea within the Project Area, including buffers, are presented in the context of the proposed transmission line in Figure 13.

Table 17: Summary of Winter 2020 Tufted Bush-pea Survey.

Location (Proposed Span / Structure)	Number of Individuals	Area of Occurrence within Project Area (ha)	Vegetation Association	Individuals Impacted by Project
Span 132-133	1	0.2850	*Eucalyptus odorata* +/- *Eucalyptus pileata* / *Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata*.	*No – individual is located 50m from nearest land disturbance. Population to be flagged off during construction when 10m from construction activity zone.*
Structure 152	8	0.0663	*Eucalyptus cladocalyx* Woodland / Open Woodland.	*No – closest individual is located 16m from nearest land disturbance. Population to be flagged off during construction when 10m from construction activity zone.*
Structure 153	9	0.1384	*Eucalyptus cladocalyx* Woodland / Open Woodland.	*No – closest individual located 2m from nearest disturbance. Individuals to be flagged off during construction when 10m from construction activity zone.*
Span 154-155	33	0.2883	*Eucalyptus cladocalyx* Woodland / Open Woodland. *Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata.*	*No – closest individual located 47m from nearest disturbance. Population to be flagged off during construction when 10m from construction activity zone.*
Spans 156-159	Widespread in stringing corridor Numerous individuals adjacent proposed structures 157 and 158	37.434 (100 m buffer around records)	*Eucalyptus cladocalyx* Woodland / Open Woodland. *Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*.	*Low impact stringing (helicopter or drone) will be implemented for these spans to eliminate removal associated with the 10m stringing track.* *Possible disturbance of 1 individual during construction of structure pad 157, however every effort will be made to micro-site the structure pad to avoid impacts.* *Unavoidable disturbance of 3 individuals for the permanent structure pad for structure 158. Possible disturbance of an additional 5*

				individuals, however every effort will be made to micro-site the structure pad to avoid impacts. *Any individuals not impacted will be flagged off during construction when 10m from construction activity zone.*
Span 178-179	13	0.1597	*Eucalyptus petiolaris* +/- *Eucalyptus odorata* +/- *Allocasuarina verticillata* Open Grassy Woodland.	*No – closest individual located 35m from nearest disturbance. Population to be flagged off during construction when 10m from construction activity zone.*
Totals		**38.3717 ha**		Unavoidable disturbance to 3 individuals. Possible disturbance of up to an additional 6 individuals (subject to micro-siting and final cut/fill design). Every effort will be made to flag off and protect these individuals. **Maximum number of individuals impacted: 9**





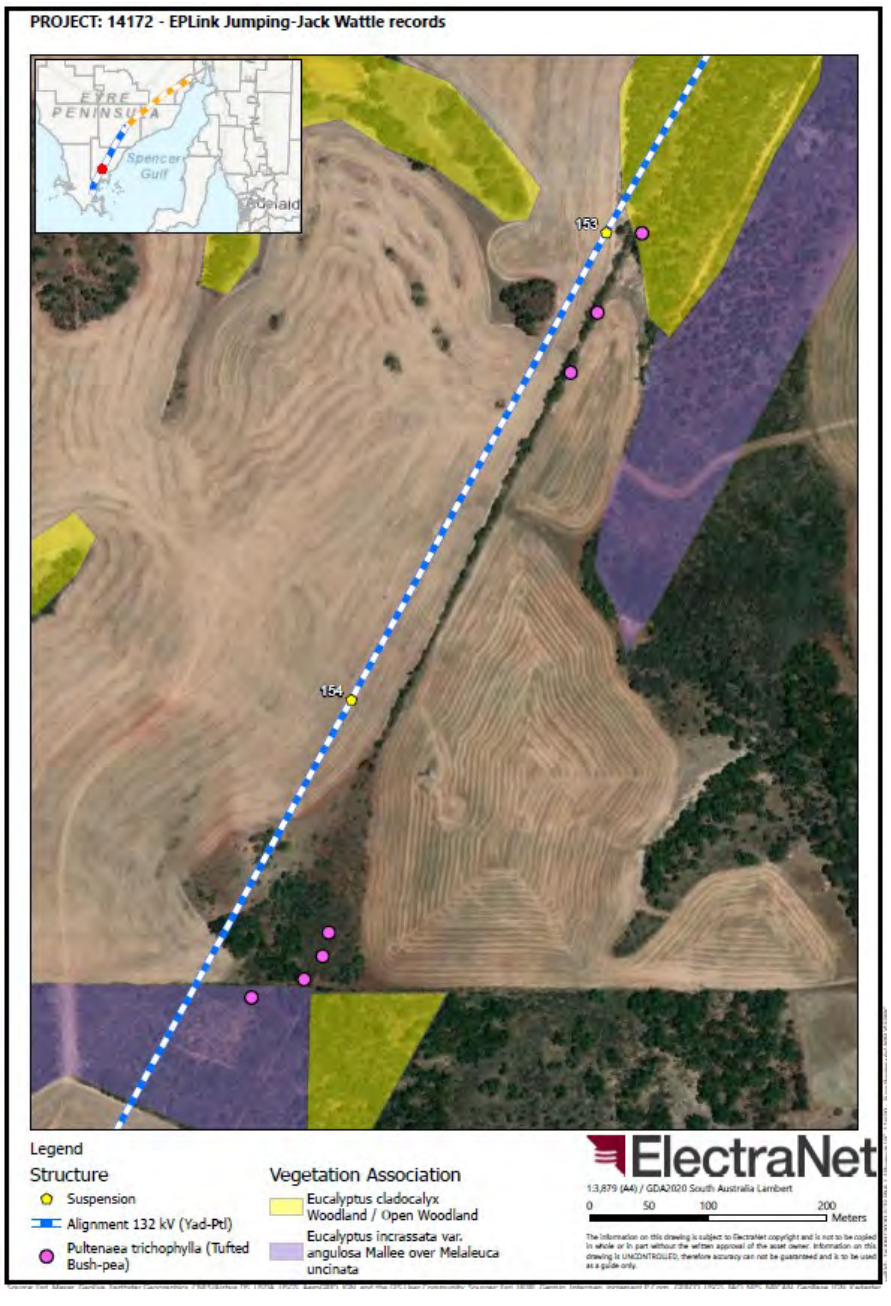


Figure 13: Presence of Tufted Bush-pea in Proximity to the Transmission Line

4. AVOIDANCE AND MITIGATION MEASURES

4.1 Policy

The application of avoidance and mitigation measures is discussed in the Australian Government Environmental Offsets Policy document (2012), and confirms that avoidance and mitigation measures are the primary strategies for managing the potential significant impacts of the Project. They aim to directly reduce the scale and intensity of the potential impacts of Project activities on Matters of National Environmental Significance (MNES).

Avoidance of impacts on protected matters may be achieved through comprehensive planning and suitable site selection, for example by changing the route of an access road to avoid an endangered ecological community.

After all reasonable avoidance measures have been put in place, mitigation of any remaining significant impact must be undertaken, for example putting in place measures to reduce sediment runoff from a development site that may otherwise affect a threatened fish species.

Avoidance and mitigation measures can reduce and, in some cases, remove the need for offsets if the residual impact is not significant. Offsets should not be considered until all reasonable avoidance and mitigation measures are considered, or acceptable reasons are provided as to why avoidance or mitigation of impacts is not reasonably achievable.

4.2 Application

4.2.1 Identification of Avoidance and Mitigation Measures

Proposed avoidance and mitigation were identified in the context of the Project activities proposed in Chapter 2 of this Report, and with consideration to the relevant conservation advice and key threatening processes for each protected matter.

When developing avoidance and mitigation measures for all phases (construction and operation) of the Project, the following hierarchy of controls was considered:

- Avoid: Adjust a project layout or eliminate the effect of the Project on the receptor by design. Significant avoidance and minimisation measures have been incorporated into decision making and project design for this Project.
- Minimise: Measures that minimise or reduce an impact (examples include storing hydrocarbons in impermeable storage areas or reducing speed limits to reduce dust emissions from vehicle travel on unsealed roads).
- Rehabilitate: Measures that rectify, repair, rehabilitate or restore an impact, for example, where temporary land clearance may be required to allow construction activities to occur, but which is not required for ongoing operations.
- Offset: Required if significant residual environmental impacts remain following the application of the above measures. The application of offsets is described in Chapter 6.

ElectraNet has a commitment to reduce the severity of potential impacts wherever possible, and as such there are further, more general, mitigation measures proposed to reduce impacts and risk to as low as reasonably achievable.

The assessment of impact significance, including consideration of the application and uncertainties associated with the proposed avoidance and mitigation measures, is presented in Section 5.

4.2.2 Management of Avoidance and Mitigation Measures

Wherever possible, ElectraNet and its contractors will endeavour to avoid impact to threatened species during construction of the project by undertaking the following:

- Project design – micro siting of infrastructure, access roads and other activities requiring vegetation clearing will occur to avoid known occurrences of threatened species and communities.
- The Project Area generally follows existing electricity infrastructure easements, and the project will maximise the use of existing access roads and in-easement tracks.

Where impacts cannot be avoided, ElectraNet and its contractors will implement management actions that address threats and threatening processes. These are documented in a Threatened Species Management Plan (TSMP, see Appendix E), and summarised in Section 4.3 of this document. By implementing these actions, unavoidable impacts will be minimised.

4.2.2.1 Scope for Environmental Management Plan

A Scope for Environmental Management Plan (SEMP), Engineering Contract Specification (ECS) - Design ECS - Construction have been developed by ElectraNet as in input to the Early Contractor Involvement contract and Design and Construction contract for the project (see Appendix F). The SEMP and ECSs detail all of the avoidance and mitigation requirements contained within this preliminary documentation report, plus conditions and obligations associated with other approvals (e.g. state Development Authorisation and Native Vegetation Clearance approvals) and requires that the contractor develop a suite of management plans that describe how these obligations and commitments will be complied with.

The SEMP and ECSs include, at a minimum, the following information:

- Environmental design criteria
- Environmental construction criteria for access and clearing works, vegetation removal and rehabilitation
- A list of data (spatial and technical) to be provided to the Contractor to facilitate the management of environmental and approvals-related commitments and obligations, including GIS data, copies of approvals documentation etc.
- Details of further approvals and permits that may be required to be obtained by the Contractor prior to the commencement of any or part of the works
- A list of the constraints and boundaries associated with the works
- Specific environmental management requirements tailored for the project

- A standard set of Safety and Sustainability Standards that detail the commitments and obligations, including avoidance and mitigation measures, that are required to be complied with. The standards cover the following environmental aspects:
  - Environmental Management Plan (general requirements)
  - Training and site inductions
  - Environmental inspections and auditing
  - Activity Zone management
  - Cultural and heritage site management
  - General weed and pest management
  - Phytophthora management
  - Water quality protection and erosion and sediment control
  - Dust suppression and air quality
  - Hydrocarbon, PCB and chemical storage and handling
  - Noise and visual amenity
  - Waste management
  - Site access and easement management
  - Water management
  - Concrete plant and equipment wash down
  - Equipment maintenance activities
  - Emergency management
  - External complaint management
  - Environmental incidents, near misses, non-conformances and hazards
  - Fire management
  - Vibration management
  - Soil contamination
  - Asbestos management
  - Access track management

4.2.2.2 Construction Environmental Management Plan

Requirements associated with the implementation of avoidance and mitigation measures will also be transferred into the Construction Environmental Management Plan (CEMP) for the Project, to be actively managed by the nominated construction contractor, with regular audits of performance against the CEMP to be undertaken by ElectraNet. The CEMP describes, for each measure and/or protected matter, the following:

- Environmental and conservation objectives for each environmental issue

- Performance criteria
- Monitoring and reporting requirements
- Incident management, auditing and corrective action processes
- Roles and responsibilities

The CEMP is an evolving document, changing in response to the needs of the as-built Project. A copy of the current draft CEMP is attached as Appendix G.

4.3 Avoidance and Mitigation Measures

The final construction footprint (final clearance area) will be influenced by micro-siting of structure pads and access tracks during the detailed design process with the aim of avoiding, minimising or rehabilitating impacts to the relevant MNES.

Where practicable, impacts to MNES will be avoided, for example through design and/or construction methods, however, it will not be possible to avoid impact to MNES altogether, due to design constraints, including limitations on maximum span distances between towers, topography, watercourses and/or drainage areas and providing clearance between the project and existing infrastructure (e.g., roads). The proposed transmission line alignment generally follows the existing transmission line alignment, which provides opportunities to use existing in-easement tracks, pastoral tracks, and waterway crossings where possible, and avoids new impacts for these components. In instances where impacts cannot be avoided, they will be minimised through the implementation of management measures.

ElectraNet proposes to avoid impacting watercourses and waterbodies by either spanning across them or by using pre-disturbed areas within the existing line easement. Vegetation assessments, including canopy height measurement, are used during the detailed design phase to determine the line profile. Where possible, conductor heights will be set to avoid or minimise the need for vegetation clearance both during construction and ongoing maintenance.

A Construction Environmental Management Plan (CEMP) will be implemented during construction works. It will identify mitigation measures to minimise impacts on vegetation and habitat associated with a variety of environmental aspects, including:

- Native vegetation clearance
- Fauna interactions
- Weed and pest animals
- Water and soil resources
- Air quality, noise and vibration
- Contamination and chemical exposure
- Waste management; and
- Fire management

The requirements of the CEMP will be included in contractual discussions between ElectraNet and the preferred construction contractor, and the CEMP will be finalised to include details on roles and responsibilities and measurable performance criteria.

Disturbed areas which are not required for the operation and maintenance of the transmission line will be rehabilitated with cleared topsoil and vegetation material progressively as construction (stringing activities) is completed along the corridor and will be left to naturally revegetate. Monitoring requirements will form a component of the contractor Rehabilitation Plan and will also form a part of ElectraNet's ongoing maintenance and inspection programs, as implemented on all other ElectraNet assets. ElectraNet maintains a staff of qualified environmental professionals for these purposes. Specific avoidance and mitigation measures for the Project are detailed in Table 18.

Table 18: Avoidance and Mitigation Measures for Protected Matters

Species or Community	Management Considerations		Management Measures		
	Conservation Advice	Key Threatening Processes	Measures to Avoid	Measures to Mitigate	Measures to Rehabilitate
All (general commitments)	Not applicable	Not applicable	**Native Vegetation Management** • Develop a factsheet of key flora species for dissemination to contractors. • Induct all site personnel to provide an understanding of the relevant vegetation protection issues including an awareness of weed species. All personnel will be inducted as to the locations of sensitive vegetation and threatened flora species. • Threatened plant populations in proximity to vegetation being cleared will be fenced using temporary flagging or otherwise clearly delineated. • Restrict vehicle movement to defined tracks and access/egress points. Undertake periodic review of access track requirements, including landowner consultations. • Restrict vehicle movement and machinery disturbance from within and around existing vegetation • Vegetation clearing will be restricted to the smallest area possible to allow construction • Areas of vegetation within the Construction Activity Zone to be retained will be clearly marked and delineated where present. • Where vegetation being cleared adjoins Eucalyptus petiolaris woodland EEC, the EEC will be clearly marked with flagging or other delineation measures. • Signage will be installed at entry/exit points that intersect public roads to minimise trespass. Where required by the landholder, entry/exit points will be fenced and gated where possible	• Where access points and tracks intersect public roads, they will be fenced with access restricted by locked gates where possible. • Vehicle and machinery parking, laydown areas and stockpile sites will be restricted to areas that do not contain native vegetation or native vegetation that will be cleared as part of construction • Environmental contractor to undertake periodic inspection of vegetation clearing to ensure it has been undertaken in accordance with these measures.	• Progressive stabilisation, revegetation and/or rehabilitation of disturbed areas, including access tracks and laydown areas. • Keep records of vegetation cleared specifically for offset calculation reconciliation • All construction contractors to have a Rehabilitation Management Plan approved by ElectraNet. • Where possible, ground vegetation will be rolled, rather than cleared to allow for effective rehabilitation • All areas not required to be cleared during the operational phase of the transmission line will be rehabilitated. • Topsoil and vegetation cleared will be stockpiled on site and respread over areas to be rehabilitated progressively on completion of construction. • Access tracks that are not required during the operational phase of the Project will be ripped and rehabilitated, unless otherwise directed by a landowner.
			Fauna Management • Develop a factsheet of key fauna species for dissemination to contractors. • Induct all site personnel to provide an understanding of the fauna potentially present. • Undertake pre-construction surveys for all EPBC species that have been identified as likely or known to be present in the development envelope and implement appropriate protection if identified. • Restrict vehicle movement to defined tracks. • Minimise impacts to species of significance by micro-siting of the infrastructure within habitat	• Minimise number and connectivity of vehicle access tracks. • Minimise vehicle movement and machinery disturbance within and around retained vegetation. • Contact the relevant authority in the event of encountering trapped or injured fauna. • Construction activities will occur during daylight hours wherever possible so as not to disturb nocturnal wildlife or roosting raptors. • Where access to structures on the existing transmission line where raptor nests are located is required, nest locations will be	• All construction contractors to have a Rehabilitation Management Plan approved by ElectraNet. • Longitudinal access track through DoD land will have road-base removed (if applied) and will be actively rehabilitated in sections either side of drainage channels and watercourses (preferred Western Grasswren habitat) to avoid the creation of a predator highway.

			areas. • All construction contractors to have a Biodiversity Management Plan, that includes clearing procedures, approved by ElectraNet	mapped and temporary flagging or other delineation installed. • 40 km/h speed limit will be imposed on all access roads and within the transmission line easement. • Maintain log of incidents involving fauna injury/death resulting from construction activities. • Areas of vegetation being removed will be surveyed for hollow bearing trees prior to clearing. Hollow-bearing trees will be mapped and clearly marked in the field. Where the removal of a hollow-bearing tree is required, the hollows will be retained on site to provide fauna habitat. • A contractor suitably qualified in the identification and handling of fauna will be present during the removal of any hollow bearing trees to remove/relocate any fauna displaced as a result. • For the temporary longitudinal access track through DoD land, feral animal baiting would be undertaken prior to construction to minimise the potential impacts of the creation of a temporary predator highway that may impact on Western Grasswren. • Contact DAWE if an interaction occurs that injures or kills an EPBC listed species. • Progressive clearing of all areas to allow fauna to escape into surrounding habitat. • Have a suitably qualified fauna expert present when clearing in native vegetation. • Include morning and evening inspections of any trenches for trapped fauna and include fauna egress points in all trenches that are not infilled overnight. • Include daily morning inspections of machinery (before use) for any fauna that may have entered overnight.	
			Weed and Pest Management		
			• Entry/Exit points to be approved by ElectraNet, mapped and documented in relevant material. Undertake periodic review of entry/exit point requirements. • Management of entry/exit points (e.g. using a rumble pad) so that site soils (potentially containing weed propagules) are not tracked to or from the site • Ensure imported fill is clean and free of weed propagules. • All construction contractors to have a Weed, Pest and Disease Management Plan approved by ElectraNet.	• Movement, control and destruction of declared plants to be in accordance with the NRM Act. This includes obtaining appropriate approvals prior to transporting declared plants on public roads. • The Project Area and construction sites will be regularly surveyed for weed outbreaks. Outbreaks and recommended corrective action will be communicated to ElectraNet. This will include undertaking periodic weed monitoring of all entry/exit points and stockpile/laydown areas. • New weed outbreaks will be controlled in accordance with the Weed Management Plan.	• Progressive stabilisation, revegetation and/or rehabilitation of disturbed areas, including access tracks and laydown areas. • Areas to be rehabilitated will use soil stripped from areas with similar vegetation communities. • Rehabilitated areas will be actively managed against weeds.

			• Prepare factsheets of weed and pest species for dissemination to contractors. • Induct all site personnel to provide an understanding of the declared plants present onsite and requirements of the NRM Act. • No waste is to be disposed on site. • Control of the declared and environmental weed species should be undertaken in the area prior to construction works commencing to help prevent the spread of weeds within the construction site. • Ensure that any construction machinery is clean and free from soil pathogens such as Phytophthora and any plant materials before entering the area. This includes performing appropriate hygiene before entering and leaving the project area to avoid potential spread. Heavy vehicles/machinery must be certified weed and soil free by the responsible officer prior to entering the Project Area • Designate/establish vehicle and machinery washdown and inspection sites • Dirty vehicles / plant potentially containing weed material to be cleaned down prior to entering and leaving Project area. • Restrict vehicle access to defined tracks and access/egress points. • Ensure waste is appropriately stored to discourage pest animals. This includes covering putrescible and organic storages associated with crib rooms and offices. • Contractor documentation will be required to include reference to the mitigation and avoidance measures in the relevant Commonwealth threat abatement plans, specifically: o Threat abatement plan for predation by European red fox (2008) o Threat abatement plan for predation by feral cats (2015) • Measures described in these plans include baiting, shooting, trapping, den fumigation or destruction, and exclusion fencing. However, the documentation notes that apart from broadscale baiting, the methods are expensive, labour intensive, long term and of limited effectiveness. On this basis, baiting is proposed to be undertaken during construction.	Any weed control will be undertaken only after consent from landowners. • Spot spraying where declared weeds are identified • Undertake weed surveys of all proposed entry and exit points, laydown and stockpile areas and complete risk assessment of each • Any predator control programme will be designed to include monitoring for non-target kills and secondary poisoning, following an adaptive management approach	
			Water and Soil Resource Management		
			• Induct all site personnel to provide an understanding of the issues associated with surface water and the management zones and strategies in place.	• Treatment measures such as sediment fences, silt socks and temporary swales and basins placed to manage erosion and drainage. These should be used in sequence where sediment	• Progressive stabilisation of soil and areas disturbed by earthworks using vegetation (hydro seeding), matting and various other techniques.

			• All construction contractors to have a Sedimentation, Erosion and Drainage Management Plan approved by ElectraNet • Soil to be stockpiled at least 50m away from drainage pathways. • Manage the seedstock/topsoil in conservation areas and scrape and stockpile topsoil in agricultural areas. • Storage of construction materials and hazardous waste at least 40m from drainage lines or watercourses. • Control the entry and exit of stormwater runoff from work areas including to divert clean stormwater away from and around materials storage areas.	loads are expected to be high. • Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies • Stop work in the event of encountering potentially contaminated soil and reassess site drainage to ensure sediments from potentially contaminated soils are contained.	• Stockpile topsoil on the side of the pad and after construction scarify the land to reduce compaction and then spread the topsoil back over.
			Air Quality, Noise and Vibration Management		
			• Induct site personnel to provide an understanding of the issues associated with air quality, noise and vibration management and the mitigating strategies in place.	• Maintain plant machinery and equipment for efficient operation and minimise engine idle times and queuing • Cover or wet-down soil and construction material stockpiles to minimise dust mobilisation. • Stop work in areas where construction activities are generating unacceptable levels of dust. • Minimise use of on-site cutting and grinding. Where used, employ equipment and techniques such as dust extractors and surface wetting to minimise dust. Consider use of specific plant such as wet cutting saws, vacuum extraction or block/slab splitters. • Regularly water exposed surfaces, including exposed stockpiles and unsealed roadways, or seal high use access tracks to suppress dust generation. • Implement proactive noise control strategies if required, such as shielding for compressors, power generators and other fixed plant; and temporary acoustic barriers or enclosures • All vehicles and equipment will be appropriately serviced and maintained	• Progressive stabilisation of soil and areas disturbed by earthworks using vegetation (hydro seeding), matting and various other techniques.
			Contamination and Chemical Exposure Management		
			• Induct site personnel to provide an understanding of the issues associated with contamination management and the mitigating strategies in place. • Hazardous materials to be appropriately stored on sealed areas with bunding, and away from drainage pathways. • Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including	• Undertake risk review of potential contaminants that could be encountered during construction. • Spill kits to be available on site. • Mixing of soil types to be avoided (i.e. contaminated/non-contaminated). • Material removed from the site to landfill, or for reuse at another site, will be undertaken in accordance with SA EPA regulatory requirements, such as a Waste Soil Assessment on surplus soils. • Emergency response plan to be followed for	• Only clean materials will be imported to the site. • Soil or other material spilled onto roadways having originated from vehicles to be removed.

			containment, bunding, cover, separation buffers and spill response and clean up contingencies. • Refuelling to be undertaken on sealed areas at least 50m away from drainage pathways. Refuelling of machinery and vehicles will occur in a designated area only, off site where possible. Spill kits will be installed at these locations.	accidental spills.	
			Waste Management		
			• Site personnel inductions to include appropriate storage (including separation) and disposal/recycling of waste • All construction contractors to have a Waste Management Plan approved by ElectraNet • Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies. • Store chemicals and fuels in appropriate containers suitable for purpose. Any chemicals used during construction or for vegetation management will be disposed of off-site and in accordance with the product directions. • Herbicides and chemicals will only be stored and used in accordance with the manufacturers' directions and with the consent of the relevant landowners.	• Work areas to be maintained in a neat and orderly manner. • Waste will be disposed of regularly by the persons/organisation undertaking the activities, with appropriate signage and separation of hard organic material from putrescible organic material. • Off-site waste disposal will be in accordance with SA EPA and Zero Waste SA guidelines/requirements. • Handle fuels in accordance with relevant standards and guidelines • Any weed control will be undertaken in accordance with the Weed Control Handbook for Declared Plants in South Australia (Invasive Species Unit, Biosecurity SA, 2018).	• Clean up spills if they occur, according to guidelines
			Fire Management		
			• All construction contractors to have a Bushfire Management Plan approved by ElectraNet. • Hot works will only occur on days of total fire ban under appropriate permit, in compliance with the documented plan and regulations. • Personnel will be informed of daily CFS Fire Danger Rating at daily toolbox meetings. The Fire Danger Rating will form part of the daily risk analysis at these meetings. • Procedures relating to fire management in the Project Area, including contact details of relevant authorities (e.g. CFS) and information sources, will be clearly communicated to all personnel during inductions.	• All vehicles accessing Project Area will be fitted with fire extinguishers that are inspected regularly. • Contractors' work safety documentation will include emergency response procedures for the event of fire. • At all times during the declared Bushfire Danger Season, or on days of Total Fire Ban outside the declared season, light vehicles will carry at least one fire-fighting backpack. • Any incidents of unplanned ignition will be immediately (or as soon as practicable) reported to the CFS and ElectraNet. • All vehicles accessing the Project Area will be inspected for the presence of a fire extinguisher. Fire extinguishers must be full, in good working order and accompanied by a fire shovel or rake.	
Malleefowl (*Leipoa ocellata*)	There is no approved Conservation Advice for this species	• Clearing • Fragmentation and isolation • Grazing (sheep)	**Threatened Species Management Approach**		
			In order to adequately understand and manage potential impacts to Malleefowl, ElectraNet has developed a Malleefowl Management Plan for the project (see Appendix D). This plan details the following information: • General species information		

		• Predation (particularly foxes) • Fire (wildfire and intentional) • Disease, inbreeding and chemical exposure • Climate change	• The outcomes of project-specific surveys and investigations into Malleefowl within the project area • The potential impacts of the project on Malleefowl (summarised in Chapter 5) • Avoidance and mitigation measures to minimise potential impacts. In addition to the general avoidance and mitigation measures previously described, the Malleefowl Management Plan also proposes the following species-specific management measures: • Under no circumstances shall Malleefowl mounds be interfered with • No permanent infrastructure shall be installed within 100 m of a Malleefowl mound (the "100 m Malleefowl buffer"). • The 100 m Malleefowl buffers shall be flagged or otherwise delineated, signed and protected in the field to prevent entry and to ensure they are not damaged. Delineation is only required on the face of the buffer which is located closest to the work front and does not need to include existing access tracks. Delineation can be temporarily removed during stringing activities. • Existing access tracks which pass through the 100 m Malleefowl buffers may be used • Structure pads must be shaped to avoid impacts within the 100m Malleefowl buffer except for structure 145 on the Cultana to Yadnarie line, where land disturbance associated with the structure pad shall be shaped to avoid impacts within a 75 m Malleefowl buffer • A fauna inspection must be undertaken immediately prior to commencing any construction (including temporary clearance) that is within the 100 m Malleefowl buffer to ascertain if the mound is active and/or if Malleefowl are present. If a Malleefowl is present, advice shall be obtained from a fauna specialist on the best way to manage construction to minimise impacts on the Malleefowl. This may include redesigning infrastructure and/or delaying construction works as necessary. • A 500m construction buffer will be implemented around active Malleefowl nests. When in the 500m construction buffer, the following must be undertaken outside of breeding season (October to February): – Clearing for access tracks, structure pads and stringing access corridor – Clearing for stringing pads located in proximity to the Middleback substation where a 500m buffer from active mounds is not possible – Foundations – Tower erection • The following activities may be undertaken within the 500m construction buffers within breeding season (October to February): – Works on the existing Middleback substation, including works to connect the new powerline to the substation – Travel on, and maintenance of, the existing transmission line access track – Stringing activities – Braking and winching on the stringing pads located in proximity to the Middleback substation where a 500m buffer from active mounds is not possible • A suitably qualified expert will assess all Malleefowl mounds within 500 m of the line during the breeding season immediately prior to construction activities commencing to determine whether Malleefowl mounds are "active" or "inactive" for the purposes of finalising the 500m construction buffers. • Line stringing works may be undertaken during the breeding season if required, as these occur over a short period. The process for stringing operations during the breeding season will be: 1. Light draw wires will be pulled into position down the centreline under the towers during a single pass down the temporary stringing access corridor. Draw wire is a light wire that is pulled out first. It is the only wire that is laid on the ground. It is used to pull out the heavier conductor wire. 2. The draw wires are then connected to the towers and then tensioned until the tension results in the draw wires floating into the air. 3. This tensioning (braking and winching) will be done on stringing pads that are outside of the 500 m buffer (except for two pads at Middleback mine which are outside a 320 m buffer). 4. Once in the air, the draw wire will then be connected to the heavier conductor and OPGW wires and it will be used to pull them into position (in the air). 5. The earth wire and conductor wire will then be tensioned (in the air) until it is in the correct position (again using the stinging pads that are outside of the 500 m buffer except for two stringing pads at Middleback mine which are outside a 320 m buffer). • Stringing pads (located approximately every 8-9 km), otherwise known as brake and winch sites, will be cleared outside of the breeding season (October to February). Stringing pads will be re-designed to be located outside of a 500 m buffer around active Malleefowl mounds where engineering constraints (including conductor and OPGW spool lengths and localised restrictions including other infrastructure such as rail, roads and existing substations) allow. • There are two stringing pads that cannot be located outside of the 500 m buffer in the vicinity of the Middleback mine – these will be located outside of a 320 m buffer. These stringing pads will be cleared outside of the breeding season (October to February) given that they are within the 500m construction buffer. These sites are located at the intersection of an operational Simec mine (Iron Duke), a rail line servicing the mine and haul road for the mine which operate at all times of the year. It is considered, in this context, that stringing activities will not result in a change in the level of disturbance at the closest Malleefowl mounds. • Vegetation clearance must be minimised during preparation of the stringing access corridor within the 100 m Malleefowl buffer. Trees and other large vegetation shall be preferentially hand trimmed where branches are overhanging the Construction Activity Zone (CAZ). The stringing access corridor shall be micro-sited to avoid trees

			and larger vegetation to the extent possible. • Where the stringing corridor is located within 25 m of a Malleefowl mound, a fauna spotter with environmental qualifications shall be present for the duration of the stringing works including the preparation of the stinging access corridor adjacent that mound to ensure the mound is not damaged and vegetation impacts are minimised. This is in addition to the pre-construction fauna inspection. • Trees in the stringing corridor within 50 of an active Malleefowl mound that require removal shall be felled in a way that encourages rapid regeneration/reshooting from lignotubers or stumps (coppicing). This may include trimming the stump using a mulcher, or hand-felling to leave a small stump to encourage regrowth. Of the 56 identified Malleefowl mounds, 17 Malleefowl mound buffers are predicted to be impacted by the project. Of these: • For 3 Malleefowl mound buffers, the temporary stringing track will be inside the 100 m buffer • For 14 Malleefowl mound buffers, the temporary stringing track will be inside the 75 m buffer • For the Malleefowl buffers for MM44 and MM45 (see Appendix D), a portion of the temporary structure pad will be inside the 100 m buffer (but outside the 75 m buffer) Roles and responsibilities associated with these management measures are detailed in the Malleefowl Management Plan. The application of these measures will avoid the potential for significant direct, indirect and cumulative impacts to Malleefowl.
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland	No Threat Abatement Plan has been identified as being relevant for this ecological community	• Clearance, fragmentation, disturbance, and edge effects • Invasive species (grazing animals and weeds) • Salinisation • Dieback (due to disease) • Inappropriate fire regimes • Climate change	**Threatened Community Management Approach** In addition to the general mitigation and avoidance measures previously described, the primary management measure for the avoidance of impacts to EPBG Woodland is to minimise any vegetation clearance within areas containing these communities. This has largely been achieved through modification of the transmission line alignment, leaving only some smaller spans to traverse the EPBG Woodland areas, primarily where the alignment crosses existing ephemeral surface waterways. All structures and access tracks have been moved out of EPGB Woodland areas, however the woodlands will still be impacted by stringing activities as the conductor will span the woodland. The specific spans (and proportion of the span with EPBG Woodland) that require further management measures are detailed below: • Portion of span 139 – 140 (10m length – likely single tree) • Portion of span 142 – 143 (80m length plus 130m wide remnant vegetation on Mine Hill Road) • Portion of span 147 – 148 (Oolanta Creek – 80 m length) • Portion of span 158 – 159 (20m length – likely single tree) • Portion of span 169 – 170 (40m wide remnant vegetation on Pillaworta Road and small 40m long pocket) • Portion of span 172 – 174 (150m length) • Portion of span 176 – 177 (150 m length) • Portion of span 181 – 182 (150m length) For the portions of these spans where EPBG woodland is present, the construction contractor will use low impact stringing methods to eliminate the need for a 10m stringing corridor. This will include the possible use of drones or helicopter stringing (subject to approvals) to avoid the need for the development of stringing corridors. In the event that this is not considered viable, the stringing corridor would be limited to 2 x 2 m wide tracks located directly under the tower arms to allow the conductor to be raised instead of the 10m stringing access corridor that will be cleared in other areas of the project. This may require minor branch trimming and/or the occasional removal of a tree, but will not require significant clearance, thus avoiding fragmentation. Alternatives to further protect vegetation would be pursued including walk-through stringing (eliminating the use of vehicles) and/or the use of hurdles (to keep the conductors off the vegetation understory, see Plate 3 and Plate 4). Where EPBG Woodland is required to be cleared, ElectraNet will preferentially keep tree stumps in place to encourage coppicing, as opposed to completely excavating, as some eucalypts are likely to regrow. Sugar gum and Blue gum are particularly successful at coppicing and more likely to successfully rehabilitate using this method. Coppicing has been shown to be more successful if the stumps are cut at a slight angle to prevent water pooling and the stump height is no more than 15 cm. This will further prevent fragmentation and dieback.
Jumping-Jack Wattle (*Acacia enterocarpa*)	There is no approved Conservation Advice for this species	• Poor recruitment • Small population size • Disease by fungal gall • Road and rail management activities	**Threatened Species Management Approach** • Impacts to individuals will be avoided. • The general mitigation and avoidance measures previously described sufficiently address the actions to be implemented to minimise impacts to this species.

		• Environmental weeds • Herbivore grazing • Disease (e.g. *Phytophthora* and Mundulla Yellows) • Inappropriate disturbance regimes • Mining	
Tufted Bush-pea (*Pultenaea trichophylla*)	No Threat Abatement Plan has been identified as being relevant for this species	• Vegetation clearance • Over-grazing by stock animals • Chemical drift (for populations adjacent to agricultural lands) • Weed invasion • Disturbance from road and fence maintenance activities • Fragmentation (inbreeding) • Fire	**Threatened Species Management Approach** • Impacts to individuals will be minimised by avoidance. • Where impacts are unavoidable, disturbance areas (such as structure pads) will be micro-sited in the field to minimise impacts to the minimum number of individuals • Low impact stringing by helicopter or drone will be used to string the transmission line between spans 156 – 158 to eliminate removal of individuals associated with the 10m stringing track. • Individuals within 10m of disturbed zones will be flagged off for protection in the field.

Plate 3: Typical Metal-framed Stringing Hurdle

Plate 4: Typical Wood-frame Stringing Hurdle

5. ASSESSMENT OF IMPACTS

5.1 Context and Method

An assessment of potential impacts and their significance (including direct, indirect, consequential and cumulative impacts) that may occur as a result of all elements and project phases associated with the construction and operation of the proposed transmission line (as described in Section 2 of this Report) was undertaken. This considered the listed threatened species and communities and their relationship to the Project as described in Section 3.3 of this report, being:

- Malleefowl (*Leipoa ocellate*)
- Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland Threatened Ecological Community (TEC)
- Jumping-Jack Wattle (*Acacia enterocarpa*)
- Tufted Bush-pea (*Pultenaea trichophylla*)

Fat-leaf Wattle (*Acacia pinguifolia*) and the Large-club Spider-orchid (*Caladenia macroclavia)* were excluded from the impact assessment on the basis that individuals or habitat for the species are now considered unlikely to occur within the Project Area (see Section 3.3.4.2 and Section 3.3.5.2, respectively).

Further, the impact assessment also assumed the successful implementation of the avoidance and mitigation measures described in Section 4 of this Report. An uncertainty (risk) assessment was also undertaken in combination with the impact assessment to consider whether the nature and/or scale of the potential impacts are unknown, unpredictable or irreversible, and what confidence is placed on the predictions or relevant impacts, including the probabilities or uncertainties associated with the ability to successfully implement the nominated avoidance and mitigation measures.

The basis for the impact assessment is the Matters of National Environmental Significance Significant impact guidelines 1.1 (Australian Government 2013), and specifically, the Significant Impact Criteria for listed threatened species and ecological communities. These vary depending on whether the MNES is a species or a community, and whether the species or community is critically endangered or endangered, or vulnerable.

5.2 Assessment of Impact Significance and Risk

Table 19 presents the outcomes of the impact and uncertainty (risk) assessment. The assessment rates the residual impact as either significant or not significant, in accordance with DAWE documentation. Offsets for residual impacts identified in this impact assessment are described in Section 6 of this Report.

Table 19: Impact Assessment and Uncertainty (Risk) Assessment for Listed Threatened Species and Ecological Communities

Species or Community	Impact Assessment						Uncertainty (Risk) Assessment		
	Habitat Impacted (ha) and quality	**Individual Impacts (ha)**	**EPBC Status**	**Significant Impact Criteria (Impact Description)**	**Assessment (Significant or not Significant)**	**Justification**	**Is the scale of the impact unknown, unpredictable or irreversible?**	**Are there uncertainties or risks associated with the application of mitigation measures?**	**Confidence in the prediction of impact significance?**
Malleefowl (*Leipoa ocellata*)	70.44 ha consisting of 64.19 ha temporary and 6.25 ha permanent (irreversible)	No mounds would be directly impacted (17 mounds, 8 of them active, occur within a 100 m buffer of construction activities).	Vulnerable	Will the Project activities lead to a long-term decrease in the size of an important population of a species?	Not significant	The Project is not expected to lead to a long-term decrease in the size of the Malleefowl population within and surrounding the Project Area, as specific avoidance, management and mitigation measures will be implemented to avoid and/or minimise impacts to Malleefowl. For example, micro-siting of permanent infrastructure (structures and access tracks) to avoid disturbance within 100 m of a Malleefowl mound, and micro-siting of temporary infrastructure (structure pads/laydowns) to avoid disturbance within 75 m of a Malleefowl mound. Weed and feral animal control will also be undertaken during construction and operation of the Project to avoid and/or minimise the potential for impacts associated with these. Please refer to Section 4.3 for more detail. Furthermore, when the area of Malleefowl habitat available in the region is taken into consideration, the scale of the impact is considered to be quite small. For example, there is approximately 290,000 ha of Malleefowl habitat within 50 km of the Project Area. An impact of 70.44 ha equates to 0.03 % of available habitat (within 50 km). While the Project will temporarily impact 70.44 ha of Malleefowl habitat, only 6.25 ha will be permanent, as 64.19 ha will be rehabilitated and/or allowed to naturally regenerate.	The nature of the impact to Malleefowl is considered to be limited to some habitat loss. Whilst there is some uncertainty regarding the relationship between impacts to habitat and impacts to individuals, evidence of ongoing occupation in the project area adjacent to the existing disturbance provides confidence that the scale of the impact is known and predictable. Whilst some permanent (irreversible) habitat loss will occur as a result of the project (6.25 ha), most impacts are temporary in nature, and the permanent habitat loss has been designed to occur outside of a buffer to any existing Malleefowl mounds, meaning no direct impacts to Malleefowl are predicted.	The proposed mitigation measures are, by and large, considered to be industry standard for the preservation of habitat more generally, and have been shown to be effective when implemented in previous projects. The avoidance and mitigation measures have been discussed and agreed with the construction partner for the project and thus are considered to be realistic and achievable. On this basis, it is considered that there is little, if any, uncertainty or risk associated with the application of the mitigation measures.	There is a high degree of confidence in the assessment of the significance of the potential project impacts to Malleefowl. An extensive volume of work has been undertaken to understand the location and nature of the Malleefowl mounds and their habitat more broadly.
				Will the Project activities reduce the area of occupancy of an important population?	Not significant	There is not predicted to be a change in the area of occupancy of the species as a result of project activities.			
				Will the Project activities fragment an existing important population into two or more populations?	Not significant	The project activities and infrastructure will not inhibit the ability of populations or individuals to traverse the area. Although stringing tracks may be established, these will temporary in nature. Permanent access will be provided using existing access tracks wherever possible.			
				Will the Project activities adversely affect habitat critical to the survival of a species?	Not significant	The project will result in the clearance of 70.44 ha of Malleefowl habitat, of which all but 6.25 ha will be rehabilitated. This is considered a relatively small area of disturbance in the context of the total area of Malleefowl habitat that exists in proximity to the project (290,000 ha of Malleefowl habitat within 50 km of the Project Area). The avoidance and mitigation measures proposed, including the use of buffers between mounds and project activities and infrastructure, will mean that			

						no individuals or mounds will be directly impacted.			
				Will the Project activities disrupt the breeding cycle of an important population?	Not significant	Whilst construction works (including vegetation clearing and the presence of construction equipment) have the potential to disrupt the breeding cycle or breeding success of some Malleefowl located within the vicinity of the Project, it is relevant to note that most Malleefowl mounds surveyed in proximity to the project activities have not been active over the last six or so years, and thus there is limited potential for the construction activities to influence breeding cycles. Further, significant construction activities (e.g. land clearing and structure construction and erection) will be timed to occur outside of the breeding season. Stringing activities may be undertaken during breeding season but these would only occur for a short period of time, further limiting the potential for impacts. .			
				Will the Project activities modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	Not significant	The project will result in the clearance of 70.44 ha of Malleefowl habitat, of which all but 6.25 ha will be rehabilitated. This is considered a relatively small area of disturbance in the context of the total area of Malleefowl habitat that exists in proximity to the project (290,000 ha of Malleefowl habitat within 50 km of the Project Area). The avoidance and mitigation measures proposed, including the use of buffers between mounds and project activities and infrastructure, will mean that no individuals or mounds will be directly impacted. As such, no decline in the species is predicted.			
				Will the Project activities result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?		Foxes and feral cats, as well as invasive weed species, are known to occur within and surrounding the project area. Although the construction of (temporary) stringing corridors and some new access tracks may create further access to feral animals, this is not considered significant in the context of the existing access tracks throughout the project area. Similarly, construction works, and vehicles travelling along access tracks during operational and maintenance activities, have the potential to spread existing, or introduce new, weed species. The avoidance and mitigation measures proposed (see Section 4.3) are considered sufficient to ensure that no change in the existing abundance and diversity of feral animal and weed species occur.			
				Will the Project activities introduce disease that may cause the species to decline?	Not significant	The Project is not expected to introduce disease that may cause Malleefowl to decline. Furthermore, specific controls (such as vehicle and equipment hygiene measures) will be implemented during construction as well as operation and maintenance to avoid introduction of disease within the project area.			

				Will the Project activities interfere substantially with the recovery of the species?	Not significant	The Project is not expected to interfere with the recovery of Malleefowl, as specific controls (such as feral animal and invasive weed control) will be implemented during construction as well as operation and maintenance to avoid and/or minimise identified impacts.			
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland	1.352 ha of total disturbance, of which 0.035 ha would be permanent (irreversible)	N/A	Endangered	Will the Project activities reduce the extent of an ecological community?	Not significant	There is predicted to be 0.035 ha of permanent (irreversible) clearance of EPBG Woodland, which is considered not significant in the context of the area of EPBG Woodland mapped in proximity to the project (For example, there are ten patches of EPBG Woodland equating to 50.09 ha within a 500 m wide survey area. Of this, 39.51 ha meets the criteria for listing as EPBC Act listed TEC (and 10.58 ha does not). Of the 39.51 ha that meets the criteria for listing as EPBC Act TEC, only 0.035 ha will be permanently impacted).	The scale of the impact is not considered to be unknown or unpredictable. There is predicted to be 0.035 ha of permanent (irreversible) clearance of EPBG Woodland, which is considered not significant in the context of the area of EPBG Woodland mapped in proximity to the project (For example, there are ten patches of EPBG Woodland equating to 50.09 ha within a 500 m wide survey area. Of this, 39.51 ha meets the criteria for listing as EPBC Act listed TEC (and 10.58 ha does not). Of the 39.51 ha that meets the criteria for listing as EPBC Act TEC, only 0.035 ha will be permanently impacted).	The proposed mitigation measures are, by and large, considered to be industry standard, and have been shown to be effective when implemented in previous projects. Further, the majority of mitigation measures associated with EPBG are based around the relocation and/or realignment of the proposed transmission line, the success of which carries no uncertainty. On this basis, it is considered that there is little, if any, uncertainty or risk associated with the application of the mitigation measures.	There is a high degree of confidence in the assessment of the significance of the potential project impacts to EPBG Woodlands. An extensive volume of work has been undertaken to understand the location and nature of the threatened community and the project has been modified to reduce impacts.
				Will the Project activities fragment or increase fragmentation of an ecological community?	Not significant	Whilst the project involves installation of a new transmission line and associated access tracks (i.e. linear impacts) it is not expected to fragment or increase fragmentation of EPBG Woodland. The primary management measure for the avoidance of impacts to EPBG Woodland is to avoid any vegetation clearance within areas containing these communities. This has largely been achieved through modification of the transmission line alignment, leaving only some smaller spans to traverse the EPBG Woodland areas, primarily where the alignment crosses existing ephemeral surface waterways. For these spans, the construction contractor will investigate the use of drone stringing to avoid the need for the development of stringing corridors. In the event that this is not considered viable, the stringing corridor would be limited to 2 x 2 m wide tracks located directly under the tower arms to allow the conductor to be raised. This may require minor branch trimming and/or the occasional removal of a tree, but will not require significant clearance, thus avoiding fragmentation. Alternatives to further protect vegetation would be pursued including walk-through stringing (eliminating the use of vehicles) and/or the use of hurdles (to keep the conductors off the vegetation understory. The (worst case) use of 2 x 2 m tracks rather than a single cleared 10 m track avoids the vast majority of tree clearance, limiting disturbance to the trimming of branches and the occasional tree removal. Thus, any fragmentation of the community will be avoided, and no additional edge effects will be introduced.			
				Will the Project activities adversely affect habitat critical to the survival of an ecological community?	Not significant	The project will result in the temporary clearance of 1.352 ha of EPBG Woodland, of which all but 0.035 ha will be rehabilitated. This is considered a relatively small area of disturbance in the context of the total area of EPBG Woodland that exists in			

						proximity to the project (For example, there are ten patches of EPBG Woodland equating to 50.09 ha within a 500 m wide survey area. Of this, 39.51 ha meets the criteria for listing as EPBC Act listed TEC (and 10.58 ha does not). Of the 39.51 ha that meets the criteria for listing as EPBC Act TEC, only 0.035 ha will be permanently impacted).			
				Will the Project activities modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns?	Not significant	The Project will have a very minor impact on soil and possibly nutrients associated with EPBG Woodland through the clearance of some vegetation in proximity to the TEC. However, this very minor impact is not expected to affect the ecological community's ongoing survival. The Project is not expected to result in an alteration of surface water drainage patterns.			
				Will the Project activities cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?	Not significant	No burning or flora or fauna harvesting is required or proposed as part of this project. As such, the Project will not cause a substantial change in the species composition of EPBC Woodland.			
				Will the Project activities cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to assisting invasive species, that are harmful to the listed ecological community, to become established, or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?	Not significant	The Project will not cause a substantial reduction in the quality or integrity of EPBG Woodland. The avoidance and mitigation measures proposed (see Section 4.3) are considered sufficient to ensure that no change in the existing abundance and diversity of feral animal and weed species occur. Furthermore, the Project will not cause mobilisation of fertilisers, herbicides or other chemicals or pollutants into EPBG Woodland.			
				Will the Project activities interfere with the recovery of an ecological community?	Not significant	As the project is only expected to directly impact (clear) 1.352 ha of EPBG Woodland, of which only 0.035 ha is permanent, the project is not expected to interfere (adversely) with the recovery of EPBG Woodland.			
Jumping-Jack Wattle (*Acacia enterocarpa*)	0.976 ha of total disturbance, of which 0.087 ha would be permanent (irreversible)	No individuals would be impacted	Endangered	Will the Project activities lead to a long-term decrease in the size of a population?	Not significant	There is predicted to be 0.087 ha of permanent (irreversible) clearance of Jumping-Jack Wattle habitat, which is considered not significant in the context of the area of species habitat mapped in proximity to the project (16.6 ha). No known individuals will be impacted by the project.	The scale of the impact is not considered to be unknown or unpredictable. There is predicted to be 0.087 ha of permanent (irreversible) clearance of Jumping-Jack Wattle habitat, which is considered not significant in the context	The proposed mitigation measures are, by and large, considered to be industry standard, and have been shown to be effective when implemented in previous projects. On this basis, it is considered that there is little, if any, uncertainty or risk associated with the application of the	There is a high degree of confidence in the assessment of the significance of the potential project impacts to Jumping-Jack Wattle. An extensive volume of work has been undertaken to understand the location and nature of the species (individuals) and their habitat more
				Will the Project activities reduce the area of occupancy of the species?	Not significant	There is not predicted to be a change in the area of occupancy of the species as a result of project activities.			
				Will the Project activities fragment an existing population into two or	Not significant	Whilst the project involves installation of a new transmission line and associated access tracks (i.e.			

				more populations?		linear impacts) it is not expected to fragment or increase fragmentation of species habitat as the impact width will be limited to a maximum of 10 m, which is not considered sufficiently wide to result in fragmentation for this species.	of the area of species habitat mapped in proximity to the project (16.6 ha).	mitigation measures.	broadly.
				Will the Project activities adversely affect habitat critical to the survival of a species?	Not significant	There is predicted to be 0.087 ha of permanent (irreversible) clearance of Jumping-Jack Wattle habitat, which is considered not significant in the context of the area of species habitat mapped in proximity to the project (16.6 ha).			
				Will the Project activities disrupt the breeding cycle of a population?	Not significant	The Project is not expected to disrupt the breeding cycle of Jumping-Jack Wattle.			
				Will the Project activities modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	Not significant	There is predicted to be 0.087 ha of permanent (irreversible) clearance of Jumping-Jack Wattle habitat, which is considered not significant in the context of the area of species habitat mapped in proximity to the project (16.6 ha), and is not expected to result in a decline in the species.			
				Will the Project activities result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	Not significant	Rabbits, as well as invasive weed species, are known to occur within and surrounding the project area. Although the construction of (temporary) stringing corridors and some new access tracks may create further access to feral animals, this is not considered significant in the context of the existing access tracks throughout the project area. Similarly, construction works, and vehicles travelling along access tracks during operational and maintenance activities, have the potential to spread existing, or introduce new, weed species. The avoidance and mitigation measures proposed (see Section 4.3) are considered sufficient to ensure that no change in the existing abundance and diversity of feral animal and weed species occur.			
				Will the Project activities introduce disease that may cause the species to decline?	Not significant	The Project is not expected to introduce disease that may cause the species to decline. Furthermore, specific controls (such as vehicle and equipment hygiene measures) will be implemented during construction as well as operation and maintenance to avoid introduction of disease within the project area.			
				Will the Project activities interfere with the recovery of the species?	Not significant	As the project is only expected to directly impact (clear) 0.976 ha of species habitat, of which only 0.087 ha is permanent, the project is not expected to interfere (adversely) with the recovery of the Jumping-Jack Wattle.			
Tufted Bush-pea (*Pultenaea trichophylla*)	3.863 ha of total disturbance, of which 0.087 ha would be permanent	Several individuals may be impacted.	Endangered	Will the Project activities lead to a long-term decrease in the size of a population?	Not significant	There is predicted to be 0.087 ha of permanent (irreversible) clearance of Tufted Bush-pea habitat, which is considered not significant in the context of the area of species habitat mapped in proximity to the project (38.72 ha recorded in the Project Area). 3 individuals will be impacted by construction of a structure. Up to Possible disturbance of up to an	The scale of the impact is not considered to be unknown or unpredictable. There is predicted to be	The proposed mitigation measures are, by and large, considered to be industry standard, and have been shown to be effective when implemented in previous	There is a high degree of confidence in the assessment of the significance of the potential project impacts to Tufted Bush-pea. Access to one land

	(irreversible)					additional 6 individuals (subject to micro-siting and final cut/fill design). Every effort will be made to flag off and protect these individuals.	0.087 ha of permanent (irreversible) clearance of Tufted Bush-pea habitat, which is considered not significant in the context of the area of species habitat mapped in proximity to the project (38.72 ha recorded in the Project Area).	projects. On this basis, it is considered that there is little, if any, uncertainty or risk associated with the application of the mitigation measures.	parcel containing the species could not be obtained during the most recent survey, so conservative estimates of the area of habitat in this region have been used in the calculation of impact significance. An extensive volume of work has been undertaken to understand the location and nature of the species (individuals) and their habitat more broadly.
				Will the Project activities reduce the area of occupancy of the species?	Not significant	There is not predicted to be a change in the area of occupancy of the species as a result of project activities.			
				Will the Project activities fragment an existing population into two or more populations?	Not significant	Whilst the project involves installation of a new transmission line and associated access tracks (i.e. linear impacts) it is not expected to fragment or increase fragmentation of species habitat as the temporary impact width will be limited to a maximum of 10 m, which is not considered sufficiently wide to result in fragmentation of this species.			
				Will the Project activities adversely affect habitat critical to the survival of a species?	Not significant	There is predicted to be 0.087 ha of permanent (irreversible) clearance of Tufted Bush-pea habitat, which is considered not significant in the context of the area of species habitat mapped in proximity to the project (38.72 ha recorded in the Project Area).			
				Will the Project activities disrupt the breeding cycle of a population?	Not significant	The Project is not expected to disrupt the breeding cycle of Tufted Bush-pea.			
				Will the Project activities modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	Not significant	There is predicted to be 0.087 ha of permanent (irreversible) clearance of Tufted Bush-pea habitat, which is considered not significant in the context of the area of species habitat mapped in proximity to the project (38.72 ha recorded in the Project Area), and is not expected to result in a decline in the species.			
				Will the Project activities result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	Not significant	Rabbits, as well as invasive weed species, are known to occur within and surrounding the project area. Although the construction of (temporary) stringing corridors and some new access tracks may create further access to feral animals, this is not considered significant in the context of the existing access tracks throughout the project area. Similarly, construction works, and vehicles travelling along access tracks during operational and maintenance activities, have the potential to spread existing, or introduce new, weed species. The avoidance and mitigation measures proposed (see Section 4.3) are considered sufficient to ensure that no change in the existing abundance and diversity of feral animal and weed species occur.			
				Will the Project activities introduce disease that may cause the species to decline?	Not significant	The Project is not expected to introduce disease that may cause the species to decline. Furthermore, specific controls (such as vehicle and equipment hygiene measures) will be implemented during construction as well as operation and maintenance to avoid introduction of disease within the project area.			
				Will the Project activities interfere	Not significant	As the project is only expected to directly impact			

				with the recovery of the species?		(clear) 3.863 ha of species habitat, of which only 0.087 ha is permanent, the project is not expected to interfere (adversely) with the recovery of the Tufted Bush-pea.			

5.3 Impact Significance and Residual Impacts

The assessment of impacts and impact significance presented in Table 19 indicates that permanent (irreversible) impacts associated with the project are confined to those related to permanent vegetation clearance in areas of native vegetation, and that, when assessed against relevant Commonwealth guidelines and with consideration to the avoidance and mitigation measures proposed in Chapter 4, none of the predicted impacts are considered likely to be significant.

The residual impact, in terms of the area of habitat and/or the EEC likely to be impacted by the project are:

- Malleefowl (*Leipoa ocellate*): 70.4 ha total (6.3 ha permanent)
- Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland: 1.4 ha total (0.035 ha permanent)
- Jumping-Jack Wattle (*Acacia enterocarpa*): 0.98 ha total (0.09 ha permanent and no individuals impacted)
- Tufted Bush-pea (*Pultenaea trichophylla*): 3.9 ha total (0.09 ha permanent), three individuals impacted with up to an additional 12 individual impacted (subject to micro-siting and final cut/fill design of structure pads)

The offset strategy for the residual impacts is presented in Chapter 6.

6. OFFSETS

Offsets are measures that compensate for the residual impacts of an action on the environment, after avoidance and mitigation measures are taken. The predicted residual impact of the Project on EPBC Act listed species has been assessed (see Chapter 5) in order to estimate the minimum direct offset area required to compensate for any adverse impacts to MNES potentially impacted by the project and provide a measurable conservation gain. The approach to offsets is detailed in the following sections.

6.1 Offsets Policy

Offsets associated with the Project will be developed and implemented in accordance with the EPBC Environmental Offsets Policy (2012, the Policy) and the associated Offsets Assessment Guide. The policy provides transparency around how the suitability of offsets is determined. The suitability of a proposed offset is considered as part of the decision as to whether to approve a proposed action under the EPBC Act. The Offsets assessment guide has been developed to give effect to the requirements of the policy, utilising a balance sheet approach to measure impacts and offsets. It applies where the impacted protected matter is a threatened species or ecological community.

An offsets package is a suite of actions that a proponent undertakes to compensate for the residual significant impact of a project. It can comprise a combination of direct offsets and other compensatory measures. Direct offsets are those actions that provide a measurable conservation gain for an impacted protected matter. Direct offsets are an essential component of a suitable offsets package. In most situations, a minimum of 90 per cent of the offset requirements for any given impact must be met through direct offsets. Other compensatory measures are those actions that do not directly offset the impacts on the protected matter but are anticipated to lead to benefits for the impacted protected matter, for example funding for research or educational programs.

The Policy provides overarching principles that are to be applied in determining the suitability of offsets, as described in Table 20.

Table 20: Environmental Offset Policy Offset Principles.

Principle Number	Principle
	Suitable offsets must:
1	Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action
2	Be built around direct offsets but may include other compensatory measures.
3	Be in proportion to the level of statutory protection that applies to the protected matter
4	Be of a size and scale proportionate to the residual impacts on the protected matter
5	Effectively account for and manage the risks of the offset failing
6	Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action)

7	Be efficient, effective, timely, transparent, scientifically robust, and reasonable
8	Have transparent governance arrangements including being able to be readily measured, monitored, audited, and enforced

6.2 Offset Requirement

Based on the potential residual impacts identified in Chapter 5 and the application of the Offset Assessment Guide, the minimum direct offset area required for each relevant EPBC Act listed species is described in Table 21.

Table 21: Environmental Offset Minimum Direct Area Requirement.

Calculator	Parameter	Value	Reasoning
Malleefowl (*Leipoa ocellate*)			
Impact	Area (ha)	70.44	Transmission line towers with construction zones, access/spur tracks and stringing impact area.
	Habitat quality	9	The range of this species overlaps with good quality vegetation within the Project Area (high native species and structural diversity, and low to nil weed cover). The species is known to occur in Project Area with several mounds recorded throughout Mallee associations in the northern extent of the Project Area by EBS is 2013/14. A fresh Malleefowl track was observed by EBS in September 2019. The stand of Mallee is large and mostly intact (i.e. not fragmented).
Offset	Time over which loss is averted	20	Loss can be averted in perpetuity through the establishment of a Heritage Agreement encompassing the Offset Area.
	Time until ecological benefit	0	The establishment of a Heritage Agreement would immediately secure the future protection and management of the Offset Area for the conservation of the species and its habitat.
	Start area (ha)	258.85	Minimum area required to achieve 100% of the impact offset has been input.
	Start quality of habitat	9	The Offset Area will be established in nearby habitat of similar quality to the impacted areas in order to best offset local impacts.
	Risk of loss without offset (%)	10	The potential expansion of mining activities in the Middleback Ranges could result in habitat loss and fragmentation without the Offset Area.
	Future quality without offset	7	Could be reduced in two ways without the Offset Area through: (1) habitat loss and fragmentation associated with mine expansion; and (2) habitat degradation associated with over-grazing and an increase in introduced predator abundance, which are possible if land owners/management practices change.
	Risk of loss with offset (%)	1	Negligible if a Heritage Agreement is established, which can protect the Offset Area in perpetuity. The only expected remaining threat could be a major fire.
	Future quality with offset	9	The Offset Area will be managed with respect to the key threats to the species (i.e. habitat loss and fragmentation, over-grazing and predation). If a Heritage Agreement is established, it can include clauses specific to the management of the Offset Area.
	Confidence in result - averted loss (%)	95	If a Heritage Agreement is established the Offset Area can be protected in perpetuity. A Heritage Agreement cannot be varied or terminated without approval from the Native Vegetation Council. Any

			change in ownership or lease to a property that contains a Heritage Agreement area must be noted to the Native Vegetation Branch. Regardless of lease, transfer or sale, a Heritage Agreement remains binding on the property title holder at that time.
	Confidence in result - habitat quality (%)	95	If a Heritage Agreement is established it can include clauses specific to the management of the Offset Area, including managing key threats to the species (i.e. habitat loss and fragmentation, over-grazing and predation), which are identified in the recovery plan for this species.
	% of impact offset (minimum 90%)	100.00	Refer to Offset Assessment Guide.
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland			
Impact	Area (ha)	1.352	0.035 ha of permanent clearance for a Permanent Pad and Spur Track. 1.317 ha of temporary clearance for an Access Track, Cleared Pad, Stringing Tracks and Stringing Tracks (Low Impact Stringing).
	Habitat quality	5	This TEC was categorised at C1 since it was in medium condition with good native vegetation cover and diverse native species in the understorey. All patches were greater than 0.2 ha in size, native vegetation cover in the mid and ground layers of the representative site comprised of greater than 50%, and seven native species from Appendix B, Table B1 in TSSC (2013) were recorded in the representative site. Large hollows were also observed in more than 20 trees per hectare in the representative site.
Offset	Time over which loss is averted	20	Loss can be averted in perpetuity through the establishment of a Heritage Agreement encompassing the Offset Area.
	Time until ecological benefit	0	The establishment of a Heritage Agreement would immediately secure the future protection and management of the Offset Area for the conservation of the species and its habitat.
	Start area (ha)	5.673	Minimum area required to achieve 100% of the impact offset has been input.
	Start quality of habitat	5	The Offset Area will be established in nearby habitat of similar quality to the impacted areas in order to best offset local impacts.
	Risk of loss without offset (%)	10	Low but possible due to change in landholder/management and/or road and rail management activities.
	Future quality without offset	4	Could be reduced through a number of ways without the Offset Area, including: (1) clearance, fragmentation, disturbance and edges effects; (2) invasive species including stock, pests and weeds; (3) salinisation; (4) dieback; and (5) inappropriate fire regimes.

	Risk of loss with offset (%)	1	Negligible if a Heritage Agreement is established, which can protect the Offset Area in perpetuity.
	Future quality with offset	5	The Offset Area will be managed with respect to the key threats to the TEC (i.e. clearance, fragmentation, disturbance and edges effects, invasive species including stock, pests and weeds, salinisation, dieback and inappropriate fire regimes). If a Heritage Agreement is established, it can include clauses specific to the management of the Offset Area.
	Confidence in result - averted loss (%)	95	If a Heritage Agreement is established the Offset Area can be protected in perpetuity. A Heritage Agreement cannot be varied or terminated without approval from the Native Vegetation Council. Any change in ownership or lease to a property that contains a Heritage Agreement area must be noted to the Native Vegetation Branch. Regardless of lease, transfer or sale, a Heritage Agreement remains binding on the property title holder at that time.
	Confidence in result - habitat quality (%)	95	If a Heritage Agreement is established it can include clauses specific to the management of the Offset Area, including managing key threats to the TEC (i.e. clearance, fragmentation, disturbance and edges effects, invasive species including stock, pests and weeds, salinisation, dieback and inappropriate fire regimes), which have been identified in the conservation advice for this TEC.
	% of impact offset (minimum 90%)	100.00	Refer to Offset Assessment Guide.
Jumping-Jack Wattle (*Acacia enterocarpa*)			
The proposed action will not impact Jumping-jack Wattle individuals, and the significant impact assessment presented in Section 5.3 concluded there would be no significant residual impacts to Jumping-jack Wattle as a result of the implementation of the action. As such, not EPBC offset is proposed for this species.			
Tufted Bush-pea (*Pultenaea trichophylla*)			
Impact	Area (ha)	3.863	Transmission line towers with construction zones, access/spur tracks and stringing impact area overlaid with records from targeted surveys in 2013 (plus 100 m buffer).
	Habitat quality	8	This species was mostly detected in excellent quality vegetation within the Project Area (diverse vegetation with very little weed infestation that resembles probable pre-European), but also in moderate quality patches (mostly intact overstorey with moderate but not severe weed infestation in the understorey). Fifty sub-populations consisting of several individuals were located within reasonably large remnant patches.
Offset	Time over which loss is averted	20	Loss can be averted in perpetuity through the establishment of a Heritage Agreement encompassing the Offset Area.

	Time until ecological benefit	0	The establishment of a Heritage Agreement would immediately secure the future protection and management of the Offset Area for the conservation of the species and its habitat.
	Start area (ha)	22.173	Minimum area required to achieve 100% of the impact offset has been input.
	Start quality of habitat	8	The Offset Area will be established in nearby habitat of similar quality to the impacted areas in order to best offset local impacts.
	Risk of loss without offset (%)	10	Low but possible due to change in landholder/management and/or road and rail management activities.
	Future quality without offset	7	Could be reduced through a number of ways without the Offest Area, including: (1) vegetation clearance; (2) over-grazing; (3) weed infestation; and (4) road, rail and fence maintenance activities.
	Risk of loss with offset (%)	1	Negligible if a Heritage Agreement is established, which can protect the Offset Area in perpetuity. The only expected remaining threat could be a major fire.
	Future quality with offset	8	The Offset Area will be managed with respect to the key threats to the species (i.e. vegetation clearance, over-grazing,) weed infestation and road, rail and fence maintenance activities). If a Heritage Agreement is established, it can include clauses specific to the management of the Offset Area.
	Confidence in result - averted loss (%)	95	If a Heritage Agreement is established the Offset Area can be protected in perpetuity. A Heritage Agreement cannot be varied or terminated without approval from the Native Vegetation Council. Any change in ownership or lease to a property that contains a Heritage Agreement area must be noted to the Native Vegetation Branch. Regardless of lease, transfer or sale, a Heritage Agreement remains binding on the property title holder at that time.
	Confidence in result - habitat quality (%)	95	If a Heritage Agreement is established it can include clauses specific to the management of the Offset Area, including managing key threats to the species (i.e. vegetation clearance, over-grazing,) weed infestation and road, rail and fence maintenance activities), which are identified in the conservation advice for this species.
	% of impact offset (minimum 90%)	100.00	Refer to Offset Assessment Guide.

6.3 Offset Strategy

6.3.1 Status

ElectraNet are currently investigating and progressing options to achieve suitable offset areas and other positive environmental outcomes within the vicinity of the transmission line alignment. Given the scale of the project across various habitats and potential impact to various EPBC Act listed species, multiple offset options are likely to be required, including offset areas in both the northern section and the southern section.

ElectraNet has been progressing discussions with several landowners and interested parties, including third-party offset providers and managers, in order to identify suitable offset sites that hold the relevant MNES. Due to the ongoing and confidential nature of discussions related to securing and managing any offsets, specific details of the proposed offsets are not provided in this PD but have been provided to the Commonwealth government in confidence.

6.3.2 Security of Offset (Tenure)

The proposed offset(s) may involve protection of native vegetation and habitat via Heritage Agreement which is subject to the *Native Vegetation Act* 1991 (SA). A Heritage Agreement is a conservation area on private land, which is established by agreement (or contract) between a landholder and the (SA) Minister for Sustainability, Environment and Conservation. Agreements are ongoing or perpetual and are binding on future landholders. Even if the property is sold or ownership is transferred, the conservation status of the land under agreement will continue.

Native plants and animals within the specified Heritage Agreement area must be protected from the time the agreement is made. It will be the responsibility of the landholder to conduct weed and feral animal control and they must abide by relevant legislation such as the *Natural Resources Management Act 2004* (SA). If an activity could adversely impact native flora and fauna in a Heritage Agreement area, then the Minister will need to grant approval before it can be performed. In addition to this, the planting of vegetation, regardless of whether it is native or exotic, requires Ministerial approval. The Minister is likely to grant approval if an activity is to provide a net benefit for the conservation of the area.

In addition to the management actions associated with the state-based offset mechanism described in Section 6.3.2, offset, or positive environmental outcomes, may also be achieved via implementation of a feral animal control program which targets foxes, goats and/or feral cats and reduces their impact on the EPBC Act listed species relevant to this project. Control of foxes and feral cats, for example, will alleviate potential predation impacts on Malleefowl caused by the creation of predator highways within access tracks.

6.3.3 Offset Management and Monitoring

The offset area(s) would be managed in accordance with an agreed management plan which would provide a detailed description of the offset site(s) including location, size, condition, and environmental values present, and include details that demonstrate that the offset meets the requirements of the Policy, under which the offset must:

- Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.
- Be built around direct offsets but may include other compensatory measures.
- Be in proportion to the level of statutory protection that applies to the protected matter.
- Be of a size and scale proportionate to the residual impacts on the protected matter.
- Effectively account for and manage the risks of the offset not succeeding.
- Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action).
- Be efficient, effective, timely, transparent, scientifically robust and reasonable.
- Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

The management plan would include sections that provide details of the monitoring program for the site. The monitoring plans would include consideration of requirements related to management actions, responsibilities, timings, and performance criteria (i.e. the specific environmental outcomes to be achieved from management measures).

A Threatened Species Management Plan has been developed (see Appendix E), which will be implemented to avoid, minimise and/or mitigate the potential impacts of construction and operation of the project on the relevant EPBC Act listed species (as described in Chapter 4). The plan details the ecology of each EPBC Act species relevant to the project, identify threats and associated management and mitigation measures, monitoring requirements and adaptive management measures.

The offset area(s) would be subject to proactive, adaptive and sustainable management including, but not limited to, the following activities:

- Control of feral and pest herbivores such as goats (particularly beneficial for flora as well as Malleefowl habitat);
- Control of feral / pest predators, including foxes and cats (particularly beneficial for Malleefowl as well as other small fauna species);
- Control of weeds, most likely by Indigenous Land Management Groups contracted by the offset provider (as currently undertaken in other conservation areas);
- Fire management, such as cool season burns to protect and/or enhance key habitat (particularly for Malleefowl); and
- Scientific monitoring and analysis, and reporting.

7. SOCIAL AND ECONOMIC MATTERS

7.1 Consultation

7.1.1 Overview

Transparency and collaboration are important drivers of ElectraNet's community engagement approach. ElectraNet focuses on careful project planning and seeks stakeholder feedback to reduce our impact on environmental, economic, and social considerations. To this end, ElectraNet's community engagement approach includes:

- Getting community and stakeholder feedback on constraints and opportunities for a project
- Considering community issues, concerns and values when making a decision
- Showing the community how feedback was considered
- Providing ways for communities interested or affected by a project to get involved
- Providing clear and timely information about a project
- Working with landowners to reduce the impact of the project where possible.

7.1.2 Objectives

ElectraNet recognises the importance of effectively engaging with community and stakeholder groups throughout the duration of its major projects and initiated a comprehensive communications and engagement strategy to support the project from its commencement in 2012. This strategy sought to ensure the timely delivery of the early phases of the project (in particular the identification of the transmission line corridor) and proactively identify and manage potential issues arising from the project's development.

Specific engagement objectives for the project were to:

- Educate and inform stakeholders about ElectraNet, the need to reinforce transmission supply to the Eyre Peninsula, the steps involved in this process and the issues influencing route selection.
- Provide stakeholders with the opportunity to be involved in the route selection process, by helping to identify key opportunities, constraints and preferences.
- Manage expectations among stakeholders of their role in the route selection process and how decisions will be made.
- Foster positive and productive relationships with stakeholders to grow support for the project and help facilitate its planning and construction phases.

7.1.3 Community Engagement Program

Three major groups of stakeholders were identified, specifically:

- Existing easement landowners (totalling 108 including 10 government or Crown stakeholders). This group was important given their experience of the existing

132kV transmission line and the likelihood of them hosting the replacement infrastructure.

- Wider Eyre Peninsula community, including residents in close proximity to the existing transmission line and those who can see the line from their property or during their regular travel patterns.
- Representative groups and individuals including Federal and State MPs, elected members of local Councils and resident action groups.

Input from affected community/stakeholder groups was obtained prior to decisions being made about the selection of the transmission line corridor and siting of structures, laydown areas, workers' camps and substations. More specifically, the following consultation and engagement initiatives were implemented:

- Media releases about the project were released on a regular basis providing information and project updates. These releases also encouraged community and stakeholder members to register their details with ElectraNet to ensure they received regular project updates.
- Displays and presentations at Eyre Peninsula Field Days (2012, 2014, 2016, 2018) to elicit broad community views about the project.
- Meeting with the Eyre Peninsula Natural Resource Management Board (December 2013)
- Introductory mail-outs to potentially-affected landowners and key stakeholders providing background information about the project and flagging an initial face-to-face meeting with project staff.
- Individual phone calls to each existing easement landowner to arrange for the initial meeting and obtain permission to access properties outside of the easement area to carry out flora and fauna surveys.
- Individual briefings with 98 existing easement landowners between November 2012 and February 2013 on the background to the project and issues experienced with the operation of the existing line. Landowners were asked to i) share information about their properties to help identify potential opportunities and constraints that might affect the project, and ii) indicate their preferences for the location of a new transmission line and whether it should take the same route as the existing line.
- Information booklets and fact sheets about the development of high voltage transmission lines were distributed to all landowners and community members.
- Three community drop-in days were held across the Eyre Peninsula at Cleve, Ungarra and Port Lincoln that included activities designed to engage children.
- Presentation to the Eyre Peninsula Friends of Parks Forum (Kimba 2011), EP Regional Development Australia (RDA) and Council CEO's Forum (December 2012- Whyalla) and the EP Local Government Association (EPLGA) Conference (Kimba 2019).
- Project hotline and email contacts were established to channel all landowner and community enquiries through a central platform that was monitored and responded to by ElectraNet staff.

- Project information, fact sheets, brochures, media releases and other news was made available on ElectraNet's website with hard copies distributed across the Eyre Peninsula.
- Project contact cards with specific contact details were distributed to landowners and the wider community.
- Newspaper advertisements about the project were published in the Eyre Peninsula Tribune, Port Lincoln Times, West Coast Sentinel and the Stock Journal.
- Numerous 'have your say' invitations to stakeholders/community members were distributed across the Eyre Peninsula seeking feedback about the project.

In addition, a Consultation Manager database was established and used to record and track all interactions made during the course of the engagement with a total of 730 events recorded against 183 stakeholders/ community members.

7.1.4 Consultation Outcomes

7.1.4.1 Support for the Proposed Action

The outcomes of the community and stakeholder engagement indicated strong support for the project based on widespread recognition of the limitations of the existing transmission line and the economic growth potential a more secure and reliable supply of power would provide. While the landowner group tended to be less effusive in their support, this could be attributed to particular circumstances these landowners have faced such as negative experiences with mining companies accessing their land and issues associated with neighbouring conservation areas. The landowners consulted were, however, strongly in favour of an augmented power supply and aware of the need to act quickly given the age and deteriorating condition of the existing transmission line.

Members of the wider community also demonstrated strong support for the potential economic growth arising from the project particularly in relation to renewable energy and mining activities.

7.1.4.2 Location of the Proposed Action

High levels of support were attained for the location of the proposed transmission line close to or following a similar path to the existing 132 kV line. Landowners were keen to discuss their preferences for where the line should go and generally confirmed their willingness to have the new line traverse their properties. Among community members, the proposed siting of the new line alongside the existing line was seen as both logical and desirable from a visual amenity perspective, fuelled in part by a desire not to have the transmission line close to their residence.

There was evidence of differing attitudes among landowners according to their location on the Peninsula. Landowners located on the northern section of the alignment were less concerned about whether the proposed transmission line would be sited east or west of the existing line easement, which can be attributed to the larger size of land holdings and the predominance of grazing (as opposed to cropping) activities being less affected by the location of the line. Landowners in the southern section of the alignment were more inclined to be quite specific about where the line should be located in order to reduce the potential impact on their property and land use activities.

Engagement participants were united in their preference for the alignment to be located away from existing residences, evidenced by landowners requesting that the new transmission line be built on the opposite side of the existing line to their dwelling. Many community participants also commented that consideration be given to avoiding areas where future residential development would likely occur.

7.1.4.3 Key Issues

For the wider Eyre Peninsula community, the issues of greatest concern related to:

- The reliability of electricity supply;
- Minimising impacts on farming activities and other land uses; and
- Safety during construction.

Additional issues identified and discussed during the engagement include:

- The role of ElectraNet in the electricity supply chain.
- The need for and timing of the project, with many landowners having experienced outages and an unreliable power supply.
- Details around the negotiation and acquisition of easements, including information about the impact on existing land uses and whether landowners would be compensated.
- Potential property damage during construction and general maintenance and how this would be managed. Landowners relayed stories of maintenance crews becoming bogged during winter and causing property damage when being towed out. The maintenance of access tracks and gates was also discussed as landowners cited examples of maintenance crews driving across cropping fields when access tracks were not available.
- Bushfire risk during construction was a concern for many landowners who requested that only diesel vehicles be used when accessing their properties. Community members also expressed concerns about bushfire risk and queried whether the alignment would be diverted away from bushfire prone areas.
- Environmental issues such as flora and fauna habitat and vegetation screening. Landowners located close to Koppio Hills and the Middleback Ranges expressed particular interest in these matters.
- Weed and pest management was of particular interest to landowners who sought assurances about vehicle sanitation measures preventing the spread of weeds.
- Social issues such as visual impact, amenity, lifestyle and health were of interest to a small number of engagement participants although familiarity with the existing transmission line meant there were few concerns expressed about these matters.
- Decommissioning of the old transmission line with landowners interested in whether structure footings would be removed.

Each of these issues has been considered by ElectraNet during the detailed design of the project and in the development of construction and operational protocols and plans to minimise the potential for stakeholder dissatisfaction.

7.1.5 Construction and Operational Engagement

7.1.5.1 Construction Engagement

ElectraNet is in discussions with landowners and landholders about specific local conditions along the corridor, with the outcomes of this consultation used to inform the construction contract (to be issued).

7.1.5.2 Construction Environmental Management Plan

The Proposed Action, if approved, would be constructed in accordance with a Construction Environmental Management Plan (CEMP). The purpose of the CEMP is to:

- Provide environmental mitigation or management measures to implement to reduce potential environmental impacts of the Project.
- Document the policies, processes and procedures to manage potential impacts along with legislative requirements, approval conditions, and other relevant environmental obligations.
- Allocate responsibilities for ensuring the effective implementation of these policies, processes and procedures.
- Describe how the environmental management performance will be monitored and reviewed to drive continuous improvement.

The CEMP is used as a basis for the contractor's Construction Environmental Management Plan, to be developed by the selected construction contractor for the construction phase of the project.

The CEMP contains provisions related to the management of complaints and commits that community concerns will be managed in an accountable, transparent, timely and meaningful way. The complaints management procedure outlines how personnel should handle, report and address complaints during construction activities.

7.1.5.3 Land Access and Easement Agreements

To obtain the relevant consents for the granting of easements covering the new transmission line, ElectraNet has entered into land access and/or easement agreements with landowners/landholders along the new transmission line corridor. Whilst the nature of these agreements is confidential, the agreements contain clauses related to the provision of land access, expected behaviours, ongoing consultation and engagement expectations and dispute resolution processes.

7.2 Economics

7.2.1 Cost of the Proposed Action

The total indicative cost of construction is influenced by a range of factors, including:

- The total distance of the transmission line
- The number of road and rail crossings
- Soil (e.g. sand, rock) characteristics

- Length of the alignment traversing protected areas and areas of remnant vegetation
- Number of transmission and distribution line crossings
- Proximity to nearest township and accommodation facilities
- Number of changes in direction / angle along the alignment

With consideration to the above, the estimated cost of the completed project is $290 million. Offsetting this capital cost is reductions in operational expenditure associated with avoiding the need for back-up generation at Port Lincoln, saving ongoing network support costs of $9 million per year, together with avoidance of the need to reconductor major sections of the existing line for which ElectraNet is already funded in the current regulatory period, at a cost of $74 million.

7.2.2 Economic Considerations

7.2.2.1 Regional Economy

The economy of the Eyre Peninsula is based largely on primary production, with aquaculture and grain production particularly prevalent. As previously noted, the region also contains significant mineral and renewable energy resources that have yet to be fully realised.

A significant proportion of South Australia's grain crops and seafood harvest comes from the Eyre Peninsula with around 45% of the State's wheat, 20% of its barley and 45% of its seafood harvest produced in the region. Some $2.63 billion in exports comprising predominantly agricultural, mining and manufacturing products were sourced from the Eyre Peninsula in 2015-16 (Infrastructure SA, 2019). These industry sectors are forecast to experience growth in coming years and there is considerable potential for the region to benefit from value-adding in these sectors.

7.2.2.2 Regional Growth

The Eyre Peninsula has significant mineral resources located in the mineral regions known as the Gawler Craton and the Eucla Basin. The region is widely recognised as an important frontier for mineral exploration and development in Australia and there are a number of mining developments at pre-feasibility, feasibility or construction stages, including Wilcherry Hill (Ironclad), Wilgerup (Centrex Metals), Warramboo (Iron Road) and Tripitaka (Iluka). To date, ElectraNet has received five formal connection enquiries from mining customers on Eyre Peninsula for a combined load of around 480 megawatts (MW).

The Proposed Action responds directly to the potential of these initiatives at a time when market prospects for growth of the mineral sector in South Australia are encouraging. It also responds to a key recommendation of the Resources and Energy Sector Infrastructure Council (RESIC) mining study in 2011 to accelerate the augmentation of the Eyre Peninsula transmission line from 132 kV to 275 kV.

The Eyre Peninsula is well suited to renewable energy development and the region is expected to experience significant growth in renewable energy infrastructure in coming years due to its abundant wind and solar energy resources. In 2010, a feasibility assessment was commissioned by Macquarie Capital Advisors to report on the possible development of a 500 kV 'Green Grid' on the Eyre Peninsula to take advantage of the potential generation of up to 2,000 MW of renewable energy from the region. At the time,

four wind farm developers indicated an interest in developing infrastructure on the Peninsula as part of the Green Grid proposal. The study also indicated that ElectraNet's existing 132 kV transmission line was near to or at full capacity and that construction of the proposed Green Grid would require augmentation of the transmission line in order to open up areas with potential for renewable energy development.

According to Renewables SA, the Eyre Peninsula has the potential to support over 10,000 MW of wind generation which would make the Peninsula the largest renewable energy region in South Australia. More recently, there have been several renewable energy initiatives in the region that have either obtained approval or are in the process of being developed. These include:

- Cathedral Rocks Wind Farm at Sleaford (66 MW)
- Mt Millar Wind Farm at Cowell (70 MW)
- Cultana Solar Farm (280 MW)
- Whyalla Solar Farm (150 MW).

The Proposed Action will facilitate the ongoing development of renewable energy resources across the Eyre Peninsula which will foster both regional and State-wide economic growth while contributing to South Australia's renewable energy targets.

Regional Development Australia (Whyalla and Eyre Peninsula) have consistently argued that the limited capacity, condition and age of the region's infrastructure is effectively constraining economic development across the Peninsula. The recent closure of the freight rail system will add extra pressure on the region's road network to efficiently service growth in the primary production and mining sectors.

Nonetheless, recent proposals for deep sea port facilities to service mineral development together with the recent upgrade to the Port Lincoln Airport attest to increasing investment into transport infrastructure across the region.

7.2.2.3 Workforce

The construction phase of the Proposed Action is expected to generate a peak workforce of around 150 personnel during the 18-month construction period. Ongoing operational workforce is not expected to materially change over the workforce currently engaged to maintain the existing transmission line.

7.2.2.4 Business Opportunities

Local businesses are encouraged to register their interest for sub-contractor opportunities during the project's construction phase and this information will be provided to the successful contractor delivering the project on behalf of ElectraNet. Information about registering interest for sub-contractor opportunities will be made available via the ElectraNet website.

7.2.3 Cost Benefit Analysis

As a component of the funding of the Proposed Action, the Australian Energy Regulator (AER) is required to consider ElectraNet's application to approve the funding for the Proposed Action. The application to the AER, known as a Contingent Project Application,

represents the final regulatory approval step for this project under the National Electricity Rules.

As a component of the Contingent Project Application, ElectraNet was required to develop a cost-benefit analysis for the Proposed Action (HoustonKemp 2020). Through this cost-benefit analysis, the Proposed Action was found to deliver net market benefits of between $50 million and $59 million compared to a 'business as usual' base case (involving reconductoring sections of the existing transmission line and establishing a new backup generation network support arrangement at Port Lincoln), depending on whether a new SA-NSW interconnector was assumed to be constructed.

8. ECOLOGICALLY SUSTAINABLE DEVELOPMENT

8.1 Principles of Ecologically Sustainable Development

Section 3A of the EPBC Act describes the principles of ecologically sustainable development (ESD) in the context of the Act, specifically:

- decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making
- improved valuation, pricing and incentive mechanisms should be promoted.

A discussion of how the Proposed Action meets these principals have been addressed in the following sections.

8.2 Application of the ESD for the Proposed Action

A summary of how the Proposed Action meets the ESD principles have been addressed in Table 22.

Table 22: Application of the ESD for the Proposed Action

ESD Principle	How the Proposed Action meets the Principle
The Integration Principle	ElectraNet makes project decisions based on both short and long-term economic (see Section 7.2), environmental (see Sections 3, 4 and 5), social and equitable considerations (see Section 7.1). The Proposed Action (see Section 2) reflects the outcomes of these considerations.
The Precautionary Principle	Extensive baseline environmental and social studies across a number of years and seasons have been undertaken to understand the existing environment along the corridor associated with the Proposed Action. This has allowed the project to be designed and optimised with a view to minimising the potential impacts to social and environmental receptors. Further, avoidance and mitigation measures have been proposed (see Chapter 4) that consider the uncertainty associated with the surveys undertaken to date, and seek to implement measures that prevent environmental degradation.
The Intergenerational Principle	The Proposed Action has been designed to minimise the impacts to native vegetation (and associated

	habitat), agricultural land and with consideration to nearby residents (see Sections 3, 4 and 5) while delivering the benefits of the project to the greater Eyre Peninsula in terms of freeing the region from energy related constraints, permitted greater regional development and prosperity (see Section 7.2). ElectraNet embraces the concept of sustainability, in terms of the triple bottom line: ecological, social and economic and are striving to embed sustainability in procurement choices related to the Proposed Action.
The Biodiversity Principle	ElectraNet has optimised the project configuration and alignment (see Table 2 and Chapter 2) based on the outcomes of extensive ecology and biodiversity studies (see Chapter 3) to ensure that biological diversity and ecological integrity are conserved in proximity to the Proposed Action.
The Valuation Principle	As with all electricity transmission infrastructure, the cost of the Proposed Action will be reflected in the charges passed on to electricity consumers. Financial modelling undertake on behalf of ElectraNet estimates a minimal price impact for the average residential customer of approximately $1 per year.

9. ENVIRONMENTAL RECORDS

9.1 ElectraNet's Environmental Management Record

ElectraNet are committed to minimising, or where possible preventing, environmental impacts as they pursue energy and infrastructure solutions for a better world. ElectraNet policies ensure that every effort is taken to safeguard the environment for future generations to enjoy, and they strive to incorporate these aspects into the planning of new developments, and to ensure this approach is consistently maintained throughout the asset lifecycle.

The ElectraNet Environmental Policy underpins our systematic approach to environmental management, and this is supported by robust procedures that all staff and contractors understand and apply. In recognition of this, ElectraNet's environmental management system is certified to the International Standards Organisation for environmental management, ISO14001. The guiding principle of ISO14001 is continual improvement, and ElectraNet strives to be authentic in applying this approach to all aspects of their activities.

9.2 Environmental Policy Statement

The ElectraNet Environmental Management Policy Statement outlines ElectraNet's commitment to developing and maintaining an Environmental Management System (EMS) that delivers improved environmental performance in accordance with the *Environmental Protection Act 1993* (SA) and other relevant legislation, standards and codes of practice. To fulfil this commitment, ElectraNet will:

- Develop and maintain an EMS appropriate to the nature and scale of ElectraNet's operations and risks
- Assess activities and assets (including property) regularly to identify environmental aspects and impacts, and develop objectives and targets which prevent pollution and achieve environmental improvement
- Develop, document and maintain, through consultation with internal and external stakeholders, robust standards and procedures to deliver these objectives and targets
- Establish and maintain key performance indicators that track EMS implementation, and measure the effectiveness of these standards and procedures through regular environmental inspections, audits and management reviews.
- Provide all employees and contractors with appropriate induction and training that support EMS implementation and wider business objectives.
- Proactively communicate and report on our environmental performance in a transparent manner and respond appropriately to stakeholder requests for additional information
- Integrate the EMS with other management systems, including but not limited to asset management, health and safety, risk and quality systems.
- Incorporate climate change and sustainability principles into the EMS and to strive to identify and deliver reductions in greenhouse gas emissions.

All employees, contractors, consultants and outsourced providers are required to comply with and act in accordance with this policy.

9.3 Environmental Management Framework

Health, Safety and Environment (HSE) management is an integral and essential part of the way ElectraNet do business and is considered an equal part of the wider system for the management of the business. The Health Safety and Environment Management System (HSEMS) is a management tool to achieve ElectraNet's commitment to conduct business in a way that protects the health and safety of workers, the public, and the environment in which they work and live.

The HSEMS document and the principles captured within are derived from, and consistent with, ElectraNet's Environmental Policy, which in turn is consistent with the overall Organisational Vision, Organisational Strategic Plan and Objectives. Use of the HSEMS throughout ElectraNet will assure that the Policy and principles are applied consistently to all operations. The HSEMS has been structured in line with ISO 14001:2015 requirements, and provides a framework that covered the following aspects:

- Context
- Leadership
- Planning
- Support
- Operation
- Performance Evaluation
- Improvement

This common format allows for integration with other key ElectraNet management system documentation following the ISO framework.

The HSEMS incorporates the concept of Plan-Do-Check-Act (PDCA) shown in Figure 14. The PDCA concept is an iterative process used to achieve continual improvement. It is applied to a management system and to each of its individual elements, as follows:

- Plan: determine and assess environmental risks and opportunities, establish objectives and processes necessary to deliver results in accordance with the Environmental Policy.
- Do: implement the processes as planned.
- Check: monitor and measure activities and processes with regard to the Environmental Policy and objectives, and report the results.
- Act: take actions to continually improve HSE performance to achieve the intended outcomes.

Each element of the HSEMS contains specific principles and expectations. The principles and expectations communicate corporate expectations. Each business unit determines for themselves how best to meet these expectations by setting their own priorities and addressing the expectations.

Success of the HSEMS requires everyone to be responsible for the HSE implications of their own actions and have a duty to carry out their work in a manner that does not present a risk to themselves, to others or to the environment.

Within the HSEMS, ElectraNet has developed a detailed range of Environmental Operating Requirements (EORs) which define our environmental management requirements for staff and contractors. These address key environmental aspects, or themes, during all phases of our activities and are continuously reviewed and improved where gaps are identified. They also define the minimum requirements we expect in the environmental management plans (EMPs) that our partners and contractors develop when working with us.

To facilitate effective environmental management, ElectraNet requires the development and implementation of EMPs, whether for construction projects or asset maintenance service providers. For example, where risk assessments identify the presence of endangered or vulnerable flora or fauna, or where noxious weeds are likely, fit for purpose EMPs ensure our contractors use sound management practices. Cultural heritage planning and management are integral to this process so that sensitive locations and habitats are protected.

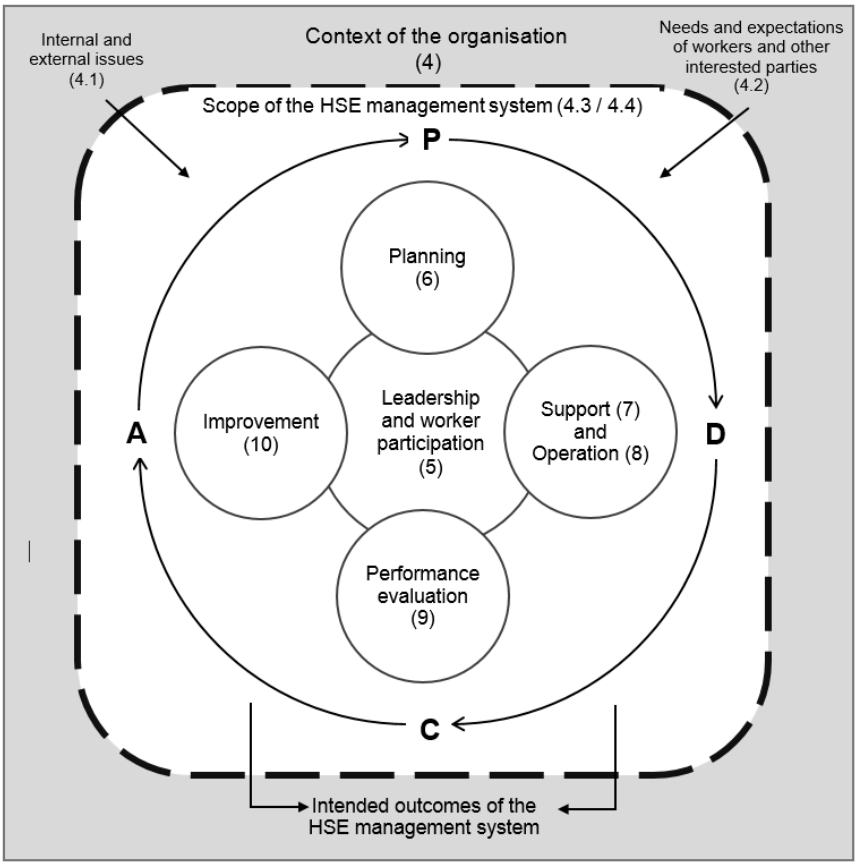


Figure 14: ElectraNet HSE Management System

9.4 Environmental Proceedings

Neither ElectraNet (both as a corporation, and in relation to the executive officers of the corporation) nor the person making this application are, or have previously, been subject

to proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.

9.5 Previous Referred and Undertaken Actions

ElectraNet has previously referred and/or been responsible for undertaking the Actions referred under the EPBC Act, as detailed in Table 23.

Table 23: Previous ElectraNet EPBC Referrals

Referral Number	Location	Description
2002/726	Monash to Robertstown (SA)	SA to NSW electricity interconnector (proposal withdrawn 18 March 2015)
2004/1903	Bungama (SA)	Upgrade existing Bungama substation and install 7 km transmission line
2005/2463	Cherry Gardens (SA)	Installation of electrical infrastructure
2009/4948	Adelaide (SA)	Construction of substation and 18 km of underground cable
2019/8468	Robertstown (SA) to NSW border	SA to NSW electricity interconnector

10. OTHER APPROVALS AND CONDITIONS

10.1 State Approvals Pathway

A number of state-based approvals are required prior to the commencement of construction and operation of the Proposed Action. These are detailed in Table 24.

Table 24: State-Based Approvals for the Proposed Action

Legislation	Approval requirement
Development Act 1993 and *Planning, Development and Infrastructure Act 2016*	Given the significance of the proposed development in augmenting critical public electricity infrastructure in the State, ElectraNet has secured the support of the South Australian Department for Energy and Mining (DEM) to sponsor the proposed development, enabling its assessment under the provisions of Section 49 of the *Development Act 1993* by the State Commission Assessment Panel (SCAP). The proposed transmission line passes through five (5) local government areas with a 50 km section extending through land not within a Council area. Development on land not within a Council area is subject to assessment under the new Planning and Design Code as applying to Land Not Within a Council Area (Outback Code). Advice received from the Department of Planning, Transport and Infrastructure (DPTI) confirms that the proposed development in its entirety will be assessed against the relevant provisions of the Outback Code. A secondary assessment against the provisions of the local Development Plan for those elements of the proposed development that pass through the relevant council area will also be conducted. In addition, the development will be assessed for consistency with the new State Planning Policies (SPPs).
Native Vegetation Act 1991	Under this Act, any clearance of native vegetation requires consent from the Native Vegetation Council (NVC). All native vegetation clearance associated with the project has been assessed in accordance with this Act with a Significant Environmental Benefit (SEB) offset to be established in accordance with NVC requirements.
Environment Protection Act 1993	Given the nature of activities associated with erecting the structures and transmission line, the proponent has, and will continue to engage with the Environment Protection Authority (EPA) on any requirements for its contractors to hold relevant licences and approvals for earthworks and drainage.
Natural Resources Management Act 2004	The proponent has considered and will comply with all requirements in relation to the management and protection of land, plants, animals and watercourses. This includes appropriate management of pest plant and animal species during construction and rehabilitation of construction sites as part of the CEMP. If required, Water Affecting Activity permits will be obtained by the construction contractor prior to works being undertaken near a watercourse.

National Parks and Wildlife Act 1972	The proponent has taken into consideration potential impacts (i.e. siting, design and construction) on all relevant conservation and recreation reserves through which the proposed transmission line traverses. Measures to minimise potential impacts to listed flora and fauna species during construction will be established and put in place as part of the CEMP.
Aboriginal Heritage Act 1988	The proponent engaged AECOM Australia Pty Ltd (AECOM) to undertake an Aboriginal cultural heritage survey of the proposed transmission line corridor. The survey involved Barngarla representatives in accord with a Cultural Heritage Agreement established between ElectraNet and the Barngarla Native Title Claimants. Several culturally significant items were identified during the survey and it was determined that further survey followed by a Cultural Heritage Management Plan detailing appropriate protocols for protecting these items during the construction of the transmission line and substations would be prepared and implemented.
Native Title (South Australia) Act 1994	The proponent is currently in discussions with the Barngarla Determination Aboriginal Corporation and Crown Lands SA with regard to Native Title matters for the project and aims to comply with all requirements related to Aboriginal cultural heritage and Native Title under both State and Commonwealth legislation.
Heritage Places Act 1993	The proponent has undertaken due diligence with respect to the protection of areas of significance and has designed the transmission line alignment to generally avoid such areas. However, the line passes close to three local heritage places with both Councils (District Council of Tumby Bay and District Council of Lower Eyre Peninsula) confirming that the proposed development will not impact on the heritage value of these places.
Road Traffic Act 1961	The transport of heavy construction materials associated with the proposed development has the potential to impact on the Eyre Highway and local road networks. These impacts will be managed via a Traffic Management Plan to meet the requirements of DPTI and relevant Councils being the bodies responsible for safe and efficient operation and maintenance of the road system.
Local Government Act 1999	Pursuant to the provisions of Section 221 (Alteration of road) of this Act, an authorisation is not required for an alteration to a road if '*…the person who proposes to make the alteration has some other statutory authorisation to make the alteration*' (e.g. development approval secured under the Development Act). A Traffic Management Plan will be prepared to support the project.
Electricity Act 1996	The proponent has undertaken due diligence and secured all required licences related to providing a safe and reliable supply of energy to the Eyre Peninsula. The proposed development has been designed to meet the legal requirements for vegetation clearance around high voltage transmission lines.
Climate Change and	The proposed transmission line will facilitate the

Greenhouse Emissions Act 2007	development and commercialisation of renewable energy and technologies across the Eyre Peninsula in accordance with the objects of this Act.

10.2 Development Approval and Conditions

As described in Table 24, the *Development Act 1993* (SA) requires that all development must be approved under the Act. The transmission line and substations are located within the City of Whyalla, the Pastoral Unincorporated Area and the District Councils of Franklin Harbour, Cleve, Tumby Bay and Lower Eyre Peninsula Local Government Areas (LGAs). The proposed action is therefore subject to approval under the *Development Act 1993* (SA).

ElectraNet submitted a development application pursuant to the Development Act and the Planning Development and Infrastructure Act in late 2019, and was granted development approval in early July 2020. An application for the clearance of native vegetation was submitted in early 2020 and approved in late August 2020. Conditions associated with these approvals are described in Table 25.

Table 25: State-Based Granted Approval Conditions.

Condition Number	Condition Description
***Development Act 1993* (SA)**	
1	The development granted Development Approval shall be undertaken and completed in accordance with the stamped plans and documentation, except where varied by conditions below
2	Prior to the commencement of site works, final detailed plans – including relevant site plans, cross sections, floor plans, elevations, cut and fill details, access arrangements – of the development shall be submitted to the satisfaction of the Minister for Planning. The plans shall include: • The final design, specification and layout of all temporary construction components of the development including (but not limited to) compounds / yard, camps, workshops / maintenance areas, outbuildings, warehouses, site office, amenities, generators, electrical connections, laydown areas, waste storage areas, water storages, fuel storages, car parking areas, refuelling areas and clean-down facilities; • The final alignment, layout, design and specifications for the above-ground transmission lines; and • The final design, specification and layout of all new, upgraded or expanded substations.
3	A Construction Environmental Management Plan (CEMP) for the construction phase of the development shall be prepared in consultation with the relevant State Government Agencies and local Councils and submitted to the satisfaction of the Minister for Planning prior to the commencement of site works Construction of the development must be in accordance with the approved CEMP, which as a minimum shall include specific management measures or plans for the following environmental aspects: • Air quality (including dust, noise and vibration) • Aboriginal and non-indigenous heritage • Native flora and fauna (including threatened species)

	• Weeds and pests • Traffic and access • Erosion and stormwater management • Waste management • Storage and handling of hazardous substances • Water quality • Fire and hazard risk • Contamination • Site rehabilitation (post-construction) • Public safety • Emergency response planning • Complaints management.
4	Any imported substrate or engineered fill shall be free of weeds and pathogens
5	Following the completion of construction works on-site, any tracks and disturbed areas (excluding those used for ongoing access and maintenance) must be rehabilitated and bare areas revegetated as soon as possible, taking advantage of natural rainfall. Any sections of the site that require rehabilitation should be monitored and maintained for a period of at least five years to ensure areas have stabilised post rehabilitation.
6	All Council, utility or state agency-maintained infrastructure (i.e. roads, drains, cross-overs etc.) that is demolished, altered, removed or damaged during construction of the development shall be reinstated to council, utility or state agency specifications.
7	A Traffic Management Plan (TMP), prepared in consultation with Commissioner of Highways and affected Councils, shall be submitted for approval by the Minister for Planning prior to the commencement of site works. The TMP shall address matters including, but not limited to, the following: • Traffic volumes and distributions, and types of vehicles to be used in both construction and operational phases of the development • Transport routes to be used for the construction phase of the development • Assessment of risks associated with the expected transport movements and determines appropriate mitigation measures • Transport asset upgrade/modifications, asset maintenance requirements, and operational management requirements that may be necessitated by the project, including: o Any road modifications (temporary or permanent) to enable safe and efficient access to/from the arterial road network o Any structural improvement requirements (e.g. bridge/culvert improvements) o Any operational management measures required to ensure safety for other transport users (e.g. temporary road closures/detours), including for transport of plant and equipment to/from the site • Identify staging/timing of transport asset upgrades/modifications.
8	Any road works on arterial roads shall be designed and constructed in accordance with Austroads Guidelines and Australian Standards and to DPTI's satisfaction, with all associated costs to be borne by the applicant. The applicant should contact Mr Bonaventure Tan, Asset Enhancement Engineer, DPTI on

	8648 5243 or bonaventure.tan@sa.gov.au to discuss the department's requirements for any proposed works.
9	Overhead transmission lines crossing arterial roads shall have a minimum vertical clearance of 7.2 m over the road (any clearance envelope associated with other Electricity Regulations will be in addition to this requirement). Transmission poles/towers shall not be installed within road reserves.
10	Any power lines crossing a rail corridor owned by the Minister for Transport, Infrastructure and Local Government shall be located within an easement
11	All vehicles shall enter and exit the site in a forward direction
12	No stormwater for this development shall be permitted to discharge on-surface to the adjacent roads. In addition, any existing drainage of the adjacent roads shall be accommodated by the development and any alterations to road drainage infrastructure as a result of this development are to be at the expense of the applicant.
13	Within two years of the existing overhead transmission line and associated infrastructure being de-energised) including any staged decommissioning process or failure to appropriately maintain), such structures and equipment shall be removed from the land and the impacted areas rehabilitated in accordance with best environmental practices to the reasonable satisfaction of the Minister for Planning.
***Planning Development and Infrastructure Act 2016* (SA)**	
i	Pursuant to Section 131(21) of the Planning, Development and Infrastructure Act 2016 before any building work is undertaken, the building work is to be certified by a private certifier, or by some person determined by the Minister for the purposes of this provision, as complying with the provisions of the Building Rules (or the Building Rules as modified according to criteria prescribed by the Regulations).
ii	The development must be substantially commenced within 12 months of the date of this Notification, unless this period has been extended by the Minister for Planning.
iii	You are advised that any act or work authorised or required by this Notification must be completed within 3 years of the date of the Notification unless this period is extended by the Minister for Planning
iv	You will require a fresh consent before commencing or continuing the development if you are unable to satisfy these requirements.
***Native Vegetation Act 1991* (SA)**	
	Conditions to be advised upon approval

10.3 Bushfire Management

Under the EPLink Major Works Contract, the Principal Contractor is required to develop, implement, monitor and review a documented process that controls and governs all aspects of the management of bushfire response in accordance with all Laws, Good Industry Practice and or Landholder requirements.

In South Australia, the *Fire and Emergency Services Act 2005 (FES Act 2005),* outlines the responsibilities of key Government organisations, the community and the public to prepare for, prevent or inhibit the spread of any bushfire.

Section 73A (1) of the FES Act 2005 requires each bushfire management committee to prepare and maintain a Bushfire Management Area Plan for its area. The plan must set out a scheme for bushfire management within its area. There are two Bushfire Management Area Plans relevant for the EPLink project – the Upper Eyre Peninsula Bushfire Management Area Plan and the Lower Eyre Peninsula Management Area Plan.

Section 73A (3) of the FES Act 2005 outlines that the Bushfire Management Area Plans must:

- Identify existing or potential risks to people and communities within its area from bushfire; and
- Outline strategies to achieve appropriate hazard reduction associated with bushfire management within its area, especially through a coordinated and cooperative approach to bushfire prevention and mitigation; and
- Identify action that should be taken by people, agencies and authorities to achieve appropriate standards of bushfire management within its area; and
- Without limiting points (b) and (c), establish or adopt principles and standards to guide or measure the successful implementation of bushfire management strategies and initiatives; and
- Include or address other matters prescribed by the regulations or specified by the SBCC.

  The Project's Bushfire Management Plan will be required to comply with the FES Act 2005 and the Bushfire Management Area Plans.

Emergencies are governed by the Emergency Management Act 2004 (SA), which establishes strategies and systems for the management of emergencies in South Australia.

Ongoing operation of the line will be managed in accordance with the FES Act 2005 and the Bushfire Management Area Plans, as well as internal ElectraNet procedures including Policy 1-07-M05 *Bushfire Risk Management Guideline.*

11. RELEVANT POLICIES AND PUBLICATIONS

11.1 Relevant Matters of National Environmental Significance

For each relevant Matter of National Significance (MNES, see Section 3.3), the Proposed Action was designed to be consistent with the relevant Conservation Advice, Recovery Plans and/or Threat Abatement Plans (see Section 2) and specifically in the development of impact avoidance and mitigation measures (see Section 5) and the identification of proposed offsets (see Section 6).

Table 26 details the plans referenced for each relevant MNES and summarises how these plans have been applied for the Proposed Action.

Table 26: Policies and Publications Relevant to each Matter of National Environmental Significance

Publication Type	Reference	Consistency with Proposed Action
Malleefowl (*Leipoa ocellate*)		
National Recovery Plan	Benshemesh, J. (2007). *National Recovery Plan for Malleefowl*. Department for Environment and Heritage, South Australia.	This documentation has been considered, and applied where relevant, in the Malleefowl Management Plan (see Appendix D)
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland		
Conservation Advice	Department of Sustainability, Environment, Water, Population and Communities (2013). *Approved Conservation Advice for the Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland*. Canberra: Department of Sustainability, Environment, Water, Population and Communities	This documentation has been applied in the determination of the corridor alignment (see Section 2.5) and the proposed stringing methodologies (see Section 2.2.3 and Section 4.3).
Threat Abatement Plan	Department of the Environment and Energy (2018). *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi*. Canberra: Commonwealth of Australia.	Management (avoidance and mitigation measures) associated with the transfer of diseases, weeds and pests have been developed and incorporated into the CEMP and other project documentation (see Chapter 4)
Jumping-Jack Wattle (*Acacia enterocarpa*)		
National Recovery Plan	Moritz, K.N. & D.C. Bickerton (2011). *Recovery Plan for the Nationally Endangered Jumping-Jack Wattle Acacia enterocarpa*. Report to the Recovery Planning and Implementation Section, Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra. Department for Environment and	Management (avoidance and mitigation measures) associated with the transfer of diseases, weeds and pests have been developed and incorporated into the CEMP and other project documentation (see Chapter 4)

	Natural Resources, South Australia.	
State Recovery Plan	Pobke, K 2007, *Draft recovery plan for 23 threatened flora taxa on Eyre Peninsula, South Australia 2007-2012*, Department for Environment and Heritage, South Australia.	Management (avoidance and mitigation measures) associated with the transfer of diseases, weeds and pests have been developed and incorporated into the CEMP and other project documentation (see Chapter 4)
Tufted Bush-pea (*Pultenaea trichophylla*)		
Conservation Advice	Department of the Environment, Water, Heritage and the Arts (2009). *Approved Conservation Advice for Pultenaea trichophylla (Tufted Bush-pea)*. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts.	Management (avoidance and mitigation measures) associated with the transfer of diseases, weeds and pests have been developed and incorporated into the CEMP and other project documentation (see Chapter 4)
State Recovery Plan	Pobke, K 2007, *Draft recovery plan for 23 threatened flora taxa on Eyre Peninsula, South Australia 2007-2012*, Department for Environment and Heritage, South Australia.	Management (avoidance and mitigation measures) associated with the transfer of diseases, weeds and pests have been developed and incorporated into the CEMP and other project documentation (see Chapter 4)

11.2 Other Protected Matters

Beyond the measures undertaken to ensure that the Proposed Action is consistent with published advice for the relevant MNES (see previous section), consideration was also given to published advice for other protected matters, including those summarised in Table 27.

Table 27: Other Protected Matters Publications Considered for the Proposed Action

Species	Publication Type	Reference
Sandhill Dunnart (*Sminthopsis psammophila*)	Conservation Advice	Threatened Species Scientific Committee (2015). *Conservation Advice Sminthopsis psammophila sandhill dunnart*. Canberra: Department of the Environment.
	National Recovery Plan	Department for Environment and Water (2019). *National Recovery Plan for the Sandhill Dunnart (Sminthopsis psammophila)*. Department for Environment and Water, South Australia
Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*)	Conservation Advice	Department of the Environment (2014). *Conservation Advice Amytornis textilis myall western grasswren (Gawler Ranges)*. Canberra: Department of the Environment.

Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*).	Conservation Advice	Department of the Environment (2013). *Approved Conservation Advice for Stipiturus malachurus parimeda (southern Emu-wren - Eyre Peninsula)*. Canberra: Department of the Environment.
Silver Daisy-bush (*Olearia pannosa* subsp. *Pannosa*).	Conservation Advice	Department of the Environment (2013). *Approved Conservation Advice for Olearia pannosa subsp. pannosa (silver daisy-bush).* Canberra: Department of the Environment.

12. INFORMATION SOURCES

12.1 Reliability and Uncertainty of Information Sources

An assessment of the major information sources used to inform this Report is presented in Table 28.

Table 28: Information Sources – Reliability and Uncertainty Assessment

Information Source and Currency	Reliability	Uncertainty
Protected Matters Search Tool (PMST)		
The online Protected Matters Search Tool (PMST) was used to identify any species or ecological communities of national environmental significance under the EPBC Act 1999 that may occur or may have suitable habitat within the project area. A PMST report was first generated for the project on 29/02/2012. However, after further planning and design development, additional PMST reports were generated on 10/04/2013 and 19/02/2019. A 10 km buffer was applied to the proposed transmission line alignment.	Not all species listed under the EPBC Act have been mapped and therefore the PMST report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. Consequently, the PMST results have been used as a starting point to guide field survey and further investigation into the presence of any species or ecological communities of national environmental significance within the project area.	For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.
Biological Database of South Australia (BDBSA)		
A search of the Biological Database of South Australia (BDBSA) maintained by the Department for Environment and Water (DEW), was obtained (Feb 2019) to identify flora and fauna species previously recorded within 10 km of the Project area which are protected by the EPBC Act.	The BDBSA only includes verified flora and fauna records submitted to DEW or partner organisations. Although much of the BDBSA data has been through a variety of validation processes, the lists may contain errors. The spatial accuracy of the BDBSA data ranges from 5 m to over 25 km. Hence the location of mapped BDBSA records may not reflect their exact location. Consequently, the BDBSA search results have been used as a starting point to guide field survey and further investigation into the presence of flora and fauna species within the project area.	The BDBSA is not a complete database of species, so it is possible that some species may not have been identified. However, extensive field survey work has been undertaken to validate the database results and further investigate the project area.

NatureMaps		
Numerous searches of NatureMaps (an interactive online mapping tool that provides geographic information about South Australia's natural resources and maintained by DEW) were undertaken to obtain an overview of the environment within and surrounding the project area, including geology, soils, hydrology, land use and heritage places (non-Aboriginal).	NatureMaps includes data from a range of information sources held or supported by various agencies of the Government of South Australia. The spatial accuracy is unknown and although the data may have been subject to validation, it is possible that it may contain errors.	There may be some environmental features that are not included in NatureMaps data.
Ecological Field Survey Data (EBS Ecology)		
Ecological field studies as detailed in Appendices B, C and D, and previous studies supporting the EPBC Referral (see Appendix H).	The findings and conclusions expressed by EBS Ecology are based upon information in existence at the time of the assessments. Field data collected during the surveys, combined with database records and background research, is part the way to providing an adequately detailed assessment of the ecology that occurs within the project area.	One of the primary objectives of the baseline study was to determine the necessity of targeted surveys which were subsequently undertaken in 2013. Survey of other fauna groups was limited to opportunistic observations, including tracks and traces. Additional reptile, mammal and frog species may be present that would only be detected through targeted survey. Targeted surveys were undertaken during the spring which aimed to capture annual species such as native orchids and lilies. Given that some of these species are only visibly present for several weeks at a time, it is possible that some species were not detected.

12.2 References

References (beyond those detailed in Section 11) used in the preparation of this Report and supporting information are presented Table 29.

Table 29: References

Reference
Bates, R. J. (2011). *South Australia's Native Orchids*. Adelaide: Native Orchid Society of South Australia
Department of Agriculture, Water and the Environment. (2013). *Draft Survey Guidelines for Australia's Threatened Orchids: Guidelines for detecting orchids listed as 'Threatened' under the Environment*

Protection and Biodiversity Conservation Act 1999. Canberra: Commonwealth of Australia.
Department of Agriculture, Water and the Environment. (2020, September 14). *Species Profile and Threats Database - Caladenia macroclavia*. Retrieved from Department of Agriculture, Water and the Environment: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=55012
Department of Environment and Water. (2020). *Native Vegetation Council (NVC) Bushland Assessment Manual - July 2020*. Adelaide: Government of South Australia.
Department of Agriculture, Water and the Environment. (2020a, July). *Species Profile and Threats Database - Pultenaea trichophylla*. Retrieved from Department of Agriculture, Water and the Environment: https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=12715
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Department of Agriculture, Water and the Environment. (2020c, July 2020c). *Species Profile and Threats Database - Acacia pinguifolia*. Retrieved from Department of Agriculture, Water and the Environment: https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=5319
Department for Environment and Water. (2020a, August 17). Retrieved from SA Fauna (BDBSA): http://www.environment.sa.gov.au/Science/Information.data/Biological_databases_of_South_Australia
Department of Agriculture, Water and the Environment. (2018). *National Vegetation Information System V5.1*. Australian Government
Department of the Environment, Water, Heritage and the Arts. (2010). *Survey Guidelines for Australia's Threatened Birds - Guidelines for detecting birds listed as threatened under the EPBC Act*. Canberra: Commonwealth of Australia.
Department of Planning, Industry and Environment. (2020). *Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method*. Sydney: NSW Government.
Government of South Australia. (2020, July). *Key to Acacias of South Australia*. Retrieved from eFloraSA - Electronic Flora of South Australia: http://www.flora.sa.gov.au/id_tool/acacias_sa.shtml
Maslin, B. R. (2018). WATTLE, *Interactive Identification of Australian Acacia. Version 3*. Australian Biological Resources Study, Canberra; Department of Biodiversity, Conservation and Attractions, Perth; Identic Pty. Ltd., Brisbane.
Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P., & Franklin, K. (2019). *The Australian Bird Guide*. Clayton South: CSIRO Publishing

EPBC Preliminary Documentation Report

Appendices

October 2020

Security Classification: Commercial in Confidence

Appendix A Transmission Line Alignment

Appendix A – Transmission Line Alignment

Legend

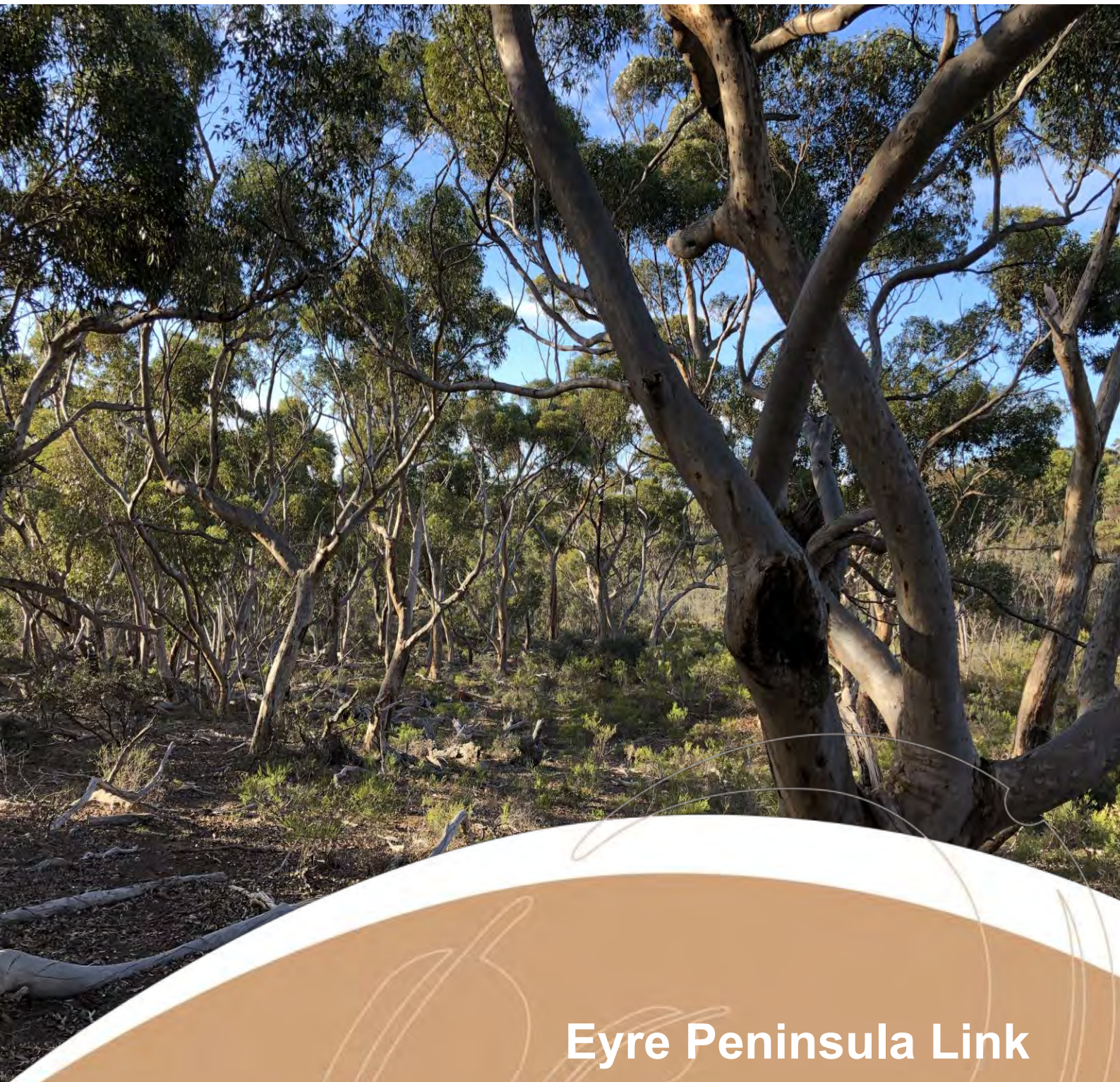
- Major Place Name
- Alignment (Yad-Ptl)
- Alignment (Cul-Yad)

ElectraNet

1:1,074,413 (A4) / GDA2020 South Australia Lambert

0 12500 25000 50000 Meters

Appendix B EPBC Act Flora Survey – Winter 2020



Eyre Peninsula Link

EPBC Act Flora Survey - Winter 2020

Eyre Peninsula Link EPBC Act Flora Survey - Winter 2020

7 October 2020

Version 3.0

Prepared by EBS Ecology for ElectraNet

Document Control					
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Cover photograph: *Eucalyptus cladocalyx* Woodland in the Project Area.

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GLOSSARY AND ABBREVIATION OF TERMS

cm	Centimetre(s)
EBS Ecology	Environment and Biodiversity Services Pty Ltd – *trading as* EBS Ecology
EEC	Endangered Ecological Community, listed under the EPBC Act.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPLink	ElectraNet Eyre Peninsula Link Project
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectare(s)
m	Metre(s)
m^2	Metre(s) squared
MNES	Matters of National Environmental Significance
Project	ElectraNet Eyre Peninsula Link Project
Project Area	The proposed Eyre Peninsula Transmission Line easement and impact footprint from Cultana to Port Lincoln.
ssp.	subspecies

EXECUTIVE SUMMARY

ElectraNet is proposing to construct a Transmission Line to replace the existing infrastructure between Cultana and Port Lincoln, known as the Eyre Peninsula Link, or EPLink, project (the Project). EBS Ecology was engaged to undertake additional targeted surveys for threatened flora known to occur in the proposed easement and impact footprint (Project Area). This included at the proposed location of Transmission Line structures, and in the spans between structures.

The objectives of this survey were to:

- Establish the extent of occurrence in the Project Area of three *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened species, also known as Matters of National Environmental Significance (MNES), as per (below):
    - *Acacia enterocarpa* (Jumping-jack Wattle) (Endangered)
    - *Acacia pinguifolia* (Fat-leaved Wattle) (Endangered)
    - *Pultenaea trichophylla* (Tufted Bush-pea) (Endangered)

Surveys for other controlled EPBC flora species (Large-club Spider-orchid – *Caladenia macroclavia*) and Threatened Ecological Communities (Eyre Peninsula Blue Gum Woodland) are provided in a separate report (Eyre Peninsula Link – EPBC Act Flora Survey – Spring 2020).

Surveys were undertaken between 29 June and 9 July 2020 with the following results:

- Twenty-three *Acacia enterocarpa* plants were recorded, with an area of occurrence of 0.397 hectares (ha) between Yadnarie and Port Lincoln. Populations were found at structure 95 and in the easement (span) between structures 120 – 121 and 121 – 122.
- Three-hundred and three *Pultenaea trichophylla* were recorded across six locations between Yadnarie and Port Lincoln, covering an area of 38.3717 ha. Most plants were located between structures 156 and 158, where it is common and widespread in the understorey.
- *Acacia pinguifolia* was not recorded during the survey, despite thorough searching of suitable habitat within the survey area. EBS Ecology believes that the one previous record of the species in the Project Area is the result of misidentification of *Acacia farinosa* (Mealy Wattle).
- One EPBC Act listed species which was not targeted by this survey and is not a controlled matter for the EPLink project was recorded. *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) (Vulnerable) was recorded at three new locations between Yadnarie and Port Lincoln. The species has been identified in the Project Area previously, although not in these locations. Within the Project Area, 26 plants with an area of occurrence of 0.13 ha were recorded. These populations occurred near structures 164, 167 and span 184 – 185.
- Silver Daisy-bush was part of the EPBC Referral for the EPLink project but impacts on this species are not considered a controlled action by the Department of Agriculture, Water and the Environment (DAWE). The location of these new individuals will be included in constraints mapping by ElectraNet for the EPLink project.
- No other EPBC Act listed species were recorded.

Some populations of the MNES listed above are located within 50 metres (m) of proposed Transmission Line structures and stringing corridors. Micro-siting of infrastructure occurred concurrently with this survey with recommendations made to ElectraNet to enable avoidance and/or minimisation of impacts to MNES.

Although not discussed in this report, recommendations relevant to the MNES listed above have been made to ElectraNet for inclusion in Preliminary Documentation and Construction Environmental Management Plan.

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1 INTRODUCTION

1.1 Background

ElectraNet is proposing to construct a Transmission Line to replace the existing infrastructure between Cultana and Port Lincoln (the Project). Following more detailed project design and feedback from the Department of Agriculture, Water and the Environment, EBS Ecology was engaged to undertake additional targeted surveys for threatened flora known to occur in the Project Area.

1.2 Project Area

The Transmission Line will broadly follow the alignment of the existing infrastructure and will be approximately 262 kilometres (km) long. The Project Area includes the proposed easement and impact footprint of the Eyre Peninsula Transmission Line, between the Cultana and Port Lincoln substations, Eyre Peninsula South Australia.

1.3 Previous Surveys

Flora surveys have previously been undertaken in the Project Area by EBS Ecology, as follows:

- *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019a). This study included a vegetation survey carried out according to Bushland and Rangeland Assessment Methodologies, to assess the Significant Environmental Benefit required to offset the Project under the *Native Vegetation Act 1991*. Targeted searches for threatened flora species were undertaken and opportunistic records of fauna collected.
- *Eyre Peninsula Transmission Line EPBC Assessment* (EBS Ecology, 2019b). Desktop study of the potential occurrence of EPBC Act listed threatened species and communities in the Project Area. The study provides a list of EPBC Act listed species and communities potentially impacted and referral requirements under the EPBC Act.
- *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology, 2014). Targeted surveys for threatened flora and some threatened fauna historically recorded within the Project Area were carried out from August to November in 2013. Vegetation surveys were also conducted to determine the suitability of habitat for species where no targeted survey was carried out.

Those above listed reports identified four Matters of National Environmental Significance (MNES) listed under the EPBC Act related to fauna species (Malleefowl, Sandhill Dunnart, Western Grasswren and Southern Emu-wren), six MNES related to flora species (Jumping-Jack Wattle, Fat Leafed Wattle, Large-Club Spider-Orchid, Green-Club Spider-Orchid, Silver Daisy Bush and Tufted Bush Pea) and one MNES Threatened Ecological Community (EP Blue Gum) within the 500m wide Project Area that may be impacted by the Project.

Impacts to these species were referred to the Department for Agriculture, Water and Environment (DAWE) pursuant to the Environmental Protection and Biodiversity Conservation Act 1999. DAWE considered that one fauna species (Malleefowl), four flora species (Jumping-Jack Wattle, Fat-leaf

Wattle, Large-Club Spider-orchid and Tufted Bush-pea) and one Threatened Ecological Community (Eyre Peninsula Blue Gum) may be significantly impacted by the project and require additional information. Note that two EPBC listed species (Fat-leaf Wattle and Large-Club Spider-Orchid) have subsequently been found to have been mis-identified and are not present in the Project Area.

1.4 Objectives

Following initial referral of the proposed Eyre Peninsula Transmission Line (the Project), five Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relating to flora were identified as requiring further information. This included one threatened ecological community and four threatened flora species (Table 1).

Table 1. Relevant matters of national environmental significance.

Scientific Name	Common Name	EPBC Act Status
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland.		Endangered
Acacia enterocarpa	Jumping-jack Wattle	Endangered
Acacia pinguifolia	Fat-leaved Wattle	Endangered
Caladenia macroclavia	Large-club Spider-orchid	Endangered
Pultenaea trichophylla	Tufted Bush-pea	Endangered

The objectives of this survey were to:

- Establish the extent of occurrence of three species listed in Table 1 in the Project Area.
    - *Acacia enterocarpa*
    - *Acacia pinguifolia*
    - *Pultenaea trichophylla*

To account for seasonal bias and limitations, surveys to determine the extent of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland and *Caladenia macroclavia* will be undertaken in spring 2020.

2 METHODS

2.1 Survey Methodology

Other than orchids, there are no EPBC survey guidelines for threatened plants. Threatened flora survey methods undertaken were therefore based on relevant state guidelines and other information documented in the following sources:

- *Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method* (Department of Planning, Industry and Environment, 2020).
- *Draft Survey Guidelines for Australia's Threatened Orchids* (Department of Agriculture, Water and the Environment, 2013).
- The Species Profile and Threats Database for each species in Table 2, available at www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.
- *EP Transmission Line - Threatened Species Management Plan (Construction)* (EBS Ecology, 2020).
- *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019a).

All areas of the Vegetation Associations associated with the relevant species (as documented in EBS Ecology 2020 and mapped in EBS Ecology 2019a) in the Project Area were searched, including sites with previous records. Survey effort was limited to the area within the proposed impact footprint.

Surveys were undertaken between 29 June and 9 July 2020 by 3 EBS Ecology Ecologists and followed methodology summarised in Table 2.

Table 2. Summary of survey methodology used during the survey.

Species	Survey Locations[1]	Methodology
Acacia enterocarpa	• *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata*. • *Eucalyptus peninsularis* +/- *Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual species.	• Parallel field transects by two observers. • Transects spaced approximately 10 - 15 m apart. • Transects followed entire length and width of vegetation patch within impact footprint. • Location and number of individuals was recorded using GPS. • Small patches of vegetation (i.e. <50 m^2 or <20 m wide) were searched thoroughly using a random meander pattern, rather than transects. • Any plants resembling the target species that could not be identified in the field were collected as voucher specimens. They were then identified using relevant keys and resources following completion of field work. • Area of occurrence was calculated by mapping native vegetation within a 10 m buffer of individual records. • Where previous records could not be resurveyed, area of occurrence was calculated by measuring the area of the entire vegetation patch within the Project Area.
Acacia pinguifolia	• *Eucalyptus cladocalyx* Woodland / Open Woodland. • *Eucalyptus cladocalyx* Very Open Woodland over scattered native shrubs and exotics. • *Eucalyptus peninsularis* +/- *Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual species. • *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata*. • *Eucalyptus odorata* +/- *Eucalyptus pileata / Eucalyptus leptophylla* Mallee over *Melaleuca uncinata*. • *Melaleuca uncinata* Tall Shrubland.	
Pultenaea trichophylla	• *Eucalyptus cladocalyx* Woodland / Open Woodland. • *Eucalyptus cladocalyx* Very Open Woodland over scattered native shrubs and exotics. • *Allocasuarina verticillata* Low Woodland. • *Melaleuca uncinata* Tall Shrubland. • *Eucalyptus odorata* +/- *Eucalyptus pileata / Eucalyptus leptophylla* Mallee over *Melaleuca uncinata*.	

Species	Survey Locations[1]	Methodology
	• *Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata* Open Grassy Woodland.	

[1]All patches of the vegetation associations listed were surveyed.

2.2 Limitations

Acacia enterocarpa, Acacia pinguifolia and *Pultenaea trichophylla* are small to medium shrub species that can be reliably detected regardless of season. They are perennial plants, each having distinguishing features visible outside of the flowering and fruiting period. A winter survey is not likely to reduce the probability of detection.

Survey locations were influenced by the project design available at the commencement of field work. While all suitable habitat within the proposed alignment was searched, no allowance was made for any significant deviations that may occur in the future.

Similarly, vegetation between structures 137 and 138 could not be accessed for cultural heritage reasons. Although this area contains records of *Pultenaea trichophylla,* the Project has since been redesigned to avoid this patch of vegetation and is now outside the Project Area.

3 RESULTS

3.1 Acacia enterocarpa (Jumping-jack Wattle)

Three populations of *Acacia enterocarpa,* totalling 34 plants, were recorded in the Project Area (Yadnarie and Port Lincoln) during the survey (Appendix 1). Two were found in road reserves between structures 120 and 121 and structures 121 and 122. The third was found in remnant mallee on private property near structurer 95. All three locations were the site of historical records and occur over a total 0.397 ha. No previously unknown populations of *Acacia enterocarpa* were detected, despite searching all patches of suitable habitat in the Project Area. Results of the survey are summarised in Table 3.

The population near structure 95 comprises a single, mature plant only. Despite extensive searching throughout this vegetation patch, no additional plants were recorded at that location.

Twenty-six plants were found in a road reserve in the span between structures 120 and 121. All were healthy, mature plants. The seven plants recorded in span 121 – 122 were located on the Lipson-Ungarra Road reserve. These plants were in very poor health, possibly impacted by roadside spraying activities. No juvenile plants were detected.

Table 3. Summary of results of *Acacia enterocarpa* 2020 survey.

Location (Span / Structure)	Number of Plants	Area of Occurrence within Project Area	Vegetation Association
95	1	0.0308 m^2	*Eucalyptus peninsularis +/- Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual species.
120 – 121	26	0.2951 m^2	*Eucalyptus odorata +/- Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata.*
121 – 122	7	0.0706 m^2	*Eucalyptus odorata +/- Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata.*
Total	**34**	**0.397 ha**	

3.2 Acacia pinguifolia (Fat-leaved Wattle)

Previously, *Acacia pinguifolia* was recorded at one location within the Project Area (Figure 1), where five individuals were found (EBS Ecology, 2014). This area was searched twice during the survey by three EBS Ecologists. The area consists of roadside vegetation in poor condition, impacted by weeds and works associated with road and infrastructure maintenance (Figure 2). No *Acacia pinguifolia* plants were located.

Five individuals of *Acacia farinosa* (Mealy Wattle) (Figure 3 and Figure 4) were found growing at the location of the historical record. *Acacia farinosa* can appear similar to *A. pinguifolia* (Figure 5), especially when the mealiness on young branches of the former species is absent.

To confirm identification, voucher specimens of the above plants were collected. These were compared to known *A. pinguifolia* plants in the field on Mine Hill Road, just south of the intersection of Ungarra – Stokes Road. Voucher specimens were also identified as *A. farinosa* using the following identification keys:

- *Key to Acacias of South Australia* (Government of South Australia, 2020)
- *WATTLE, Interactive Identification of Australian Acacia, Version 3* (Maslin, 2018).

It is likely that records of *A. pinguifolia* at this location relate to misidentification of the five *A. farinosa* present.

Areas of suitable habitat elsewhere within the Project Area were searched for *A. pinguifolia* (Table 2). The plant was not detected, despite thorough searching as described in Section 2.1. It is unlikely that this species occurs in the Project Area.

Figure 1. The location of previous *Acacia pinguifolia* records, probably attributable to misidentification of *Acacia farinosa*.

Figure 2. Location of previous *Acacia pinguifolia* records within the Project Area (photo by EBS Ecology).

Figure 3. *Acacia farinosa* plants (circled) at the location of *Acacia pinguifolia* records (photo by EBS Ecology).

Figure 4. Detail of *Acacia farinosa* recorded in the Project Area on Bailla Hill Road, between proposed structures 187 and 188 (photo by EBS Ecology).

Figure 5. Detail of *Acacia pinguifolia*. This plant was photographed on the side of Mine Hill Road, *outside* the Project Area during the survey (photo by EBS Ecology).

3.3 Pultenaea trichophylla (Tufted Bush-pea)

Previous surveys have located *Pultenaea trichophylla* at 12 locations in the Project Area (EBS Ecology, 2020). These areas were searched again in 2020, as well as other patches of suitable Vegetation Associations that had not previously been targeted. This additional survey effort has consolidated previous records into six populations, as indicated in Table 4.

In native vegetation patches between structures 156 and 158, *Pultenaea trichophylla* was found to be common in the understorey, widely distributed throughout. Although 239 individual plants were recorded in this area, this represents only a fraction of the plants actually present. In this instance, a 100 m buffer around recorded plants has been used as an indication of potential habitat in the Project Area.

Elsewhere, at surveyed populations, a total of 64 individuals were located at the surveyed populations.

One known population between structures 136 and 139 was not surveyed, as it is now situated outside the Project easement and impact area (Figure 6).

The locations of *Pultenaea trichophylla* records are mapped in Appendix 2.

Table 4. Summary of results of *Pultenaea trichophylla* 2020 survey.

Location (Span / Structure)	Number of Plants	Area of Occurrence within Project Area	Vegetation Association
July 2020 Survey			
132 – 133	1	0.2850 ha	*Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata.*
152	8	0.0663 ha	*Eucalyptus cladocalyx* Woodland / Open Woodland.
153	9	0.1384 ha	*Eucalyptus cladocalyx* Woodland / Open Woodland.
154 – 155	33	0.2883 ha	*Eucalyptus cladocalyx* Woodland / Open Woodland. *Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata.*
156 - 158	Widespread throughout vegetation patch.	37.434 ha (100 m buffer around records)	*Eucalyptus cladocalyx* Woodland / Open Woodland. *Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata.* *Allocasuarina verticillata* Low Woodland
178 – 179	13	0.1597 ha	*Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata* Open Grassy Woodland.
Total		**38.3717 ha**	

Figure 6. Previous *Pultenaea trichophylla* records (note these were not surveyed in 2020). Since the records were collected, the project design (Alignment Southern) has changed, now avoiding the plant in this area. The original design would have followed the existing Transmission Line, shown on the map as the eastern most easement.

3.4 Other EPBC Act listed flora

New records of one other EPBC Act listed flora species were collected during the 2020 survey:

- *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush).

This species is listed as Vulnerable.

It was recorded at three additional locations to previous survey results, and was resurveyed at one site, as mapped in Appendix 3. One population consisted of two juvenile plants, while the population near proposed structure 164 included 23 plants distributed over 339.5 m^2 within the Project Area (Yadnarie to Port Lincoln). An additional 57 plants were found near this location, although they were outside the Project Area (Table 5).

Table 5. Records of *Olearia pannosa* ssp. *pannosa* collected during the 2020 survey. The totals in the table do not include the population outside the Project Area.

Location (Structure / Span)	Number of Plants	Area of Occurrence within Project Area (ha)	Vegetation Association
164	23	0.03395	*Eucalyptus cladocalyx* Woodland / Open Woodland.
164 (outside Project Area)	57	0.05695	*Eucalyptus cladocalyx* Woodland / Open Woodland.
167	2	0.06593	*Eucalyptus cladocalyx* Very Open Woodland over scattered native shrubs and exotics.
184 – 185	1	0.0314	*Eucalyptus cladocalyx* Very Open Woodland over scattered native shrubs and exotics
Total	**26**	**0.18 ha**	

All records were within *Eucalyptus cladocalyx* Woodland or Very Open Woodland, with the larger groups of plants occurring in areas associated with past disturbances, such as tree removal and track construction, For example, the plant shown in Figure 7 was found in an area disturbed by the removal of a large *Eucalyptus cladocalyx* during track construction.

No other EPBC Act listed flora species were recorded.

Figure 7. *Olearia pannosa* ssp. *pannosa* in disturbed *Eucalyptus cladocalyx* Woodland near structure 164. Twenty-three plants were recorded at this site (photo by EBS Ecology).

4 DISCUSSION

Acacia enterocarpa, *Pultenaea trichophylla* and *Olearia pannosa* ssp. *Pannosa* occur within 50 m of the proposed structures. At these locations, there is potential for individual plants to be directly impacted by vegetation clearing activities.

Pultenaea trichophylla also occurs within the 10 m wide stringing corridor between structures. Stringing corridors are also likely to be subjected to vegetation management that may directly impact on plants by removing individuals, or indirectly by impacting habitat.

It is noted that *Olearia pannosa ssp. Pannosa* is not a controlled MNES for the EPLink Project. Impacts to this species is provided to allow ElectraNet to include newly located individuals in constraints mapping.

The locations of impacts from structures or stringing corridors are provided in Table 6.

The total areas of impact from structures and stringing tracks, calculated based on current Project design, on the three species are:

- *Acacia enterocarpa* (Jumping-jack Wattle) – 0.397 ha.
- *Pultenaea trichophylla* (Tufted Bush-pea) – 2.381 ha.
- *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) – 0.13 ha.

At these locations, there is potential for individual plants to be directly impacted by vegetation clearing activities.

Table 6. Structures and stringing corridors within 50 m of EPBC Act listed flora.

Structure / Stringing Corridor	Species	Common name
95	*Acacia enterocarpa*	Jumping-jack Wattle
152	*Pultenaea trichophylla*	Tufted Bush-pea
153	*Pultenaea trichophylla*	Tufted Bush-pea
156 – 158	*Pultenaea trichophylla*	Tufted Bush-pea
164	*Olearia pannosa* ssp. *pannosa*	Silver Daisy-bush
167	*Olearia pannosa* ssp. *pannosa*	Silver Daisy-bush
178 – 179	*Pultenaea trichophylla*	Tufted Bush-pea

One species targeted by the survey, *Acacia pinguifolia* (Fat-leaved Wattle), was not detected in the Project Area. Non-detection occurred despite thorough searching of record locations and suitable habitat. EBS Ecology believes that the only previous record of the species in the Project Area is attributable to misidentification of *Acacia farinosa* (Mealy Wattle).

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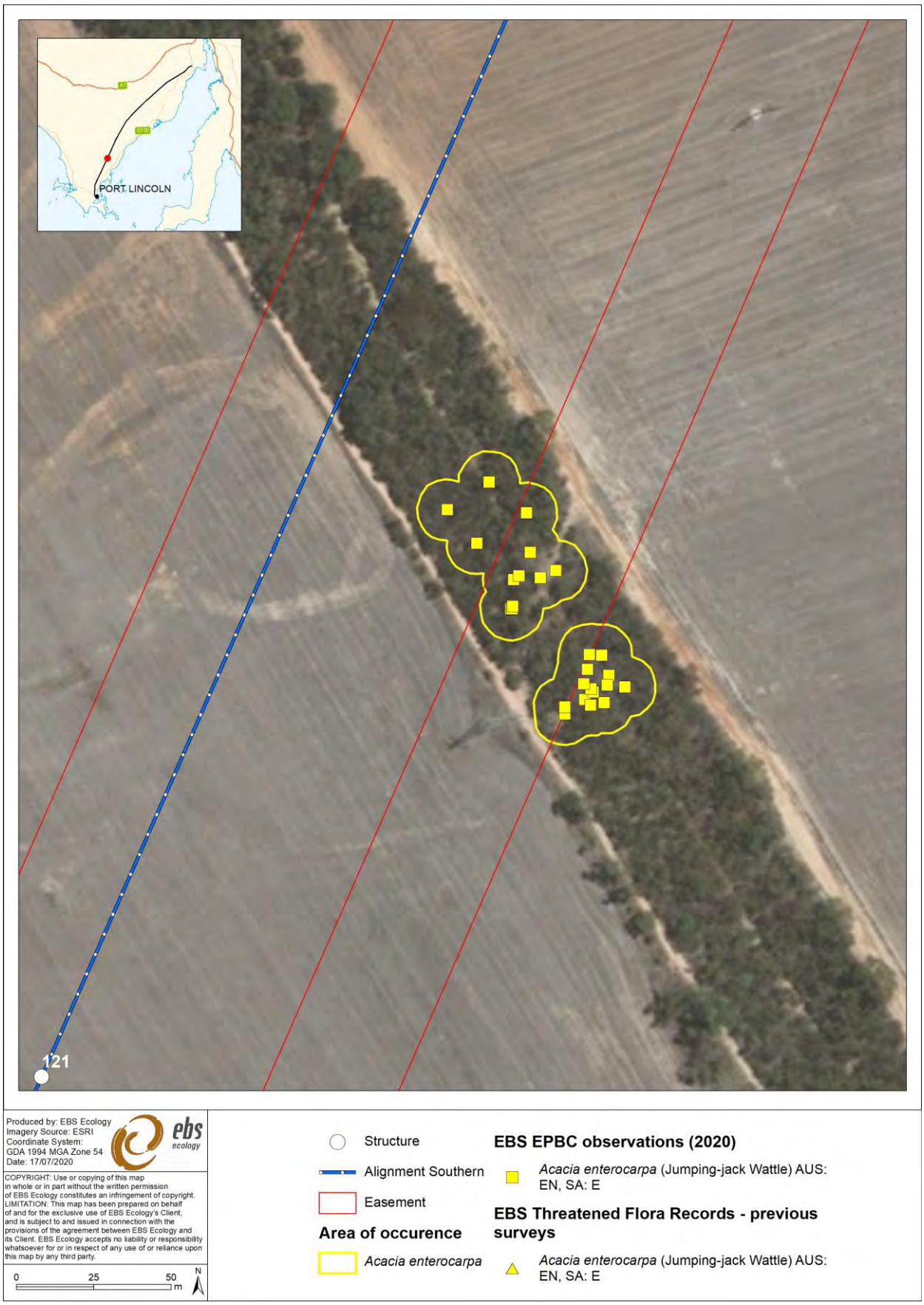
6 APPENDICES

Appendix 1 Locations of Acacia enterocarpa *populations and area of occurrence recorded during the 2020 survey*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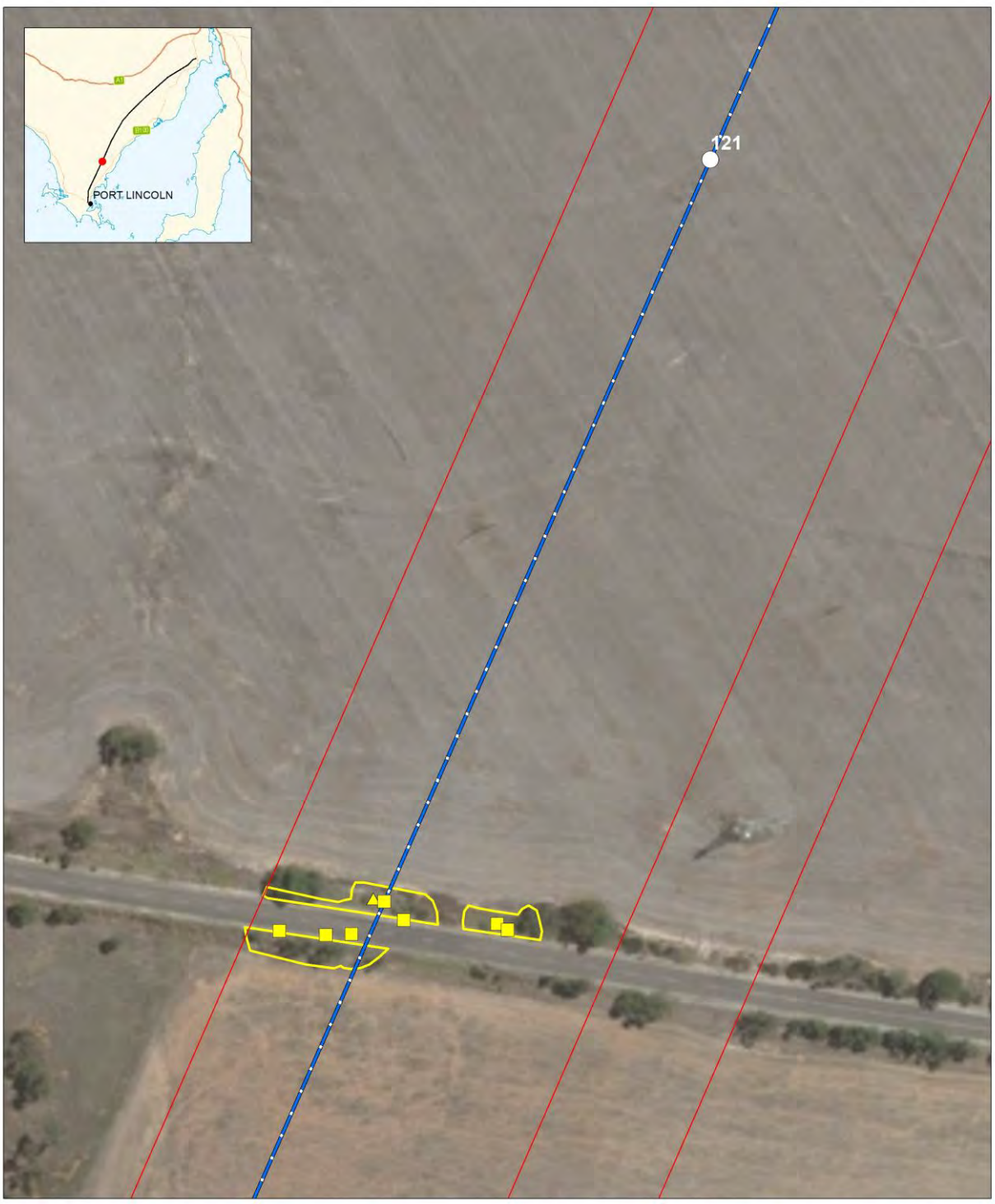
Structure
Alignment Southern
Easement
Area of occurence
Acacia enterocarpa
EBS EPBC observations (2020)
Acacia enterocarpa (Jumping-jack Wattle) AUS: EN, SA: E
EBS Threatened Flora Records - previous surveys
Acacia enterocarpa (Jumping-jack Wattle) AUS: EN, SA: E



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0 25 50 m N

Structure
Alignment Southern
Easement

Area of occurence

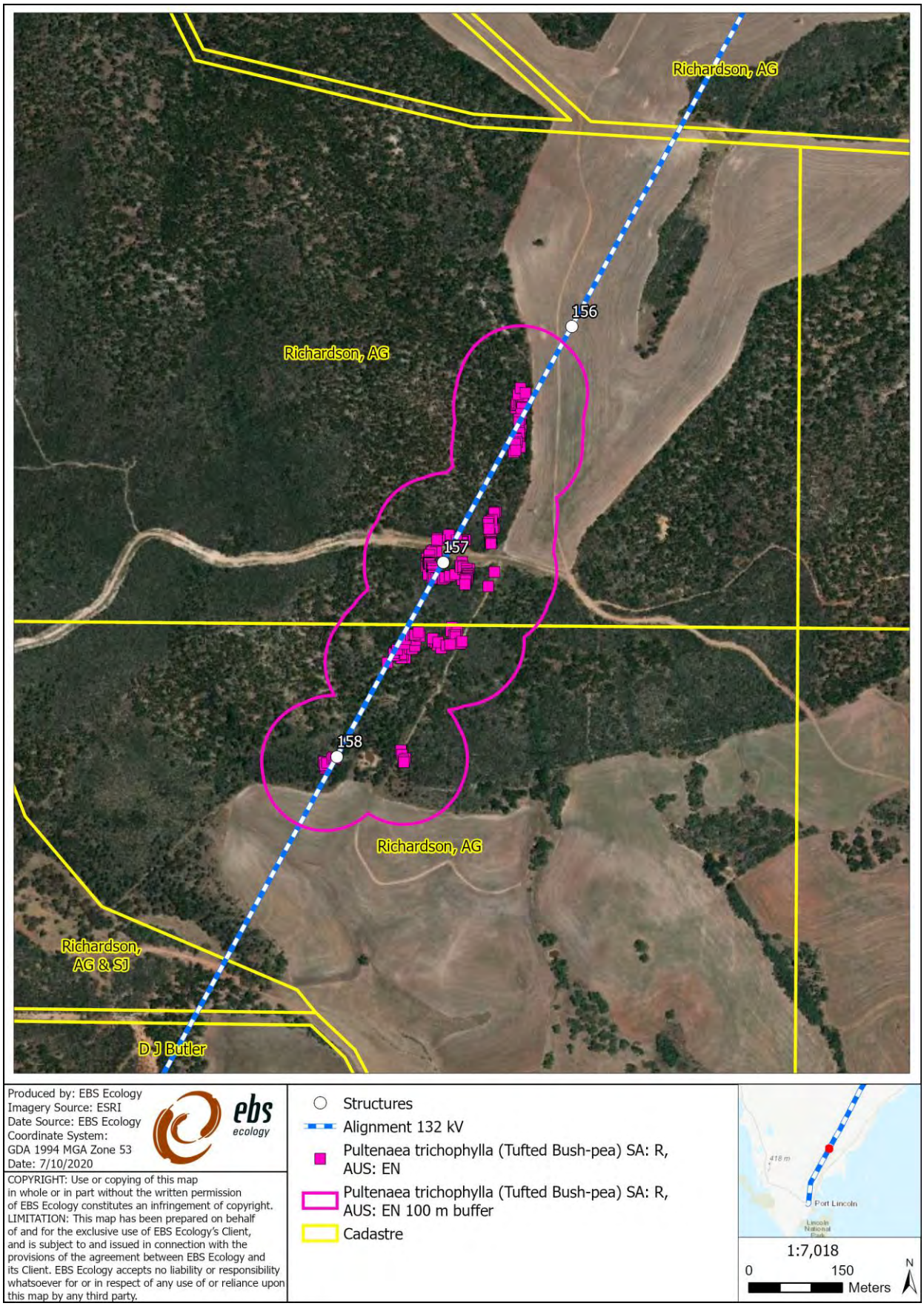
Acacia enterocarpa

EBS EPBC observations (2020)

Acacia enterocarpa (Jumping-jack Wattle) AUS: EN, SA: E

EBS Threatened Flora Records - previous surveys

Acacia enterocarpa (Jumping-jack Wattle) AUS: EN, SA: E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Structures
Alignment 132 kV
Pultenaea trichophylla (Tufted Bush-pea) SA: R, AUS: EN
Pultenaea trichophylla (Tufted Bush-pea) SA: R, AUS: EN 100 m buffer
Cadastre
418 m
Port Lincoln
Lincoln National Park
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Appendix 2 Locations of* Pultenaea trichophylla *records and area of occurrence surveyed in 2020.

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GDA 1994 MGA Zone 54
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Structure
Alignment Southern
Easement

Area of occurence

Pultenaea trichophylla

EBS EPBC observations (2020)

Pultenaea trichophylla (Tufted Bush-pea) AUS: EN, SA: R


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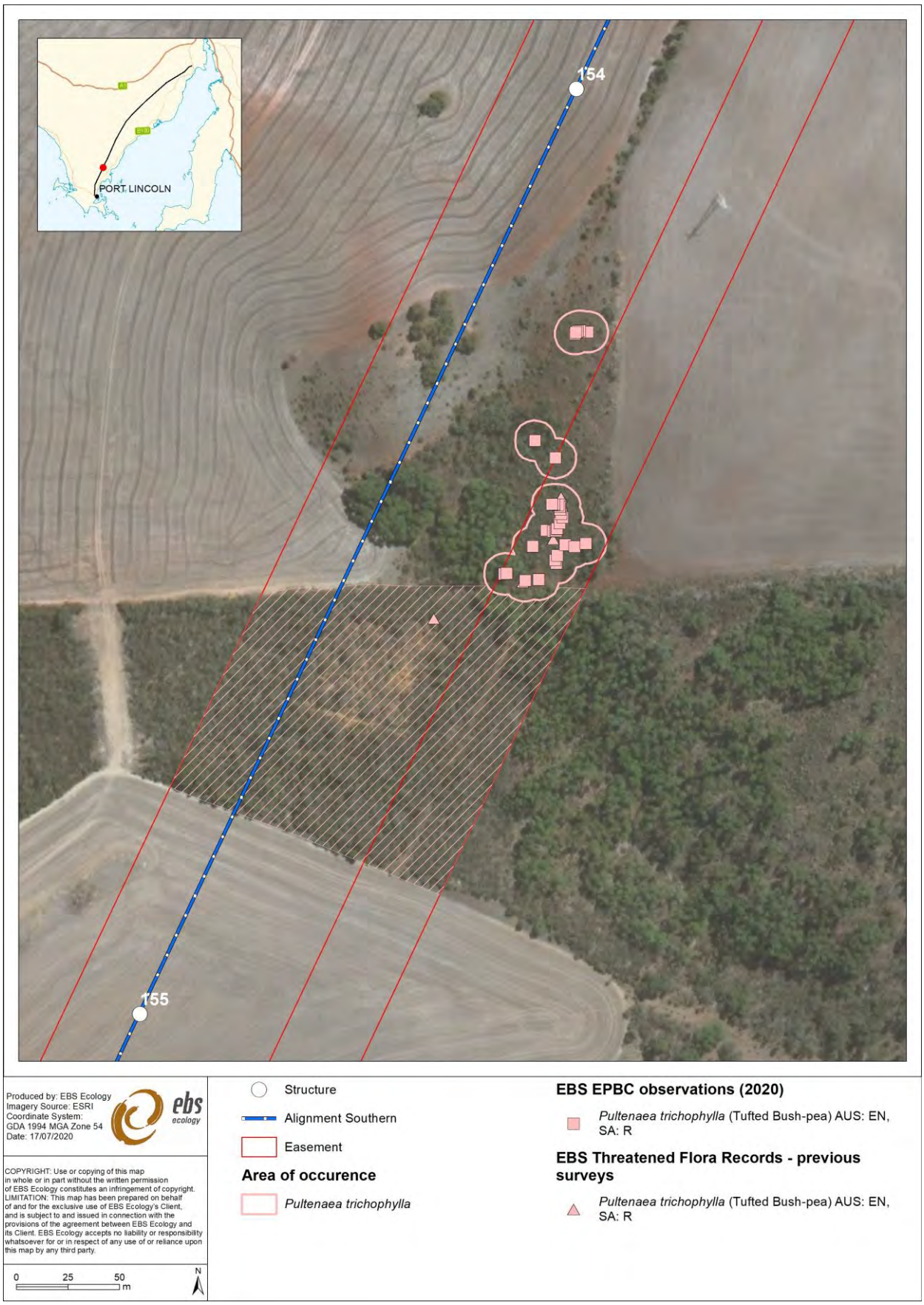
Structure
Alignment Southern
Easement
Area of occurence
Pultenaea trichophylla
EBS EPBC observations (2020)
Pultenaea trichophylla (Tufted Bush-pea) AUS: EN, SA: R
EBS Threatened Flora Records - previous surveys
Pultenaea trichophylla (Tufted Bush-pea) AUS: EN, SA: R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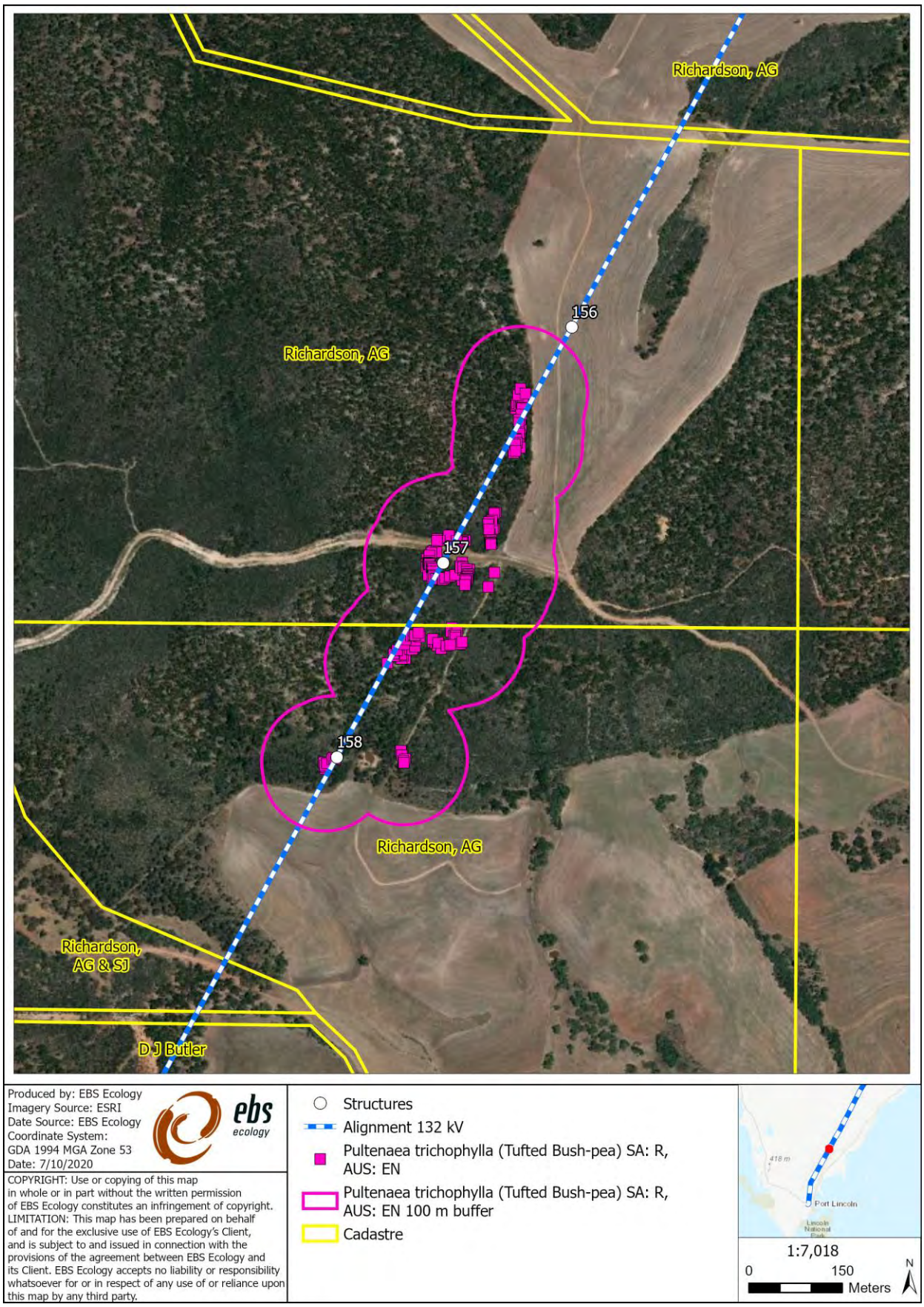
Structure
Alignment Southern
Easement
Area of occurence
Pultenaea trichophylla
EBS EPBC observations (2020)
Pultenaea trichophylla (Tufted Bush-pea) AUS: EN, SA: R
EBS Threatened Flora Records - previous surveys
Pultenaea trichophylla (Tufted Bush-pea) AUS: EN, SA: R


Richardson, AG
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Structures
Alignment 132 kV
Pultenaea trichophylla (Tufted Bush-pea) SA: R, AUS: EN
Pultenaea trichophylla (Tufted Bush-pea) SA: R, AUS: EN 100 m buffer
Cadastre
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Port Lincoln
Lincoln National Park
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178
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Structure
Alignment Southern
Easement
Area of occurence
Pultenaea trichophylla
EBS EPBC observations (2020)
Pultenaea trichophylla (Tufted Bush-pea) AUS: EN, SA: R

Appendix 3 Location of populations and area of occurrence of* Olearia pannosa ssp. pannosa *populations surveyed in 2020.


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Structure
Alignment Southern
Easement
Area of occurence
Olearia pannosa ssp. pannosa
EBS EPBC observations (2020)
Olearia pannosa ssp. pannosa (Silver Daisy-bush)
AUS: VU, SA: V
EBS Threatened Flora Records - previous surveys
Olearia pannosa ssp. pannosa (Silver Daisy-bush)
AUS: VU, SA: V


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Structure
Alignment Southern
Easement
Area of occurence
Olearia pannosa ssp. pannosa
EBS Threatened Flora Records - previous surveys
Olearia pannosa ssp. pannosa (Silver Daisy-bush)
AUS: VU, SA: V

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Appendix C EPBC Act Flora Survey – Spring 2020

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Eyre Peninsula Link

EPBC Act Flora Survey - Spring 2020

Eyre Peninsula Link EPBC Act Flora Survey - Spring 2020

7 October 2020

Version 2.0

Prepared by EBS Ecology for ElectraNet

Document Control					
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Cover photograph: *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum).

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Daniel Duval, South Australian Seed Conservation Centre

Katrina Pobke, National Parks and Wildlife Service South Australia

GLOSSARY AND ABBREVIATION OF TERMS

cm	Centimetre(s)
EBS Ecology	Environment and Biodiversity Services Pty Ltd – *trading as* EBS Ecology
EEC	Endangered Ecological Community, listed under the EPBC Act.
EPLink	Eyre Peninsula Link project
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPBG Woodland	Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland
ha	Hectare(s)
km	kilometre (s)
m	Metre(s)
MNES	Matters of National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1972*
Project	ElectraNet Eyre Peninsula Transmission Line (Eyre Peninsula Link) Project
Project Area	The proposed Eyre Peninsula Transmission Line easement and impact footprint from Cultana to Port Lincoln.
sp.	species
spp.	species plural
ssp.	subspecies
var.	variant
<	less than
>	greater than
≥	greater than or equal to

EXECUTIVE SUMMARY

ElectraNet is proposing to construct a Transmission Line to replace the existing infrastructure between Cultana and Port Lincoln (the Project). EBS Ecology was engaged to undertake additional targeted surveys for threatened flora and ecological communities known to occur in the proposed easement and impact footprint (Project Area). This included at the proposed location of Transmission Line structures, and in the spans between structures.

The objectives of this survey were to:

- Establish the extent of occurrence of *Caladenia macroclavia* (Large-club Spider Orchid) in the Project Area and if 2013 records of the species were due to misidentification.
- Determine whether any areas of Eyre Peninsula Blue Gum woodland meet condition thresholds for listing as the EPBC Act listed Endangered Ecological Community (EEC).

Surveys for other controlled EPBC flora species (Jumping-Jack Wattle, Fat-leaf Wattle, and Tufted Bush Pea) are provided in a separate report (Eyre Peninsula Link EPBC Act Flora Survey – Winter 2020).

Surveys were undertaken between 8th and 11th September 2020 with the following results:

- Large-club Spider-orchid was not recorded during the survey, despite extensive searching of the site of previous records and areas of similar habitat. It is probable that the one previous record of the species in the Project Area is the result of misidentification of *Caladenia septuosa* (Koppio Spider-orchid). There is no evidence that Large-club Spider-orchid occurs in the Project Area.
- Ten patches of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland (EPBG Woodland) occur within the 500m wide Project Area.
- The total area of EP Blue Gum anticipated to be impacted by the project is 1.352 ha. Of this, 1.022 ha of impact will be in Blue Gum woodlands which are considered an *Endangered Ecological Community.* The remaining 0.33 ha of impact will be in Blue Gum woodlands which do not meet the criteria for EPBC listing. Of the 1.352 ha impacted by the project, only 0.035ha (350 square metres) is permanent. The remaining 1.317 is temporary and will be rehabilitated.
- The ten patches of Eyre Peninsula Blue Gum within the 500m wide study area total 50.09 hectares (ha) in extent. Of this, 39.51 ha meets the criteria for listing as the EPBC Act listed Endangered Ecological Community. This includes:
    - 19.43 ha of Category A woodland (exceptional quality).
    - 1.4 ha of Category B woodland (very high quality).
    - 18.68 ha of Category C2 woodland (medium quality).
- The remaining 10.58 ha does not meet the criteria for EPBC listing and is therefore not considered a Threatened Ecological Community under the EPBC Act.

Impact associated with the Project includes permanent and temporary clearing of vegetation for the construction of Transmission Line towers, construction pads, access tracks and stringing corridors. Given the impact footprint at the time of writing, this will impact EPBG Woodland as displayed in the Table below.

EPBC Category	Patch	Permanent Impact (ha)	Temporary impact (ha)	Total impact (ha)	Total (ha)
A	A	0	0.152	0.152	0.659
	C	0.035	0.184	0.219	
	I	0	0.288	0.288	
B	G	0	0.029	0.029	0.029
C2	B	0	0.158	0.158	0.334
	H	0	0.176	0.176	
Not listed	D	0	0.038	0.038	0.33
	E	0	0.103	0.103	
	F	0	0	0	
	J	0	0.189	0.189	
Total impact (ha)		0.035	1.317		1.352

As it has been shown that Large-club Spider-orchid does not occur in the Project Area, this species will not be impacted by the Project.

Recommendations relevant to avoiding and minimising impact to EPBG Woodland are included in the Preliminary Documentation report for the EPLink Project.

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1 INTRODUCTION

1.1 Background

ElectraNet is proposing to construct a Transmission Line to replace the existing infrastructure between Cultana and Port Lincoln (the Project). Following more detailed project design and feedback from the Department of Agriculture, Water and the Environment (DAWE), EBS Ecology was engaged to undertake additional targeted surveys for threatened flora known to occur in the Project Area.

This flora survey is concerned only with Large-Club Spider-Orchid (*Caladenia macroclavia*) and Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Threated Ecological Community. Surveys for other controlled EPBC flora species (Jumping-Jack Wattle, Fat-leaf Wattle, and Tufted Bush Pea) are provided in a separate report (Eyre Peninsula Link EPBC Act Flora Survey – Winter 2020).

1.2 Project Area

The Transmission Line will broadly follow the alignment of the existing infrastructure and will be approximately 262 kilometres (km) long. A 500 metre (m) wide study area has been considered for native vegetation and fauna studies, however the new transmission line easement is only 100 m wide with a much smaller construction footprint within the easement. The Project Area is centred on the proposed easement and impact footprint of the Eyre Peninsula Link transmission line between the Cultana and Port Lincoln substations, Eyre Peninsula South Australia.

1.3 Previous Surveys

1.3.1 Surveys undertaken

Flora surveys have previously been undertaken in the Project Area by EBS Ecology, as follows:

- *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019a). This study included a vegetation survey carried out according to Bushland and Rangeland Assessment Methodologies, to assess the Significant Environmental Benefit required to offset the Project under the *Native Vegetation Act 1991*. Targeted searches for threatened flora species were undertaken and opportunistic records of fauna collected.
- *Eyre Peninsula Transmission Line EPBC Assessment* (EBS Ecology, 2019b). Desktop study of the potential occurrence of EPBC Act listed threatened species and communities in the Project Area. The study provides a list of EPBC Act listed species and communities potentially impacted and referral requirements under the EPBC Act.
- *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology, 2014). Targeted surveys for threatened flora and some threatened fauna historically recorded within the Project Area were carried out from August to November in 2013. Vegetation surveys were also conducted to determine the suitability of habitat for species where no targeted survey was carried out.

Those above listed reports identified four Matters of National Environmental Significance (MNES) listed under the EPBC Act related to fauna species (Malleefowl, Sandhill Dunnart, Western Grasswren and Southern Emu-wren), six MNES related to flora species (Jumping-Jack Wattle, Fat Leafed Wattle, Large-Club Spider-Orchid, Green-Club Spider-Orchid, Silver Daisy Bush and Tufted Bush Pea) and one MNES Threatened Ecological Community (Eyre Peninsula Blue Gum) within the 500m wide Project Area that may be impacted by the Project.

Impacts to these species were referred to the Department for Agriculture, Water and Environment (DAWE) pursuant to the Environmental Protection and Biodiversity Conservation Act 1999. DAWE considered that impacts to one fauna species (Malleefowl), four flora species (Jumping-Jack Wattle, Fat-leaf Wattle, Large-Club Spider-orchid and Tufted Bush-pea) and one Threatened Ecological Community (Eyre Peninsula Blue Gum) were controlled actions and require additional information. Note that two EPBC listed species (Fat-leaf Wattle and Large-Club Spider-Orchid) have subsequently been found to have been mis-identified and are not present in the Project Area.

1.3.2 Expert advice

Expert advice on orchid identification and management was sought from the following sources:

- Ms. Katrina Pobke, Conservation Ecologist Eyre and Far West, National Parks and Wildlife Service South Australia; and
- Mr. Daniel Duval, Senior Seed Biologist South Australian Seed Conservation Centre, Botanic Gardens and State Herbarium of South Australia

Advice received suggested that records of *Caladenia macroclavia* (Large-club Spider-orchid) collected by EBS Ecology in 2013 (EBS 2014) were attributable to misidentification of the similar *Caladenia septuosa* (Koppio Spider-orchid).

1.4 Objectives

Following initial referral of the proposed Eyre Peninsula Transmission Line (the Project), five MNES listed under the EPBC Act relating to flora were identified as requiring further information. This survey focusses on two of the five MNES relating to flora:

- Large-club Spider Orchid (*Caladenia macroclavia*). Listed as Endangered under the EPBC Act; and
- Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland. Listed as Endangered under the EPBC Act.

The objectives of this survey were to:

- Establish the extent of occurrence of Large-club Spider Orchid in the Project Area and if 2013 records of the species were due to misidentification; and
- Determine whether any areas of Eyre Peninsula Blue Gum woodland (EPBG Woodland) meet condition thresholds for listing as the EPBC Act listed Endangered Ecological Community (EEC).

2 METHODS

2.1 Survey Methodology

2.1.1 Caladenia macroclavia (Large-clubbed Spider Orchid)

All sites of past records and areas of similar habitat in the Project Area were surveyed for the Large-club Spider-orchid. This included two areas impacted by the Project on rocky hill tops with shallow sandy loam soil and Mallee over *Melaleuca uncinata* or *Melaleuca uncinata* shrubland, comprising of the following Vegetation Associations:

- *Eucalyptus odorata* (Peppermint Box) +/- *Eucalyptus pileata* (Capped Mallee) / *Eucalyptus leptophylla* (Narrow-leaved Red Mallee) Mallee +/- *Melaleuca uncinata* (Broombush); and
- *Melaleuca uncinata* (Broombush) Shrubland.

The survey was conducted following methods set out in the *Draft Survey Guidelines for Australia's Threatened Orchids* (Department of Agriculture, Water and the Environment, 2013), as described in Table 1. Both the area search method and parallel search transects were undertaken, depending on the nature of impact.

Time was spent locating plants previously recorded as Large-club Spider-orchid, with the survey undertaken on the 9th and 11th of September, within the peak flowering season for the target species.

Table 1. Survey methodology for *Caladenia macroclavia* (Large-club Spider-orchid).

Date of survey	Known flowering time	Methods	
		Structure pads	Stringing corridors
9 – 11 September, 2020	September – October (Department of Agriculture, Water and the Environment, 2020).	**Area search** – proposed structure pads (50 m x 50 m) in suitable habitat were searched. Two observers searched each area systematically for a total of 30 minutes.	**Parallel search transects –** Stringing corridors (10 m wide) in suitable habitat were searched. Two observers walked parallel transects spaced 5 m apart.

All orchid species detected during the survey were recorded. Detailed notes were taken of any *Caladenia* species encountered, including descriptive features of the plant and habitat. As the surveyed population numbered more than 20 plants, a voucher specimen was collected.

Immediately prior to undertaking the surveys, observers visited the population of Large-club Spider-orchid at Muloowurtie on Yorke Peninsula. The plants at this site were flowering at the time and allowed observers to become familiar with the species. In addition, identification of possible Large-club Spider-orchid plants, including previously recorded individuals that were located, was checked by Mr. Daniel Duval from the South Australian Seed Conservation Centre, Botanic Gardens and State Herbarium of South Australia

2.1.2 Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland

Areas previously mapped as EPBG Woodland in *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019a) were surveyed. This included the following Vegetation Associations:

- *Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata* Open Grassy Woodland.
- *Eucalyptus petiolaris* over *Acacia pycnantha* Woodland.

Areas that fell within the proposed impact area at the time of the study were surveyed.

The *Approved Conservation Advice for the Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland* (Threatened Species Scientific Committee, 2013) categorises the listed EPBG Woodland based on its condition. These categories are shown in Table 2. The thresholds for meeting the requirements for each category include the percent native understorey vegetation cover, number of characteristic plant species present and patch size. These thresholds are provided in Appendix 1, with characteristic plant species listed in Appendix 2.

The Conservation Advice states that:

"For EPBC Act referral, assessment and compliance purposes, the national ecological community is limited to patches that meet the following key diagnostics and condition thresholds"

Patches surveyed that do not meet the criteria in Appendix 2 are therefore not the EPBC listed community.

Table 2. Condition categories for EPBC listed Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland (Threatened Species Scientific Committee, 2013).

Category	Condition / rationale
A	Exceptional quality – larger patches with very high native species vegetation cover and diverse understorey.
B	High quality – good native vegetation cover and good native species diversity in the understorey.
C1	Medium quality – good native vegetation cover and diverse native species in the understorey.
C2	Medium quality – patches with connectivity to other native vegetation remnants in the landscape.
C3	Medium quality – patches that have large mature trees or trees with hollows.

Survey methodology followed the Bushland Assessment Method (BAM), as detailed in the *Native Vegetation Council (NVC) Bushland Assessment Manual* (Department of Environment and Water, 2020). The BAM is a quadrat-based method that collects the following data to assess the condition of native vegetation:

- Number and identification of native plant species within the quadrat surveyed.
- Presence/absence of hollow-bearing trees and the size of hollows present.
- Tree canopy cover.
- Native understorey cover and biomass.

- Presence / absence of habitat features such as fallen logs and litter.

Guidance notes found within The *Approved Conservation Advice for the Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland* (Threatened Species Scientific Committee, 2013) were also followed when determining the survey design and effort required, including the timing of surveys and sampling protocols. In line with these guidelines, surveys were undertaken in spring (September), with multiple quadrats surveyed in patches greater than 5 ha, or where condition of vegetation was not homogenous throughout a patch.

Where multiple quadrats were surveyed in a patch, cover per cent and number of native species were averaged across the sites. Where the area of EPBG Woodland within the impact area was less than 1 ha, survey quadrats were placed in adjoining vegetation of similar condition.

The survey was undertaken on the 9th and 10th of September, increasing the ability to identify seasonal or cryptic flowering plants.

2.2 Limitations

Survey locations were influenced by the project design available at the commencement of field work. While all suitable habitat within the proposed alignment was searched, no allowance was made for any significant deviations that may occur in the future.

The Endangered Large-club Spider-orchid can show considerable variation in flower size and colour, depending on seasonal conditions and other factors. It is also similar in form to a number of other species and identification can be difficult. To overcome this limitation, observers spent time familiarising themselves with the plant and consulted expert advice, as detailed above.

3 RESULTS

3.1 *Caladenia macroclavia* (Large-club Spider-orchid)

Plants previously recorded by EBS Ecology as Large-club Spider Orchid were successfully located during the survey. They occurred at the site of the original record (Figure 3) and throughout the vegetation patch in a population of greater than 100 plants. A description of the plants recorded (Figure 1) is given below. A photograph of a Large-club Spider-orchid taken at Muloowurtie is provided for comparison (Figure 2).

- **Description.** Flowering stem hairy, green to reddish and up to 18 centimetres (cm) tall. All plants observed were single-flowered and up to 5 cm across. Sepals and petals pale green, with a red median stripe of varying width. Sepals from 3.5 to 4 cm long and ending in yellow-brown clubs, varying in length but none more than 0.6 cm. Labellum without lobes, green at the base and red from the mid-point to the base, the tip curled under and margins with 6 to 8 pairs of green teeth. Calli in four rows. Leaf lanceolate, hairy, green above and red at the base and underneath, 4 to 6 cm long and 0.3 to 0.7 cm wide.

  Habitat. Rocky hill-top, with outcropping rock and areas of skeletal, sandy loam soil. Low *Eucalyptus odorata* (Peppermint Box) Mallee over *Melaleuca uncinata* (Broombush), with a diversity of heathy low shrubs.

Figure 1. *Caladenia septuosa* (Koppio Spider-orchid), photographed by EBS Ecology in the Project Area during the survey. Plants at this sight were previously recorded as *Caladenia macroclavia* (Large-club Spider-orchid). However, the shorter (6 mm) yellow-brown clubs clearly distinguish it from that species.

Figure 2. *Caladenia macroclavia* (Large-club Spider-orchid), photographed by EBS Ecology at Muloowurtie, Yorke Peninsula. The long (16 mm), dark brown clubs at the end of the sepals are clearly visible.

Species descriptions taken from Bates 2011 are provided in Appendix 3 for comparison and indicate that the plants recorded during the survey differ from the Large-club Spider Orchid as follows:

- Sepal clubs are yellow-brown, not dark brown, and are relatively short when compared to Large-club Spider Orchid;

- Sepals are pale green, not cream; and
- Labellum is not distinctly lobed and edged with less pairs of teeth than Large-club Spider Orchid.

In addition, *Caladenia septuosa* (Koppio Spider-orchid) commonly occurs around rock outcrops and in hills in similar habitat to that in the Project Area (Bates, 2011), while the Large-club Spider Orchid is known only from fertile loams over limestone and is associated with *Eucalyptus gracilis* (Yorrel), *Eucalyptus socialis* (Red Mallee) and *Eucalyptus incrassata* (Ridge-fruited Mallee).

On the weight of evidence, it was determined that the plants recorded in 2013 and resurveyed in this study are Koppio Spider-orchid and not Large-club Spider Orchid. The above description, notes on habitat and photographs were forwarded to Mr. Daniel Duval, who concurred with these findings.

One *Caladenia* species was recorded at the second survey site (Figure 4). *Caladenia capillata* (White Daddy Longlegs) was common at this site, with hundreds of plants distributed throughout the vegetation patch. No plants resembling Large-club Spider Orchid were detected. The White Daddy Longlegs is not listed as threatened under the EPBC Act or the *National Parks and Wildlife Act 1972* (NPW Act).

Fourteen orchid species from eight genera were recorded during the survey. None are listed as threatened under the EPBC Act or NPW Act (Table 3).

Table 3. Orchid species recorded during the survey.

Scientific Name	Common Name	NPW Act	EPBC Act	Location Map
Acianthus pusillus	Mosquito Orchid	Not listed	Not listed	Figure 3, Figure 4
Caladenia septuosa	Koppio Spider-orchid	Not listed	Not listed	Figure 3
Caladenia capillata	White Daddy Longlegs	Not listed	Not listed	Figure 4
Diuris orientis	Wallflower Donkey Orchid	Not listed	Not listed	Figure 3
Microtis sp.	Onion orchid	Not listed	Not listed	Figure 4
Prasophyllum occultans	Cryptic Leek-orchid	Not listed	Not listed	Figure 4
Prasophyllum sp.	Leek-orchid	Not listed	Not listed	Figure 4
Pterostylis dolichochila	Long-tongue Shell-orchid	Not listed	Not listed	Figure 3
Pterostylis nana	Dwarf Greenhood	Not listed	Not listed	Figure 3
Pterostylis plumosa	Bearded Greenhood	Not listed	Not listed	Figure 3
Pterostylis sanguinea	Maroon Banded Greenhood	Not listed	Not listed	Figure 3
Pyrorchis nigricans	Fire Orchid	Not listed	Not listed	Figure 3
Thelymitra nuda	Plain Sun Orchid	Not listed	Not listed	Figure 3, Figure 4
Thelymitra rubra	Common Pink Sun Orchid	Not listed	Not listed	Figure 3, Figure 4

Figure 3. The location of *Caladenia macroclavia* searches north west of Louth Bay. The entire impact area within the mapped Vegetation Association was searched.

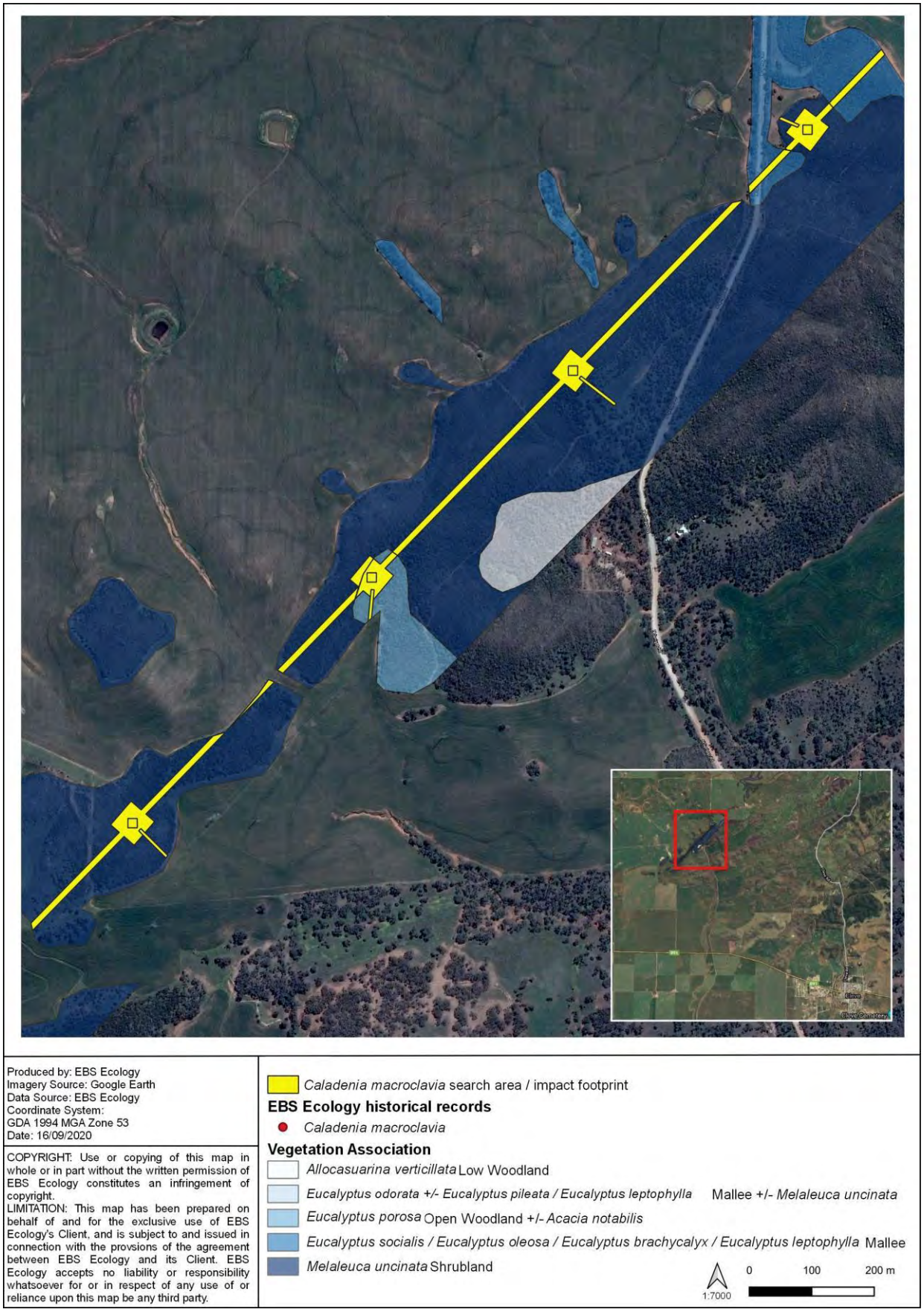

Figure 4. The location of *Caladenia macroclavia* searches north west of Cleve. The entire impact area within the mapped Vegetation Association was searched.

3.2 Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland

3.2.1 Survey results

Ten patches of EPBG Woodland were surveyed. This included one area not previously mapped as EPBG Woodland by previous studies. The location of survey sites and EPBG Woodland patches are shown in Table 4 and Figure 5 to Figure 8.

Table 4. Location of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland survey sites. Patch size represents total area of the patch in the Project Area, including areas not impacted. It excludes vegetation outside the Project Area.

Patch	Survey Site	Patch size (ha)	GDA 94 53H Easting	GDA 94 53H Northing
A	A1	2.94	584244	6191128
B	B1	8.48	585351	6193379
	B2		585508	6193289
C	C1	3.49	586294	6194735
D	D1	0.97	586502	6195026
E	E1	6.62	586828	6195963
F	F1	0.38	587114	6196073
G	G1	1.4	589370	6200349
H	H1	10.2	592010	6205162
	H2		591842	6205162
I	I1	13	593061	6207326
	I2		592993	6207040
J	J1	2.61	593318	6208432

Figure 5. Location of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland, Patches A and B. The map shows the location of survey sites and proposed impact areas.

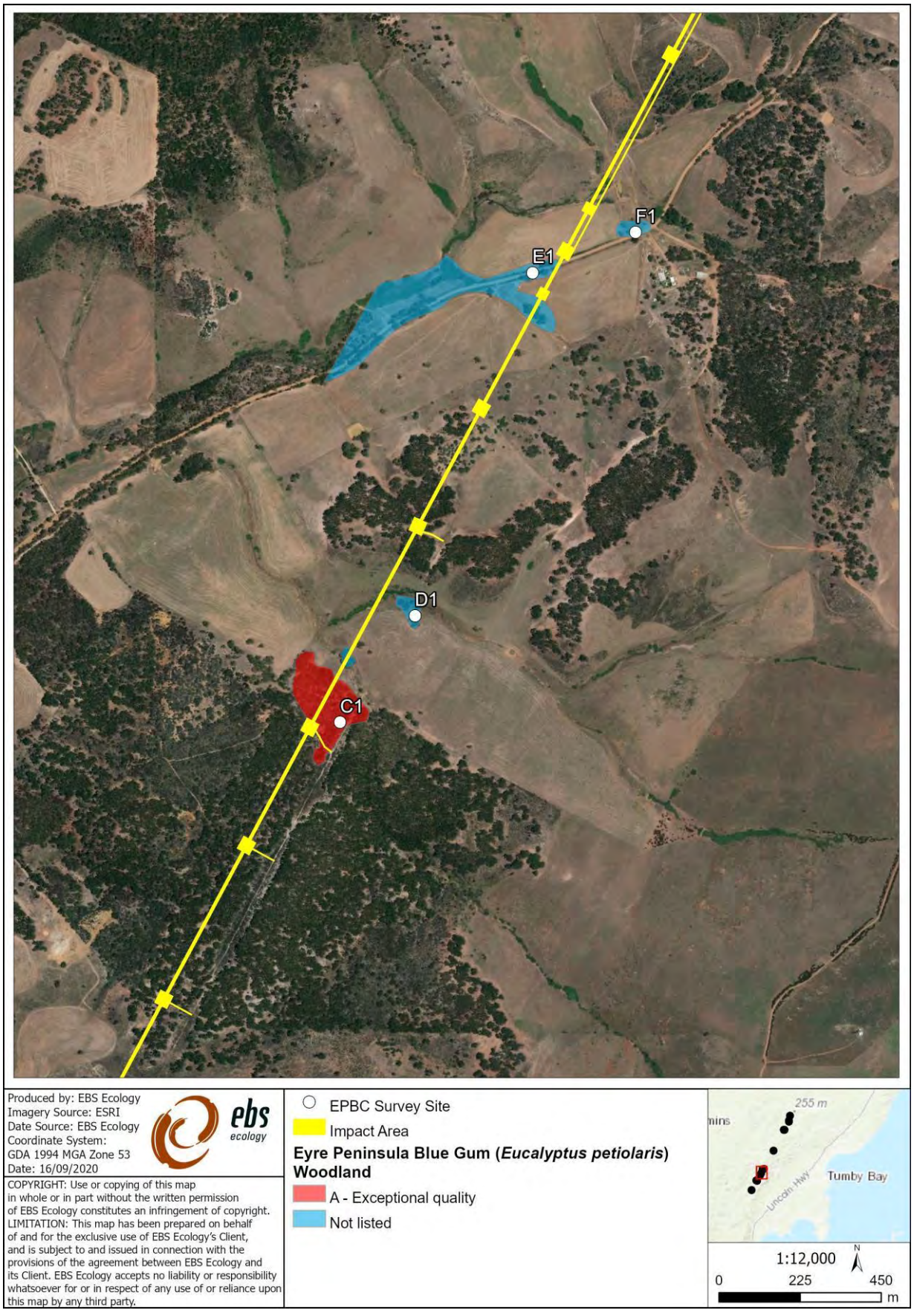

Figure 6. Location of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland, Patches C, D, E and F. The map shows the location of survey sites and proposed impact areas.

Figure 7. Location of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland, Patch G. The map shows the location of survey sites and proposed impact areas.

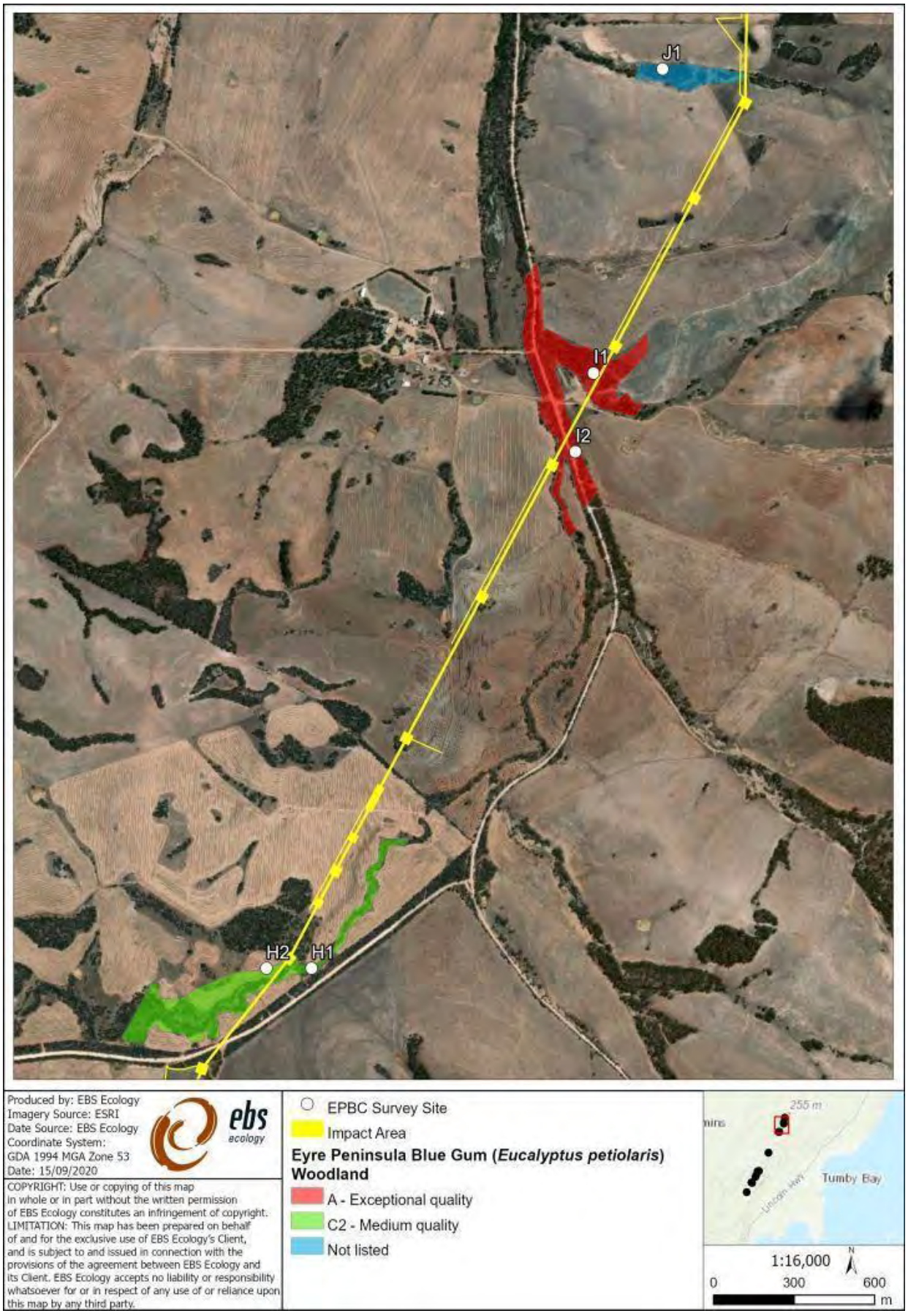

Figure 8. Location of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland, Patches H, I and J. The map shows the location of survey sites and proposed impact areas.

Patches varied from small (less than 0.5 ha), isolated remnants to larger areas that formed part of more extensive remnant vegetation in the landscape. A total of 108 plant species were recorded across all survey sites (Appendix 4), including 39 introduced species. Two species recorded are listed as Rare under the NPW Act:

- *Acacia imbricata* (Feathery Wattle); and
- *Daviesia pectinata* (Zigzag Bitter-pea)

No plants listed as threatened under the EPBC Act were recorded.

The number of species per Patch varied from 13 at Patch E to 29 at Patch I. Percentage of native understorey cover also varied, from as little as less than 5% to over 70%, with smaller patches particularly impacted by a high cover of introduced grasses and forbs.

Survey results are summarised in Table 5. Photographs of survey quadrats are provided as Appendix 5.

Table 5. Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland survey results.

Patch	Total number of plant species	Number of characteristic species (Appendix 2.)	Native understorey cover (%)	Hollow-bearing trees (trees/ha)
A	33	18	70	<5
B	37	18	40	6-10
C	35	22	80	<5
D	14	2	<5	<5
E	13	3	20	<5
F	20	6	5	6-10
G	27	17	70	<5
H	46	26	30	<5
I	54	29	70	<5
J	21	10	20	<5

3.2.2 Assessment against EPBC listed community thresholds

The assessment of each Patch of EPBG Woodland against EPBC condition thresholds is shown in Table 6. The table indicates that Patches A, B, C, G, H and I are the listed EEC. These Patches range from exceptional quality (EPBC category A) to medium quality (EPBC category C2), with differences in patch size and native vegetation cover determining the result.

The remaining Patches do not meet the criteria for listing as the EEC. Patches D, E, F and J contained few native species and were either small in extent (less than 1 ha) and/or had a low cover of mid and ground layer native vegetation. The range in vegetation condition across the Project Area is illustrated in Figure 9 (vegetation that does not meet listing criteria) and Figure 10, (vegetation of exceptional quality - Category A).

Table 6. Assessment of Eyre Peninsula Blue Gum Woodland patches against the EPBC listed community thresholds.

Patch	EPBC Category	Justification	Patch area (ha)
A	A	• Patch size ≥1 ha. • 70% of total mid and ground vegetation is native. • 18 species recorded are listed in Appendix 2.	2.94
B	C2	• Patch size ≥0.2 ha. • 40% of total mid and ground vegetation is native. • 18 species recorded are listed in Appendix 2. • The patch is contiguous with a larger area (≥1 ha) of native vegetation.	8.48
C	A	• Patch size ≥1 ha. • 80% of total mid and understorey vegetation is native. • 22 species recorded are listed in Appendix 2.	3.49
D	Not the listed community	• Only <5% of total mid and ground vegetation is native. • Only 2 species recorded are listed in Appendix 2. • The patch is not contiguous with larger areas (≥1 ha) of native vegetation.	0.97
E	Not the listed community	• Only 20% of total mid and ground vegetation is native. • Only 3 species recorded are listed in Appendix 2.	6.62
F	Not the listed community	• Only 5% of total mid and ground vegetation is native. • The patch is not contiguous with larger areas (≥1 ha) of native vegetation.	0.38
G	B	• Patch size is between 0.2 ha and 1 ha. • 70% of total mid and ground vegetation is native. • 17 species recorded are listed in Appendix 2.	1.40
H	C2	• Patch size ≥0.2 ha. • 30% of total mid and ground vegetation is native. • 26 species recorded are listed in Appendix 2. • The patch is contiguous with a larger area (≥1 ha) of native vegetation.	10.2
I	A	• Patch size ≥1 ha. • 70% of total mid and ground vegetation is native. • 29 species recorded are listed in Appendix 2.	13
J	Not the listed community	• Only 20% of total mid and ground vegetation is native.	2.61

Figure 9. Patch E consisted of a narrow roadside strip of vegetation. Few native species were recorded and the site was highly disturbed by introduced plants. The Patch does not meet EPBC listed community thresholds.

Figure 10. Patch C was part of a larger area of native vegetation and had a higher diversity of native plant species than any other patch surveyed. This Patch falls within Category A of the listed EEC.

4 DISCUSSION

4.1 *Caladenia macroclavia* (Large-club Spider-orchid)

After resurveying previous records, consulting experts for identification of *Caladenia* sp. and observers familiarising themselves with the target species, it has been concluded that plants previously identified as Large-club Spider-orchid in the Project Area are Koppio Spider-orchid. This species is not listed as threatened under the EPBC Act or NPW Act. The conclusion is based on differences in the appearance of the flower, notably the absence of dark brown sepal clubs, habitat, and known distribution.

Although considerable search effort was conducted at the appropriate season and 14 orchid species were identified, Large-club Spider-orchid was not detected.

There is no evidence that Large-club Spider-orchid occurs in the Project Area, and thus it will not be impacted by the Project.

4.2 Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland

Ten patches of Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland (EPBG Woodland) occur within the 500m wide Project Area.

The total area of EP Blue Gum anticipated to be impacted by the project is 1.352 ha. Of the 1.352 ha impacted by the project, only 0.035ha (350 square metres) is permanent. The remaining 1.317 is temporary and will be rehabilitated (Table 7).

Of the 1.352 ha of impact, 1.022 ha of impact will be in EPBG Woodland which are considered an *Endangered Ecological Community*, and only 0.659 ha is in Category A (exceptional quality) EBBG Woodland. The remaining 0.33 ha of impact will be in EPBG Woodland which do not meet the criteria for EPBC listing.

In summary, only 1.022 ha of impact will occur in EPBG Woodland that meets the criteria for Endangered Ecological Community under the EPBC Act 1999, and of that 1.022 ha of impact, 0.987 ha or 96.6% will be rehabilitated.

The ten patches of Eyre Peninsula Blue Gum within the 500m wide study area total 50.09 hectares (ha) in extent. Of this, 39.51 ha meets the criteria for listing as the EPBC Act listed Endangered Ecological Community. This includes:

- 19.43 ha of Category A woodland (exceptional quality).
- 1.4 ha of Category B woodland (very high quality).
- 18.68 ha of Category C2 woodland (medium quality).

The remaining 10.58 ha does not meet the criteria for EPBC listing and is therefore not considered a Threatened Ecological Community under the EPBC Act.

Table 7. Impact to Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland.

EPBC Category	Patch	Permanent impact (ha)	Temporary impact (ha)	Total Impact (ha)	Total
A	A	0	0.152	0.152	0.659
	C	0.035	0.184	0.219	
	I	0	0.288	0.288	
B	G	0	0.029	0.029	0.029
C2	B	0	0.158	0.158	0.334
	H	0	0.176	0.176	
Not listed	D	0	0.038	0.038	0.33
	E	0	0.103	0.103	
	F	0	0	0	
	J	0	0.189	0.189	
Total Impact (ha)					**1.352**

5 REFERENCES

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6 APPENDICES

Appendix 1. Condition Thresholds for the Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland ecological community

Category and Rationale	Thresholds
A. Exceptional quality – larger patches with very high native species vegetation cover and very diverse understorey.	Patch size is ≥ 1ha; **AND** ≥70% of total vegetative cover[1] in the mid and ground layers are comprised of native species[2]; **AND** 18 or more native species from Appendix 2 are present in the mid and ground layers.
B. High quality – good native vegetation cover and good native species diversity in the understorey.	Patch size is ≥ 0.2 ha; **AND** ≥50% of total vegetative cover in the mid and ground layers are comprised of native species; **AND** 12 or more native species from Appendix 2 are present in the mid and ground layers.
C1. Medium quality – good native vegetation cover and diverse native species in the understorey.	Patch size is ≥ 0.2 ha; **AND** ≥50% of total vegetative cover in the mid and ground layers are comprised of native species; **AND** 4 or more native species from Appendix 2 are present in the mid and ground layers;
C2. Medium quality – patches with connectivity to other native vegetation remnants in the landscape.	Patch size is ≥ 0.2 ha; **AND** ≥30% of total vegetative cover in the mid and ground layers are comprised of native species; **AND** 4 or more native species from Appendix 2 are present in the mid and ground layers; **AND** The patch is contiguous with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) that is ≥1ha in area.
C3. Medium quality – patches that have large mature trees or trees with hollows (habitat).	Patch size is ≥ 0.2 ha; **AND** ≥30% of total vegetative cover in the mid and ground layers are comprised of native species; **AND** 4 or more native species from Appendix 2 are present in the mid and ground layers; **AND** The patch has at least one tree with hollows or at least one large tree (≥80cm dbh[3]) from the upper layer species list in Appendix 2. Where patches are ≥1 ha, a density of at least one mature tree or tree with hollows per hectare is required.

[1]Vegetation cover excludes mosses and lichens, patches of bare ground and plant litter.

[2]Mid and ground layers exclude juvenile canopy species. This applies to categories A, B, C1, C2 and C3.

[3]dbh is diameter at breast height.

Appendix 2. Characteristic plant species of the Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland ecological community

Scientific Name	Common Name
Upper layer (trees > 3 m)	
Allocasuarina verticillata	Drooping Sheoak
Eucalyptus camaldulensis	River Red Gum
Eucalyptus cladocalyx	Sugar Gum
Eucalyptus odorata	Peppermint Box
Eucalyptus petiolaris	Eyre Peninsula Blue Gum
Mid layer (small trees and medium shrubs 1 – 3 m)	
Acacia calamifolia	Wallowa
Acacia dodonaeifolia	Hop-bush Wattle
Acacia gillii	Gill's Wattle
Acacia imbricata	Feathery Wattle
Acacia pinguifolia	Fat-leaf Wattle
Acacia pycnantha	Golden Wattle
Acacia rupicola	Rock Wattle
Acacia spinescens	Spiny Wattle
Allocasuarina muelleriana	Common Oak-bush
Babingtonia behrii	Silver Broombush
Banksia marginata	Silver Banksia
Bursaria spinosa	Sweet Bursaria
Callistemon rugulosus	Scarlet Bottlebrush
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush
Exocarpos sparteus	Slender Cherry
Grevillea aspera	
Grevillea ilicifolia	Holly-leaf Grevillea
Hakea cycloptera	Elm-seed Hakea
Hakea rugosa	Dwarf Hakea
Leptomeria aphylla	Leafless Currant-bush
Melaleuca brevifolia	Short-leaf Honey-myrtle
Melaleuca decussata	Totem-poles
Melaleuca uncinata	Broombush
Olearia ramulosa	
Pittosporum angustifolium	Native Apricot
Xanthhorrhoea semiplana	Grass Tree
Ground Layer (herbs and shrubs)	
Acacia continua	Thorn Wattle
Adenanthos terminalis	Yellow Gland-flower
Astroloma humifusum	Cranberry Heath
Astroloma conostephioides	Flame Heath
Baeckea crassifolia	Desert Baeckea
Boronia coerulescens	Blue Boronia
Burchardia umbellata	Milkmaids
Calytrix tetragona	Common Fringe-myrtle

Scientific Name	Common Name
Chamaescilla corymbosa var. corymbosa	Blue Squill
Cheilanthes austrotenuifolia	
Cheiranthera alternifolia	Hand-flower
Chrysocephalum apiculatum	Common Everlasting
Convolvulus remotus	Grassy Bindweed
Dampiera rosmarinifolia	Rosemary Dampiera
Daucus glochidiatus	Native Carrot
Daviesia Asperula	
Dianella revoluta	Black-anther Flax-lily
Dichondra repens	Kidney Weed
Dodonaea hexandra	Horned Hop-bush
Drosera sp.	Sundew
Eutaxia microphylla	Common Eutaxia
Geranium retrorsum	Common Cranesbill
Gonocarpus mezianus	Broad-leaf Raspwort
Goodenia blackiana	Native Primrose
Goodenia robusta	Woolly Goodenia
Helichrysum leucopsideum	
Hibbertia spp.	
Homoranthus homoranthoides	
Kennedia prostrata	Running Postman
Lagenophora huegelii	Course Bottle-daisy
Lasiopetalum behrii	Pink Velvet-bush
Lissanthe strigosa	Peach Heath
Neurachne alopecuroides	
Olearia pannosa ssp. pannosa	Silver Daisy-bush
Opercularia scabrida	
Pimelea octophylla	Woolly Riceflower
Pomaderris paniculosa	
Prostanthera serpyllifolia	
Prostanthera spinosa	
Pultenaea acerosa	
Pultenaea teretifolia	
Pultenaea trinervis	
Pultenaea trichophylla	Tufted Bush-pea
Scaevola linearis	Rough Fanflower
Sporobolus virginicus	Coastal Rat-tail Grass
Spyridium vexilliferum	
Thomasia petalocalyx	Paper-flower
Thysanotus patersonii	Twining Fringe-lily
Vittadinia spp.	New Holland Daisy
Wahlenbergia spp.	Bluebell
Climbers	
Clematis microphylla	Old Man's Beard
Cassytha spp.	Dodder
Grasses and grass-like plants	
Austrostipa sp.	Spear Grass
Carex inversa	Knob-sedge

Scientific Name	Common Name
Carex tereticaulis	Rush Sedge
Chorizandra enodis	Black Bristle-sedge
Gahnia ancistrophylla	Hooked-leaf Saw Sedge
Gahnia filum	Thatching Grass
Juncus bufonius	Toad Rush
Juncus krausii	Sea Rush
Juncus subsecundus	Finger Rush
Lepidosperma carphoides	Black Raiper-sedge
Lepidosperma viscidum	Sticky Sword-sedge
Lomandra collina	Pale Mat-rush
Lomandra effusa	Scented Mat-rush
Lomandra juncea	Desert Mat-rush
Lomandra micrantha	Small Flowered Mat-rush
Rytidosperma spp.	Wallaby Grass
Schoenus apogon	Common Bog-rush
Schoenus breviculmis	Matted Bog-rush
Schoenus nitens	Shiny Bog-rush
Triodia scariosa	Porcupine Grass

Appendix3. Species descriptions for *Caladenia septuosa* and *C. macroclavia*, taken from Bates 2011.

***Caladenia septuosa* (Koppio Spider-orchid)**

Description: Leaf linear-lanceolate, erect, to 8cm long, shortly hairy, green above red below. The stem is to 20cm tall, slender hairy, reddish and green. Flower usually single, crimson and cream and green, to 5cm across; segments all similar, linear-lanceolate, green with a red median stripe, to 4cm long; sepals ending in distinct yellow-brown clubs of variable length; dorsal sepal erect; lateral sepals spreading obliquely in front of the flower and often crossed; petals smaller and spreading behind. Labellum hardly lobed, somewhat laid back, green basally with a large, red, mid-apical section which curls under, margins fringed with long linear teeth which become smaller and sparser toward the apex, calli red, slender, stalked, in four neat rows, extending well forward.

Similar species: *C. tensa, C. clavula, C. macroclavia. C. macroclavia* in its relatively smaller labellum and larger bayonet-shaped, dark brown sepal clubs.

Habitat: Grows in woodland, mallee-broom-bush, scrubs and shrub-land as well as about rock outcrops, in more fertile soils, including over limestone, especially on the south side of shrubs.

***Caladenia macroclavia* (Large-club Spider-orchid**

Description: Leaf oblong-lanceolate, to 10cm long, rigid, shortly hairy, red based. Stem to 30cm, reddish, slightly hairy. Flower usually single about 5cm across, yellow-green and maroon with dark brown osmophores. Segments all similar, linear-lanceolate with red central stripe, the sepals ending in large dark brown, flattened clubs to 16mm long; dorsal sepal erect; laterals sepals rigid, thrust forward and down in front of the flower; petals smaller, without osmophores, spreading behind the flower. Labellum on a short tremulous claw, trilobed, small compared to the rest of the flower, apex crimson and curled under; side lobes entire near the base, but fringed with a about 12 pairs of long, linear, green teeth; calli in four congested rows, stalked and clavate. Flowers not scented.

Habitat: Favours fertile shallow loams in mallee-broombush associations, usually where other orchids are numerous.

Appendix 4. Plant species recorded during the Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland survey

Scientific name (*= introduced species)	Common name	Conservation status		Declared Weed	Survey site												
		Aus	SA		A1	B1	B2	C1	D1	E1	F1	G1	H1	H2	I1	I2	J1
Acacia continua	Thorn Wattle				✓	✓						✓	✓		✓		✓
Acacia imbricata	Feathery Wattle	R			✓							✓	✓			✓	
Acacia calamifolia	Wallowa												✓	✓	✓	✓	
Acacia pycnantha	Golden Wattle				✓	✓	✓	✓			✓	✓					
Acacia rupicola	Rock Wattle				✓	✓		✓				✓					
Acaena echinata	Sheep's Burr				✓	✓	✓		✓	✓	✓	✓			✓		
Acrotriche affinis	Ridged Ground-berry							✓			✓						
Allocasuarina verticillata	Drooping Sheoak				✓			✓				✓			✓		
Alyogyne huegelii	Native Hibiscus						✓										
*Arctotheca calendula**	Cape Weed				✓	✓	✓		✓			✓	✓	✓	✓	✓	✓
*Asparagus asparagoides f.**	Bridal Creeper			Yes	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Asperula sp.	Woodruff				✓												
Astroloma conostephioides	Flame Heath							✓							✓		
Astroloma humifusum	Cranberry Heath				✓			✓				✓					
Atriplex sp.	*Saltbush*															✓	✓
Austrostipa elegantissima	Feather Spear-grass													✓		✓	
Austrostipa sp.	Spear-grass				✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
*Avena barbata**	Bearded Oat				✓	✓			✓	✓	✓		✓		✓	✓	✓
*Bromus sp.**	Brome							✓	✓				✓				
Bursaria spinosa ssp.	Bursaria					✓		✓					✓	✓	✓		
Callistemon rugulosus	Scarlet Bottlebrush				✓			✓					✓	✓	✓		✓
Carex inversa var.	Knob Sedge															✓	
Carex tereticaulis	Rush Sedge										✓						
Cassytha sp.	Dodder-laurel												✓	✓	✓	✓	✓
Chamaescilla corymbosa var. corymbosa	Blue Squill														✓		
Cheilanthes sp.	Rock-fern				✓			✓							✓		
Chrysocephalum apiculatum	Common Everlasting														✓	✓	
Clematis microphylla	Old Man's Beard											✓	✓				
*Dactylis glomerata**	Cocksfoot				✓												

Scientific name (*= introduced species)	Common name	Conservation status		Declared Weed	Survey site												
		Aus	SA		A1	B1	B2	C1	D1	E1	F1	G1	H1	H2	I1	I2	J1
Dampiera rosmarinifolia	Rosemary Dampiera														✓		
*Daucus sp.**	Carrot							✓									
Daviesia pectinata	Zig-zag Bitter-pea	R						✓									
Dianella revoluta var.					✓			✓				✓	✓		✓	✓	
Distichlis distichophylla	*Emu-grass*															✓	✓
Drosera sp.	Sundew					✓						✓	✓		✓		
*Ehrharta calycina**	*Perennial Veldt Grass*														✓	✓	✓
*Ehrharta longiflora**	Annual Veldt Grass				✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Elymus sp.	Wheat-grass															✓	
Enchylaena tomentosa var.	Ruby Saltbush														✓	✓	
Eragrostis curvula	African Lovegrass															✓	✓
*Erodium sp.**	Heron's-bill/Crowfoot				✓	✓			✓					✓	✓		
Eucalyptus leptophylla	Narrow-leaf Red Mallee											✓					
Eucalyptus odorata	Peppermint Box												✓	✓		✓	✓
Eucalyptus petiolaris	Eyre Peninsula Blue Gum				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eutaxia microphylla	Common Eutaxia					✓		✓									
*Freesia laxa**	Freesia															✓	
Gahnia filum	Thatching Grass					✓	✓										
Geranium retrorsum	Common Cranesbill				✓	✓	✓				✓	✓	✓		✓		
Gonocarpus mezianus	Broad-leaf Raspwort												✓		✓		
Goodenia robusta	Robust Goodenia							✓									
Grevillea ilicifolia ssp.	Holly-leaf Grevillea												✓		✓	✓	
Hakea cycloptera	Elm-seed Hakea												✓	✓			
Hakea rugosa	Dwarf Hakea							✓					✓	✓		✓	
Hibbertia riparia	Bristly Guinea-flower						✓	✓				✓	✓			✓	
*Hordeum vulgare**	Barley								✓		✓			✓			
*Hypochaeris glabra**	Smooth Cat's Ear													✓			
Juncus kraussii	*Sea Rush*				✓	✓	✓										✓
Juncus subsecundus	Finger Rush				✓		✓										

Scientific name (*= introduced species)	Common name	Conservation status		Declared Weed	Survey site												
		Aus	SA		A1	B1	B2	C1	D1	E1	F1	G1	H1	H2	I1	I2	J1
Kennedia prostrata	Scarlet Runner							✓									
Lagenophora huegelii	Coarse Bottle-daisy							✓									
Lasiopetalum behrii	Pink Velvet-bush												✓			✓	
*Lepidium sp.**	Peppercress										✓						
Lepidosperma sp.	Sword-sedge/Rapier-sedge								✓					✓			
Lepidosperma viscidum	Sticky Sword-sedge				✓	✓	✓	✓		✓		✓	✓				
Lissanthe strigosa ssp. subulata	Peach Heath				✓	✓	✓	✓				✓	✓		✓		✓
*Lolium sp.**	Ryegrass					✓	✓							✓		✓	✓
Lomandra collina	Sand Mat-rush														✓	✓	
Lomandra effusa	Scented Mat-rush						✓	✓				✓					
Lomandra micrantha ssp.	Small-flower Mat-rush												✓				✓
Lomandra sp.	Mat-rush														✓		
*Lycium ferocissimum**	African Boxthorn			Yes												✓	
*Medicago minima var. minima**	Little Medic				✓		✓										
*Medicago polymorpha**	Burr-medic												✓		✓	✓	
Melaleuca halmaturorum	Swamp Paper-bark												✓	✓			
Melaleuca uncinata	Broombush												✓	✓	✓	✓	
*Moraea setifolia**	Thread Iris				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Neurachne alopecuroidea	Fox-tail Mulga-grass							✓									
*Olea europaea ssp.**	Olive						✓										
Oxalis perennans	Native Sorrel				✓	✓		✓				✓					
*Oxalis pes-caprae**	Soursob									✓	✓		✓			✓	
*Paspalum dilatatum**	Paspalum										✓						
Pimelea glauca	Smooth Riceflower							✓									
*Pinus radiata**	Radiata Pine				✓												
Pittosporum angustifolium	*Native Apricot*																✓
Poa annua	Winter Grass						✓								✓		
Pomaderris paniculosa ssp.													✓	✓	✓		
*Rhamnus alaternus**	Blowfly Bush						✓										

Scientific name (*= introduced species)	Common name	Conservation status		Declared Weed	Survey site												
		Aus	SA		A1	B1	B2	C1	D1	E1	F1	G1	H1	H2	I1	I2	J1
*Romulea rosea var. australis**	Common Onion-grass													✓		✓	
*Rosa canina**	Dog Rose			Yes						✓	✓						
*Rosa sp.**	Wild Rose/Briar								✓								
*Rubus fruticosus aggregate**	Blackberry			Yes			✓				✓						
*Rumex acetosella**	Sorrel											✓					
*Rumex sp.**	Dock				✓				✓	✓							
Rytidosperma sp.	Wallaby-grass				✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
*Salvia verbenaca var.**	Wild Sage										✓						
Santalum acuminatum	Quandong												✓				
Schoenus sp.	Bog-rush					✓											
*Senecio pterophorus**	African Daisy						✓	✓			✓	✓	✓				✓
*Sonchus oleraceus**	Common Sow-thistle				✓					✓				✓			
Stackhousia monogyna	Creamy Candles					✓											
Themeda triandra	Kangaroo Grass									✓	✓					✓	
*Trifolium arvense var. arvense**	Hare's-foot Clover															✓	
*Trifolium campestre**	Hop Clover					✓											
*Trifolium repens**	White Clover				✓		✓	✓				✓	✓	✓			
*Trifolium sp.**	Clover								✓								
*Vicia sp.**	Vetch															✓	
Vittadinia cuneata var.	Fuzzy New Holland Daisy				✓			✓									
Vittadinia sp.	New Holland Daisy							✓									

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare.

Appendix5. Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland survey quadrat photographs

Patch A, A1.

Patch B, B1.

Patch B, B2.

Patch C, C1.

Patch D, D1

Patch E, E1

Patch F, F1.

Patch G, G1.

Patch H, H1.

Patch H, H2.

Patch I, I1.

Patch I, I2

Patch J, J1.

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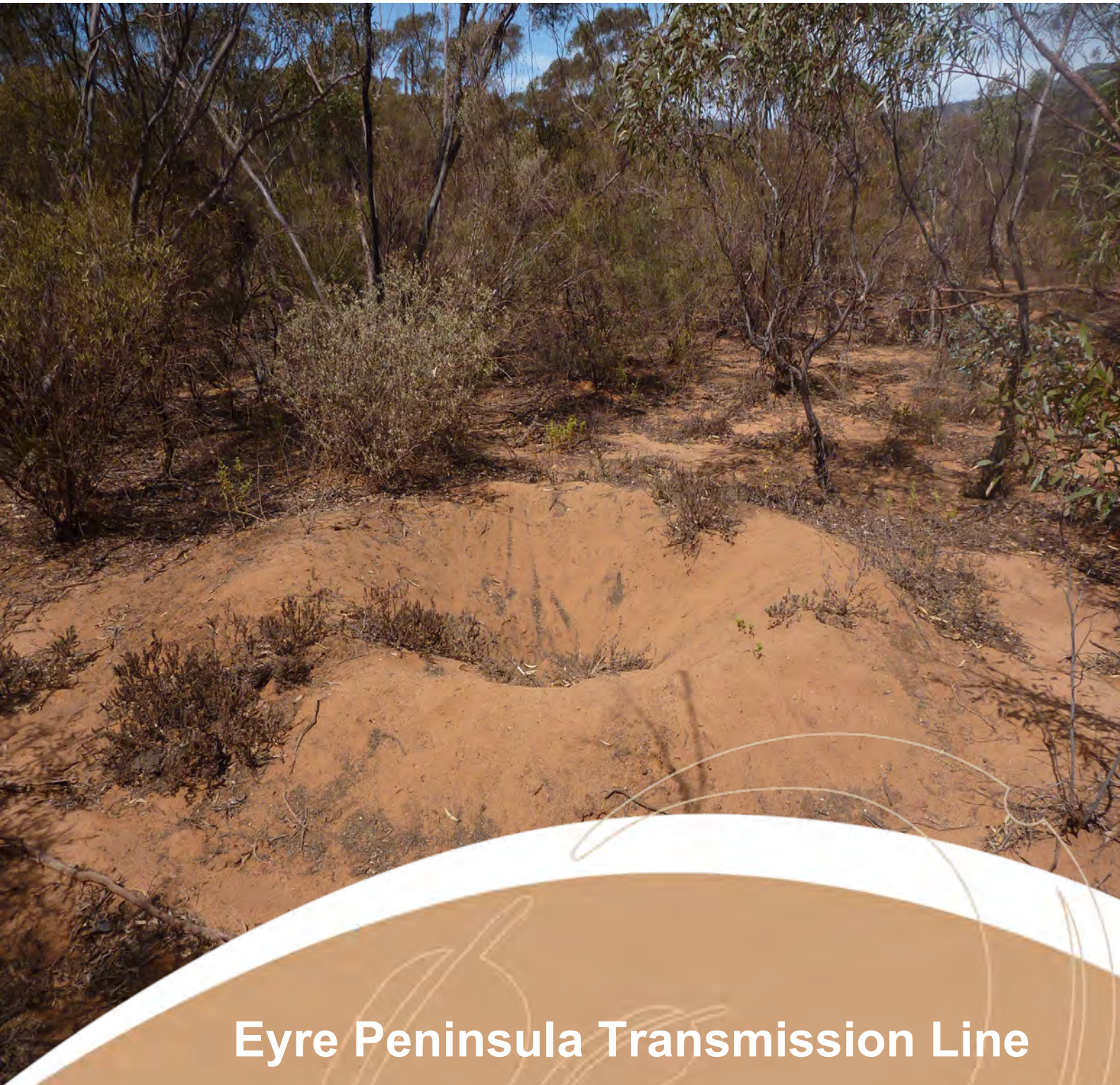
Appendix D EPLink Malleefowl Management Plan

ebs ecology



Eyre Peninsula Transmission Line

Malleefowl Management Plan

Eyre Peninsula Transmission Line Malleefowl Management Plan

19 November 2020

Version 4.0

Prepared by EBS Ecology for ElectraNet

Document Control					
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EBS Ecology Project Number: E90106D

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Cover photograph: Inactive Malleefowl mound in the Project Area (photograph by EBS Ecology).

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GLOSSARY AND ABBREVIATION OF TERMS

BAM	Bushland Assessment Methodology
CEMP	Construction Environmental Management Plan
DAWE	Department of Agriculture, Water and the Environment
DEM	Digital Elevation Model
EBS Ecology	Environmental and Biodiversity Services Pty Ltd – trading as EBS Ecology
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ha	hectare(s)
IBRA	Interim Bioregionalisation of Australia
km	kilometre(s)
kV	kilovolt
LiDAR	Light Detection and Ranging – a remote sensing method that uses light to measure elevation.
m	Metre(s)
mm	millimetres
NVC	Native Vegetation Council
OPGW	Optical Ground Wire
Project	ElectraNet Eyre Peninsula Transmission Line Project
Project Area	The impact footprint of the Project.
sp.	Species
spp.	Species plural
ssp.	Subspecies
VA	Vegetation Association(s)

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1 INTRODUCTION

1.1 Project background

ElectraNet is proposing to construct the Eyre Peninsula Link, a new 275 kilovolt (kV) transmission line to replace the existing infrastructure between Cultana and Port Lincoln on the eastern Eyre Peninsula, South Australia (the Project).

During baseline investigations for the Project, it was identified that the Malleefowl (*Leipoa ocellata*), listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), is present within the Project Area.

The Project was referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the EPBC Act and declared to be a controlled action due to the potential for impacts on a number of species including Malleefowl. As such, the Project is to be assessed for approval by DAWE by preliminary documentation.

Following more detailed project design, additional targeted survey effort, impact assessment and feedback from DAWE, EBS Ecology was engaged to prepare a Malleefowl Management Plan to be used as a guiding document for avoiding and minimising impact to Malleefowl. This Malleefowl Management Plan forms part of the preliminary documentation to be assessed for project approval under the EPBC Act.

1.2 Project Area

The new transmission line will be approximately 262 kilometres (km) long and extends between Cultana substation in the north and Port Lincoln terminal substation in the south. Through Malleefowl habitat, the transmission line will follow the alignment of the existing infrastructure. The Project Area includes the proposed easement and impact footprint of the Eyre Peninsula Link Project (Figure 1).

1.3 Objectives

The objectives of the Malleefowl Management Plan are to:

- Summarise Malleefowl survey effort to date and present the key findings;
- Re-assess the direct, indirect and cumulative impacts of the Project on Malleefowl, based on prior knowledge of Malleefowl in the region and survey results; and
- Provide management actions to avoid and minimise these impacts during the construction and operational stages of the Project.

The management requirements outlined in this Malleefowl Management Plan will be incorporated into the wider Construction Environmental Management Plan (CEMP) to be prepared by the construction contractor for the Eyre Peninsula Link Project.

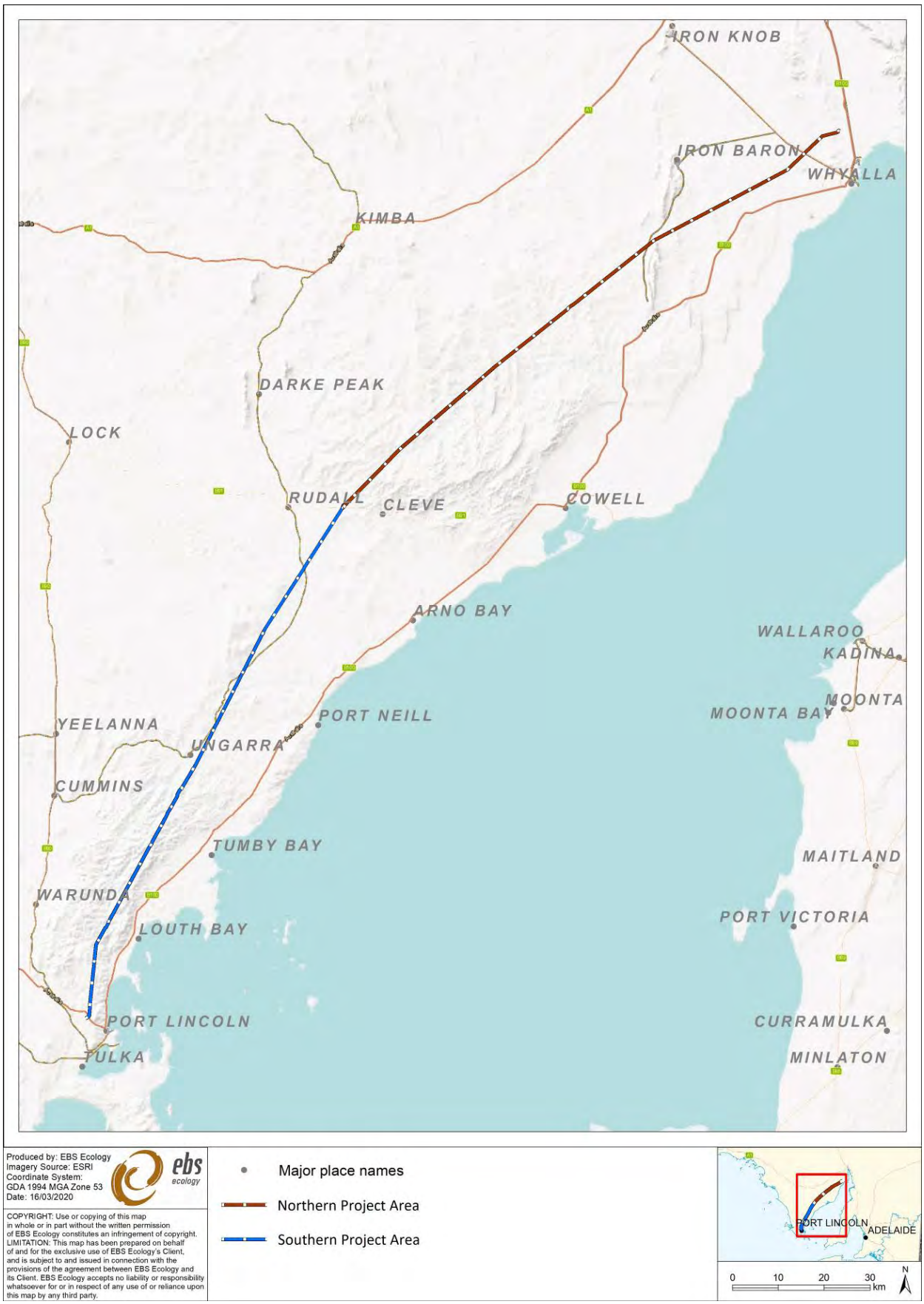

Figure 1. Location of the Project Area.

2 BACKGROUND INFORMATION

The National Recovery Plan for Malleefowl provides a detailed description of the species, its conservation status, distribution and abundance, preferred habitat, life history and ecology, and survival threats to Malleefowl (Benshemesh, National Recovery Plan for Malleefowl, 2007). The following section is a summary of the Malleefowl's biology and ecology.

2.1 Species Information

Biology and description

Malleefowl (Figure 2) are large ground birds which can grow up to 60 centimetres in length, weighing up to 2.5 kilograms. The size of the bird means it is not likely to be confused with any other in the Project Area. Its wings and back are mottled and barred with grey, black, brown and white. The head and neck are grey, with a distinctive black stripe down the fore-neck. It has a short dark bill and large, strong legs and feet (Menkhorst, et al., 2019).

Both sexes are similar in appearance but male Malleefowl are slightly larger than female Malleefowl. Juveniles can be distinguished from the adults by size and the paler and creamier colouring on the head and neck, and in the patterning of the upper surfaces of the wings and tail, which are mainly dull brown and cream and lack the white patches present in the adults. Immature Malleefowl are like the adults in appearance.

Malleefowl are distinctive in that they incubate their eggs within a large nest mound, constructed of sand, leaves, bark and twigs. The mound is constructed by the male and can be up to 5 metres (m) in diameter and 1 m high. The male attends the mound constantly, maintaining the temperature within by adding or removing layers of material (Menkhorst, et al., 2019). Eggs are laid in the mound from September until late summer and hatch after about 60 days. Chicks receive no parental care after hatching (Benshemesh, National Recovery Plan for Malleefowl, 2007). Malleefowl are generalist feeders, foraging on the ground for seeds, fruits, insects and other invertebrates (Benshemesh, National Recovery Plan for Malleefowl, 2007).

Ecology

Malleefowl breed annually except in drought years. Eggs are laid in mounds, comprising a large mass of sand, usually three to five metres in diameter and one metre high, within which moist litter is buried.

Egg laying usually begins in September and an egg is laid every five to seven days until mid to late summer. The incubation period of eggs varies with temperature but is usually approximately 60 days at typical nest temperatures. Chicks typically begin hatching and emerging from mounds in November, although hatching may continue until March in some seasons. Most chicks usually emerge from mounds before January.

Malleefowl are generalist feeders. Various anecdotal reports and studies have described the diet of Malleefowl as consisting of the seeds, flowers and fruits of shrubs (especially legumes), herbs, invertebrates, tubers and fungi.

Malleefowl mostly move about their home-range by foot and rarely fly except when they are disturbed or to roost in the canopy. Breeding birds tend to be sedentary, nesting in the same general area year after year, using a number of mounds over different years.

Malleefowl are thought to disperse on foot and various anecdotal reports suggest they use corridors of relatively thick vegetation when dispersing through open landscapes.

Malleefowl chicks are capable of dispersing widely almost immediately after emerging from their nests and do not seem confined to particular habitat types. Chicks move on average over 600 m per day, however some chicks can move over two kilometres per day.

Habitat

Typical Malleefowl habitat includes semi-arid to arid low woodlands, mallee and shrublands. The shrublands and low woodlands communities where Malleefowl occur are usually dominated by multi-stemmed species of eucalypts (mallee) and occur on sandy or loamy soils with abundant leaf litter, in areas that receive 200 to 450 millimetres (mm) of rainfall each year.

The breeding habitat of the Malleefowl, within its home range, is characterised by light soil and an abundant leaf litter, which is used in the construction of nesting mounds. However, the Malleefowl has been known to forage in open areas when they are located near more typical habitat i.e. in grasslands, crop fields and around roads close to remnant vegetation.

A sandy substrate with an abundance of leaf litter is required for construction of nest mounds (Figure 3) (Benshemesh, National Recovery Plan for Malleefowl, 2007).

Figure 2. Malleefowl (*Leipoa ocellata*), photographed attending a nest mound.

Figure 3. A typical Malleefowl nest mound in sandy substrate in a Mallee over *Triodia* Vegetation Association.

2.2 Status

The Malleefowl is listed as Vulnerable at both the Commonwealth (EPBC Act) and State (*National Parks and Wildlife Act 1972*) level.

Regionally, Malleefowl status on the Eyre Peninsula is shown in Table 1. Records in the Eyre Peninsula Landscape Board region are concentrated in the northern and central Eyre Peninsula, where larger and more interconnected patches of native Mallee vegetation occur (Figure 4). A cluster of records occurs in the north of the Project Area, south of the Myall Plains IBRA subregion.

Table 1. The regional status and population trends of Malleefowl on Eyre Peninsula listed by IBRA subregion.

IBRA Subregion	Status	Population Trend
Eyre Hills	Vulnerable	Probable decline
Eyre Mallee	Vulnerable	Probable decline
Gawler Volcanics	Vulnerable	Probable decline
Myall Plains	Vulnerable	Probable decline
Talia	Endangered	Probable decline
Yellabinna	Vulnerable	Probable decline

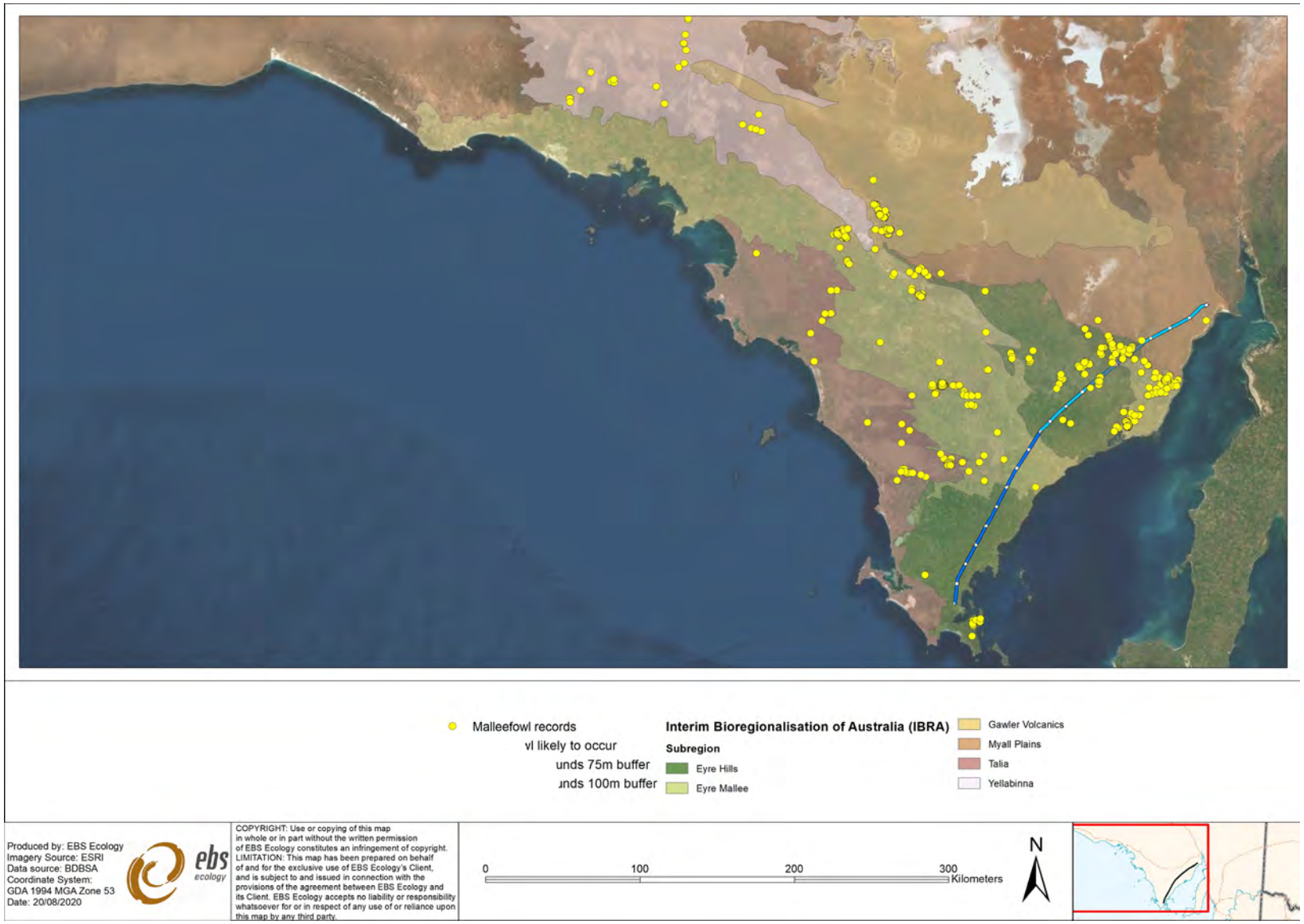

Figure 4. Malleefowl records collected since 1995 on the Eyre Peninsula (Department for Environment and Water, 2020a).

3 SURVEY EFFORT IN THE PROJECT AREA

3.1 Desktop assessments

Desktop assessments of the Project Area were undertaken during the early stages of project development to determine the likelihood of the presence of threatened flora and fauna. This work included literature reviews and the search of relevant databases.

First undertaken in 2012, desktop analysis was updated with new database searches in 2014 and 2019. Detailed methodology and results of desktop assessments are included in the following reports:

- *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019).
- *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology, 2014).
- *Eyre Peninsula Reinforcement Project: Phase 1 Desktop Assessment* (EBS Ecology, 2012).

Desktop assessments indicated that Malleefowl were highly likely to occur in areas north of Yadnarie, where extensive areas of interconnected habitat occur. In these areas, birds and their nest mounds continue to be recorded. This includes a 45 km section of the Project Area between Sheoak Hill Conservation Park and Iron Duchess (Figure 5).

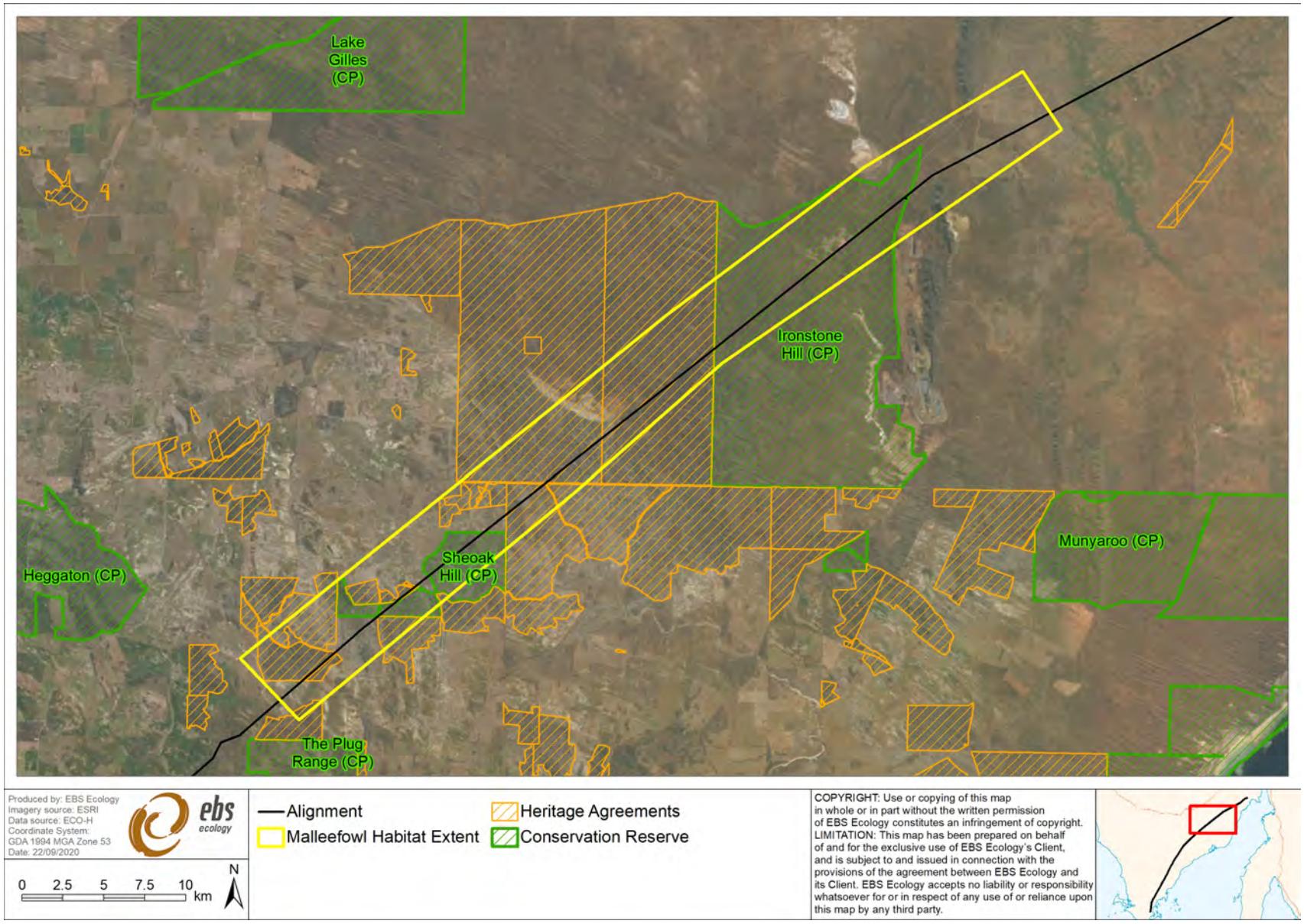

Figure 5. Extent of the Project Area where Malleefowl are highly likely to occur.

3.2 Fauna, Flora and Vegetation surveys

Several surveys have been undertaken within the Project Area (Table 2). Targeted surveys for Malleefowl were undertaken during the 2013 and 2019 studies, with any sightings of Malleefowl or signs of Malleefowl found during the 2020 work recorded as opportunistic sightings.

Table 2. Summary of previous survey work on Malleefowl within the Project Area.

Survey Year	Type of survey
2012	Baseline and targeted fauna, flora and vegetation surveys, bird surveys
2013	Further baseline surveys
2019	Comprehensive vegetation surveys
2020	Targeted threatened flora surveys and micro-siting

Methodology and results (in respect to Malleefowl) from the above studies are summarised in the following sections (below), with detailed accounts found in the following reports:

- *Eyre Peninsula Transmission Line EPBC Act Flora Survey – Winter 2020* (EBS Ecology, 2020).
- *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019).
- *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology, 2014).

3.2.1 Methodology

Areas identified as potential Malleefowl habitat by desktop analysis were targeted for baseline fauna and habitat surveys. Survey for Malleefowl followed methods detailed in the *Survey Guidelines for Australia's Threatened Birds: Guidelines for detecting birds listed as threatened under the EPBC Act* (Department of the Environment, Water, Heritage and the Arts, 2010). Areas were actively searched for mounds, tracks, scats and other signs and individual birds.

Vegetation surveys were carried out according to the Bushland Assessment Methodology (BAM) outlined in the *Native Vegetation Council (NVC) Bushland Assessment Manual* (Department for Environment and Water, 2020b). This method enables the categorising and mapping of vegetation into Vegetation Associations (VAs).

3.2.2 Results

Although no Malleefowl individuals were directly observed, the 2019 survey detected recent signs of Malleefowl activity at one location (Table 3). Fresh Malleefowl tracks were observed in 2019 on the access track that follows the existing ElectraNet transmission line. The 2019 observation indicates that although mounds in the Project Area have probably not been used recently, the area remains important habitat for Malleefowl.

Table 3. Location of Malleefowl track records in the Project Area (EBS Ecology 2019 and 2014).

Survey Year	Easting	Northing
2019	674182	6310955

Vegetation surveys determined that 19 VAs occur within Malleefowl habitat in the Project Area, as listed in Table 4. Note that VA numbers in the Table do not necessarily correspond to previous mapping.

VAs associated with Malleefowl mounds are shown on the Impact Assessment maps in Section 4. A complete map series of VAs in the Project Area is included within *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019).

Table 4. Location of Malleefowl track records in the Project Area (EBS Ecology 2019 and 2014).

VA Number	Vegetation Association description
1.	*Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.*
2.	*Acacia wilhelmiana +/- Senna artemisioides* ssp. *coriacea +/- Eucalyptus gracilis +/-Melaleuca uncinata* Tall Shrubland over *Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx.*
3.	*Callitris gracilis* Low Woodland over *Alyxia buxifolia* and *Beyeria lechenaultii +/- Alectryon oleifolius* ssp. *canescens +/- Dodonaea viscosa* ssp. *angustissima.*
4.	*Eremophila oppositifolia, Eremophila alternifolia, Dodonaea lobulata, Acacia nyssophylla* Open Shrubland over *Maireana sedifolia* and *Rhagodia ulicina.*
5.	*Eucalyptus brachycalyx +/- Callitris verrucosa* Mallee over *Calytrix involucrata* and *Phebalium bullatum.*
6.	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona.*
7.	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Melaleuca uncinata* and *Calytrix tetragona.*
8.	*Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata* mixed Mallee over *Cratystylis conocephala* and *Atriplex vesicaria.*
9.	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee.
10.	*Eucalyptus oleosa +/- Eucalyptus* spp. Mallee over *Maireana sedifolia.*
11.	*Eucalyptus porosa* Mallee over *Dodonaea viscosa* ssp. *angustissima, Senna artemisioides* ssp. *coriacea, Acacia wilhelmiana*.
12.	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus.*
13.	*Geijera linearifolia +/- Senna artemisioides* ssp. *coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia* Shrubland.
14.	*Maireana sedifolia* Low Shrubland *+/- Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *canescens.*
15.	*Melaleuca lanceolata* Tall Shrubland over *Atriplex stipitata* and *Dodonaea viscosa* ssp. *angustissima*.
16.	*Melaleuca uncinata +/- Eucalyptus brachycalyx +/- Callitris gracilis +/- Eucalyptus oleosa.*
17.	*Melaleuca uncinata* Shrubland.
18.	*Melaleuca uncinata* Tall Shrubland *+/- Eucalyptus incrassata* and *Eucalyptus brachycalyx.*
19.	*Senna artemisioides* ssp. *coriacea, Dodonaea lobulata* Tall Shrubland *+/- Myoporum platycarpum, Dodonaea viscosa* ssp. *angustissima* and *Acacia oswaldii.*

3.3 LiDAR Malleefowl mound and ground-truthing surveys

LiDAR surveys for Malleefowl were carried out in 2013 and 2019. Methodology and results of both surveys are summarised below. Further detailed information can be found in the following reports:

- *Malleefowl Monitoring within the ElectraNet Powerline Easement* (Ecological Horizons, 2020).
- *Survey for Malleefowl Mounds in the vicinity of the proposed new ElectraNet high voltage transmission line in north-eastern Eyre Peninsula* (Ecological Horizons, 2014).

3.3.1 Methodology

Aerial surveys for Malleefowl mounds, using LiDAR technology, were undertaken throughout the area identified by desktop and vegetation surveys as potential Malleefowl habitat. Surveys were carried out in 2013 and again in 2019 by Aerometrex and enabled the creation of an accurate digital elevation model (DEM) of Malleefowl habitat.

The DEM was then analysed by Anditi, using near-ground feature detection algorithms, to locate potential Malleefowl mounds. Each of these datapoints was then ranked depending on the probability of being a mound, as indicated in Table 5.

Table 5. LiDAR ratings for potential Malleefowl mounds (Ecological Horizons, 2020).

LiDAR Rating	Mound Likelihood
1	Highly likely Malleefowl mound
2	Moderately likely Malleefowl mound
3	Low likelihood of Malleefowl mound
4	Very low likelihood of Malleefowl mound

Datapoints with a LiDAR rating of 1, 2 or 3 were ground-truthed by Ecological Horizons (John Read and Katherine Moseby) in March 2014 and February 2020.

Datapoints with a LiDAR rating of 4 (indicating a very low likelihood of being a Malleefowl mound) were assumed to not be Malleefowl mounds and were not ground-truthed.

As well as confirming if a LiDAR datapoint was a Malleefowl mound, ground-truthing surveys identified whether a mound had been recently active. As per the survey guidelines (Department of the Environment, Water, Heritage and the Arts, 2010), the presence of tracks, feathers and scats was used to determine recent mound activity. Since eggshell can remain in the environment for some time, its presence was not used as a sign of recent activity, although it was recorded.

3.3.2 Environmental Buffer

Two environmental buffers have been mapped around Malleefowl mound locations:

- a 75 m environmental buffer from the centre-point of the mound; and
- a 100 m environmental buffer from the centre-point of the mound.

The aim of the 100 m buffer is to ensure that all permanent infrastructure is outside of this buffer. This means that after construction is complete and rehabilitation implemented, all transmission towers and access tracks will be at least 100 m from any confirmed mound.

The aim of the 75 m buffer is to ensure that all temporary structure construction pads/laydowns are located outside of this buffer. Structure construction is more intensive work with a longer duration than other construction work such as stringing. As such, the aim of the 75 m buffer is that temporary construction work associated with towers will be at least 75 m from any confirmed mound. Other temporary construction of short duration (such as stringing) will be undertaken within the 75m buffer with additional environmental management requirements where it cannot be avoided.

3.3.3 Results

Confirmed Mounds

The LiDAR surveys identified over 3000 datapoints within 350 m of the Project Area, of which only 56 were confirmed as Malleefowl mounds (Appendix 1). The 56 confirmed mounds consist of the following:

- The 2014 survey and subsequent ground-truthing confirmed 41 mounds;
- The 2019 survey and subsequent ground-truthing confirmed 36 mounds out of 40 locations ground-truthed (four locations were found not to be mounds);
- Of the 41 mounds confirmed in 2014, 21 were identical to those confirmed in 2019 and 20 were different; and
- Of the 36 mounds confirmed in 2019, 21 were identical to those confirmed in 2014 and 15 were new.

The total of 56 identified mounds consists of the 41 mounds confirmed in the 2014 survey and ground-truthing (including 21 which were identical to those picked up in 2014) plus the additional 15 that were identified in 2019.

The 56 Malleefowl mounds identified during LiDAR and ground-truthing are listed in Appendix 1.

Mounds Located within the Project Boundary

Of the 56 identified mounds identified, **no mounds are impacted by the Project**.

Of the 56 identified mounds, 17 Malleefowl mound buffers are impacted by the project.

Of the 17 Malleefowl mound buffers impacted by the project:

- For 3 Malleefowl mound buffers, the temporary stringing track will be inside the 100 m buffer;
- For 14 Malleefowl mound buffers, the temporary stringing track will be inside the 75 m buffer; and
- For the Malleefowl buffers for Malleefowl Mound (MM) 44 and MM45 - a portion of the temporary structure pad will be inside the 100 m buffer (but outside the 75 m buffer)

The 17 Malleefowl mound buffers impacted by the project are listed in Table 7.

Active Mounds

Ground-truthing surveys in 2014 found that one mound (MM7) had likely been active in the 2012 – 2013 summer (Ecological Horizons, 2014), but this mound is not impacted by the project.

Although Malleefowl signs were found at seven mounds in 2019, it was thought that mounds had not been used for nesting since at least 2016 (Ecological Horizons, 2020).

Out of the total of 56 mounds, a total of 32 mounds were assessed as recently active during either the 2014 or 2019 surveys and 24 mounds were found to be inactive. Of the 32 recently active mounds, only 8 are within the project boundary. No active or inactive Malleefowl mounds will be impacted by the project.

Of the 17 Malleefowl mound buffers potentially impacted by the project:

- 8 mounds were found to have been active between 2014 and 2019; and
- 9 mounds were found to have been inactive between 2014 and 2019.

Although some mounds were found to be inactive, works within both active and inactive Malleefowl mound buffers will be subject to environmental management requirements given the possibility that the mounds may become active again should Malleefowl populations improve.

The 11 recently active Malleefowl mounds impacted by the project are listed in Table 7.

Malleefowl Habitat and Activity in the Project Area

Results of survey effort to date, indicate that Malleefowl are distributed within a 45 km section of the Project Area, between Sheoak Hill Conservation Park and Iron Duchess (Figure 6 to Figure 13). The area is characterised by large and interconnected patches of Mallee and shrubland vegetation consisting of 20 VAs.

Fifty-six Malleefowl mounds have been recorded in seven of the 19 VAs within 350 m of the Project Area, as listed in Table 6.

Recent activity, indicated by tracks and scats, has been recorded in the following VAs:

- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee;
- *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee; and
- *Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. *and Calytrix tetragona.*

Although recent activity has only been found in these three VAs, given the interconnected nature of habitat, it is highly likely that Malleefowl occur in other Mallee and Shrubland habitats anywhere in the Project Area between Sheoak Hill Conservation Park and Iron Duchess.

Recent sign of Malleefowl at mounds indicates that the area may at least occasionally be used for breeding, even though the most recent survey suggested nesting had probably not occurred since 2016 (Ecological Horizons, 2020).

Table 6. Malleefowl records by Vegetation Association.

Record Type	Recent Activity	Vegetation Association
Mounds Tracks Scats	Yes	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus.*
Mounds	Yes	*Acacia wilhelmiana +/- Senna artemisioides* ssp. *coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over Triodia spp. *+/- Eucalyptus incrassata +/- Eucalyptus brachycalyx*.
Mounds Tracks Scats	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee.
Mounds Tracks	Yes	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. *and Calytrix tetragona.*
Mounds	Yes	*Melaleuca uncinata* Shrubland.
Mounds	Yes	*Melaleuca uncinata* and *Eucalyptus brachycalyx +/- Callitris gracilis +/- Eucalyptus oleosa*
Mounds	Yes	*Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata* mixed Mallee over *Cratystylis conocephala* and *Atriplex vesicaria.*

4 IMPACT ASSESSMENT

4.1 Direct impact to Malleefowl Mounds

Impacts to Mounds

No Malleefowl mounds will be directly impacted, destroyed or interfered with by either temporary or permanent project activities or infrastructure.

Impacts within Malleefowl Mound Buffers

Although no mound will be directly impacted, two environmental buffers have been established (as outlined previously in Section 3.3.2) to provide adequate distance between project activities and infrastructure and the habitat directly surrounding a mound.

All permanent infrastructure has been micro-sited outside of the 100 m buffer. This means that post-construction, no transmission towers or access tracks will be located within 100 m of a confirmed mound.

All temporary structure pads will be located outside of the 75 m buffer and only two temporary structure pads/laydowns will have a slight impact within the 100 m buffer (MM44 and MM45).

Only stringing activities will be undertaken within the 75 m buffer. Stringing work is temporary work of short duration and will be subject to environmental management requirements where it cannot be avoided (see Section 5).

Of the 56 identified mounds, only 17 Malleefowl mound buffers are impacted by the project. Of the 17 Malleefowl mound buffers impacted by the project:

- For 3 mounds (2 recently active, 1 inactive), the temporary stringing track will be inside the 100 m buffer;
- For 14 mounds (6 recently active, 8 inactive), the temporary stringing track will be inside the 75 m buffer;
- For MM44 (not active) and MM45 (recently active) - a portion of the temporary structure pad will be inside the 100 m buffer (but outside the 75 m buffer); and
- Only 8 Malleefowl mounds in total within the project activity zone are categorised as being recently active.

Potential impacts to Malleefowl mound buffers resulting from temporary construction and operational activities within 100 m of a recently active mound include:

- Reduced reproduction rates due to disturbance and subsequent abandonment of active mounds; and
- Increased risk of mortality due to vehicle strikes resulting from increased traffic during construction.

Table 7. Ground-truthed Malleefowl mounds within 75 m and 100 m of the impact footprint.

ElectraNet ID	Survey Year	Recently Active	Impact within 75 m Buffer	Impact within 100 m Buffer	Management Measures to be Implemented
MM1	2014 / 2019	Yes	No	Yes – stringing track	Yes
MM2	2014	Yes	Yes – stringing track	-	Yes
MM3	2014 / 2019	Yes	No	Yes – stringing track	Yes Structure pad to be shaped to avoid 100 m buffer if possible
MM5	2014 / 2019	Yes	Yes – stringing track	-	Yes Structure pad to be shaped to avoid 100 m buffer if possible
MM10	2014 / 2019	No	Yes – stringing track	-	Yes
MM18	2019	No	Yes – stringing track	-	Yes Structure pad to be shaped to avoid 100 m buffer if possible
MM20	2019	No	Yes – stringing track	-	Yes
MM21	2019	Yes	Yes – stringing track	-	Yes
MM24	2014	Yes	Yes – stringing track	-	Yes
MM25	2014 / 2019	No	Yes – stringing track	-	Yes
MM30	2014	Yes	Yes – stringing track	-	Yes Structure pad to be shaped to avoid 100 m buffer if possible
MM38	2014 / 2019	No	Yes – stringing track	-	Yes
MM41	2019	No	Yes – stringing track	-	Yes Structure pad to be shaped to avoid 100 m buffer if possible
MM44	2014 / 2019	No	Yes – stringing track	Yes – structure pad	Yes Structure pad to be shaped to avoid 75 m buffer if possible
MM45	2014 / 2019	Yes	Yes – stringing track	Yes – structure pad	Yes Structure pad to be shaped to avoid 75 m buffer if possible
MM46	2014 / 2019	No	No	Yes – stringing track	Yes
MM52	2019	No	Yes – stringing track	-	Yes Structure pad to be shaped to avoid 100 m buffer if possible

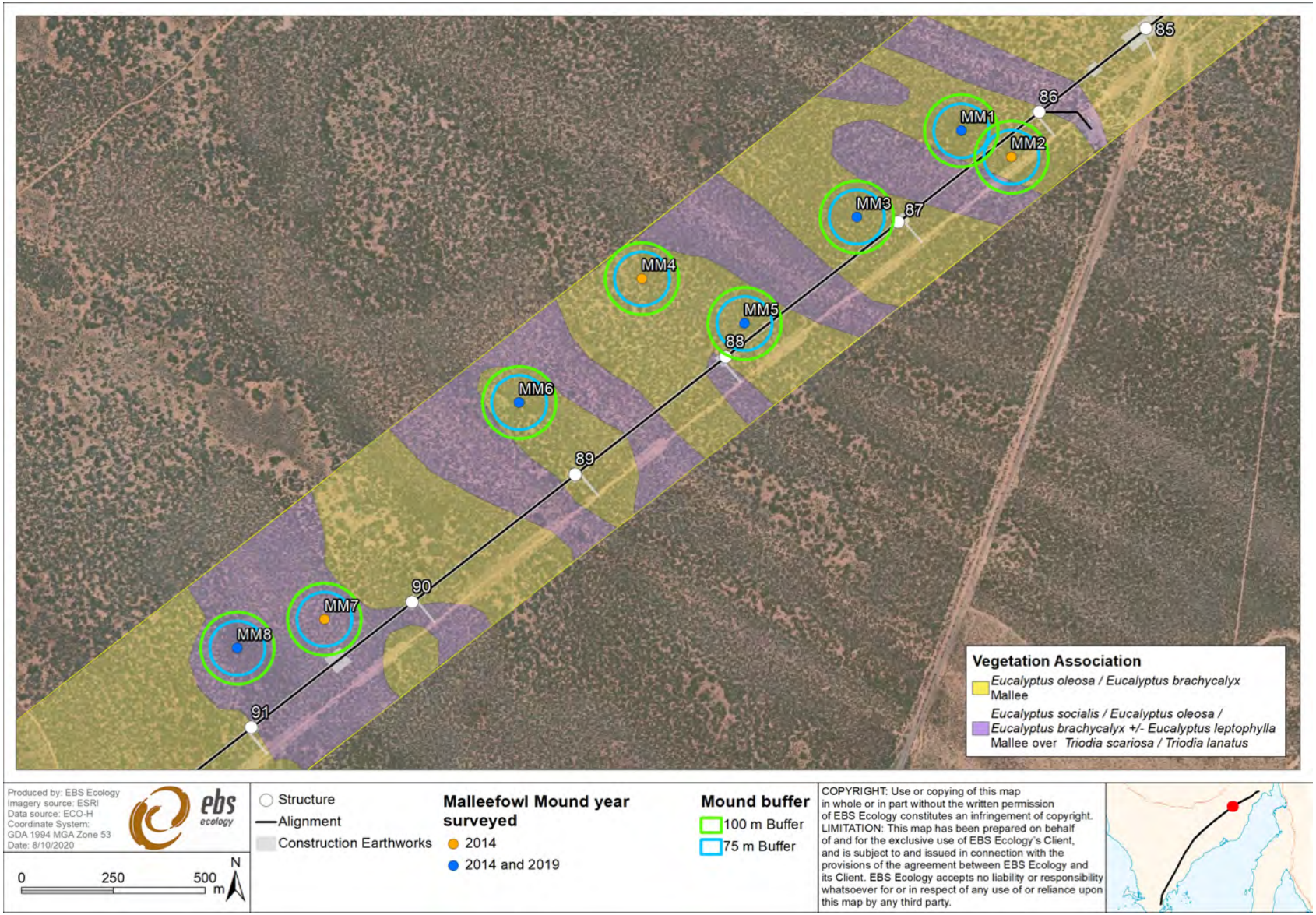

Figure 6. Proximity of Malleefowl mounds to the impact footprint, Map 1 of 9.

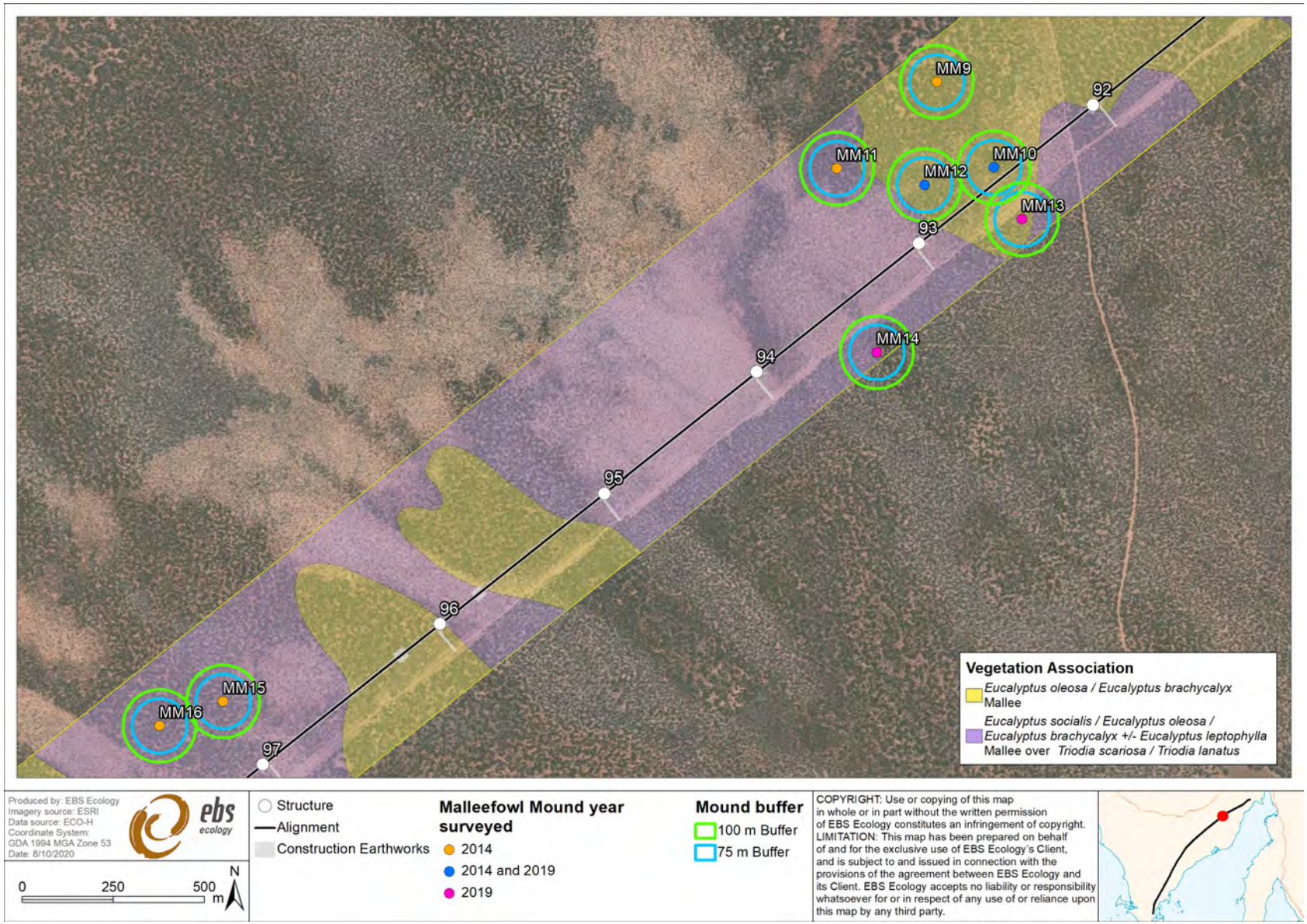

Figure 7. Proximity of Malleefowl mounds to the impact footprint, Map 2 of 9.

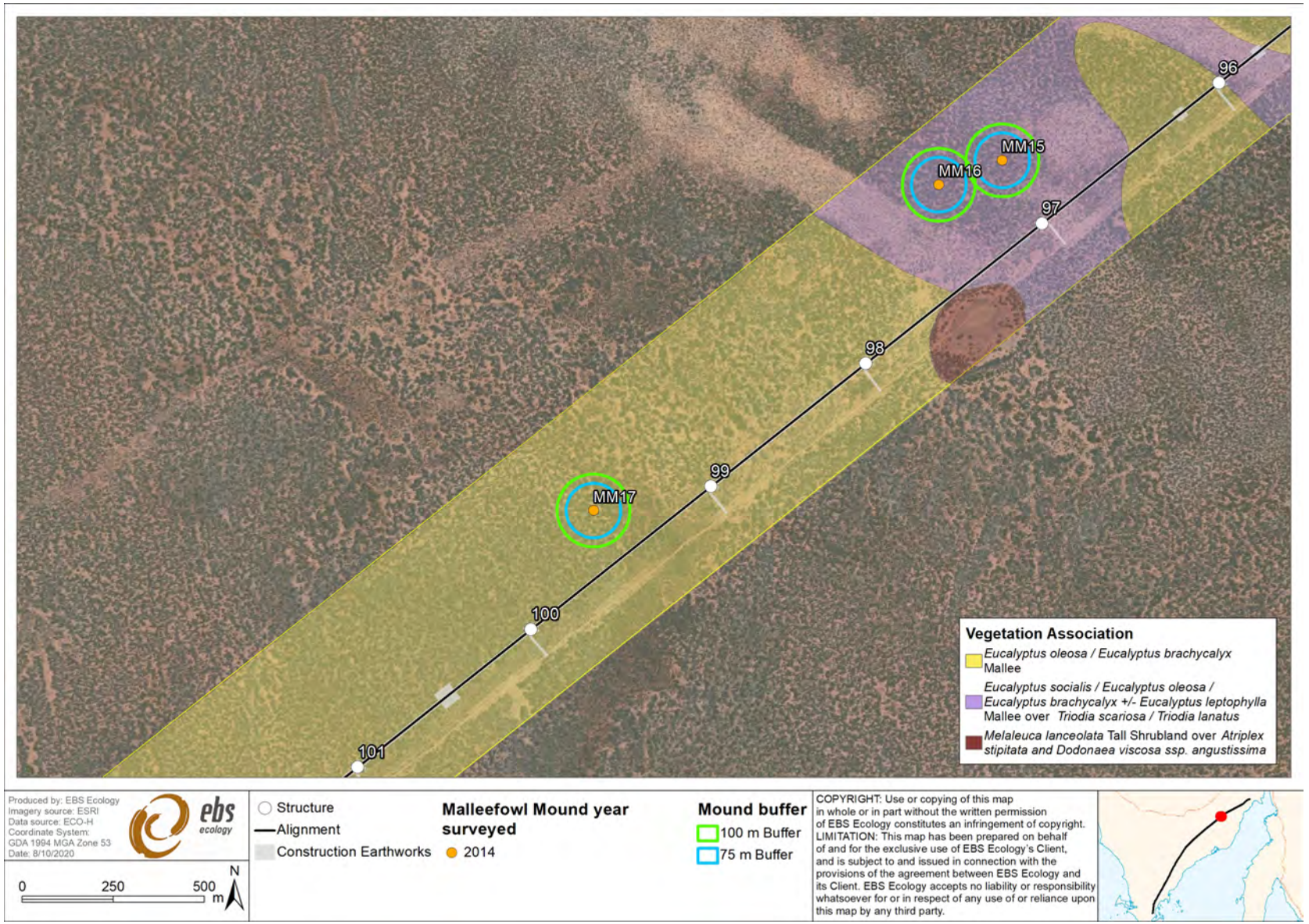

Figure 8. Proximity of Malleefowl mounds to the impact footprint, Map 3 of 9.

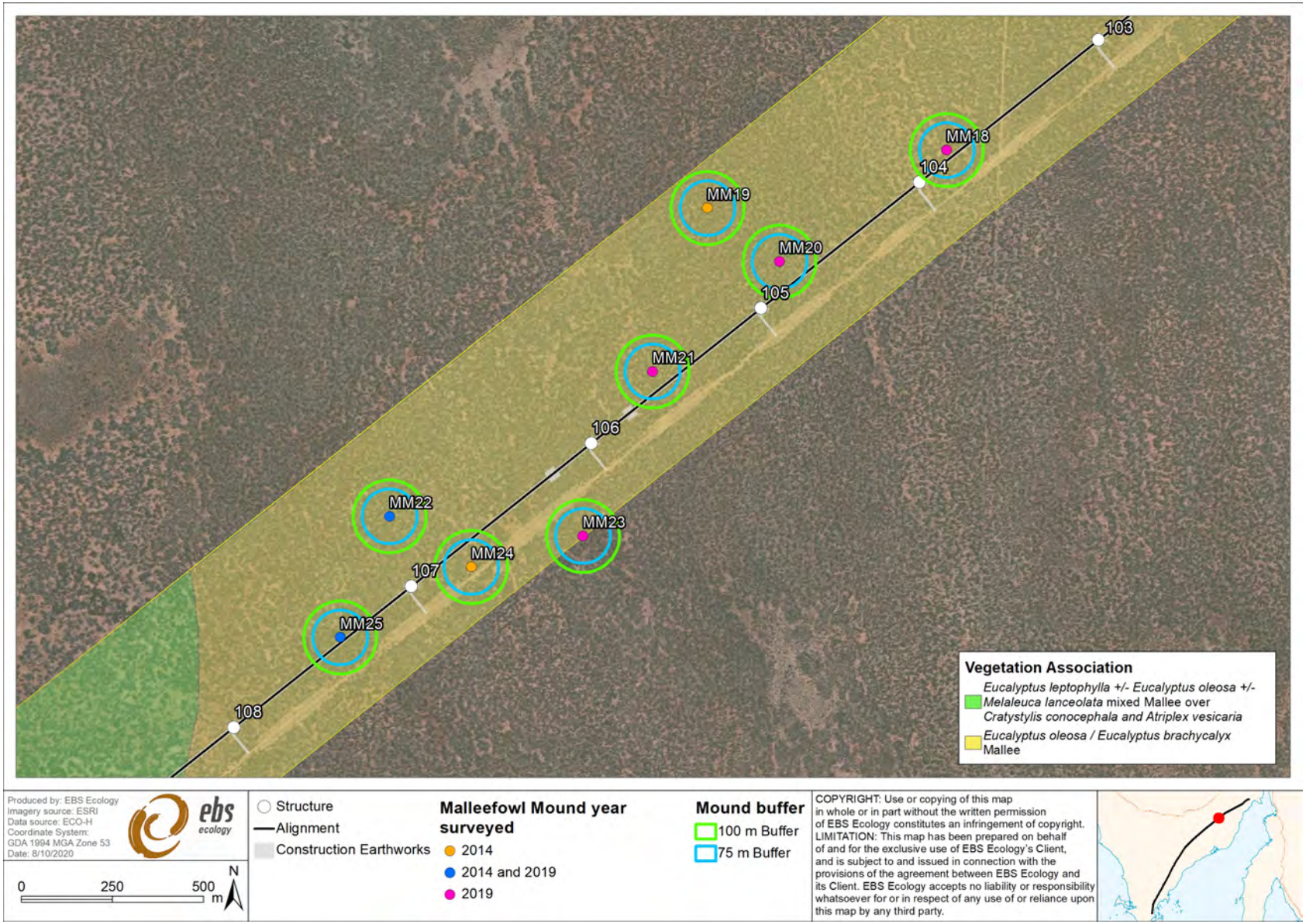

Figure 9. Proximity of Malleefowl mounds to the impact footprint, Map 4 of 9.

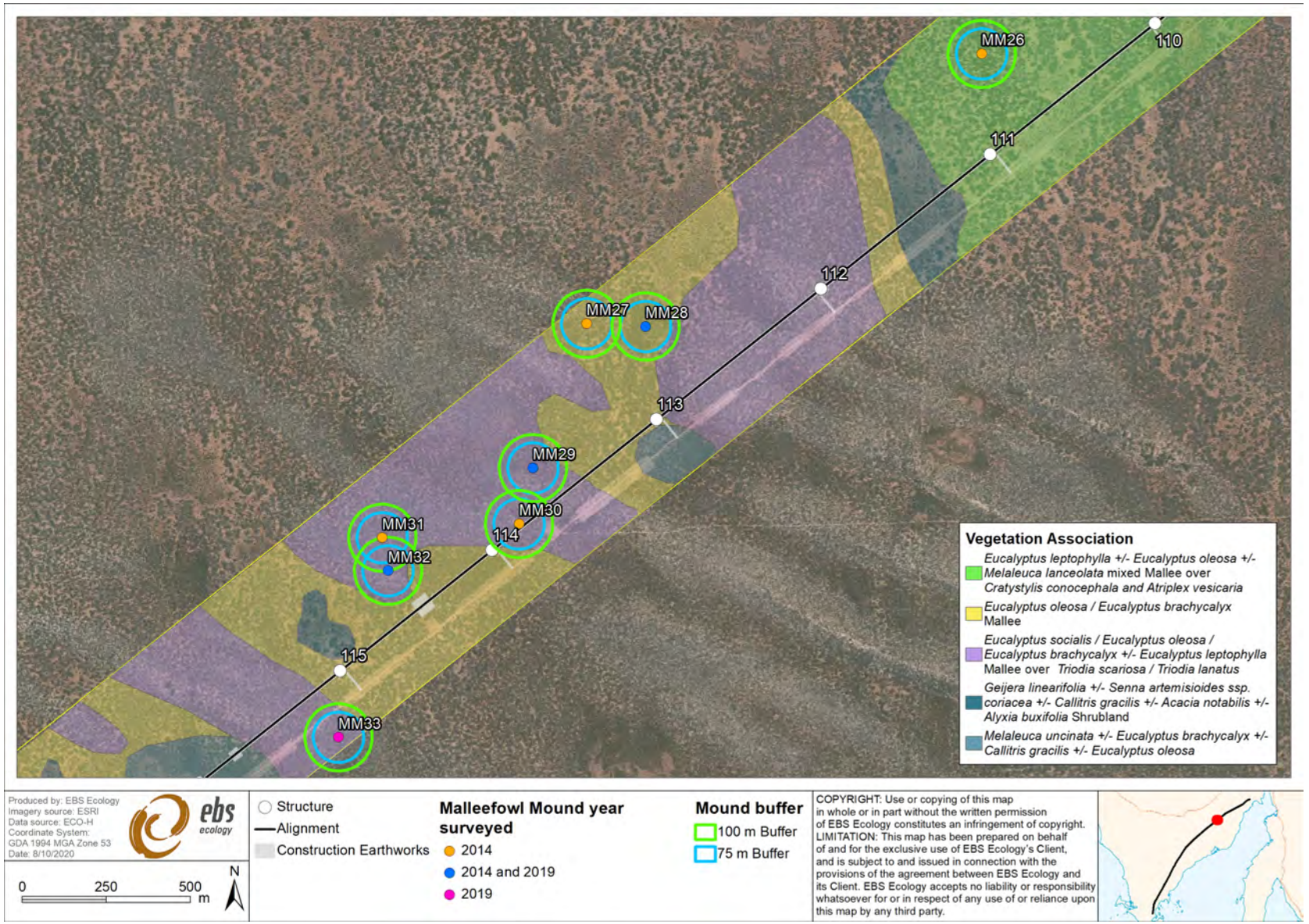

Figure 10. Proximity of Malleefowl mounds to the impact footprint, Map 5 of 9.

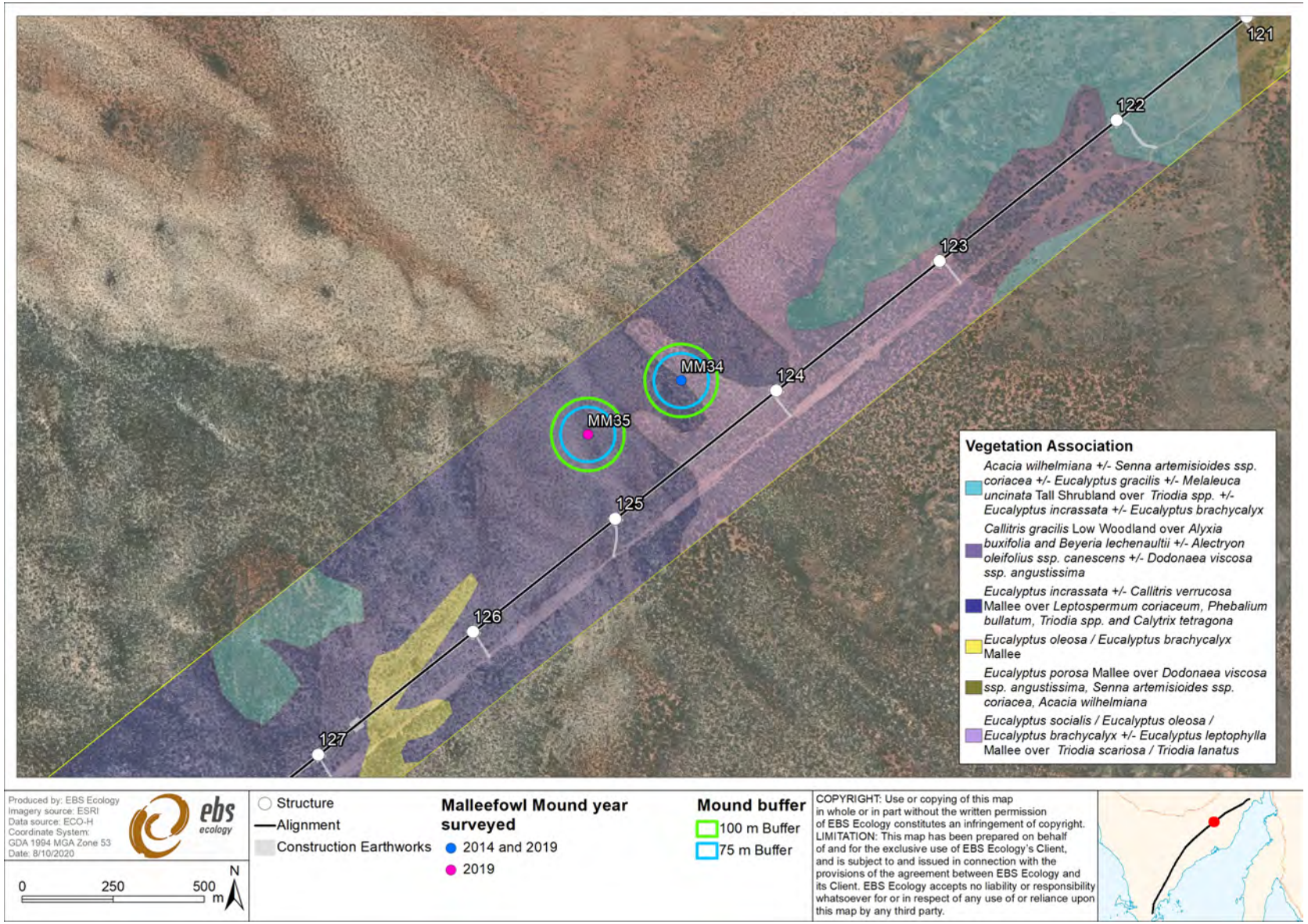

Figure 11. Proximity of Malleefowl mounds to the impact footprint, Map 6 of 9.

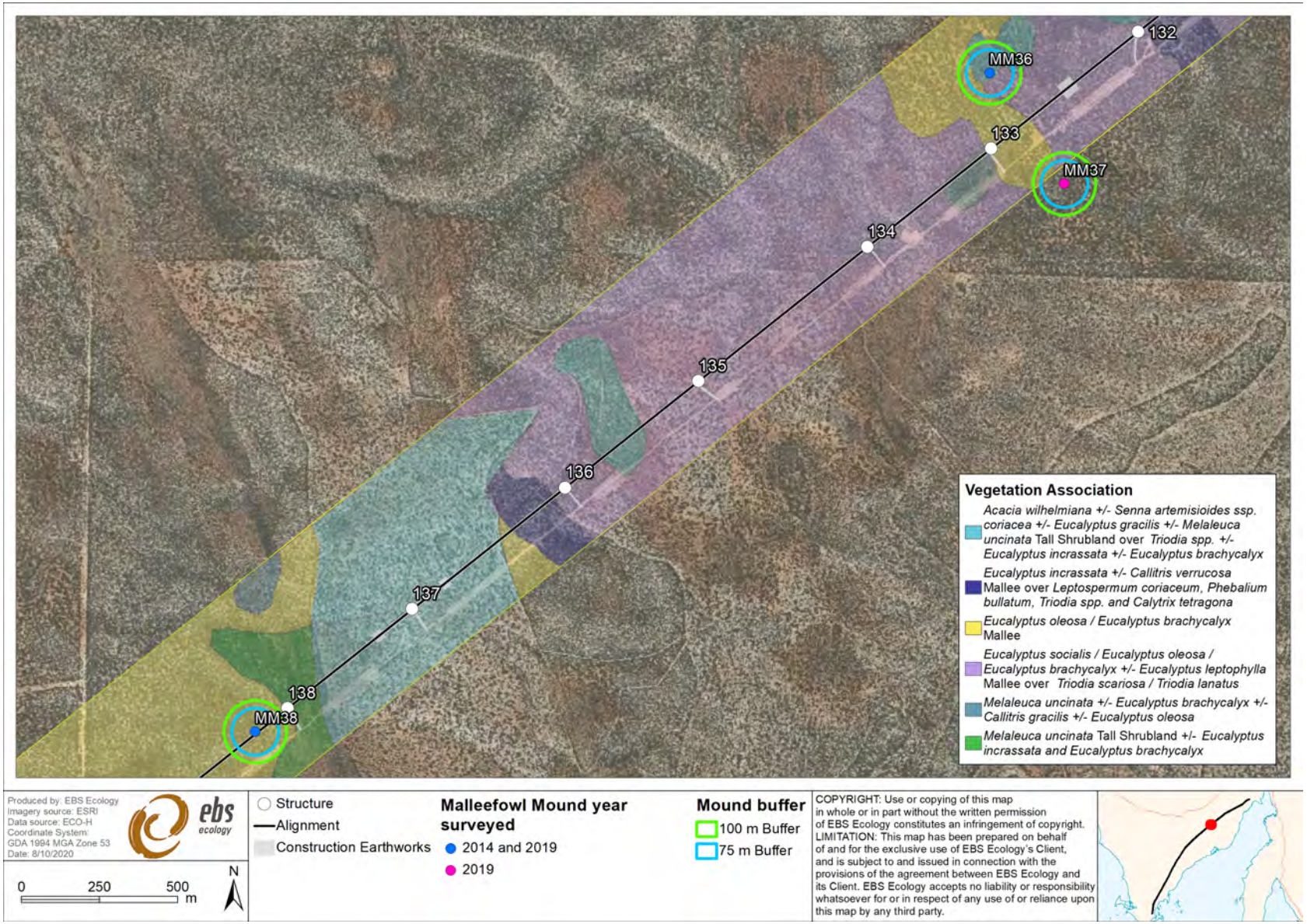

Figure 12. Proximity of Malleefowl mounds to the impact footprint, Map 7 of 9.

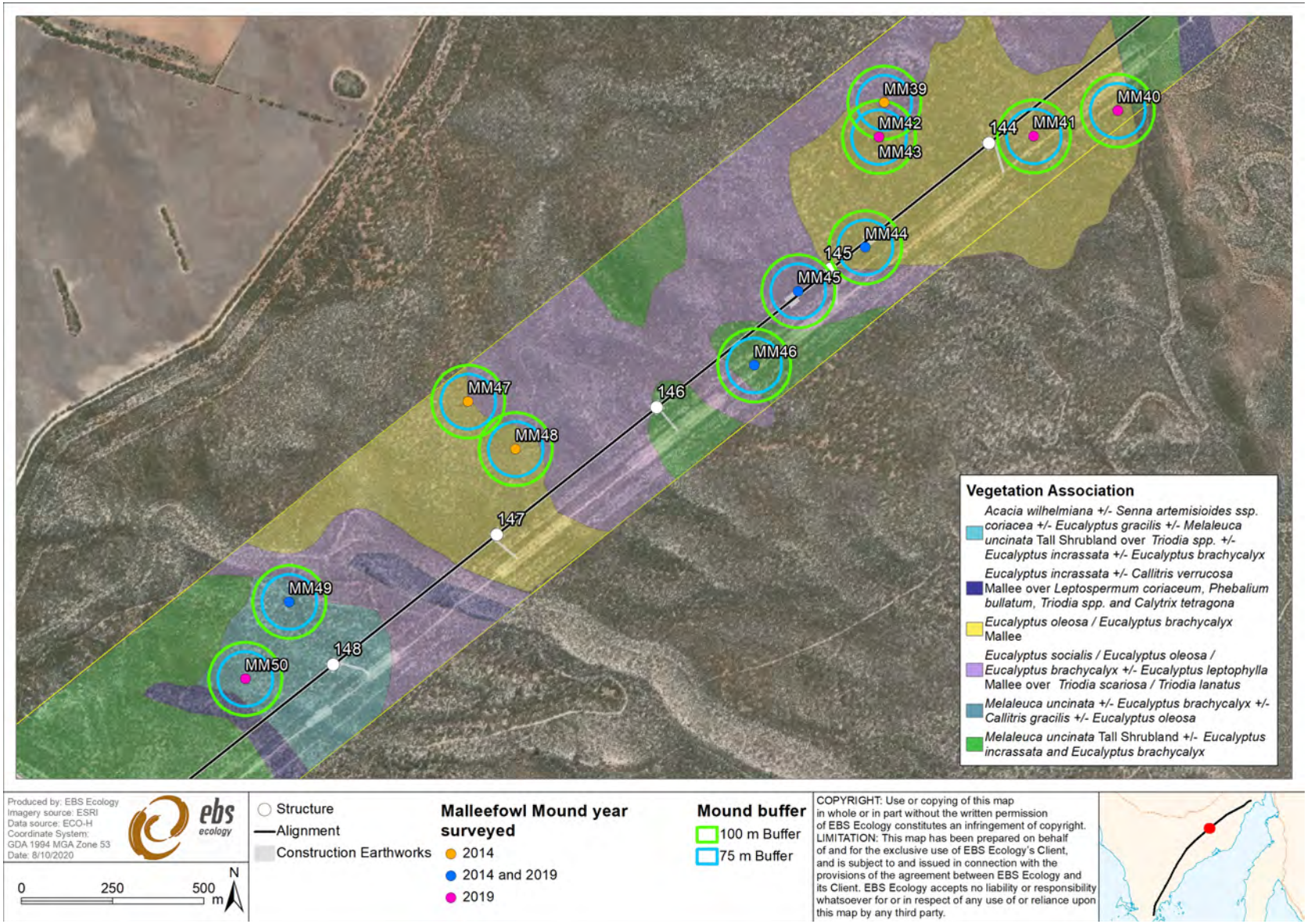

Figure 13. Proximity of Malleefowl mounds to the impact footprint, Map 8 of 9.

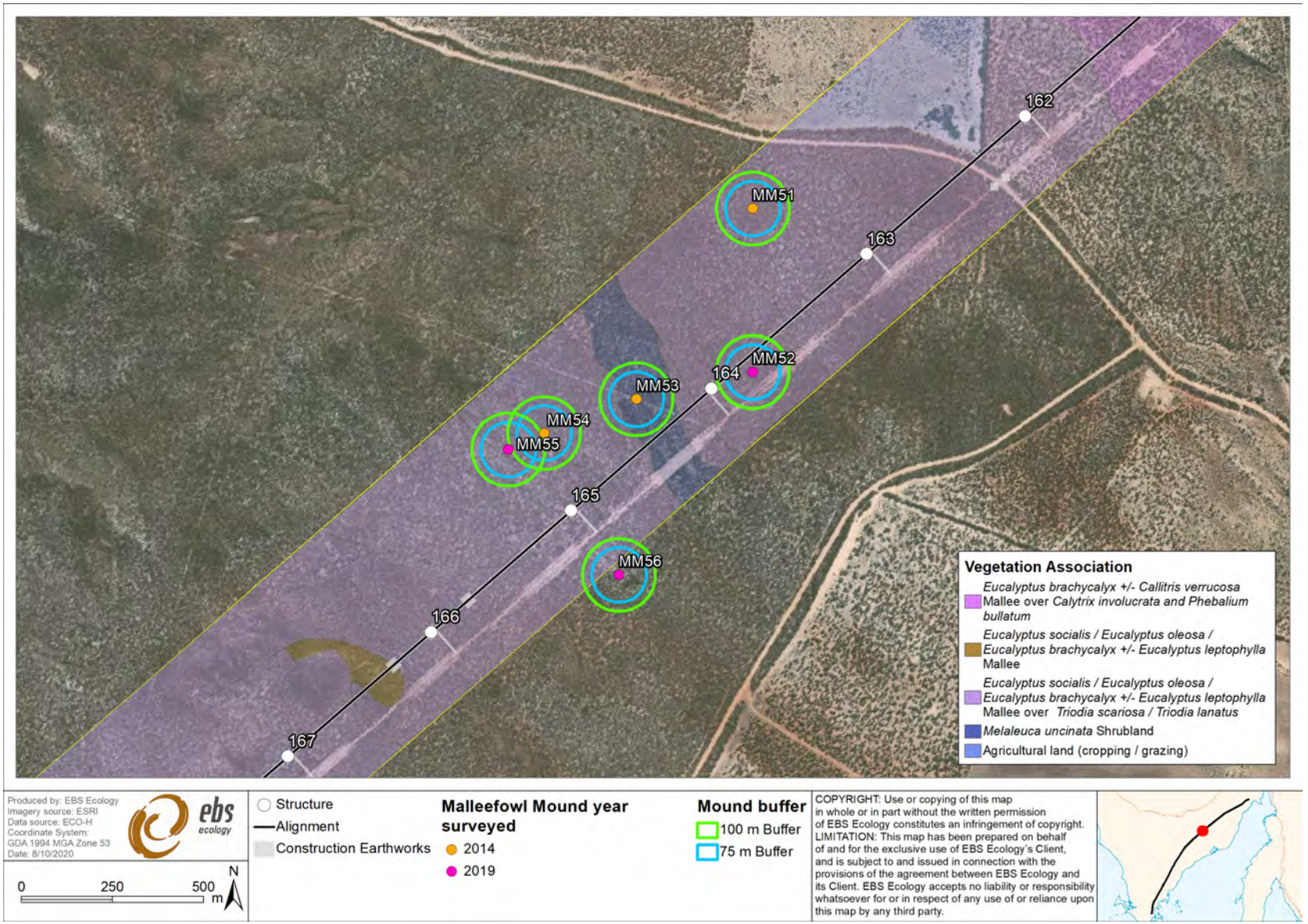

Figure 14. Proximity of Malleefowl mounds to the impact footprint, Map 9 of 9.

4.2 Direct impact to Malleefowl habitat

The Project requires the construction of suspension and strain towers, stringing lines, access tracks and stringing pads. This will require the removal of vegetation, directly impacting Malleefowl habitat by:

- Habitat removal;
- Habitat disturbance; and
- Habitat fragmentation.

Habitat removal will be permanent at the location of towers and access tracks. Areas cleared for stringing pads, stringing lines and laydown areas will be rehabilitated following completion of construction, with impact expected to be temporary only.

Calculated based on Project design at the time of writing, a total of 70.447 hectares (ha) of known Malleefowl habitat will be impacted (Table 8). Of this, 6.245 ha will be permanently impacted, while the remaining 64.194 ha will be rehabilitated. Impact will occur along a linear corridor within an otherwise mostly intact (i.e. not fragmented) Mallee woodland (EBS Ecology, 2019). The woodland is currently dissected by the existing transmission line easement access track and landholder access tracks. In context of these existing impacts, the 10 m temporary stringing corridor is considered insufficiently wide to result in significant fragmentation of habitat.

Table 8. Impact to Malleefowl habitat in the Project Area. Figures exclude impact to agricultural land (cropping and grazing).

Vegetation Association	Temporary Impact (ha)	Permanent Impact (ha)	Total Impact (ha)
Acacia papyrocarpa Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.*	1.296	0.085	1.381
Acacia wilhelmiana +/- Senna artemisioides ssp. *coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx.*	3.462	0.350	3.812
Callitris gracilis Low Woodland over *Alyxia buxifolia* and *Beyeria lechenaultii +/- Alectryon oleifolius* ssp. *canescens +/- Dodonaea viscosa* ssp. angustissima.	0.608	0.026	0.634
Eremophila oppositifolia, Eremophila alternifolia, Dodonaea lobulata, Acacia nyssophylla Open Shrubland over *Maireana sedifolia* and *Rhagodia ulicina.*	0.369	0.078	0.447
Eucalyptus brachycalyx +/- Callitris verrucosa Mallee over *Calytrix involucrata* and *Phebalium bullatum*.	1.775	0.177	1.952
Eucalyptus incrassata +/- Callitris verrucosa Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona.*	3.831	0.368	4.199
Eucalyptus incrassata +/- Callitris verrucosa Mallee over *Melaleuca uncinata* and *Calytrix tetragona.*	3.132	0.307	3.439
Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata mixed Mallee over *Cratystylis conocephala* and *Atriplex vesicaria.*	2.024	0.169	2.193
Eucalyptus oleosa / Eucalyptus brachycalyx Mallee.	19.313	1.880	21.193
Eucalyptus oleosa +/- Eucalyptus spp. Mallee over *Maireana sedifolia.*	1.041	0.053	1.094

Vegetation Association	Temporary Impact (ha)	Permanent Impact (ha)	Total Impact (ha)
Eucalyptus porosa Mallee over *Dodonaea viscosa* ssp. *angustissima, Senna artemisioides* ssp. *coriacea, Acacia wilhelmiana*.	0.959	0.112	1.071
Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over *Triodia scariosa / Triodia lanatus.*	21.243	2.096	23.344
Geijera linearifolia +/- Senna artemisioides ssp. *coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia* Shrubland	0.510	0	0.510
Maireana sedifolia Low Shrubland *+/- Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *canescens.*	1.396	0.141	1.537
Melaleuca lanceolata Tall Shrubland over *Atriplex stipitata* and *Dodonaea viscosa* ssp. *angustissima*.	0.008	0	0.008
Melaleuca uncinata +/- Eucalyptus brachycalyx +/- Callitris gracilis +/- Eucalyptus oleosa.	1.077	0.186	1.263
Melaleuca uncinata Shrubland.	0.627	0.012	0.639
Melaleuca uncinata Tall Shrubland *+/- Eucalyptus incrassata* and *Eucalyptus brachycalyx.*	1.308	0.179	1.487
Senna artemisioides ssp. *coriacea, Dodonaea lobulata* Tall Shrubland +/- *Myoporum platycarpum, Dodonaea viscosa* ssp. *angustissima* and *Acacia oswaldii.*	0.218	0.026	0.244
Total Impact (ha)	**64.194**	**6.245**	**70.447**

4.3 Indirect impacts to Malleefowl and Malleefowl habitat

Removal, disturbance and fragmentation of habitat may indirectly impact Malleefowl as follows:

- Potential increased predation risk on Malleefowl by feral animals such as foxes and cats caused by the establishment of 'predator highways' (in the form of vehicle access tracks) through a largely intact area of habitat;
- Potential increased predation risk on Malleefowl by native birds of prey due to the establishment of additional perching/roosting sites (in the form of transmission towers/structures);
- Potential decreased opportunities for dispersal, particularly for Malleefowl chicks, due to habitat fragmentation and increased predation risk; and
- Potential reduced use of the general area by Malleefowl, due to human disturbance associated with construction and operation (e.g. construction noise and increased vehicle traffic).

In addition, Malleefowl habitat not directly affected by construction and/or operational activities may be indirectly impacted by weed invasion, altered fire regimes and increased grazing pressure from feral and native herbivores. Potential indirect impacts to Malleefowl resulting from these processes may include:

- Potential weed invasion:
    - Reduction in available foraging resources caused by increased incidents of weed outbreaks altering the floristics of habitat.

- Potential altered fire regimes:
    - Changing fire patterns due to increased incidence of ignition and wildfire resulting from increased human activity and operation of the transmission line, leaving habitat unsuitable.
- Potential increased grazing pressure:
    - Increased access to habitat by herbivores, such as goats and kangaroos, causing decreased foraging resources for Malleefowl and altering floristics of habitat;
    - Increased access to habitat by herbivores, such as goats and kangaroos, removing the litter layer and trampling nesting mounds; and
    - Increase in rabbit population, caused by opening up habitat, sustaining larger populations of predators.

4.4 Cumulative impacts

Adult Malleefowl tracked near the impact footprint have been shown to disperse up to 40 km in suitable habitat (Katherine Moseby Pers. Comm. February 2020). For this reason, a buffer of 50 km around the impact footprint has been applied to discuss cumulative impact of the project.

Clearing of Mallee habitats, especially on fertile soils in areas of higher rainfall, is known to have been a primary cause of decline in Malleefowl populations throughout their distribution (Benshemesh, National Recovery Plan for Malleefowl, 2007). Using available mapping from the *National Vegetation Information System* (Department for Environment and Water, 2020b), it is estimated that approximately 290 000 ha of suitable Malleefowl habitat occurs within 50 km of the proposed impact footprint (Figure 15). Of this, 126 500 ha is currently protected in reserves. The remaining 163 500 ha occurs within farmland and road corridors and is likely subject to impacts related to grazing, clearing and management of vegetation (Table 9).

Table 9. Estimated total area of Malleefowl habitat within 50 km of the transmission line and approximate proportion impacted.

	Approximate Area (ha)	Impact Extent (ha)	Proportion of Habitat Impacted (%)
Unreserved	163 500	31.25	0.02
Ironstone Hill Conservation Park	19 728	24.5	0.12
Sheoak Hill Conservation Park	2430	14.7	0.60
Other Reserves	104 342	0	0
Total	**290 000**	**70.447**	**0.03**

The cumulative impact of vegetation disturbance associated with the transmission line is difficult to assess. What is clear is that the proportion of available Malleefowl habitat within 50 km to be impacted is small (0.03%). Although it should be noted that this includes vegetation otherwise protected within reserves. It is likely that the impacts associated with habitat fragmentation caused by the linear development are more important than the cumulative impact of removing a relatively small proportion of likely Malleefowl habitat.

Figure 15. Extent of likely Malleefowl habitat, expressed as *Eucalyptus* mallee forest and mallee woodland, within 50 km of the Project Area, or impact footprint (Department of Agriculture, Water and the Environment, 2018).

5 IMPACT MANAGEMENT

5.1 Avoiding impacts to Malleefowl and habitat

ElectraNet will avoid direct impact to Malleefowl mounds and Malleefowl habitat where possible. This will be achieved by undertaking the management actions listed in Table 10.

Table 10. Disturbance of active nest mounds avoidance measures.

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing	Responsibility
Direct impacts	Disturbance of active nest mounds. Abandonment of nest mounds. Increased risk of mortality due to vehicle strikes.	Micro-siting of structure pads/laydowns infrastructure to avoid disturbance within 75 m of a Malleefowl mound.	Construction	Principal Contractor
		Micro-siting of permanent infrastructure (structures and access tracks) to avoid disturbance within 100 m of Malleefowl mound.	Construction	
		40 km/h speed limit will be imposed on all access roads and within the transmission line easement.	Construction Operation	
		Major construction works (i.e. those associated with vegetation clearance, foundations and structure construction and erection) will be limited to period outside of the Malleefowl breeding season wherever these works are required within 500 m of an active Malleefowl mound	Construction	

5.2 Minimising and mitigating impacts to Malleefowl and habitat

Where avoidance is not possible, ElectraNet will take actions to minimise and mitigate the impact of construction and operation of the Eyre Peninsula Transmission Line. These actions are listed in Table 11 and Table 12.

Additional management actions that ElectraNet and its contractors will implement to minimise impact on other biodiversity values are detailed within the *EP Transmission Line Threatened Species Management Plan (Construction)* (EBS Ecology, 2020).

Table 11. Direct and cumulative impacts and mitigation measures.

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
Direct impact Cumulative impact	Habitat removal/disturbance and fragmentation.	Under no circumstances shall Malleefowl mounds be interfered with.	✓	✓	Principal Contractor
		No permanent infrastructure shall be installed within 100m of a Malleefowl mound (the 100m Malleefowl buffer).	✓	✓	
		The 100m Malleefowl buffers shall be flagged, signed and protected in the field to minimise entry and to ensure they are not damaged. Flagging is only required on the face of the buffer which is located closest to the work front and does not need to include existing access tracks. Flagging can be temporarily removed during stringing activities.	✓		
		Existing access tracks which pass through the 100m Malleefowl buffers may be used.	✓	✓	
		Structure pads must be shaped to avoid impacts within the 100m Malleefowl buffer except for structure 145 on the Cultana to Yadnarie line where land disturbance associated with the structure pad shall be shaped to avoid impacts within a 75m Malleefowl buffer.	✓		
		A fauna inspection must be undertaken immediately prior to commencing any construction (including temporary clearance) that is within the 100m Malleefowl buffer) to ascertain if the mound is active (i.e. if a Malleefowl is nesting). If a Malleefowl is present, advice shall be obtained from a fauna specialist on the best way to manage construction to minimise impacts on the Malleefowl.	✓		
		Vegetation clearance must be minimised during preparation of the stringing access corridor within the 100m Malleefowl buffer. Trees and other large vegetation shall be preferentially hand trimmed where branches are overhanging the CAZ. The stringing access corridor shall be micro-sited to avoid trees and larger vegetation where possible.	✓		

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
		Where the stringing corridor is located within 25m of a Malleefowl mound, a fauna spotter with environmental qualifications shall be present for the duration of the stringing works including the preparation of the stinging access corridor adjacent that mound to ensure the mound is not damaged and vegetation impacts are minimised. This is in addition to the pre-construction fauna inspection.	✓		
		A 500 m construction buffer will be implemented around active Malleefowl nests. When in the 500 m construction buffer, the following must be undertaken outside of breeding season (October to February): • Clearing for access tracks, structure pads and stringing access corridor; • Clearing for stringing pads located in proximity to the Middleback substation where a 500m buffer from active mounds is not possible; • Foundations; and • Tower erection. The following activities may be undertaken within the 500 m construction buffers within breeding season (October to February): • Works on the existing Middleback substation, including works to connect the new powerline to the substation; • Travel on, and maintenance of, the existing transmission line access track; • Stringing activities; and • Braking and winching on the stringing pads located in proximity to the Middleback substation where a 500 m buffer from active mounds is not possible.	✓		

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
		A suitably qualified expert will assess all Malleefowl mounds within 500 m of the line during the breeding season immediately prior to construction activities commencing to determine whether Malleefowl mounds are “active” or “inactive” for the purposes of finalising the 500 m construction buffers.	✓		
		Line stringing works may be undertaken during the breeding season if required, as these occur over a short period. The process for stringing operations during the breeding season will be: 1. Light draw wires will be pulled into position down the centreline under the towers during a single pass down the temporary stringing access corridor. Draw wire is a light wire that is pulled out first. It is the only wire that is laid on the ground. It is used to pull out the heavier conductor wire. 2. The draw wires are then connected to the towers and then tensioned until the tension results in the draw wires floating into the air. 3. This tensioning (braking and winching) will be done on stringing pads that are outside of the 500 m buffer (except for two pads at Middleback mine which are outside a 320 m buffer). 4. Once in the air, the draw wire will then be connected to the heavier conductor and Optical Ground Wires (OPGW) and it will be used to pull them into position (in the air). 5. The earth wire and conductor wire will then be tensioned (in the air) until it is in the correct position (again using the stinging pads that are outside of the 500 m buffer except for two stringing pads at Middleback mine which are outside a 320 m buffer).	✓		

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
		Stringing pads (located approximately every 8-9 km), otherwise known as brake and winch sites, will be re-designed to be located outside of a 500 m buffer around active Malleefowl mounds where engineering constraints (including conductor and OPGW spool lengths and localised restrictions including other infrastructure such as rail, roads, existing substations) allow. There are two stringing pads that cannot be located outside of the 500 m buffer in the vicinity of the Middleback mine – these will be located outside of a 320 m buffer. These stringing pads will be cleared outside of the breeding season (October to February) given that they are within the 500 m construction buffer. These sites are located at the intersection of an operational Simec mine (Iron Duke), a rail line servicing the mine and haul road for the mine which operate at all times of the year. It is considered, in this context, that stringing activities will not result in a change in the level of disturbance at the closest Malleefowl mounds.	✓		
		Construction contractor to have a Construction Environmental Management Plan approved by ElectraNet	✓		
		Construction contractor to have a Rehabilitation Management Plan approved by ElectraNet.	✓		
		Construction contractor to have a Weed, Pest and Disease Management Plan approved by ElectraNet.	✓		
		Construction contractor to have a Waste Management Plan approved by ElectraNet.	✓		
		All waste, including food wrappers and food scraps, will be removed and disposed of within a licensed waste disposal facility and in accordance with a Waste Management Plan.	✓	✓	
		Vegetation clearing will be restricted to the smallest area possible to allow construction, as documented in Eyre Peninsula Transmission Line – EPBC Preliminary Documentation Report	✓		

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
		Areas of vegetation to be retained within the Construction Activity Zone to be retained will be clearly marked and roped off using flagging.	✓		
		For temporary clearances ground vegetation will be rolled or driven over rather than cleared unless clearance needed for access, stability or safety to allow for effective rehabilitation.	✓		
		Trees in the stringing corridor within 50 m of an active Malleefowl mound that require removal shall be felled in a way that encourages rapid regeneration/reshooting from lignotubers or stumps (coppicing). This may include trimming the stump using a mulcher, or hand-felling to leave a small stump to encourage regrowth.	✓		
		64.194 ha of 70.447 ha area disturbed will be rehabilitated.		✓	
		Site offices, camps, laydown areas and stockpile sites will be restricted to areas that do not contain native vegetation or native vegetation that will be cleared as part of construction.	✓	✓	
		ElectraNet will fund Ecological Horizons to undertake predator management as part of the Project.		✓	ElectraNet
		Residual impact of vegetation clearing will be offset by ElectraNet's SEB contribution and other offsetting as approved under the EPBC Act.		✓	
		Stringing corridor within 50 m of recently active Malleefowl nests will be actively rehabilitated using coppicing and/or direct planting to encourage more rapid rehabilitation.		✓	

Table 12. Potential indirect impacts and mitigation measures.

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
Indirect Impacts	Weed invasion	Construction contractor to have a Weed, Pest and Disease Management Plan (including Phytophthora) approved by ElectraNet. The plan will be developed based on baseline winter and summer weed surveys undertaken prior to construction.	✓	✓	Principal Contractor
		Limit entry/exit points to the Project Area to the minimum number possible.	✓	✓	
		Undertake weed surveys of all proposed disturbance areas prior to commencement of construction works.	✓		
		Designate/establish vehicle and machinery washdown and inspection sites.	✓		
		All fill materials required for construction (e.g. sand, soil, gravel) will be sourced from certified weed and phytophthora free sites.	✓		
		Restrict all vehicle and machinery traffic to designated (existing and new) roads and access tracks that are approved by landowners.	✓	✓	
		All vehicles and machinery accessing the Project Area will be washed down and inspected by a trained responsible officer in accordance with the Weed Management Plan. This will occur at the designated washdown/inspection sites. Heavy vehicles/machinery must be certified weed and soil free by the responsible officer prior to entering the Project Area.	✓		
		The Project Area and construction sites will be regularly surveyed for weed outbreaks. Outbreaks and recommended corrective action will be communicated to ElectraNet.	✓	✓	
		New weed outbreaks will be controlled in accordance with the Weed, Pest and Disease Management Plan. Any weed control will be undertaken only after consent from landowners.	✓	✓	
Indirect impacts	Changing fire regimes	Construction contractors to have a Bushfire Management Plan approved by ElectraNet.	✓	✓	Principal Contractor

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
		All vehicles accessing Project Area will be fitted with fire extinguishers or other suitable firefighting equipment such as water carts that are inspected regularly.	✓	✓	
		Hot works will only occur on days of total fire ban under appropriate permit, in compliance with the documented plan and regulations. Restrictions will be in place on catastrophic rating days.	✓	✓	
		Contractors' work safety documentation will include emergency response procedures for the event of fire.	✓	✓	
		Personnel will be informed of daily CFS Fire Danger Rating at daily toolbox meetings. The Fire Danger Rating will form part of the daily risk analysis at these meetings.	✓	✓	
		At all times during the declared Bushfire Danger Season, or on days of Total Fire Ban outside the declared season, light vehicles will carry fire-fighting backpacks for each personnel in vehicle. From spring to autumn, all light vehicles will carry one fire fighting backpack and shovel as a minimum regardless of the fire danger rating.	✓	✓	
		Any incidents of unplanned ignition will be immediately (or as soon as practicable) reported to the CFS and ElectraNet.	✓	✓	
		Procedures relating to fire management in the Project Area, including contact details of relevant authorities (e.g. CFS) and information sources, will be clearly communicated to all personnel during inductions.	✓	✓	
Indirect impacts	Competition from herbivores/grazing	Unless clearance is required for access, stability or safety reasons, ground vegetation will be rolled rather than cleared to minimise disturbance to topsoil, seedstock and rootstock.	✓		Principal Contractor
		64.194 ha of 70.447 ha area disturbed will be rehabilitated.	✓	✓	
		Residual impact of vegetation clearing will be offset by ElectraNet's SEB contribution and other offsetting as approved under the EPBC Act.	✓		ElectraNet

Impact Type	Impacts	Avoidance and Mitigation Measure	Timing		Responsibility
			Construction	Operation	
Indirect impacts	Potential increased predation by cats and foxes. Potential increased predation by birds of prey. Potential decreased opportunities for dispersal.	All construction contractors to have a Rehabilitation Management Plan approved by ElectraNet.	✓	✓	Principal Contractor
		All contractors to have a Weed, Pest and Disease Management Plan approved by ElectraNet.	✓	✓	
		All construction contractors to have a Waste Management Plan approved by ElectraNet.	✓	✓	
		All waste, including food wrappers and food scraps, will be removed and disposed of within a licensed waste disposal facility and in accordance with a Waste Management Plan.	✓	✓	
		Vegetation clearing will be restricted to the smallest area possible to allow construction, as documented in Eyre Peninsula Transmission Line – EPBC Assessment.	✓		
		Designated Construction Activity Zones will be planned and approved by ElectraNet via a Land Disturbance Permit. All works will be confined to those approved activity zones. Areas of vegetation within the Construction Activity Zone to be retained will be clearly delineated using fencing, flagging, roping off and/or signage.	✓		
		Unless clearance is required for access, stability or safety reasons, ground vegetation will be rolled rather than cleared to minimise disturbance to topsoil, seedstock and rootstock.	✓		
		64.194 ha of 70.447 ha area disturbed will be rehabilitated.		✓	
		Residual impact of vegetation clearing will be offset by ElectraNet's SEB contribution and other offsetting as approved under the EPBC Act.		✓	ElectraNet
		ElectraNet will fund Ecological Horizons to undertake predator management as part of the Project.		✓	

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7 APPENDICES

Appendix 1 – Malleefowl mounds surveyed by LiDAR and confirmed by ground-truthing.

New ENet ID	National Malleefowl Database No	Survey Year	Recently Active	Ground-truth Notes	Impact within 75 m Buffer	Impact within 100 m Buffer	Management Measures to be Implemented	Vegetation Association	Easting	Northing	2014 ID (No longer Used)	Current ID (No longer used)
MM1	MA157	2014 and 2019	Yes	Sign 2014, 2016, 2020	No	Yes - Stringing Track	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	695601.4	6328202	C080	Malleefowl Nest 1
MM2		2014	Yes	Sign 2014, 2016	Yes - Stringing Track	-	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	695737.8	6328129	C081	N/A
MM3	MA153	2014 and 2019	Yes		No	Yes - Stringing Track	Yes Structure pad to be shaped to avoid 100m buffer if possible	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	695317.2	6327963	C079	Malleefowl Nest 2
MM4		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	694732.6	6327792	C077	N/A
MM5	MA117	2014 and 2019	Yes	Sign 2015	Yes - Stringing Track	-	Yes Structure pad to be shaped to avoid 100m buffer if possible	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	695011.8	6327668	C078	Malleefowl Nest 3
MM6	MA108	2014 and 2019	No	Old nest	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	694398.7	6327449	C076	Malleefowl Nest 4
MM7		2014	Yes		No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	693868.7	6326850	P086	N/A
MM8	MA144	2014 and 2019	No	Old nest	No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	693631.8	6326770	C075	Malleefowl Nest 5
MM9		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	692832.1	6326288	C071	N/A
MM10	MA273	2014 and 2019	No	Old nest	Yes - Stringing Track	-	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	692988.5	6326053	C073	Malleefowl Nest 7

New ENet ID	National Malleefowl Database No	Survey Year	Recently Active	Ground-truth Notes	Impact within 75 m Buffer	Impact within 100 m Buffer	Management Measures to be Implemented	Vegetation Association	Easting	Northing	2014 ID (No longer Used)	Current ID (No longer used)
MM11		2014	Yes		No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	692558.4	6326050	C069	N/A
MM12	MA270	2014 and 2019	No	Old nest	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	692798.5	6326005	C070	Malleefowl Nest 8
MM13		2019	No	Old nest	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	693065.9	6325911	N/A	Malleefowl Nest 6
MM14	MA124	2019	No	Old nest	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	692667.9	6325546	N/A	Malleefowl Nest 9
MM15			No	Old nest	No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	690875.9	6324589	C065	Malleefowl Nest 10
MM16		2014	Yes		No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	690701.7	6324522	C064	N/A
MM17		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	689754.9	6323628	C062	N/A
MM18		2019	No	Old nest	Yes - Stringing Track	-	Yes Structure pad to be shaped to avoid 100m buffer if possible	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	687753.7	6321876	N/A	Malleefowl Nest 11
MM19		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	687097.8	6321717	C059	N/A
MM20		2019	No	Old nest	Yes - Stringing Track	-	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	687295.2	6321570	N/A	Malleefowl Nest 12
MM21		2019	Yes	Recent. Big mound, worth monitoring.	Yes - Stringing Track	-	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	686947	6321269	N/A	Malleefowl Nest 13

New ENet ID	National Malleefowl Database No	Survey Year	Recently Active	Ground-truth Notes	Impact within 75 m Buffer	Impact within 100 m Buffer	Management Measures to be Implemented	Vegetation Association	Easting	Northing	2014 ID (No longer Used)	Current ID (No longer used)
MM22	MA255	2014 and 2019	No	Old nest	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	686226.2	6320872	C055	Malleefowl Nest 15
MM23		2019	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	686756.3	6320818	N/A	Malleefowl Nest 14
MM24		2014	Yes	Old mound, some shell.	Yes - Stringing Track	-	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	686450.1	6320733	C056	N/A
MM25	MA253	2014 and 2019	No	Old nest	Yes - Stringing Track	-	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	686090.8	6320540	C053	Malleefowl Nest 16
MM 26	MA251	2014 and 2019	No	Old nest	No	No	No	*Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata* mixed Mallee over *Cratystylis conocephala* and *Atriplex vesicaria.*	684426.4	6319521	C051	Malleefowl Nest 17
MM27		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	683253	6318719	C046	N/A
MM28	MA208	2014 and 2019	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	683428	6318711	P047	Malleefowl Nest 18
MM29	MA245	2014 and 2019	Yes		No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	683093.5	6318290	C045	Malleefowl Nest 19
MM30		2014	Yes		Yes - Stringing Track	-	Yes Structure pad to be shaped to avoid 100m buffer if possible	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	683052.2	6318124	C044	N/A
MM31		2014	Yes		No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	682645.9	6318083	C042	N/A

New ENet ID	National Malleefowl Database No	Survey Year	Recently Active	Ground-truth Notes	Impact within 75 m Buffer	Impact within 100 m Buffer	Management Measures to be Implemented	Vegetation Association	Easting	Northing	2014 ID (No longer Used)	Current ID (No longer used)
MM32	MA243	2014 and 2019	No	Old nest	No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	682663.1	6317985	C043	Malleefowl Nest 20
MM33		2019	No	Old nest	No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	682515.8	6317490	N/A	Malleefowl Nest 21
MM34		2014 and 2019	Yes	Recent. Big mound, worth monitoring.	No	No	No	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona.*	678259.3	6314536	P030	Malleefowl Nest 23
MM35		2019	No	Old nest	No	No	No	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona.*	678003.2	6314388	N/A	Malleefowl Nest 24
MM36		2014 and 2019	Yes	Sign 2020	No	No	No	*Acacia wilhelmiana +/- Senna artemisioides* ssp. *coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia* spp. *+/- Eucalyptus incrassata +/- Eucalyptus brachycalyx*.	674479.5	6311541	C016	Malleefowl Nest 26
MM37		2019	No	Old nest	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	674717.9	6311186	N/A	Malleefowl Nest 25
MM38		2014 and 2019	No	Old nest	Yes - Stringing Track	-	Yes	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	672130.3	6309435	C012	Malleefowl Nest 27
MM39		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	668980.6	6307263	C010	N/A
MM40		2019	Yes	Sign 2020	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	669619.7	6307241	N/A	Malleefowl Nest 28
MM41		2019	No	Old nest	Yes - Stringing Track	-	Yes Structure pad to be shaped to avoid 100m buffer if possible	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	669389.9	6307171	N/A	Malleefowl Nest 29

New ENet ID	National Malleefowl Database No	Survey Year	Recently Active	Ground-truth Notes	Impact within 75 m Buffer	Impact within 100 m Buffer	Management Measures to be Implemented	Vegetation Association	Easting	Northing	2014 ID (No longer Used)	Current ID (No longer used)
MM42		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	668966.4	6307169	P021	N/A
MM43		2019	No	Old nest	No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	668965.8	6307169	N/A	Malleefowl Nest 30
MM44		2014 and 2019	No	Old nest	Yes - Stringing Track	Yes - Structure Pad	Yes Structure pad to be shaped to avoid 75m buffer if possible	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	668928.3	6306867	C009	Malleefowl Nest 31
MM45		2014 and 2019	Yes	Sign 2013	Yes - Stringing Track	Yes - Structure Pad	Yes Structure pad to be shaped to avoid 75m buffer if possible	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	668744.9	6306747	C008	Malleefowl Nest 32
MM46		2014 and 2019	No		No	Yes - Stringing Track	Yes	*Melaleuca uncinata +/- Eucalyptus brachycalyx +/- Callitris gracilis +/- Eucalyptus oleosa*	668624.3	6306544	P018	N/A
MM47		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	667841.3	6306445	C006	N/A
MM48		2014	Yes		No	No	No	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee	667971.2	6306315	C007	N/A
MM49		2014 and 2019	Yes	Sign 2013	No	No	No	*Melaleuca uncinata +/- Eucalyptus brachycalyx +/- Callitris gracilis +/- Eucalyptus oleosa*	667351.7	6305897	C005	Malleefowl Nest 35
MM50		2019	No	Old nest	No	No	No	Acacia wilhelmiana +/- Senna artemisioides ssp. *coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over Triodia spp. *+/- Eucalyptus incrassata +/- Eucalyptus brachycalyx*.	667231.1	6305686	N/A	Malleefowl Nest 36
MM51		2014	Yes		No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	660548	6300443	C004	N/A

New ENet ID	National Malleefowl Database No	Survey Year	Recently Active	Ground-truth Notes	Impact within 75 m Buffer	Impact within 100 m Buffer	Management Measures to be Implemented	Vegetation Association	Easting	Northing	2014 ID (No longer Used)	Current ID (No longer used)
MM52		2019	No	Old nest	Yes - Stringing Track	-	Yes Structure pad to be shaped to avoid 100m buffer if possible	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	660547.4	6299994	C003	Malleefowl Nest 37
MM53		2014	Yes		No	No	No	*Melaleuca uncinata* Shrubland	660228.7	6299920	C002	N/A
MM54		2014	Yes		No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	659975.6	6299827	C001	N/A
MM55		2019	Yes	Sign 2020	No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	659877.6	6299782	N/A	Malleefowl Nest 39
MM56		2019	No	Old nest	No	No	No	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee over *Triodia scariosa / Triodia lanatus*	660181.2	6299438	N/A	Malleefowl Nest 38
Malleefowl Nest 22 NOT MOUND							GROUND-TRUTHING CONFIRMED THIS IS NOT A MALLEEFOWL MOUND					
Malleefowl Nest 33 NOT MOUND							GROUND-TRUTHING CONFIRMED THIS IS NOT A MALLEEFOWL MOUND					
Malleefowl Nest 34 NOT MOUND							GROUND-TRUTHING CONFIRMED THIS IS NOT A MALLEEFOWL MOUND					
Malleefowl Nest 40 NOT A MOUND							GROUND-TRUTHING CONFIRMED THIS IS NOT A MALLEEFOWL MOUND					

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Malleefowl Monitoring within the ElectraNet Powerline Easement

Ecological Horizons

April 2020

Ecological Horizons staff Katherine Moseby recording data on National Malleefowl Recovery Team datasheet while Marina Louter and Emma Tremain from EBS Ecology check for malleefowl egg shell, scats and tracks while ground-truthing mound 25 detected by LiDAR within the ElectraNet Powerline Easement.

Limitations Statement

In preparing this document Ecological Horizons Pty Ltd makes no warranty or guarantee, whether expressed or implied, with respect to the information reported or to the findings, observations or conclusions expressed in this document. Further, such information, findings, observations and conclusions are based solely on observations made and information available to Ecological Horizons Pty Ltd at the time of this study.

CITATION: Ecological Horizons (2020): Malleefowl Monitoring within the ElectraNet Powerline Easement. April 2020. Report to EBS Ecology. Ecological Horizons, Kimba.

Introduction and Scope

Ecological Horizons were contracted to ground-truth 40 prospective malleefowl (*Leipoa ocellata*) mounds identified using LiDAR technology within the proposed new ElectraNet Powerline Easement (the Easement) on Secret Rocks Nature Reserve, Ironstone Hill Conservation Park, Sheoak Hill Conservation Park and adjacent Heritage Agreements. The nesting activity and malleefowl visitation at these mounds was recorded and put into a historical perspective by comparing them with activity of other mounds in the district.

Methods

The LiDAR survey was undertaken by Aerometrex in 2019. The LiDAR survey identified 2904 datapoints, of which 40 had the potential to be a Malleefowl mound (Table 1).

Table 1. Summary table of Aerometrex 2019 LiDAR survey results.

LiDAR Rating	Number of datapoints
1 - highly likely a mound	10
2 - could be a mound	19
3 - low chance of being a mound	11
4 - very low change of being a mound	2864
Total	**2904**

The spatial data was provided to Ecological Horizons by ElectraNet and prospective mounds were ground-truthed between February 27th and March 5th 2020. The March 5th visit to mounds south of Secret Rocks was conducted with EBS Ecology staff Marina Louter and Emma Tremain and ElectraNet TAAMs officer Jeremy Rabig in attendance. As well as the 40 mounds identified by the ElectraNet LiDAR survey, an additional 7 mounds known to Ecological Horizons were checked within 300m of the Easement.

Middleback Alliance also conducts annual monitoring of malleefowl mounds in the region (coordinated by Ecological Horizons). Long term data from these surveys are included in this reportto provide a regional perspective on the significance of the malleefowl activity or potential within the Easement. Middleback Alliance mounds are surveyed according to the National Malleefowl Recovery Team's monitoring manual (National Malleefowl Recovery Team (2019)). Information from this survey, including presence of tracks, scats or eggshell of malleefowl and dimensions and activity of the mounds was also uploaded onto the National Malleefowl Database.

Results

LiDAR ground-truthing results

A total of 36 of the 40 prospective mounds identified by ElectraNet LiDAR were confirmed to be actual malleefowl mounds (90% accuracy), with the remainder being large mallee stumps or dirt piles of similar dimensions (10% false positive) (Table 2).

Table 2. Summary table of Malleefowl LiDAR ground-truthing results.

LiDAR Rating	Number of datapoints	Confirmed Malleefowl mounds (%)	False positives
1 - highly likely a mound	10	10 (100 %)	0
2 - could be a mound	19	19 (100 %)	0
3 - low chance of being a mound	11	7 (63%)	4
Totals	**40**	**37 (90%)**	**4 (10%)**

Mound activity

None of the 36 mounds surveyed along the Electranet easement were used for nesting in the 2019/20 season. Seven of the 36 mounds (19%) showed recent sign of malleefowl activity in the form of malleefowl scats and/or tracks (Table 3). A highlight was the recording of fresh malleefowl tracks on ElectraNet mound 38, a previously unknown mound on Secret Rocks Nature Reserve, which incidentally was one of class 3 mounds considered to a low chance of being a mound (Plate 1).

Plate 1: LiDAR mound 38 with fresh malleefowl tracks (left) and close-up photo of malleefowl tracks.

Historical context

In a historical context, 19 of the 36 LiDAR mounds had been confirmed and monitored previously. Five of these 19 mounds (26%) have previously shown signs of malleefowl activity, although none have been actively used for nesting (Table 3).

Two of the 7 (29%) additional mounds checked within 300m of the easement (MA201 to MA207) also showed signs of malleefowl activity. Several of the ground-truthed mounds that had not been surveyed before were in the fireground from the January 2020 fires on Secret Rocks and one of

these (Mound 27) may potentially have been active in recent years, but will now be unusable until the mallee regenerates (Plate 2). Six of the new mounds detected for the first time on this survey were lichen encrusted and hence had likely not been active for several decades (Plate 3).

The rate of malleefowl track and/or scat activity in 2019/20 seen at mounds near the Electranet easement (37 plus additional 7) is 20% and more than double that observed regionally in 2019/20, where only 8% of the 267 regional mounds surveyed in 2019/20 showed signs of malleefowl activity.

Plate 2: *Mound 27 had not been discovered before this survey and appeared to have been used relatively recently before the January 2020 fire. It will likely take several decades before this habitat is again suitable for malleefowl nesting.*

Plate 3: *Six of the mounds detected for the first time in this survey like Mound 2*6 *were crusted with lichen and hence had probably not been active for several decades. The small 'whipstick' mallee in the background suggests a fire here 20-30 years ago.*

Table 3. Mounds surveyed by Ecological Horizons in 2020 and historical context. Shading indicates mound not surveyed that year. T = malleefowl tracks, S = malleefowl scats, A = active mound, NM= not a mound. MA number refers to the National Malleefowl Database no. for that mound.

MA no.	Electranet no.	Latitude	Longitude	2019/20	18/19	17/18	16/17	15/16	14/15	13/14	12/13	11/12	10/11	09/10	2020 comments
MA209	1100	-33.36416348	136.8157306												very old, bushes inside
MA253	1214	-33.23807392	136.9972962												old mound
MA270	1613	-33.18763699	137.0680893												old mound
MA273	1711	-33.18716836	137.0701163												old mound
MA153	1811	-33.1695356	137.0946709					T S		S					
MA157	19	-33.16732454	137.0976653	T				T		T					fresh tracks
MA322	2102	-33.25501895	136.9690956	S	S										fresh scats
MA208	2112	-33.36527358	136.8137832												sandy mound in broombush
MA251	2113	-33.24754103	136.9796487												
MA255	2132	-33.23506071	136.9986806												
MA124	2142	-33.19179802	137.0667865												
MA144	2162	-33.18058739	137.0768603												
MA108	2172	-33.17432695	137.0849359												
MA117	2182	-33.17224732	137.0914607					T							
MA205	23	-33.37314947	136.7989715							T					old mound
MA321	24	-33.36143006	136.816077												old mound
MA203	275	-33.42740879	136.7269112												old mound
MA243	28	-33.26169111	136.9610405												old mound
MA245	29	-33.25887211	136.9655969	S											
CO12	1115	-33.34049885	136.8496415												old mound, some shell
	1314	-33.22574498	137.0148583												big old mound
	1414	-33.23135046	137.0063307												good mound, worth monitoring
CO65	1514	-33.2007395	137.0477745												inactive
	2112	-33.36527358	136.8137832												old mound
	2122	-33.23544754	137.0043777												old mound
	2152	-33.18842992	137.0709757												mound right near powerline
	2212	-33.42942355	136.7197466												old mound some shell
	25	-33.3606787	136.8230888												sandy crust, inactive mound
	26	-33.29489476	136.9117442												sparse shell in old fire scar
	27	-33.26617828	136.95956												big mound in Jan 2020 fire scar
	3100	-33.43661321	136.7153117	NOT MOUND											NOT MOUND
	3102	-33.22858343	137.0100036												historic old mound
	3112	-33.36769167	136.8117363	NOT MOUND											NOT MOUND
	3211	-33.36712564	136.8125254	NOT MOUND											NOT MOUND
	3310	-33.36135261	136.8206329												Crusty old mound with shell
	34	-33.26549674	136.9592781	NOT MOUND											NOT MOUND
	35	-33.43248085	136.7230719												sparse shell
	36	-33.37507445	136.7977152												old mound
	37	-33.32430191	136.877096												old scrape with leaf but not shell
	38	-33.32114185	136.8744666	T											Not active but **fresh MF tracks** & shell
	39	-33.29351636	136.9144641												Big mound, lots shell, in Jan 2020 fire
MA207		-33.36930535	136.8055429												old mound
MA206		-33.36814558	136.8041234												old mound
MA205		-33.37315967	136.7989652												old mound
MA204		-33.42337711	136.7268294							S					
MA203		-33.427417	136.7269072												old mound
MA202		-33.428143	136.7234894												old mound
MA201		-33.429012	136.7207851							S					

Table 4. Total mounds surveyed on Ironstone Hill Conservation Park and Secret Rocks Nature Reserve each year by Middleback Alliance.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total mounds surveyed	**76**	**80**	**100**	**193**	**130**	**152**	**160**	**164**	**239**	**267**

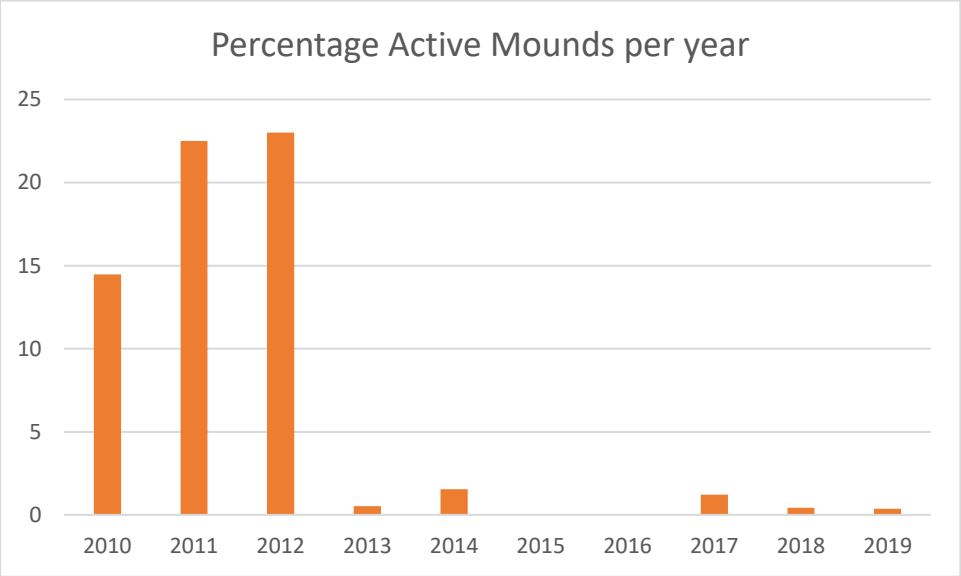

Figure 1. The percentage of regionally checked malleefowl mounds that were active each year.

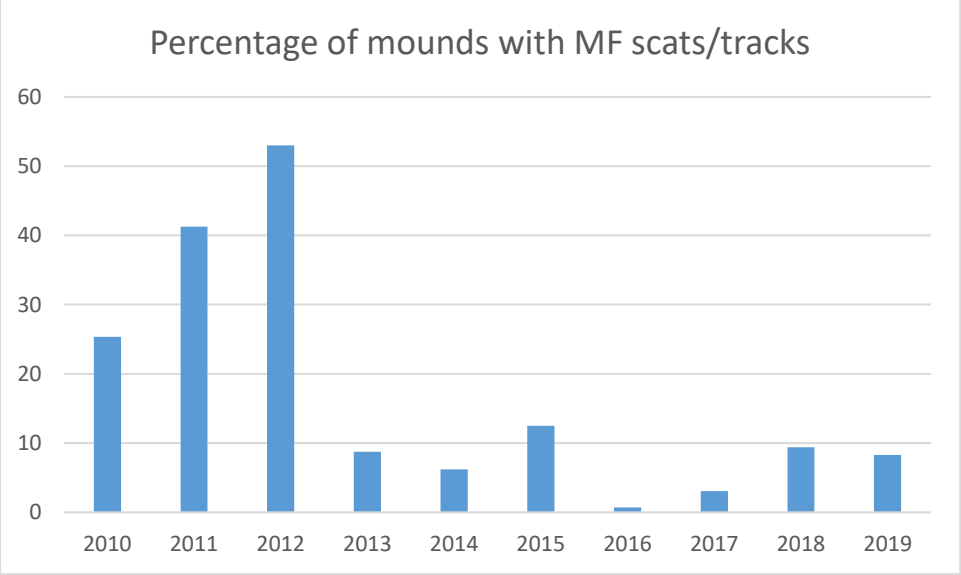

Figure 2. The percentage of regionally checked malleefowl mounds where malleefowl scats or tracks that were recorded each year.

The number of malleefowl munds surveyed by Middleback Alliance has increased each year from 76 in 2010 to 267 in 2019 (Table 3). Rates of malleefowl nesting and activity have declined in the last 10 years in the Middleback Region (Figs. 1 and 2). High rainfall recorded in 2010 and 2011 may have contributed to high nesting rates early in the monitoring period, but rains have likely been sufficient for breeding until the very dry years of 2018 and 2019 (Fig. 3), so the cause(s) of the dramatic decline are unclear. Removal of food resources and cover by overabundant kangaroos, and to a lesser extent goats, along with predation by cats and foxes and perhaps increased mortality in heat waves are likely contributors. A study by PhD student Peri Stenhouse in the region has found high mortality of tagged malleefowl from cat and fox predation as well as vehicle collisions (P. Stenhouse pers. comm.). Although nesting rates have been very low in the last 6 years, malleefowl are still present in the area as evidenced by the presence of scats and tracks at around 10% of checked mounds in this 2020 survey.

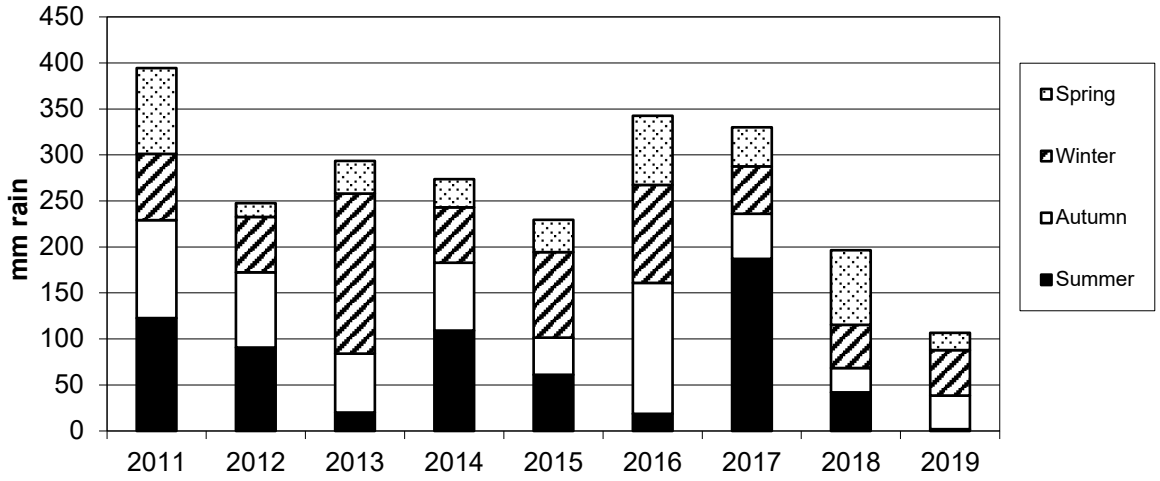

Figure 3: Rainfall records (mm) from Secret Rocks.

Discussion

The Middleback Alliance region, traversed by the ElectraNet Powerline Easement, remains an important landscape scale refuge for nationally threatened malleefowl. Reduced detections and nesting activity in the Middleback Alliance region in recent years has been matched, even surpassed by reductions elsewhere on Eyre Peninsula and the wider mallee region (National Malleefowl Database (2020). Indeed, the active mound recorded on Secret Rocks in 2019 was the only active mound from over 320 malleefowl mound grids surveyed by the Malleefowl Recovery Team on Eyre Peninsula that year.

This survey reinforces the value of LiDAR surveys for detecting malleefowl mounds. The percentage of LiDAR detected objects confirmed to be mounds in this survey was even greater than the LiDAR 1 survey in 2014 when 67 (83%) of the 81 'highly likely' and 70 (76%) of the 92 'possible' mounds were confirmed as malleefowl mounds (Read *et al*. 2014). The 2019 LiDAR survey over a similar transect added a further 18 known mounds to the Middleback Alliance and National databases. One of these newly discovered mounds (LiDAR mound 38) was a distinctive mound with fresh malleefowl tracks that is unlikely to have been overlooked in 2014 and hence probably represents a mound constructed between the two surveys.

This survey also reinforced the decline in malleefowl activity evident from long-term monitoring.No active mounds were recorded. Conservation of Eyre Peninsula malleefowl will likely be contingent upon researching the effects and implementing mitigatory actions for the most likely threats to malleefowl which include competition for food with kangaroos and goats, predation by feral cats and foxes, broadscale fires and habitat fragmentation.

Management actions that are being implemented by the Middleback Alliance include aerial fox baiting, fire management, goat mustering and shooting and kangaroo control. However, these activities are not conducted every year due to limited funding for some activities.

References

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Survey for Malleefowl Mounds in the vicinity of the proposed new Electranet high voltage transmission line in north-eastern Eyre Peninsula

Ecological Horizons Pty Ltd

DRAFT

May 2014

Malleefowl mound P86 identified by LiDAR search adjacent to the powerline easement

Limitations statement

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Scope of work

Ecological Horizons Pty Ltd, sub-consulting through EBS, were contracted to provide Electranet with details on the distribution of malleefowl mounds in the vicinity of their high voltage powerline in the Middleback region of north-eastern Eyre Peninsula, South Australia. Malleefowl are mound-nesting birds that are nationally listed as a vulnerable species by the EPBC Act due to significant declines in range and abundance, primarily as a result of clearance of their mallee habitat, inappropriate fire regimes and predation by foxes. Electranet propose to construct another high voltage transmission line adjacent to their existing line, and hence are required to describe and minimise any potential impacts to malleefowl.

Ecological Horizons were contracted to provide the following;

-conduct a search and provide a map of all known malleefowl mounds within 500m NW of the existing powerline in the Middleback region, where the proposed powerline is planned.

-Provide informed commentary on the density of recently active and historic mounds along the proposed powerline route in comparison with regional densities to determine whether long-term nesting density is likely affected by proximity to powerlines.

Methods

Malleefowl construct large mounds, typically 4-6 metres in diameter and up to 90cm high in which they incubate their eggs. Disused mounds can persist in the environment for many decades, with historic mounds not used for several decades distinguished from more recently used mounds by crusting of lichen or moss on the mounds. Inspection of mounds can therefore facilitate appraisals of whether nesting densities have increased (low percentage of historic mounds) or decreased (high percentage of historic mounds) in recent decades.

Four different techniques were used to locate malleefowl mounds in the study area. Opportunistic searches have located over 100 mounds in the Ironstone Hill CP and Secret Rocks Nature Reserve section of the study area from 2008-13. Secondly, aerial surveys conducted from a helicopter provided more detailed assessment of 4 x 1 km^2 search grids in the study area in April 2013. Thirdly, strategic ground based walking surveys in November 2013 provided further precision on the location and number of mounds in these same grids. Finally, the relatively new LiDAR technology was utilised to survey all the mallee vegetation within the proposed powerline easement (500m width) for mounds (Powerline transect), along with an additional transect (Control transect- also 500m width) located 2.5km west of the powerline easement. The advantage of the LiDAR survey is that it uniformly covered the entire survey area, unlike the other surveys that were more limited in geographic scope.

LiDAR survey techniques

The LiDAR survey, coordinated by Mark Lander of AAM surveyed:

Powerline transect: 60km survey at 500m buffer from 33 06.1498'S, 137 13.2769'E to 33 26.1961'S, 136 42.3993'E.

Control transect: 30km survey at 500m buffer from 33 09.2684'S, 137 04.1706'E to 19.3521'S, 136 49.5152'E.

A Bell Longranger L3 (C30 Turbine) aircraft flown at 400m AGL and 60 knots equipped with a ALTM 3100 LiDAR Sensor was flown over the transects between 30 November – 2 December 2013. A DiMAC 51 mm image sensor, using nominal point density of 20+ points / m2 provided a resolution of 10cm pixel size with relative system accuracy of 2 cm on both horizontal and vertical scales. Data analysis and modelling was conducted from 16 December 2013- 26 February 2014.

By exaggerating the vertical scale of the surface created by the LiDAR ground points most mounds were clearly visible (Fig. 1) and a 3D point were manually placed by operators in the centre of objects of similar size and shape to malleefowl mounds. A total of 253 objects were identified but cross-checking with orthorectified photos suggested that a percentage of these objects were not malleefowl mounds. To eliminate most of these false positives an algorithm was created to eliminate all objects with an arbitrary height lower than 25cm above the surrounding plain, which eliminated 80 of the identified objects. The remaining 173 objects (from both transects) were reviewed using the LiDAR ground points and the orthorectified imagery to differentiate between objects with a concave apex and those with a domed apex. This process differentiated 81 'confirmed' mounds (Fig 1) with a concave shape and 92 'possible' mounds which were flat or domed.

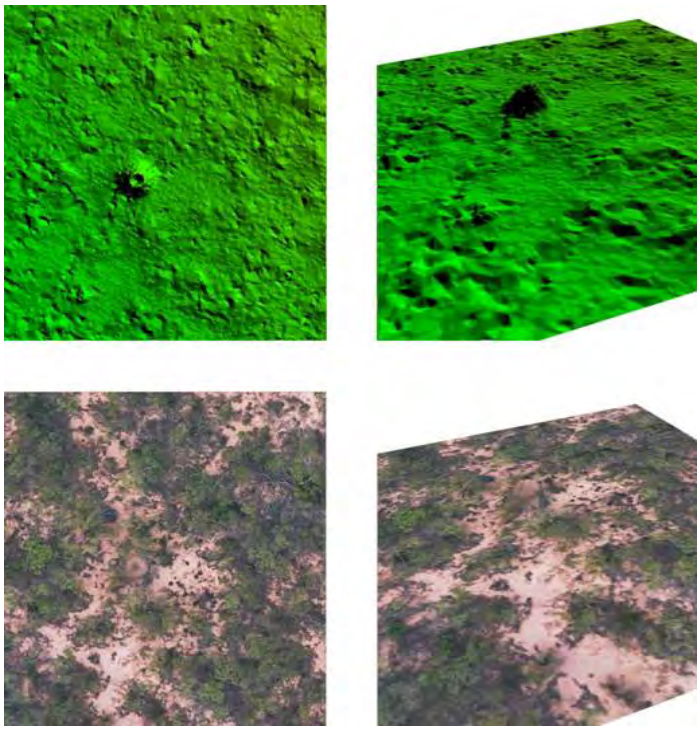

Figure 1 examples of LiDAR and aerial photography (used to 'confirm' mounds) for malleefowl mound MA78.

Ground truthing

Ground truthing of 137 of the 173 identified mounds, constituting 67 (83%) of the 81 'confirmed' and 70 (76%) of the 92 'possible' mounds was conducted by John Read of Ecological Horizons in March and April 2014. Dimensions and characteristics of the mounds were scored using standard national malleefowl mound monitoring sheets. Distance from powerline was determined on the Google Earth image generated by AAM. 'Historic' mounds were distinguished from more recently active mounds by moss or lichen (Fig. 2). Incidentally, several earthen mounds, presumably created during the powerline construction, exhibited similar degrees of crusting as these historic mounds.

Figure 2. Old malleefowl eggshell, moss and lichen on a historic malleefowl mound (C056)

Results

95% (64 of 67) of the 'confirmed' objects identified by LiDAR were found to be malleefowl mounds by ground truthing (Table 1). If the same percentage accuracy is assumed for the 14 'confirmed' objects which were not visited on the ground, we can assume another 13 of these objects were mounds. By contrast, only 8.5% (6 of 70) 'possible' objects were confirmed to be malleefowl mounds (Table 1). If the same percentage of false positives is assumed for the 22 'possible' objects that were not visited on the ground we can assume another 2 'possible' objects were mounds.

The powerline transect included several areas of cleared land or unsuitable habitat, and only 35.8km was considered to traverse malleefowl habitat. Together these data suggest that 85 malleefowl mounds were detected by LiDAR on the 65.8 km of mallee habitat on both transects combined, at a density of 2.6 mounds per square kilometre (Fig. 4).

The only two mounds visited that were likely to have been active in the previous summer (see cover photo) were considered to be 'possible' mounds through the LiDAR analyses. Active mounds may alter from having a concave shape to a domed shape over the course of a day (Fig. 3), and it is likely that these mounds were indeed mounded and active when the LiDAR was flown. Improvements in the algorithm used to distinguish mounds from LiDAR data to include these convex mounds, would likely improve the percentage of active mounds correctly assigned as 'confirmed' and possibly decrease the number of mounds not detected (false negatives) by the LiDAR.

Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)
C001	659975.633	6299827.400	Y	5	30
C002	660228.671	6299919.637	Y	22	30
C003	660547.790	6299994.841	Y	80	25
C004	660548.000	6300442.949	Y	41	30
C005	667351.788	6305897.792	Y	25	30
C006	667841.333	6306445.494	Y		35
C007	667971.185	6306314.599	Y	80	45
C008	668744.953	6306746.870	Y	35	37
C009	668928.654	6306866.762	Y	50	25
C010	668980.626	6307262.578	Y	65	30
C011	670373.505	6310905.514			
C012	672130.529	6309435.465			
C013	672328.452	6312737.143			
C014	672613.192	6312519.329			
C015	674101.473	6314112.707			
C016	674479.808	6311541.158			
C017	675598.523	6315381.544	Y	17	16
C018	675875.703	6315527.551	Y	10	18
C019	675944.283	6315340.136	Y		10
C020	676113.234	6315813.358	Y	25	18
C021	676311.676	6315780.073	Y	29	15
C022	676537.052	6315743.031	Y	24	15
C023	676633.574	6315905.773	Y	6	21
C024	677170.668	6316280.683	Y	13	25
C025	677226.526	6316695.647	Y	8	22
C026	677307.496	6316293.676	Y	15	18
C027	678040.093	6317068.903	N		
C028	678635.355	6317323.626	Y	25	33
C029	678747.896	6317898.716	Y	32	30
C030	678831.111	6318071.397	Y	35	2
C031	679019.752	6318145.398	Y	30	17
C032	679270.423	6318028.566	Y		
C033	679451.223	6318500.112	N		
C034	679612.512	6318144.539	Y		
C035	679731.966	6318340.684	Y		
C036	679879.841	6318640.846	Y	40	40
C037	680548.879	6319199.669	Y	30	12
C038	680846.239	6319125.122	Y	23	20
C039	682096.118	6320604.151			
C040	682187.520	6317835.435			

Mound	Easting	Northing	Confirmed	Depth (cm	Height (cm
C042	682645.868	6318082.946	Y	20	40
C043	682662.963	6317985.012	Y	58	30
C044	683052.233	6318123.875	Y	40	22
C045	683093.672	6318290.032	Y	68	30
C046	683252.955	6318719.118	Y	35	10
C047	683577.561	6321380.893			
C048	683618.377	6321344.196			
C049	683693.986	6321636.841			
C050	683872.424	6321901.325			
C051	684426.101	6319521.788	Y	90	20
C052	685621.851	6322930.396			
C053	686091.062	6320539.980	Y	15	29
C054	686124.571	6323869.939	Y	22	12
C055	686226.554	6320872.192	Y	38	18
C056	686450.115	6320733.117	Y	5	20
C057	686955.589	6324153.005	Y	80	26
C058	687056.079	6324181.159	Y	35	25
C059	687097.772	6321716.992	Y	45	35
C060	687577.515	6324500.903	Y	33	47
C061	689163.149	6326201.243	Y	54	30
C062	689754.915	6323628.166	Y	30	5
C063	690335.412	6326997.619	Y	28	20
C064	690701.710	6324521.656	Y	37	7
C065	690875.899	6324588.790	Y	58	12
C066	690978.059	6327298.420	Y	32	27
C067	691819.175	6328124.635	Y	40	28
C068	692081.276	6328378.277	Y	45	30
C069	692558.388	6326050.132	Y	12	22
C070	692798.206	6326005.031	Y	20	32
C071	692832.095	6326288.127	Y	30	15
C072	692872.380	6326301.009	N		
C073	692988.770	6326052.632	Y	66	15
C074	693029.122	6328889.554	Y	17	23
C075	693632.026	6326770.823	Y	15	20
C076	694398.012	6327449.056	Y		
C077	694732.562	6327791.718	Y		
C078	695011.948	6327668.613	Y	34	25
C079	695317.386	6327962.825	Y	45	42
C080	695601.345	6328202.223	Y	40	32
C081	695737.826	6328129.194	Y	50	17

Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)
P001	659451.692	6298991.592	N		
P002	659466.353	6298977.497	N		
P003	659673.349	6299693.253	N		
P004	659874.158	6299354.658	N		
P005	660476.012	6299835.202	N		
P006	660736.414	6300103.745	N		
P007	660743.979	6300112.150	N		
P008	660758.043	6300098.895	N		
P009	660796.581	6300610.877	N		
P010	664675.006	6303594.606			
P011	665954.090	6304895.652			
P012	665969.355	6304765.196			
P013	665970.668	6304892.148			
P014	666130.093	6304511.098			
P015	666879.200	6305257.309	N		
P016	668144.602	6306161.985	N		
P017	668550.321	6306482.790	N		
P018	668624.824	6306543.808	N		
P019	668651.675	6306565.790	N		
P020	668834.035	6306709.009	N		
P021	668966.420	6307169.228	Y	50	
P022	671957.621	6309194.628			
P023	672557.090	6309580.513			
P024	672903.799	6312966.116			
P025	675385.363	6311914.863	N		
P026	675964.107	6312380.529	N		
P027	676566.491	6312787.656			
P028	676580.303	6312786.378			
P029	678119.496	6317113.559	N		
P030	678259.830	6314536.791			
P031	678505.377	6314375.212	N		
P032	679912.273	6315523.278	N		
P033	680470.264	6315957.622	N		
P034	680475.444	6315937.501	N		
P035	680815.028	6316243.092	N		
P036	680845.375	6316235.100	N		
P037	682209.413	6317319.056	N		
P038	682491.593	6317566.530	N		
P039	682526.003	6317593.379	N		
P040	682701.056	6317729.647	N		
P041	682704.746	6321182.557			
P042	682743.711	6317743.042	N		
P043	682758.847	6317776.618	N		
P044	682846.597	6317847.490	N		
P045	683048.883	6321085.216			
P046	683348.262	6318249.111	N		
P047	683428.016	6318710.894	Y	30	32

Mound	Easting	Northing	Confirmed	Depth (cm	Height (cm
P048	683438.702	6321595.102			
P049	683716.105	6321421.663			
P050	683721.525	6318521.114	N		
P051	683749.672	6318574.386	N		
P052	683786.055	6318597.318	N		
P053	683802.054	6318585.348	N		
P054	684152.405	6321967.943			
P055	684483.630	6319149.269	N		
P056	684630.287	6319265.084	N		
P057	684689.616	6319293.570	N		
P058	684805.916	6319407.791	N		
P059	685087.051	6319632.179	N		
P060	685123.490	6319612.201	N		
P061	685127.943	6319616.723			
P062	685297.923	6319796.892	N		
P063	685430.719	6319908.618	N		
P064	685479.233	6323259.800	N		
P065	685506.300	6319940.534	N		
P066	685516.468	6323116.630	N		
P067	685519.746	6319948.644	N		
P068	685523.521	6323162.384	N		
P069	685854.700	6323589.330	Y	5	45
P070	686180.642	6320500.828	N		
P071	686510.136	6320732.874	N		
P072	686676.374	6321145.401			
P073	686822.754	6321018.531	N		
P074	687280.427	6321889.277			
P075	687424.719	6324389.042	Y	60	29
P076	688543.719	6322807.986			
P077	688584.302	6322416.442	N		
P078	688960.271	6323239.433			
P079	689213.941	6323429.410			
P080	690354.967	6326897.682	Y	10	20
P081	691381.703	6328148.468	N		
P082	691618.455	6324796.056	N		
P083	691681.608	6324869.347	N		
P084	693122.087	6329180.321	N		
P085	693168.043	6326308.982	N		
P086	693868.655	6326850.112	Y	48	25
P087	696804.698	6329396.058	N		
P088	696926.541	6329405.308	N		
P089	697528.210	6329604.653	N		
P090	698440.568	6330159.263	N		
P091	700108.507	6331313.898	N		
P092	700119.406	6331393.236	N		
MFM14b	688556.000	6325955.000	Y	30	17
C37A	680748.000	6319150.000	Y	30	27

Table 1. Location and dimensions of confirmed malleefowl mounds (bold and Y) and other objects

Figure 3. A pair of malleefowl displaying on an active 'convex' mound at Secret Rocks.

False positives

The vast majority of the 67 false positives objects considered by AAM to be either 'confirmed' or 'possible' mounds that were visited were attributed to piles left by earthmoving equipment during construction or maintenance of the powerline or fire-containment activities. Several others were the elevated lignotubers and associated soil mounding around old-growth mallees (Fig. 4).

Figure 4. P89 is an example of a potential mound that was in fact the elevated lignotubers around a mallee stump.

False negatives

Four mounds identified by chopper or ground searches along the LiDAR transects were not identified by the LiDAR survey. One of these, MA108, was identified by the LiDAR operators but discarded because, like the other three false negatives, its height above ground level was lower than the arbitrary 25cm cut-off. Three of these undetected mounds had previously been located in the three 1 km^2 grids methodically surveyed by chopper and on the ground. Assuming that half of each 1 km^2 grid was surveyed by the 500m LiDAR swathe, these data suggests a false negative rate of approximately 1 mound per square kilometre. Together with the correctly detected mounds described above, these undetected false negative mounds suggest that the regional density of recent and historic malleefowl mounds is approximately 3.6 km^2.

Comparison of powerline and control transect

38 mounds were confirmed on 24.1km of powerline transect ground truthed (density of 3.2 km2), compared with 37 on 16.6 km (density of 4.4 km2) of the control transect (Fig .5). These data suggest that malleefowl mound density along the powerline was 73% of that in areas remote from the powerline.

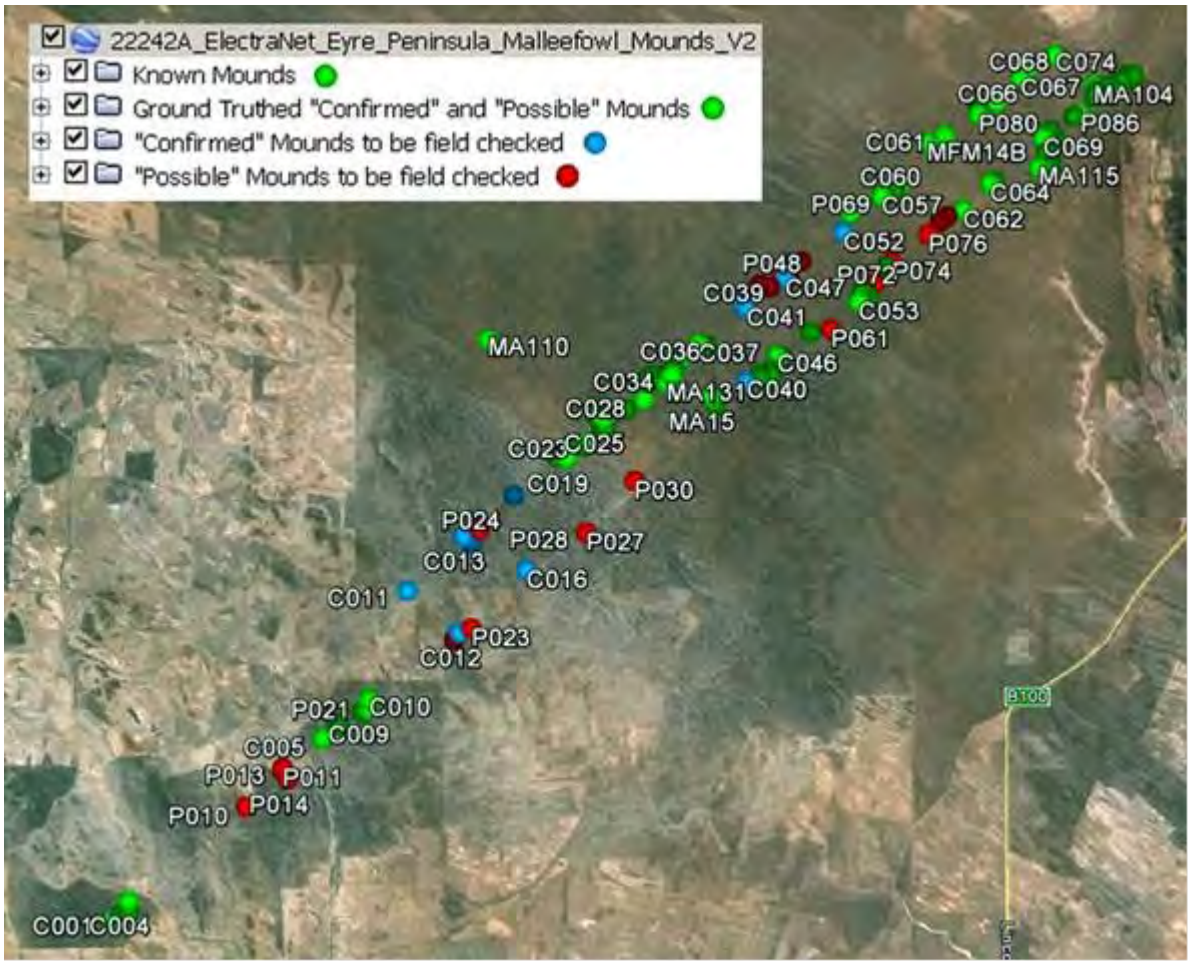

Figure 5. Green dots: confirmed (ground truthed) malleefowl mounds; blue dots: not ground-truthed but 95% likely based on confirmed percentage of 'confirmed' objects; and red dots: not ground-truthed but 8.5% likely (based on confirmed percentage of 'possible' objects).

Within the powerline transect, there was no obvious pattern in higher density of mounds or ratio of historic to active mounds with increasing distance from the existing powerline (Fig. 6). However, 17% (5 of 29) of the mounds on the powerline transect were historic compared with 12% (4 of 34) of historic mounds on the remote control transect.

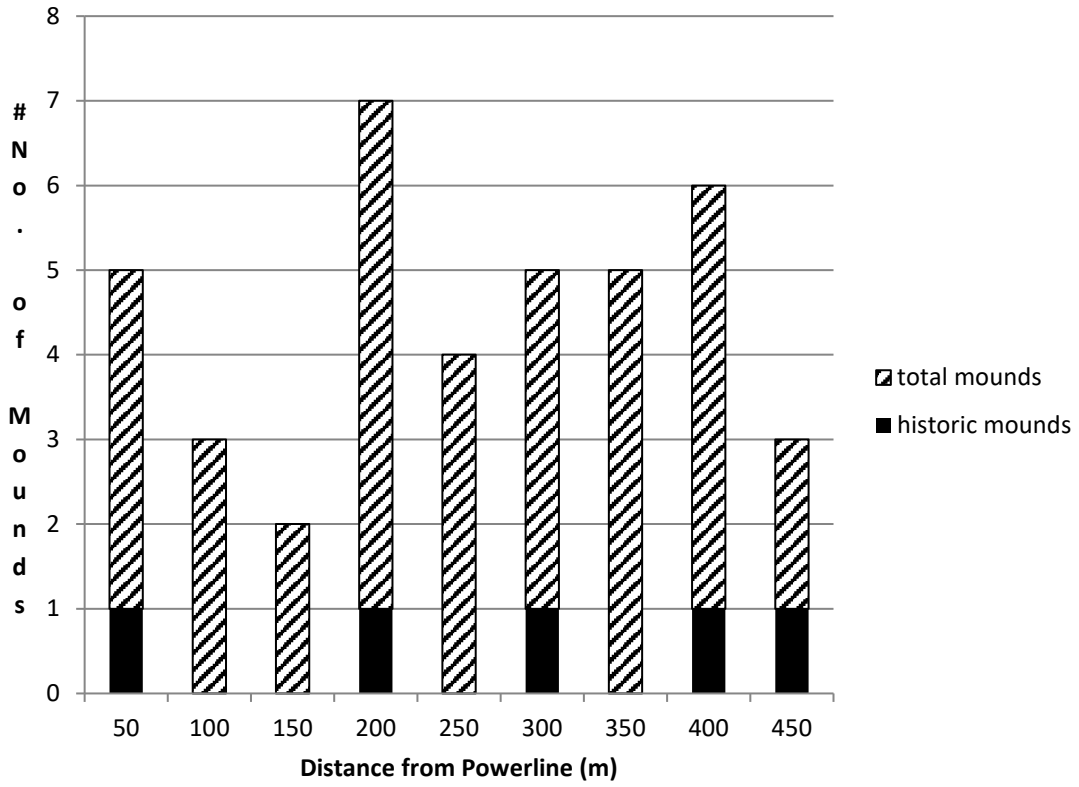

Figure 6. Distance of historic and more recent mounds from the powerline on the powerline transect

Low percentages of active nests (2 from 70, 2.9%) along both powerline and control transects recorded in this survey was consistent with low nesting success recorded by the Middleback Alliance monitoring program in 2013, when only 2 of 127 monitored mounds (1.6%) were recorded as active in the same region. This low nesting effort is believed to be related to environmental conditions and contrasts markedly with activity levels of 12.9%, 22.3% and 24.7% in the years 2011, 2012 and 2013 respectively.

One dead malleefowl was recorded at nest C008 near the southern extremity of the powerline transect. Fresh fox scats were evident on this mound that was only 70m from the powerline.

Discussion

This survey confirmed that the intact mallee vegetation traversed by the existing and proposed high voltage powerline through the Middleback region of NE Eyre Peninsula is inhabited by malleefowl, with mound densities of 3.2-4.4 mounds per km^2. This density is approximately half the median mound density for malleefowl sites in South Australia but relatively high for an arid region (J. Benshemesh pers. comm.). Less arid areas with high density mounds are typically restricted to small isolated remnants suggesting that the Middleback region, whilst supporting lower density is supporting a significant malleefowl population due to the large area of intact habitat. The mound density determined by this study should form the basis of any offsets associated with impacts to the local malleefowl habitat.

One of the key outcomes of this study was the comparison of recently active malleefowl mound density adjacent to and remote from the powerline to determine whether proximity to the powerline might affect long-term nest site selection. Confirmed mound densities along the powerline were 28% lower than densities on the remote transect. There was also a 5% higher percentage of historic mounds on the powerline transect compared to the control transect. This lower density of recently active mounds and relatively low percentage of historic mounds would be expected if proximity to the powerline increased the likelihood of mounds being abandoned or led to higher predation rate of nesting birds. Together these data suggest that proximity to the powerline may negatively influence nest site selection, and possibly nesting success, in malleefowl . The most plausible conclusion from this study is that recently active malleefowl mound density and hence possibly nesting success, is reduced by approximately one third in the vicinity of the existing Electranet powerline.

Relative densities of recently active malleefowl mounds adjacent to the powerline compared with remote areas could be confounded by variation in fire history and habitat between the two transects. Therefore, the negative correlation found in this study should ideally be compared with analogous datasets from other regions. Within the powerline transect, there was no indication that the distribution of recent or historic mounds showed any relationship with distance to the powerline, as could have been expected if higher predation rates (foxes and raptors using the powerline easement) affected nest location choice in the malleefowl. It is possible that any effect of the powerline could extend for the entire 500m width of the powerline easement and hence not exhibit a pattern at a finer scale. Furthermore, if malleefowl select their mound locations on the basis of habitat quality, rather than variability in predation risk, mound location would not be expected to be influenced by proximity to the powerline. Unfortunately, due to the low nesting success of malleefowl in the Middleback region in 2013-14, we were unable to investigate any impacts of proximity to the powerline on malleefowl nesting success, which is a more important measure of powerline impacts than the distribution of nesting effort that we measured.

The LiDAR survey was the most widespread and representative malleefowl mound survey technique used in this survey. On the basis of the false negative records verified by ground searches, those mounds identified by LiDAR are assumed to constitute 69-72% of the mounds along the transmission line easement at the time the LiDAR was flown. A high percentage of the mounds not identified are likely to be historic low mounds that did not protrude more than 25cm above the surrounding ground surface. Identified mounds presented in Table 1, and provided in a spreadsheet appendix,

will therefore provide guidance for positioning of pylons and other ground-disturbing activities. However, more detailed ground searches will be required prior to initiation of any ground-disturbing activity to ensure that new mounds have not been constructed or old mounds overlooked in the vicinity of the new powerline.

This study provided valuable information on the precision of LiDAR surveys for malleefowl mounds and a comparison of the cost effectiveness of the different survey techniques compared here will form the basis of a scientific paper presented to the 2014 Malleefowl forum. Measurements of false-negative and false positive mounds, along with confirmed malleefowl mounds identified by LiDAR, will enable the algorithm and process for refining likely mounds to be improved in future LiDAR surveys. Therefore, in addition to providing valuable information on the location of most malleefowl mounds along the powerline easement and likely chronic effects of the powerline on malleefowl nesting success, this study has advanced the science of malleefowl monitoring and management.

Appendix E EPLink Threatened Species Management Plan

EP Transmission Line

Threatened Species Management Plan (Construction)

EP Transmission Line Threatened Species Management Plan (Construction)

9 October 2020

Version 3.0

Prepared by EBS Ecology for ElectraNet

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GLOSSARY AND ABBREVIATION OF TERMS

cm	Centimetre(s)
DAWE	Australian Government Department of Agriculture, Water and the Environment (previously DoTEE)
EBS Ecology	Environmental and Biodiversity Services Pty Ltd – trading as EBS Ecology
EEC	Endangered Ecological Community(ies)
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ha	Hectare(s).
km	Kilometre(s).
kV	Kilovolt(s).
m	Metre(s).
mm	Millimetre(s)
NPW Act	South Australian *National Parks and Wildlife Act 1972*
NV Act	South Australian *Native Vegetation Act 1991*
Project	ElectraNet Eyre Peninsula Transmission Line Project
Project Area	Impact footprint of the Project
SEB	Significant Environmental Benefit
sp.	Species
spp.	Species plural
ssp.	Subspecies
TEC	Threatened Ecological Community(ies)
TSMP	Threatened Species Management Plan
var.	Variant

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1 INTRODUCTION

EBS Ecology was engaged by ElectraNet to prepare a Threatened Species Management Plan (TSMP) for the proposed Eyre Peninsula Transmission Line (the 'Project') to outline the measures to be implemented for management of impacts to threatened ecological communities and species listed as Matters of National Environmental Significance (MNES) during construction of the Project.

EBS Ecology has completed various flora and fauna studies within the proposed transmission line corridor, including targeted threatened species surveys and vegetation association mapping. In addition, targeted surveys for Malleefowl and Sandhill Dunnart have been undertaken by Ecological Horizons Pty Ltd. Results of these studies have also informed the relevant sections of the TSMP.

The TSMP provides species descriptions and distribution information for threatened species either recorded or highly likely to occur in the Project impact footprint. It identifies potential threats possibly exacerbated by construction activities and describes the management actions that will be required to be undertaken by ElectraNet and its contractors to minimise the potential impacts to significant species.

1.1 *Objectives*

This TSMP is to be used by ElectraNet during construction of the Project to minimise and mitigate impacts to significant species that may occur as a result of the activity and cannot be avoided.

For the purposes of this plan 'significant species' are those species or communities considered to be Matters of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The document is intended to minimise potential impacts during the construction phase only. It does not fulfill any long-term monitoring or offset obligations ElectraNet may incur as a result of impacts during the operation of the Eyre Peninsula transmission line.

Broadly this TSMP describes:

- Significant species known or potentially present within the Project Area
- Specific requirements for managing potential impacts to significant species during the construction phases of the Project; and
- Monitoring and reporting requirements.

1.2 *Project Area*

The Project will replace the existing, soon-to-be obsolete, infrastructure between Port Lincoln and Cultana, currently a 132 kilovolt (kV) transmission line and is planned to broadly follow a similar alignment to the existing line. The transmission line will be approximately 290 kilometres (km) long. Detailed project design is dependent on route constraints and has not yet been finalised, however a construction impact footprint of 454.35 hectares (ha) is expected. This impact footprint is referred to as the Project Area from here on. It contains up to 192.02 ha of native vegetation, with the remainder made up of cropping areas, pasture and planted vegetation.

The Project Area (Figure 1) is located within the Eyre Peninsula and South Australian Arid Lands Natural Resource Management regions and the following local government areas:

- Lower Eyre Peninsula
- Tumby Bay
- Cleve
- Franklin Harbour
- Whyalla.

For the purposes of this TSMP, the Project Area has been divided into two sections: the southern and northern sections, with the Southern Project Area being that section south of Yadnarie.

Figure 1. The location of the Project Area.

1.3 *Legislative framework*

1.3.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage matters of national environmental significance, including threatened species and threatened ecological communities (TEC).

As the Project potentially impacts several species and communities, referral of the Project under the EPBC Act has occurred. This TSMP is an integral component of that referral and consequent assessment by the Australian Department of Agriculture, Water and the Environment (DAWE).

ElectraNet will offset any impact to EPBC listed species that occurs as a result of the Project in agreement with DAWE. The intent of this TSMP is to document management actions to be implemented to avoid and minimise impacts that occur during the construction phase of the Project. It should not be regarded as an offset programme and does not include any long-term management or monitoring that may be required throughout the operational phase of the Project.

1.3.2 South Australian National Parks and Wildlife Act 1972

Vascular plants and vertebrate animals are protected in South Australia (SA) under the threatened species schedules of the *National Parks and Wildlife Act 1972* (NPW Act). Threatened species under the NPW Act are listed in the following schedules:

Schedule 7 – Endangered Species

Schedule 8 – Vulnerable Species

Schedule 9 – Rare Species.

1.3.3 South Australian Native Vegetation Act 1991

Impact to native vegetation caused by the Project has been assessed under the *Native Vegetation Act 1991* (NV Act). Under this assessment, impact to species listed on Schedule 7, 8 or 9 of the NPW Act has been accounted for within the calculation of the Significant Environmental Benefit (SEB) offset for the Project.

This TSMP does not discuss the SEB obligations associated with the Project. This has been completed previously by EBS Ecology in *Eyre Peninsula Transmission Line Vegetation Assessment* (EBS Ecology, 2019a).

1.4 *Previous threatened species surveys*

The following studies have been used to inform this TSMP:

- *Eyre Peninsula Transmission Line Native Vegetation Assessment* (EBS Ecology, 2019a). This study included a vegetation survey carried out according to Bushland and Rangeland Assessment Methodologies, in order to assess the SEB required to offset the Project. Targeted searches for threatened flora species were undertaken and opportunistic records of fauna collected.

- *Eyre Peninsula Transmission Line EPBC Assessment* (EBS Ecology, 2019b). Desktop study of the potential occurrence of EPBC Act listed threatened species and communities in the Project Area. The study provides a list of EPBC Act listed species and communities potentially impacted and referral requirements under the EPBC Act.
- *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology, 2014a). Targeted surveys for threatened flora and some threatened fauna historically recorded within the Project Area were carried out from August to November in 2013. Vegetation surveys were also conducted to determine the suitability of habitat for species where no targeted survey was carried out.
- *Sandhill Dunnart Habitat Assessment Proposed ElectraNet Transmission Line Corridor Eastern Eyre Peninsula – March 2014* (Moseby, 2014). Targeted surveys and habitat modelling were carried out by Ecological Horizons Pty Ltd in the Project Area in 2014.

The above studies included desktop research and field surveys undertaken in 2012, 2013 and 2019. Field surveys undertaken in 2012 and 2013 included targeted surveys for threatened flora and bird species. Surveys undertaken in 2019 completed vegetation mapping in order to calculate the SEB obligations of the Project.

1.5 *ElectraNet's Environmental Management*

ElectraNet is committed to conducting its operations and activities to minimise disturbance to the environment in which it operates by using environmental standards consistent with development in technology, industry codes of practice and relevant statutory requirements. ElectraNet has a Health, Safety and Environment Management System (HSEMS) that establishes a framework under which environmental management of ElectraNet's activities takes place. It also ensures the identification of environmental impacts and that measures are in place to mitigate, measure and review impacts as well as environmental performance.

This TSMP forms part of the environmental management procedures established within the HSEMS. ElectraNet will incorporate the relevant management actions into procedures and plans for contractors to comply with its contents.

ElectraNet's Construction Environmental Management Plan (CEMP) (in preparation) is the document that describes the actions ElectraNet will take to minimise impacts during construction. This includes the following sub-plans:

- Biodiversity Management Plan (in preparation)
- Rehabilitation Management Plan (in preparation)
- Weed, Pest and Disease Management Plan (in preparation)
- Sedimentation, Erosion and Drainage Management Plan (in preparation)
- Unexploded Ordinance (UXO) Management Plan (in preparation)
- Landholder Liaison Plan (in preparation)

- Cultural Heritage Management Plan (in preparation)
- Bushfire Management Plan, including Lightning Management Plan (in preparation)
- Waste Management Plan (in preparation).

2 ROLES AND RESPONSIBILITIES

ElectraNet is responsible for management of construction activities in the Project Area. All ElectraNet employees and contractors are responsible for conforming to applicable Australian and South Australian laws and regulations and conducting work in accordance with permit and approval conditions, ElectraNet's HSEMS, CEMP (and sub-plans) and this TSMP.

An overview of the roles and responsibilities of ElectraNet personnel and the Principal Contractors are summarised in Table 1. Detailed descriptions of roles and responsibilities are provided in the Principal Contractor's Construction Environmental Management Plan and sub-plans.

Table 1. Roles and responsibilities during the Project construction phase.

Role	Responsibilities
ElectraNet	• Obtain statutory approvals in accordance with the EP Link Contract. • Comply with conditions of statutory approvals. • Maintain documentation and a compliance system to ensure compliance with approval conditions, the EP Link Contract, and the CEMP. • Ensure all contractors operate in accordance with the EP Link Contract. • Complete environmental audits. • Ensure all personnel are competent to perform their assigned duties. • Ensure all personnel have received appropriate training and inductions.
Principal Contractor	• Overall responsibility for environmental compliance, including monitoring, data collection and reporting. • Preparation and implementation of the Construction Environmental Management Plan (CEMP) and sub-plans. • Inclusion of the management measures outlined in this TSMP into the CEMP and sub-plans. • Ensure resources are available to manage environmental obligations and implement management actions. • Identify and address risks associated with Contractor's activities prior to commencing works. • Ensure all contractor personnel are competent to perform their assigned duties. • Ensure all contractor personnel have received appropriate training and inductions. • Ensure that personnel are adequately supervised. • Ensure that all activities are carried out in accordance with the CEMP and sub-plans. • Implement the management actions identified in the CEMP and sub-plans. • Immediately notify the ElectraNet Environmental Manager of any incidents and non-compliances with the CEMP or statutory approvals conditions. • Undertake project auditing and monitoring.

3 THREATENED SPECIES OF RELEVANCE

3.1 *Threatened ecological communities*

Previous studies indicate that one TEC is potentially impacted by the Project, as shown in Table 2. While vegetation associations were not assessed against the EPBC Act criteria for listing as the TEC, it has been assessed as highly likely that some areas within the Project Area are the listed community *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Woodland.

Table 2. Threatened ecological communities potentially impacted by the Project.

Threatened Ecological Community	Conservation status		Likelihood of occurrence within project area
	Aus	SA	
Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland	EN		Highly Likely

Aus: Australia (Environment Protection and Biodiversity Conservation Act 1999). SA: South Australia (National Parks and Wildlife Act 1972). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare.

3.2 *Threatened species*

Previous studies have identified 25 flora and eight fauna species listed as threatened under the EPBC Act and/or the NPW Act are potentially impacted by the Project. This includes the following:

- Six EPBC listed flora
- Four EPBC listed fauna
- Twenty-one NPW Act listed flora
- Ten NPW Act listed fauna.

Note that some species are listed under both Commonwealth and State legislation. Threatened species and their listed status are shown in Table 3. The locations of threatened species observed throughout these studies are shown in Figure 2 to Figure 5.

Many species share similar habitats across the Project Area, have similar ecology, with similar threatening processes affecting their status throughout their distribution. Similar species therefore require the implementation of comparable management actions to avoid and/or minimise impact. This TSMP addresses the management of similar species within common sections in the document. Table 3 indicates which Section of the Management Plan refers to each species.

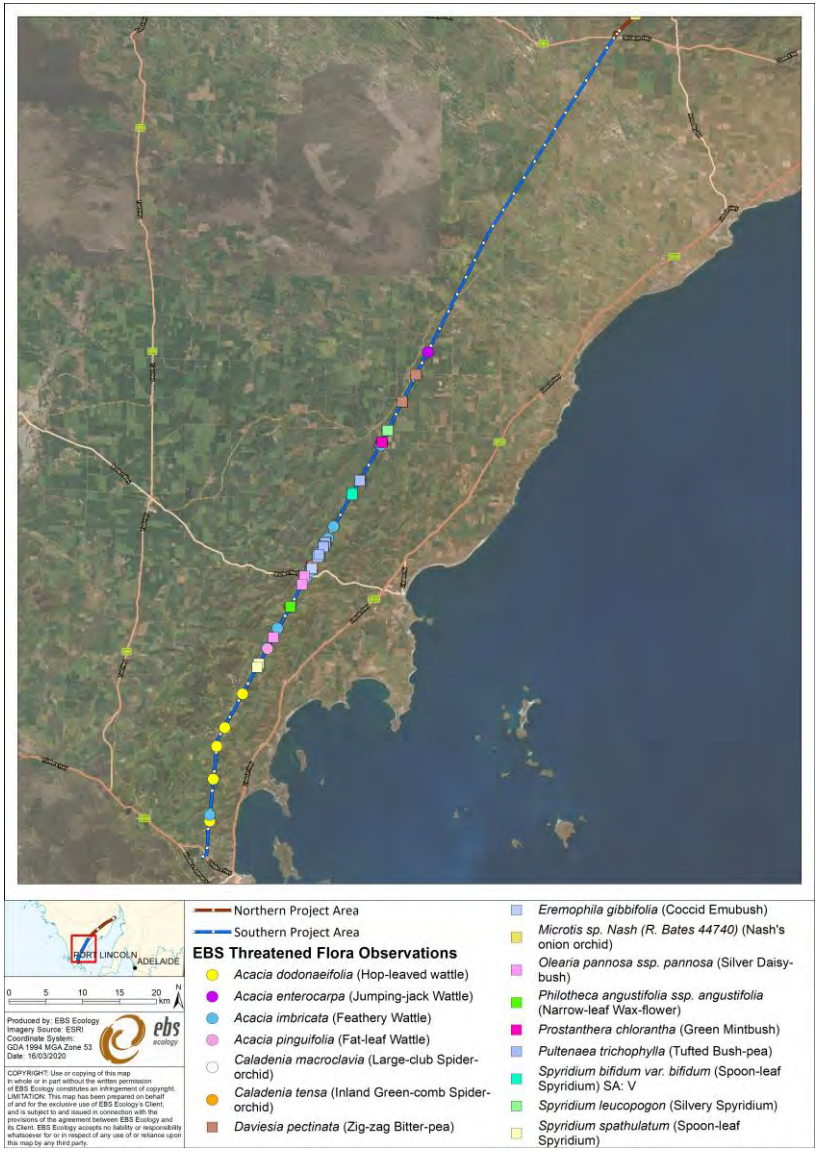

Figure 2. Threatened flora species recorded by EBS Ecology, Southern Project Area.

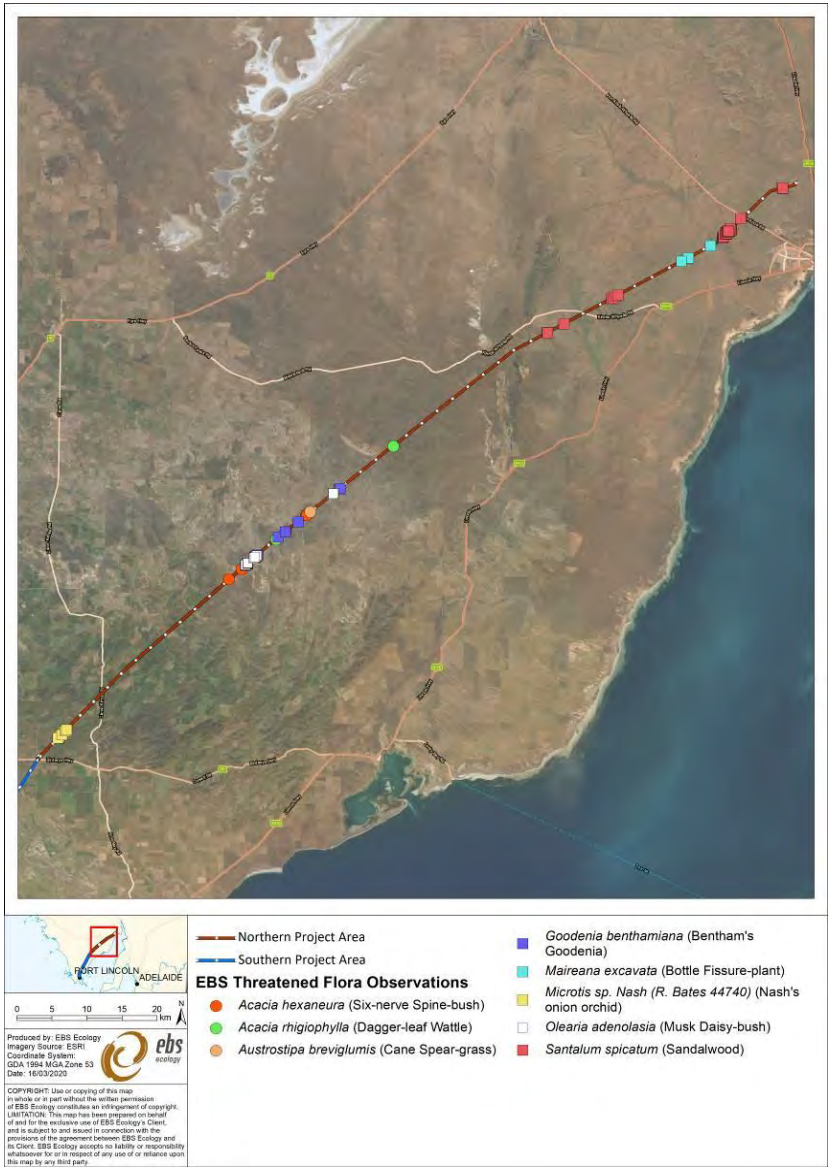

Figure 3. Threatened flora species recorded by EBS Ecology, Northern Project Area.

Figure 4. Threatened fauna species recorded by EBS Ecology, Southern Project Area.

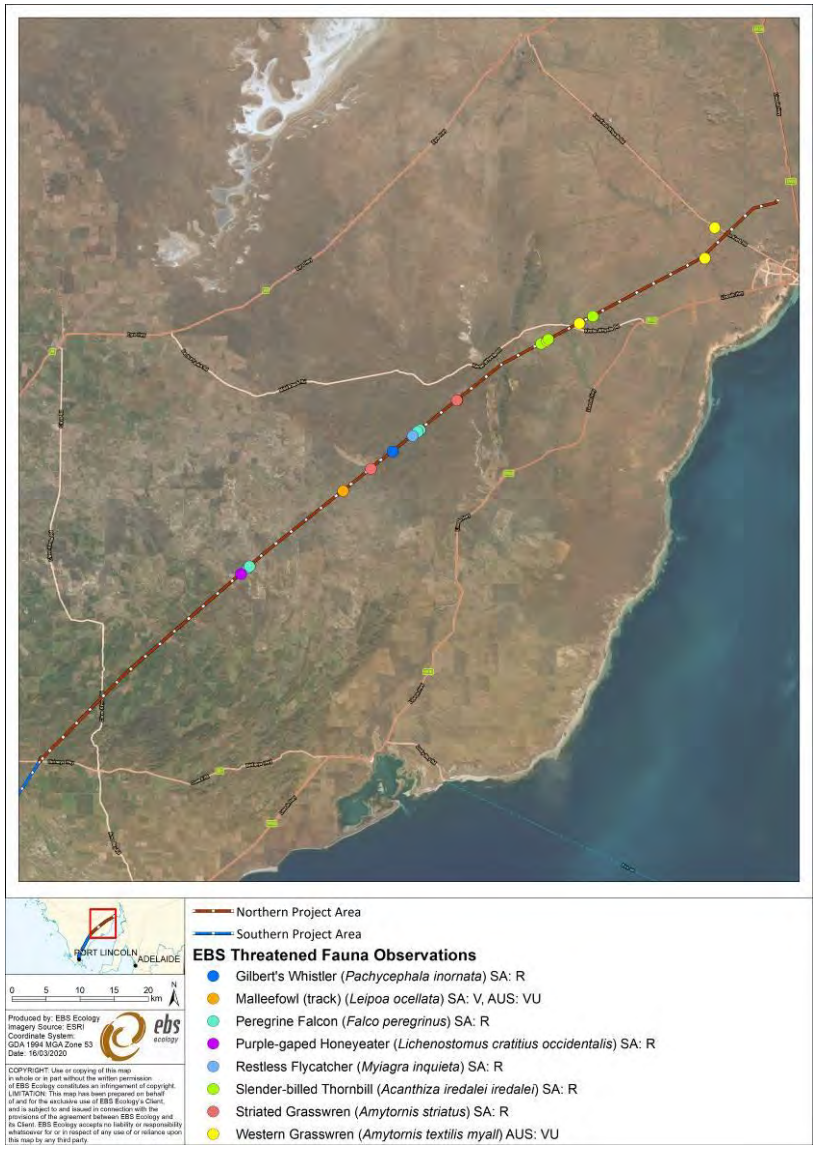

Figure 5. Threatened fauna species recorded by EBS Ecology, Northern Project Area.

Table 3. Threatened species recorded or likely occurring within the Project Area and potentially impacted by the Project.

Management Plan Section	Scientific Name	Common Name	Conservation Status		Presence in Project Area
			Aus	SA	
Flora of National Environmental Significance					
Section 6.2	*Acacia enterocarpa*	Jumping-jack Wattle	EN	E	Recorded 2013
Section 6.5	*Acacia pinguifolia*	Fat-leaf Wattle	EN	E	Recorded 2013
Section 5.1	*Caladenia macroclavia*	Large-club Spider-orchid	EN	E	Recorded 2013
Section 5.2	*Caladenia tensa*	Inland Green-comb Spider-orchid	EN		Recorded 2013
Section 7.6	*Olearia pannosa* ssp. *pannosa*	Silver Daisy-bush	VU	V	Recorded 2013
Section 7.7	*Pultenaea trichophylla*	Tufted Bush-pea	EN	R	Recorded 2013
Fauna of National Environmental Significance					
Section 13.2	*Amytornis textilis myall*	Western Grasswren	VU	V	Recorded 2012
Section 12.6	*Leipoa ocellata*	Malleefowl	VU	E	Recorded 2012, 2013, 2019
Section 11.1	*Sminthopsis psammophila*	Sandhill Dunnart	EN	E	Recorded 2009 - 2013
Section 12.10	*Stipiturus malachurus parimeda*	Southern Emu-wren (Eyre Peninsula)	VU	E	Highly likely to occur
Flora of State Environmental Significance					
Section 6.1	*Acacia dodonaeifolia*	Hop-bush Wattle		R	Recorded 2013, 2019
Section 6.3	*Acacia hexaneura*	Six-nerve Wattle		R	Recorded 2013, 2019
Section 6.4	*Acacia imbricata*	Feathery Wattle		R	Recorded 2013, 2019
Section 6.6	*Acacia rhigiophylla*	Dagger-leaf Wattle		R	Recorded 2013
Section 10.1	*Austrostipa breviglumis*	Bamboo Spear-grass		R	Recorded 2013
Section 10.2	*Austrostipa tenuifolia*			R	Recorded 2013
Section 7.1	*Daviesia benthamii* ssp. *humilis*	Mallee Bitter-pea		R	Recorded 2013
Section 7.2	*Daviesia pectinata*	Zig-zag Bitter-pea		R	Recorded 2013, 2019
Section 7.3	*Eremophila gibbifolia*	Coccid Emubush		R	Recorded 2013, 2019
Section 9.1	*Eucalyptus cretata*	Darke Peak Mallee		R	Recorded 2013
Section 7.4	*Goodenia benthamiana*	Bentham's Goodenia		R	Recorded 2013, 2019
Section 8.2	*Maireana excavata*	Bottle Fissure-plant		V	Recorded 2019
Section 8.3	*Maireana suaedifolia*	Lax Bluebush		R	Recorded 2013
Section 5.3	*Microtis sp. Nash (R. Bates 44740)*	Nash's Onion-orchid		R	Recorded 2013
Section 7.5	*Olearia adenolasia*	Musk Daisy-bush		R	Recorded 2013, 2019

Section 7.8	*Philotheca angustifolia* ssp. *angustifolia*	Narrow-leaf Wax-flower		R	Recorded 2013
Section 7.9	*Prostanthera chlorantha*	Green Mintbush		R	Recorded 2013
Section 8.1	*Santalum spicatum*	Sandalwood		V	Recorded 2013, 2019
Section 7.10	*Spyridium bifidum* var. *bifidum*	Forked Spyridium		V	Recorded 2013
Section 7.11	*Spyridium leucopogon*	Silvery Spyridium		R	Recorded 2013
Section 7.12	*Spyridium spathulatum*	Spoon-leaf Spyridium		R	Recorded 2013
Fauna of State Environmental Significance					
Section 13.1	*Acanthiza iredalei iredalei*	Slender-billed Thornbill (Western)		R	Recorded 2012, 2013, 2019
Section 12.1	*Amytornis striatus*	Striated Grasswren		R	Recorded 2012
Section 12.2	*Calamanthus cauta*	Shy Heathwren		R	Recorded 2012
Section 12.3	*Corcorax melanorhamphos*	White-winged Chough		R	Recorded 2012, 2019
Section 14.1	*Falco peregrinus*	Peregrine Falcon		R	Recorded 2012
Section 12.4	*Gerygone fusca*	Western Gerygone		R	Recorded 2019
Section 12.5	*Lichenostomus cratititus*	Purple-gaped Honeyeater		R	Recorded 2012
Section 12.7	*Myiagra inquieta*	Restless Flycatcher		R	Recorded 2012
Section 12.9	*Stagonopleura guttata*	Diamond Firetail		R	Recorded 2019
Section 12.8	*Pachycephala inornata*	Gilbert's Whistler		R	Recorded 2012

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA**: South Australia (*National Parks and Wildlife Act 1972*). **Conservation codes: CE**: Critically Endangered. **EN/E**: Endangered. **VU/V**: Vulnerable. **R**: Rare.

4 THREATENED ECOLOGICAL COMMUNITIES

4.1 *Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland*

4.1.1 Conservation Status

Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland is listed as an Endangered Ecological Community (EEC) under the EPBC Act.

4.1.2 Description

Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland EEC is typically a woodland community with a canopy dominated by *Eucalyptus petiolaris.* It often occurs in sheltered valleys, along watercourses and on lower slopes. The structure of the community varies from a mid to dense shrub layer with a low, open ground layer dominated by grasses and sedges, the key diagnostic features of the community being as follows (Threatened Species Scientific Committee):

- Distribution within the Eyre York Block bioregion (Eyre Hills subregion) with outliers possibly in the Talia subregion of the Eyre Peninsula.
- Woodland or open forest structure.
- Upper layer dominated or co-dominated by *Eucalyptus petiolaris*, with a tree cover of 10% or more.
- The mid layer varies from open to dense in response to soil moisture and disturbance and/or management history and consists of native sclerophyllous shrubs and small trees.
- The ground layer is variable in development and composition, ranging from sparse to a thick layer of native grasses and other herbs.
- The ecological community is mainly restricted to well-drained, moderate to high fertility soils and is typically associated with sheltered valleys, lower hill slopes and watercourses in the higher rainfall districts of the Eyre Peninsula.

4.1.3 Occurrence in the Project Area

Although not assessed against EPBC criteria for listing as the EEC, one vegetation association mapped in the Project Area may possibly meet the listing:

- *Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata* Open Grassy Woodland (Figure 6).

The location of this vegetation association is mapped in Appendix 1.

Figure 6. ***Eucalyptus petiolaris* +/- *Eucalyptus odorata* +/- *Allocasuarina verticillata* Open Grassy Woodland.**

4.2 *Management of Threats to Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland*

Key threats to the EEC are listed in the *Approved Conservation Advice for the Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland* (Threatened Species Scientific Committee). They include:

- Vegetation clearance, fragmentation and edge effects,
- Invasive species, including weeds,
- Grazing,
- Salinization,
- Dieback,
- Inappropriate fire regimes.

Hollows that often form in the larger *Eucalyptus petiolaris* are an important structural element of habitat for many of the fauna species characteristic of the EEC (Government of South Australia). This includes some species listed as threatened under the NPW Act such as the Endangered Gould's Wattled Bat (*Chalinolobus gouldii*) and Rare Common Brushtail Possum (*Trichosurus vulpecula*). The loss of hollow-bearing trees is likely to impact fauna characteristic of the community, as described in Table 4.

Table 4. Threats and management of impacts to *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Woodland (Threatened Species Scientific Committee).

Threat	Discussion	Exacerbated by the Project during construction	Management Actions
Vegetation clearance, fragmentation and edge effects	• Historical land clearing was extensive in the past. • Ongoing clearing continues to degrade remaining patches, increasing the risk of local extinction.	**Yes.** • Although steps have been taken to avoid vegetation clearing where possible, some clearance is required for the Project.	**4.1** **4.2** **4.3** **4.7** **4.8** **4.9** **4.10** **4.11** **4.12**
Loss of hollow-bearing trees	• Removal of hollow-bearing trees may have long-term impact on fauna characteristic of the EEC by removing a critical habitat component that takes many years to replace. • Short-term impact to individual fauna by death, injury or displacement may occur if utilising hollows are being cleared.	**Yes.** • Larger, potentially hollow-bearing, trees may be required to be removed during construction.	**4.4** **4.5** **4.6**
Invasive species (e.g. weeds)	• Weed species such as *Ehrharta longiflora* and *Asparagus asparagoides* are replacing native species, changing vegetation structure and/or altering fire regimes.	**Yes.** • Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand contaminated by weed seeds) is a vector of spread for weeds during construction. • Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7** **1.8** **1.9** **1.10** **1.11**
Grazing	• Animals such as cattle and sheep browse and damage native vegetation	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	

Threat	Discussion	Exacerbated by the Project during construction	Management Actions
Salinization	• Native vegetation clearance and stream flow reduction can form salt deposition on the soil surface on the naturally saline Eyre Peninsula, leading to vegetation decline and death.	**No.** • The Project does not include any actions that are likely to contribute to soil salinization, such as alteration of water courses or water extraction.	**Not exacerbated by the Project.**
Dieback	• Decline and condition of trees due to insect attack, water stress and salinity.	**No.** • The Project does not include any actions that are likely to contribute to dieback of *Eucalyptus* spp. or canopy trees.	**Not exacerbated by the Project.**
Inappropriate fire regimes	• Fires can impact the perennial flora within the ecological community causing changes in species composition and/or interfering with regeneration capacity.	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction. • Clearing of vegetation and access tracks for construction make some areas more accessible to the public, increasing risk of ignition.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7**

5 THREATENED ORCHIDS

Three species of threatened orchids have previously been recorded in the Project Area or are highly likely to occur. This includes the following species:

- *Caladenia macroclavia* (Large-club Spider-orchid),
- *Caladenia tensa* (Greencomb Spider-orchid,
- *Microtis* sp. Nash (Nash's Onion-orchid).

All three are terrestrial species found in woodland or mallee habitats, and they die back to an underground tuber during a summer dormancy period. They are commonly threatened by habitat loss, weed invasion and changing fire regimes.

5.1 *Caladenia macroclavia (Large-club Spider-orchid)*

5.1.1 Conservation Status

Caladenia macroclavia (Figure 7) is listed as Endangered under the EPBC Act and NPW Act.

5.1.2 Ecology

Biology and description

Caladenia macroclavia is a terrestrial orchid. It has a wiry flowering stem up to 28 centimetres (cm) in height. It produces oblong-lanceolate basal leaves that are dull green, hairy and 8 - 10 cm long by 1 – 1.3 cm wide. The solitary flowers are green to yellow-green with a prominent dark red central band down each segment. The sepals terminate in a prominent thickened, brown, bayonet-shaped osmophore (Quarmby, 2010).

The species usually produces a leaf in July or August, with flowering occurring in late August to mid-September. However, a leaf and flower may not be produced every year, with plants possibly remaining dormant for one or more years. The underground tubers are replaced annually during winter and spring, with the plants being dormant over the dry summer (Quarmby, 2010).

Habitat

Caladenia macroclavia populations occur in sandy loam soils over limestone often in low-lying areas. It has been recorded in *Eucalyptus gracilis / Eucalyptus socialis / Eucalyptus incrassata* Mallee over *Melaleuca uncinata, Alyxia buxifolia, Acrotriche patula, Lepidosperma congestum, Gahnia deusta* and *Lomandra effusa* (Quarmby, 2010).

5.1.3 Occurrence in the Project Area

The species is endemic to South Australia and occurs on the York and Eyre Peninsulas, with most populations located on the eastern York Peninsula.

One occurrence of *Caladenia macroclavia* has been recorded in the Southern Project Area. Three plants were found by EBS Ecology in targeted surveys during 2013 at the location listed in Table 5. The plants

were found in Vegetation Association *Eucalyptus odorata* +/- *Eucalyptus pileata / Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata* (Figure 8). This location is mapped in Figure 2.

Table 5. Location of *Caladenia macroclavia* in the Project Area. Location information from EBS Ecology 2014. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation association
53 H 581367E 6185823N	3	*Eucalyptus odorata* +/- *Eucalyptus pileata / Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata*

Figure 7. *Caladenia macroclavia* (Large-club Spider-orchid). Photographed in the Project Area during targeted surveys by EBS Ecology in 2013.

Figure 8. Typical habitat of *Caladenia macroclavia* in the Project Area. Photographed by EBS Ecology during vegetation surveys in 2019.

5.2 *Caladenia tensa (Green-comb Spider-orchid)*

5.2.1 Conservation Status

Caladenia tensa (Figure 9) is listed as Endangered under the EPBC Act. The species is listed as Endangered due to its small population size, limited distribution and continuing decline due to threatening processes such as habitat loss (Department of Agriculture, Water and the Environment, 2020a).

The species is not listed as threatened under the NPW Act.

5.2.2 Ecology

Description and biology

Caladenia tensa is an herbaceous terrestrial orchid that dies back annually to a small underground tuber during summer dormancy. When not dormant, it develops a single long, narrow leaf with an erect hairy flower stem appearing in winter to spring (recorded from August to November), following winter rainfall. The species is most likely pollinated by the wasp species Slender Black Thynnid (*Thynnoides* sp. aff. *gracilis*) (Department of Agriculture, Water and the Environment, 2020a).

Habitat

Generally occurring on red-brown sandy loams, Caladenia tensa is known from open woodland vegetation associations including those dominated by *Eucalyptus leucoxylon* (South Australian Blue Gum) and *Callitris* spp. It is also known to occur in mallee-heath associations and *Melaleuca uncinata* (Broombush) mallee often with rock outcrops (Department of Agriculture, Water and the Environment, 2020a).

5.2.3 Occurrence in the Project Area

The species is distributed western Victoria and south-eastern South Australia to the Eyre Peninsula. In western Victoria and eastern South Australia, *Caladenia tensa* can be locally common in suitable habitat, with some populations containing hundreds of plants.

Caladenia tensa was recorded in the Project Area by EBS Ecology in 2013. The location of this record is shown in Table 6. The species was recorded in a single Vegetation Association, *Melaleuca uncinata* Tall Shrubland (Figure 10).

The location of the record is mapped in Figure 2.

Table 6. Location of *Caladenia tensa* in the Project Area. Location information from EBS Ecology 2014. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53 H 598984E 6217929N	25	*Melaleuca uncinata* Shrubland

Figure 9. *Caladenia tensa* in the Project Area, photographed by EBS Ecology in 2013

Figure 10. *Melaleuca uncinata* Shrubland in the Project Area, where *Caladenia tensa* was recorded.

5.3 *Microtis sp. Nash (Nash's Onion-orchid)*

5.3.1 Conservation Status

Microtis sp. Nash (Figure 11) is listed as Rare under the NPW Act.

5.3.2 Ecology

Description and biology

This species was formerly classified within the *Microtis unifolia* (Common Onion-orchid) species complex and is difficult to distinguish from that species (South Australian Seed Conservation Centre, 2020).

Microtis sp. Nash is a terrestrial herb 5 – 60 cm tall with erect, fleshy green-yellow stems. The 6 -100 densely packed flowers are spirally arranged on the single stem in racemes 2 – 20 cm long. They are yellow-green, slightly scented on pedicels 1 -1.5 mm long (Bates, 1984).

The plant flowers from August to January and forms small to extensive colonies.

Habitat

It occurs in a wide variety of habitats, including saline soils, and can be found germinating in disturbed areas (Bates, 1984).

5.3.3 Occurrence in the Project Area

Microtis sp. Nash has been recorded by EBS Ecology at nine locations in both the Southern and Northern Project Area, with the number of plants at each location ranging from three to more than 60 (Table 7). It was recorded in two Vegetation Associations:

- *Eucalyptus porosa* Open Woodland +/- *Acacia notabilis* (Figure 12),
- *Melaleuca uncinata* Tall Shrubland.

The locations are mapped in Figure 2and Figure 3.

Table 7. Location of *Microtis* sp. Nash in the Project Area. Location information from EBS Ecology 2014. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53H 633550E 6275311N	3	*Eucalyptus porosa* Open Woodland +/- *Acacia notabilis*
53H 633130E 6274836N	>60	*Eucalyptus porosa* Open Woodland +/- *Acacia notabilis*
53H 633095E 6274783N	10	*Eucalyptus porosa* Open Woodland +/- *Acacia notabilis*
53H 632863E 6274524N	2	*Melaleuca uncinata* Tall Shrubland
53H 632729E 6274399N	20	*Melaleuca uncinata* Tall Shrubland
53H 632687E 6274393N	30	*Melaleuca uncinata* Tall Shrubland
53H 633238E 6274843N	10	*Eucalyptus porosa* Open Woodland +/- *Acacia notabilis*
53H 633714E 6275378N	15	*Melaleuca uncinata* Tall Shrubland
53H 633930E 6275554N	5	*Melaleuca uncinata* Tall Shrubland

Figure 11. *Microtis* sp. Nash, photographed by EBS Ecology in 2013.

Figure 12. *Eucalyptus porosa* Open Woodland, in the Project Area. The largest population of *Microtis* sp. Nash was recorded in this Vegetation Association (Photo from EBS Ecology 2019).

5.4 *Management of Threats to Orchids*

Known threats to the three orchid species listed above have been identified in the following documents:

- *Recovery Plan for Twelve Threatened Orchids in the Lofty Block Region of South Australia 2010* (Quarmby, 2010),
- *Recovery Plan for twelve threatened Spider-orchid* Caladenia *taxa (Orchidaceae: Caladeniinae) of Victoria and South Australia 2000 – 2004* (Todd, 2000).

These documents identify seven threats and threatening processes as impacting on orchids throughout their distributions, including *Caladenia macroclavia* and *Caladenia tensa*. They are listed and discussed in Table 8. Five have relevance to the Project, which are also discussed in the table.

While threats to *Microtis* sp. Nash are not documented and no recovery plan for the species exists, it has been assumed that the species is impacted by similar threats as other orchid species in the Project Area. This has been assumed based on the species' similar woodland and shrubland habitats, its occurrence in similar regions within the Project Area and its broadly similar ecology, that is a terrestrial orchid species that dies back to an underground tuber when dormant. However, due to the size of some populations recorded by EBS Ecology in 2013, lack of pollination, lack of recruitment and loss of genetic diversity are not likely to be impacting on this species.

This document identifies management actions that will be implemented by ElectraNet and its contractors to minimise their impact on threatened orchid species. These actions are discussed in detail in Section 15. Management Actions relevant to orchids are listed in Table 8.

Table 8. Threats and management actions to minimise impact on threatened orchids.

Threat	Species	Discussion	Exacerbated by the Project	Management Action
Weed invasion[1, 2]	*Caladenia macroclavia* *Caladenia tensa* *Microtis* sp. Nash	• Invasion of weeds such as *Asparagus asparagoides* (Bridal Creeper), *Oxalis pes-caprae* (Soursob), *Avena* spp. (Wild Oats) and other introduced grasses is a threat to all known populations of *Caladenia macroclavia*.[1] *Caladenia tensa* is also threatened by introduced grasses such as *Ehrharta calycina* (Perennial Veldt Grass).[2] • It has been assumed that threats from weed invasion, particularly invasive grasses, would also impact on *Microtis* sp. Nash, since theses grasses are widespread throughout the Project Area.	**Yes.** • Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand contaminated by weed seeds) is a vector of spread for weeds during construction. • Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7** **1.8** **1.9** **1.10** **1.11**
Grazing and herbivory[1, 2]	*Caladenia macroclavia* *Caladenia tensa* *Microtis* sp. Nash	• Grazing by domestic stock directly impacts species by impact to plants. It also causes indirect impacts resulting from habitat degradation caused by grazing activities[1]. • Herbivory of flowers by kangaroos and rabbits in known to occur within populations of both *Caladenia* species.[1, 2]	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	
Inappropriate fire regimes[1, 2]	*Caladenia macroclavia* *Caladenia tensa* *Microtis* sp. Nash	• Fire prevention and fuel reduction activities during the active growing period, such as slashing of fire breaks and prescribed burns, during the active growing period is likely to damage or kill orchids.[1] • Hot, intense wildfire may damage underground tubers.[1]	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction. • Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, increasing risk of ignition.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8**
Site disturbance[2]	*Caladenia tensa* *Microtis* sp. Nash	• Sites are known to be disturbed by vehicles and other recreational activities in some cases.[2]	**Yes.** • While project design can avoid known populations of all three orchid species, excessive or unintended vegetation/site disturbance may occur as a result of construction within the vicinity of populations. • Sites may be disturbed indirectly by other threats exacerbated by the Project (e.g. weed invasion).	**3.1** **3.2** **3.5** **3.6** **3.8**

			• Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, creating more opportunity for disturbance.	
Lack of pollination[1]	*Caladenia macroclavia*	• Within studied populations of *Caladenia macroclavia*, only low levels of natural pollination have been observed. Often with only one flowering plant within each fragmented population, cross-pollination is unlikely.[1]	**Yes.** • Vegetation clearing and fragmentation is expected as a result of this Project. This process may exacerbate the effects of lack of pollination.	**8.1**
Lack of recruitment[1]	*Caladenia macroclavia*	• Low rates of natural pollination have resulted in very poor recruitment rates for *Caladenia macroclavia*. Poor recruitment has been exacerbated by other threats, such as grazing.[1]	**No.** • The Project does not include any actions that would impact on the rate of recruitment.	**Not exacerbated by the Project.**
Loss of genetic diversity[1]	*Caladenia macroclavia*	• Almost all known populations of *Caladenia macroclavia* consist of less than 10 plants, with limited or no chance of cross-pollination between populations due to habitat fragmentation.	**No.** • Vegetation clearing and fragmentation is expected as a result of this Project. This process may exacerbate the effects of lack of pollination, leading to a loss of genetic diversity.	**Not exacerbated by the Project.**

1: ***Recovery Plan for Twelve Threatened Orchids in the Lofty Block Region of South Australia 2010*** (Quarmby, 2010)**.**
2: ***Recovery Plan for twelve threatened Spider-orchid Caladenia taxa (Orchidaceae: Caladeniinae) of Victoria and South Australia 2000 – 2004*** (Todd, 2000)**.**

6 THREATENED *ACACIA* SPECIES

Six threatened *Acacia* species have previously been recorded in the Project Area or are highly likely to occur, as listed below:

- *Acacia dodonaefolia* (Hop-bush Wattle),
- *Acacia enterocarpa* (Jumping-jack Wattle),
- *Acacia hexaneura* (Six-nerve Wattle),
- *Acacia imbricata* (Feathery Wattle)
- *Acacia pinguifolia* (Fat-leaved Wattle),
- *Acacia rhigiophylla* (Dagger-leaf Wattle)

All six species occur in woodland, shrubland or mallee Vegetation Associations, with species occurring in both the Southern and Northern Project Area.

6.1 *Acacia dodonaeifolia (Hop-bush Wattle)*

6.1.1 Conservation status

Acacia dodonaeifolia is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

6.1.2 Ecology

Biology and description

Acacia dodonaeifolia (Figure 13) is a small shrub to small tree 2 – 6 metres (m) tall. Phyllodes are linear to lanceolate, being 4 – 10 cm long and 4 – 10 millimetres (mm) broad. Flowering from July to November, flowers are bright yellow and occur in globular heads, usually in groups of two (Berkinshaw, 2010).

Within its distribution, *Acacia dodonaeifolia* occurs in areas of higher rainfall (500 – 700 mm annually) (Berkinshaw, 2010).

Habitat

Occurring in woodland or open forest Vegetation Associations, *Acacia dodonaeifolia* prefers acidic yellow duplex or shallow red sandy loams (Government of South Australia, 2020a).

6.1.3 Occurrence in the Project Area

Endemic to South Australia, the species is distributed mainly in the southern Eyre Peninsula and southern Mount Lofty Ranges. However, scattered occurrences elsewhere are known (e.g. Kangaroo Island) (Government of South Australia, 2020a).

Acacia dodonaeifolia (Figure 13) was recorded by EBS Ecology in the south of the Project Area during surveys in both 2013 and 2019. The locations of these records are listed in Table 9. The species was recorded in 5 Vegetation Associations (Figure 14):

- *Allocasuarina verticillata* Low Woodland
- *Eucalyptus cladocalyx* Woodland / Open Woodland
- *Juncus* spp. Sedgeland
- *Acacia dodonaeifolia* Tall Shrubland
- *Acacia paradoxa* Shrubland +/- *Eucalyptus* spp.

Within *Acacia dodonaeifolia* Tall Shrubland (Figure 14), the species is the dominant overstorey species. In all other Vegetation Associations, it occurs as an infrequent understorey shrub.

The locations of *Acacia dodonaeifolia* records in the Project Area are mapped in Figure 2.

Table 9. Locations of *Acacia dodonaeifolia* in the Project Area. Location information from EBS Ecology 2014a and EBS Ecology 2019a. Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of Plants	Vegetation Association
53H 579390E 6182180N	>10	*Allocasuarina verticillata* Low Woodland
53H 575867E 6175049N	>10	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 576969E 6177606N	1	*Juncus* spp. Sedgeland
53H 574928E 6164906N	5	*Juncus* spp. Sedgeland
53H 574927E 6165749N	Dominant species	*Acacia dodonaeifolia* Tall Shrubland
53H 575418E 6170592N	>10	*Acacia paradoxa* Shrubland +/- *Eucalyptus* spp.

Figure 13. *Acacia dodonaeifolia*, photographed by EBS Ecology while undertaking vegetation surveys of the Project Area in 2019.

Figure 14. *Acacia dodonaeifolia* Tall Shrubland in the Project Area (EBS Ecology, 2019).

6.2 *Acacia enterocarpa (Jumping-jack Wattle)*

6.2.1 Conservation status

Acacia enterocarpa (Figure 15) is listed as Endangered under the EPBC Act, due to its area of occupancy remaining less than 500 square km (km^2) (Moritz & Bickerton, 2011). It is also listed as Endangered under the NPW Act.

6.2.2 Ecology

Biology

Acacia enterocarpa (Figure 15) is a perennial shrub growing to 1.5 m in height. It is typically dense and prickly, with straight to slightly curved phyllodes 2-4.5 cm long and 1 mm wide. Phyllodes usually have a rigid, sharp reddish-brown tip (Pobke, 2007).

Flowering has been documented from May to October, with inflorescences growing from the joint between phyllode and stem, generally in pairs. The plant is likely to be wind or insect pollinated, although this is unknown. The seed pod is distinct, growing in a shape resembling a jumping-jack firecracker (Pobke, 2007).

Habitat

On the Eyre Peninsula, *Acacia enterocarpa* has been recorded on mottled-yellow duplex soils in the south and on red calcareous red duplex soils and dense brown loams in the north. Sub-populations occur within several mallee associations, including *Eucalyptus calycogona* (Square-fruited Mallee), *Eucalyptus Dumosa* (White Mallee), *Eucalyptus gracilis* (White Mallee), *Eucalyptus incrassata* (Ridge-fruited Mallee), *Eucalyptus peninsularis* (Cummins Mallee) and *Eucalyptus socialis* (Red Mallee). Sites generally have an understorey of *Melaleuca uncinata* (Broombush) and/or *Melaleuca lanceolata* (Dryland Teatree) (Moritz & Bickerton, 2011).

6.2.3 Occurrence in the Project Area

Acacia enterocarpa was recorded in the Project Area by EBS Ecology (2014), but not in subsequent surveys in 2019 ((EBS Ecology, 2019a)). The species was recorded at three locations in roadside reserves east of Ungarra and south-east of Mount Hill in the following Vegetation Associations:

- *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata* (Figure 16).
- *Eucalyptus peninsularis* +/- *Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual species.

Locations of records are mapped in Figure 2 and shown in Table 10.

Table 10. Location of known populations of *Acacia enterocarpa* in the Project Area. Location information from EBS Ecology 2014. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53H 598033E 6215960N	8	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata*.
53H 598303E 6216312N	18	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata*.
53H 604529E 6228597N	2	*Eucalyptus peninsularis* +/- *Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual species.

Figure 15. *Acacia enterocarpa* flowers, photographed during targeted surveys undertaken by EBS Ecology in 2013.

Figure 16. *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata,* in which the majority of *Acacia enterocarpa* were recorded.

6.3 *Acacia hexaneura (Six-nerve Wattle)*

6.3.1 Conservation status

Acacia hexaneura (Figure 17) is listed under the NPW Act as Rare. It is confined to the north-eastern Eyre Peninsula and is endemic to South Australia (Government of South Australia, 2020b).

Acacia hexaneura is not listed as threatened under the EPBC Act.

6.3.2 Ecology

Biology and description

A rigid, prickly shrub no more than 1 m high and spreading to 2 m. The phyllodes are rigid, prickly and occur with the stems. They are distinctly six-veined, 5 – 17 mm long by 1 – 2 mm wide. The plant flowers in winter to spring, the globular, golden-yellow flower heads appearing from July to September (Government of South Australia, 2020b).

Habitat

Occurring on well drained sands and gravelly loams over limestone and ironstone, *Acacia hexaneura* is associated with mallee Vegetation Associations, often dominated by *Eucalyptus dumosa* and *Eucalyptus gracilis* with a shrubby understorey including *Melaleuca uncinata* (Government of South Australia, 2020b).

6.3.3 Occurrence in the Project Area

Acacia hexaneura was recorded in the Project Area in 2013 and 2019 at the locations listed in Table 11. It was found in two mallee Vegetation Associations in the central part of the Project Area:

- *Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee (Figure 18)
- *Eucalyptus incrassata* +/- *Callitris verrucosa* Mallee over *Melaleuca uncinata* and *Calytrix tetragona*

The locations of *Acacia hexaneura* records are mapped in Figure 3.

Table 11. Location of known populations of *Acacia hexaneura* in the Project Area. Location information from EBS Ecology (2014 and 2019). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of Plants	Vegetation Association
53H 657055E 6297000N	2	*Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee
53H 658859E 6298455N	>50	*Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee
53H 665088E 6303783N	40	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Melaleuca uncinata* and *Calytrix tetragona*
53H 668050E 6306150N	15	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Melaleuca uncinata* and *Calytrix tetragona*
53H 668118E 6306134N	1	*Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee
53H 665098E 6303785N	1	*Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee

Figure 17. *Acacia hexaneura*, photographed in the Project Area by EBS Ecology in 2013.

Figure 18. Typical habitat of *Acacia hexaneura* in the Project Area (EBS Ecology, 2019a).

6.4 *Acacia imbricata (Feathery Wattle)*

6.4.1 Conservation status

Acacia imbricata (Figure 19) is listed as Rare under the NPW Act. The plant is endemic to South Australia, its distribution limited to the southern Eyre Peninsula (Berkinshaw, 2010).

Acacia imbricata is not listed as threatened under the EPBC Act.

6.4.2 Ecology

Biology and description

A low shrub, dense and spreading, *Acacia imbricata* grows to 1 -2 m in height. Phyllodes are small, 10 - 15 mm long and 2 mm wide, flat with a single vein. Globular yellow flower heads appear in pairs during July to September. Seed pods are papery, light brown and usually straight (Berkinshaw, 2010).

Habitat

This species grows in grows in forest, woodland and mallee in areas receiving 400 – 500 mm of rainfall annually. It mainly occurs in hard acidic to neutral soils.

6.4.3 Occurrence in the Project Area

Acacia imbricata was recorded at 16 locations in the Project Area in both 2013 and 2019 by EBS Ecology (Table 12). It occurs in the southern part of the Project Area in woodland and mallee Vegetation Associations, including those listed below:

- *Eucalyptus cladocalyx* Woodland / Open Woodland
- *Eucalyptus cladocalyx* Very Open Woodland over scattered native shrubs and exotics (Figure 20)
- *Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*
- *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata* (Figure 21)

It occurs as an understorey shrub to a *Eucalyptus* spp. overstorey and is co-dominant in the shrub layer with *Melaleuca uncinata* in one Vegetation Association.

The locations of EBS Ecology records are mapped in Figure 2.

Table 12. Occurrences of *Acacia imbricata* in the Project Area. Location information from EBS Ecology 2014 and 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of Plants	Vegetation Association
53H 582616E 6188443N	20	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 582625E 6188429N	>20	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 582695E 6188416N	5	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 582748E 6188376N	15	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588547E 6198980N	>500	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 590382E 6202271N	Throughout	*Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*
53H 589806E 6201267N	Throughout	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 590982E 6203304N	Throughout	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588006E 6197882N	1	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 591772E 6204909N	Throughout	*Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*
53H 598133E 6215936N	Dominant shrub	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata*
53H 595350E 6211212N	Throughout	*Eucalyptus odorata* +/- *Eucalyptus pileata* / *Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata*
53H 598303E 6216312N	Dominant shrub	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata*
53H 585854E 6193960N	Throughout	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 584130E 6191082N	>5	*Eucalyptus cladocalyx* Very Open Woodland over scattered native shrubs and exotics
53H 574927E 6165749N	>20	*Eucalyptus cladocalyx* Woodland / Open Woodland

Figure 19. *Acacia imbricata* photographed in the Project Area by EBS Ecology in 2013.

Figure 20. Most locations of *Acacia imbricata* records are within *Eucalyptus cladocalyx* Woodland, as shown above.

Figure 21. *Acacia imbricata* is a co-dominant shrub in areas of *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata.*

6.5 *Acacia pinguifolia (Fat-leaf Wattle)*

6.5.1 Conservation status

Acacia pinguifolia (Figure 22) is listed as Endangered under the EPBC Act and NPW Act.

Population are scattered on the Eyre Peninsula and include sites near Cummins, Wanilla, the Koppio Hills and Ungarra (Pound, Obst, How, & Bickerton, 2009).

6.5.2 Ecology

Biology and description

Acacia pinguifolia is a dense spreading shrub that grows to 1-2 m tall, spreading to 2-3 m wide. Numerous arching branches ascent from near ground level, with smooth reddish-brown branchlets and pale grey bark at the base of stems. Phyllodes are 1-3.5 mm long and 2-3 mm wide, light green, rigid, thick and fleshy. Inflorescences are solitary or in pairs, growing from the leaf axils. Flower-heads are deep yellow in colour.

Flowering has been observed from July to October, with pods ripening between November and January (Pound, Obst, How, & Bickerton, 2009).

Acacia pinguifolia appears to respond to fire with mass germination events, with mass recruitment observed after a fire in 2005 on Eyre Peninsula (Pound, Obst, How, & Bickerton, 2009).

Habitat

Acacia pinguifolia occurs on sandy or hard alkaline yellow duplex soils. Populations on the Eyre Peninsula are situated in undulating terrain with a westerly aspect. It occurs in various woodland, open woodland and shrubland Vegetation Associations, including (but not limited to) the following (Pound, Obst, How, & Bickerton, 2009):

- *Eucalyptus cladocalyx* mid-woodland
- *Eucalyptus behriana* +/- *Eucalyptus odorata* low open woodland
- *Eucalyptus calycogona* +/- *Eucalyptus dumosa* mid-mallee woodland
- *Melaleuca uncinata* tall open shrubland.

6.5.3 Occurrence in the Project Area

Populations of *Acacia pinguifolia* are scattered on the Eyre Peninsula and include sites near Cummins, Wanilla, the Koppio Hills and Ungarra (Pound, Obst, How, & Bickerton, 2009).

Acacia pinguifolia was recorded at one location in the Project Area, where 5 plants were present in roadside vegetation, as indicated in Table 13 and mapped in Figure 2.

It was recorded in roadside vegetation east of Koppio in Vegetation Association *Eucalyptus cladocalyx* Woodland / Open Woodland (Figure 23). At this site, the species occurs in association with *Acacia imbricata,* listed as Rare under the NPW Act.

Table 13. Location of known populations of *Acacia pinguifolia* in the Project Area. Location information from EBS Ecology (2014). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 582770E 6188334N	5	*Eucalyptus cladocalyx* Woodland / Open Woodland

Figure 22. *Acacia pinguifolia* photographed in the Project Area during targeted surveys undertaken by EBS Ecology in 2013.

Figure 23. *Eucalyptus cladocalyx* Woodland / Open Woodland in the Project Area, where *Acacia pinguifolia* was recorded.

6.6 *Acacia rhigiophylla (Dagger-leaf Wattle)*

6.6.1 Conservation status

Acacia rhigiophylla is listed as Rare under the NPW Act, occurring as two small, disjunct populations on the Eyre Peninsula and Murray regions.

The species is not listed as threatened under the EPBC Act.

6.6.2 Ecology

Biology and description

A stiff, prickly shrub growing to 2 m tall, *Acacia rhigiophylla* has stiff, shiny green phyllodes that are flattened with three raised veins on each face. Flowers are arranged in spherical heads of 3 – 10 flowers on short peduncles in the leaf axils. It flowers in spring and summer (Costermans, 1994).

Habitat

This species is found growing in areas of between 300 mm and 400 mm annual rainfall on alkaline red duplex or grey-brown calcareous loams. It occurs in open shrublands and mallee and is often associated with *Eucalyptus socialis* and *Eucalyptus gracilis* (Government of South Australia, 2020c).

6.6.3 Occurrence in the Project Area

Acacia rhigiophylla has been recorded at three locations in the Project Area (Table 14). It was recorded in Mallee and Tall Shrubland Vegetation Associations in the north of the Project Area, as listed below:

- *Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee (Figure 25),
- *Acacia wilhelmiana +/- Senna artemisioides* ssp. *coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia* spp. +/- *E. incrassata* +/- *E. brachycalyx*

Locations listed in Table 14 are mapped in Figure 3.

Table 14. Location of known populations of *Acacia rhigiophylla* in the Project Area. Location information from EBS Ecology 2014a and 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53H 659565E 6299131N	15	*Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee
53H 663770E 6302679N	30	*Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee
53H 680452E 6315984N	1	*Acacia wilhelmiana +/- Senna artemisioides* ssp. *coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia* spp. *+/- E. incrassata +/- E. brachycalyx*

Figure 24. *Acacia rhigiophylla,* photographed by EBS Ecology in 2013.

Figure 25. Most occurrences of *Acacia rhigiophylla* in the Project Area are in *Eucalyptus socialis / E. oleosa / E. brachycalyx +/- E. leptophylla* Mallee.

6.7 *Management of Threats to Acacia Species*

Known threats to the *Acacia* species discussed above have been identified in the following documents:

- *Recovery Plan for the Endangered Jumping-Jack Wattle* Acacia enterocarpa *(2011)* (Moritz & Bickerton, 2011)
- *Draft Recovery Plan for 23 Threatened Flora Taxa on Eyre Peninsula, South Australia 2007-2012* (Pobke, 2007)
- *Draft Recovery Plan for Acacia pinguifolia (*Fat-leaved Wattle*)* (Pound, Obst, How, & Bickerton, 2009)

These documents cover extensively the threats impacting on the two EPBC listed threatened species *Acacia enterocarpa* and *Acacia pinguifolia.* These are listed in Table 15. These threats include threatening processes that are understood to be widely impacting on threatened plants in fragmented landscapes, but also includes more species-specific threats such as mining.

While there is no formal documentation of threats to the remaining NPW Act listed species, it is assumed that they are impacted by similar widespread threatening processes but are probably not impacted by more specific threats. This is based on the following:

- All species described above are shrubs found in woodland, open woodland and mallee habitats.
- All occur within a highly cleared and fragmented landscape, except *Acacia rhigiophylla.* This species occurs in the north of the Project Area, where native vegetation is more widespread.
- Due to current and past land use in the Project Area, threatening processes such as weed invasion, changed fire regimes, grazing and habitat loss and fragmentation are widespread.

Table 15 identifies 11 threats as impacting on threatened *Acacia* species. Of these, the following six have the potential to be exacerbated by the Project:

- Disease,
- Weed invasion,
- Inappropriate disturbance and fire regimes,
- Grazing,
- Vegetation clearing and habitat fragmentation,
- Spray drift.

How these threats are potentially impacted by the Project is discussed in Table 15.

The management of threats that are exacerbated by the construction phase of the Project will be managed by implementing management actions also listed in Table 15. While ElectraNet has endeavoured to avoid impact wherever possible, these management actions aim to minimise impact where it cannot be avoided.

Management Actions are described in detail in Section 15.

Table 15. Threats to *Acacia* species exacerbated by the Project and management actions to minimise the impact of construction.

Threat	Species	Discussion	Exacerbated by the Project	Management Action
Poor recruitment[1, 2]	*Acacia enterocarpa*	• Anecdotal information suggests that although Eyre Peninsula populations of *Acacia enterocarpa* contain healthy plants, there is poor seed set and very few juvenile plants present[1].	**No.** • It is unlikely that any action undertaken as part of the Proposal would influence recruitment in *Acacia enterocarpa.*	**Not exacerbated by the Project.**
Small population size[1, 2, 3]	*Acacia dodonaeifolia* *Acacia enterocarpa* *Acacia hexaneura* *Acacia imbricata* *Acacia pinguifolia* *Acacia rhigiophylla*	• *Acacia enterocarpa* and *Acacia pinguifolia* are found only in small, isolated sub-populations, although were likely more widespread before land clearing.[1, 3] • Small, isolated populations are increasingly vulnerable to extinction by single events such as wildfire.[1] • Other threatened *Acacia* species in the Project Area are also likely to exist in small, disjunct populations due to historical land clearing.	**No.** • The Proposal does not include any actions that would decrease the size of any population.	**Not exacerbated by the Project.**
Disaese[1, 2, 3]	*Acacia dodonaeifolia* *Acacia enterocarpa* *Acacia hexaneura* *Acacia imbricata* *Acacia pinguifolia* *Acacia rhigiophylla*	• The Project Area falls within the known and/or potential range of *Phytophthora* species. *Phytophthora* spp. are known to infect *Acacia* spp., eventually killing infected plants.[1, 2] • All threatened *Acacia* species have the potential to be impacted by *Phytophthora*.	**Yes.** • Vehicles, machinery and personnel may act as a vector of spread for *Phytophthora* if carrying contaminated soil. • Contaminated construction materials brought into the Project Area (e.g. contaminated gravel/fill/sand) is a potential vector of spread.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7** **1.8** **1.9** **1.10** **1.11**
Road and rail management activities[1, 2, 3]	*Acacia dodonaeifolia* *Acacia enterocarpa* *Acacia hexaneura* *Acacia imbricata* *Acacia pinguifolia* *Acacia rhigiophylla*	• Some populations of threatened *Acacia* occur within road and rail corridors. Ongoing maintenance of road and rail infrastructure, including vegetation management, potentially remove plants and magnify the impacts of other threats such as weed invasion and spray drift.[1]	**No.** • The Project does not include the maintenance of any road and/or rail corridors.	**Not exacerbated by the Project.**
Weed invasion[1, 2, 3]	*Acacia dodonaeifolia*	• Competition with weed species, including *Asparagus asparagoides* (Bridal Creeper),	**Yes.**	**1.1** **1.2**

Threat	Species	Discussion	Exacerbated by the Project	Management Action
	Acacia enterocarpa *Acacia hexaneura* *Acacia imbricata* *Acacia pinguifolia* *Acacia rhigiophylla*	*Oxalis pes-caprae* (Soursob), *Asparagus declinatum* (Bridal Veil), *Scabiosa atropurpurea* (Scabious) and *Ehrharta calycina* (Perennial Veldt Grass), is a major threat to small, isolated *Acacia* sp. populations.[1, 2] • This competition potentially reduces the ability of the shrubs to establish from seed and potentially increases the frequency and intensity of wildfires due to increased fuel loads.[2]	• Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand contaminated by weed seeds) is a vector of spread for weeds during construction. • Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.3** **1.4** **1.5** **1.6** **1.7** **1.8** **1.9** **1.10** **1.11**
Grazing[1, 2, 3]	*Acacia dodonaeifolia* *Acacia enterocarpa* *Acacia hexaneura* *Acacia imbricata* *Acacia pinguifolia* *Acacia rhigiophylla*	• It is assumed that grazing by stock, rabbits and kangaroos impacts *Acacia* sp. by reducing recruitment and facilitating the spread of invasive weeds.[1, 3] • Sheep grazing of adult *Acacia pinguifolia* has been observed within some populations.[2]	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	
Inappropriate site disturbance and fire regimes[1, 2, 3]	*Acacia dodonaeifolia* *Acacia enterocarpa* *Acacia hexaneura* *Acacia imbricata* *Acacia pinguifolia* *Acacia rhigiophylla*	• Disturbance requirements for the relevant species are not well known, however *Acacia* species are generally early colonisers that require a disturbance event to plant reproduction and recruitment.[1] • Long periods between disturbances are expected to result in successional decline in the populations of some species.[2] • Disturbance too soon following a germination event could result in population failure and local extinction.[2]	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction. • Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, increasing risk of ignition.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8** **3.1** **3.2** **3.5** **3.6** **3.8**
Mining[1]	*Acacia enterocarpa*	• Some areas where *Acacia enterocarpa* occurs have been subjected to historical mining and extraction activities.[1]	**No.** • The Project does not include any mining or extraction activity.	**Not exacerbated by the Project.**

Threat	Species	Discussion	Exacerbated by the Project	Management Action
Vegetation clearing and habitat fragmentation[2, 3]	*Acacia dodonaeifolia* *Acacia enterocarpa* *Acacia hexaneura* *Acacia imbricata* *Acacia pinguifolia* *Acacia rhigiophylla*	• Land clearing has drastically reduced the area of land potentially suitable as habitat for all species listed and has caused isolation and fragmentation of populations. [1, 2, 3] • Further clearing of land would increase this impact	**Yes.** • Vegetation clearing, although kept to the minimum possible, is required as part of the Project. Any clearing of native vegetation exacerbates threats associated with clearing of habitat and fragmentation.	**3.1** **4.1** **4.2** **4.3** **4.4** **4.8** **4.9** **4.10** **4.11** **4.12** **4.13** **4.14**
Salinity / changes in hydrology[2]	*Acacia enterocarpa*	• Alteration to drainage and riparian zones is thought to have a high impact on *Acacia enterocarpa* populations that occur in drainage areas.[2]	**No.** • The Project does not impact on any riparian or drainage areas. The *Acacia enterocarpa* populations within the Project Area are not situated in a drainage area.	**Not exacerbated by the Project.**
Spray drift[2, 3]	*Acacia pinguifolia*	• Populations occur adjacent farmland used for cropping. Spray drift from herbicide use on crops may occur. Similarly, herbicide used for vegetation, weed and fire management within road and rail reserves may also impact plants.[3]	**Yes.** • Use of herbicide for weed control associated with the Project may exacerbate this threat if used near threatened *Acacias*.	**5.1** **5.2** **5.3**

1: ***Recovery Plan for the Endangered Jumping-Jack Wattle*** **Acacia enterocarpa** ***(2011)*** (Moritz & Bickerton, 2011)***.***

2: ***Draft Recovery Plan for 23 Threatened Flora Taxa on Eyre Peninsula, South Australia 2007-2012*** (Pobke, 2007)***.***

3: Draft Recovery Plan for Acacia pinguifolia (**Fat-leaved Wattle*****)*** (Pound, Obst, How, & Bickerton, 2009)***.***

7 SHRUBS OF WOODLANDS AND MALLEE

Within mallee and woodland habitats, covering several Vegetation Associations, there are 12 threatened shrub species that have been recorded in the Project Area. Two are listed as threatened under the EPBC Act and NPW Act (*Olearia pannosa* ssp. *pannosa* and *Pultenaea trichophylla*), while the remaining 9 species are listed under the NPW Act only.

They range from low shrubs, less than 1 m in height occurring, in heathy understorey, to taller shrubs of over 1 m. Many are threatened by habitat fragmentation, grazing activity and vegetation management, such as maintenance of road and rail corridors. Some have not previously had threats assessed in detail.

The threatened shrubs covered in this section are listed below.

- *Daviesia benthamii* ssp. *humilis* (Mallee Bitter-pea)
- *Daviesia pectinata* (Zig-zag Bitter-pea)
- *Eremophila gibbifolia* (Coccid Emubush)
- *Goodenia benthamiana* (Bentham's Goodenia)
- *Olearia adenolasia* (Musk Daisy-bush)
- *Olearia pannosa* ssp. *pannosa*
- *Philotheca angustifolia* ssp. *angustifolia* (Narrow-leaf Wax-flower)
- *Prostanthera chlorantha* (Green Mintbush)
- *Pultenaea trichophylla* (Tufted Bush-pea)
- *Spyridium bifidum* var. *bifidum* (Forked Spyridium)
- *Spyridium leucopogon* (Silvery Spyridium)
- *Spyridium spathulatum* (Spoon-leaf Spyridium)

7.1 *Daviesia benthamii ssp. humilis (Mallee Bitter-pea)*

7.1.1 Conservation Status

Daviesia benthamii ssp. *humilis* (Figure 26) is listed as Rare under the NPW Act in South Australia. The species is not listed as threatened under the EPBC Act.

7.1.2 Ecology

Biology and description

Daviesia benthamii ssp. *humilis* is a dense, multi-stemmed shrub, growing to 0.6 m in height. The plant has phyllodes that are terete and rigid, 5 – 30 mm long and 1 – 2 mm in diameter. Flowering occurs in September and October, with racemes of 4 – 6 flowers (Royal Botanic Gardens and Domain Trust, 2020a).

Habitat

Daviesia benthamii ssp. *humilis* grows in mallee on calcareous sandy or loamy soils.

7.1.3 Occurrence in the Project Area

Daviesia benthamii ssp. *humilis* is likely to occur in the Project Area between Hinks and Ironstone Hill Conservation Parks. Vegetation Associations in which it might occur include:

- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee.
- *Eucalyptus diversifolia +/- Eucalyptus incrassata* Mallee over exotics and *Enchylaena tomentosa*.
- *Eucalyptus peninsularis +/- Eucalyptus dumosa* Mallee over *Enchylaena tomentosa* and emergents (Figure 27).
- *Eucalyptus incrassata +/- Melaleuca uncinata +/- Melaleuca lanceolata* Mallee over *Ehrharta calycina.*
- *Eucalyptus incrassata +/- Melaleuca uncinata +/- Melaleuca lanceolata* Mallee.
- *Eucalyptus calycogona ssp. calycogona +/- Eucalyptus phenax ssp. phenax* Mallee over *Maireana brevifolia* and exotics.
- *Eucalyptus incrassata +/- Callitris verrucose* Mallee over *Melaleuca uncinata* and *Calytrix tetragona*.

Figure 26. *Daviesia benthamii* ssp. *humilis*, photographed in the Project Area by EBS Ecology in 2013.

Figure 27. *Eucalyptus peninsularis +/- Eucalyptus dumosa* Mallee, likely habitat for *Daviesia benthamii* ssp. *humilis*.

7.2 *Daviesia pectinata (Zig-zag Bitter-pea)*

7.2.1 Conservation Status

Daviesia pectinata (Figure 28) is listed as Rare under the NPW Act and is not listed as threatened under the EPBC Act.

7.2.2 Ecology

Biology and description

Daviesia pectinata is a rigid shrub to 1.5 m high. The phyllodes are flattened laterally, lanceolate tapering into a sharp point and up to 5 cm long. Flowers occur in axillary racemes of up to 10 buds and are orange-red in colour. The plant generally flowers in spring, from September to November (Government of South Australia, 2020d).

Habitat

This species grows in mallee and woodlands on dry stony or sandy soils (Royal Botanic Gardens Foundation Victoria, 2020a).

7.2.3 Occurrence in the Project Area

Daviesia pectinata occurs at 16 locations in the south of the Project Area (Table 16). It occurs in four woodland and mallee Vegetation Associations, as listed below:

- *Eucalyptus cladocalyx* Woodland / Open Woodland
- *Eucalyptus odorata* +/- *Eucalyptus pileata* / *Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinate*
- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx* +/- *Eucalyptus leptophylla* Mallee (Figure 29)
- *Eucalyptus peninsularis* +/- *Eucalyptus Dumosa* Mallee over *Gahnia deusta* and herbaceous annual spp.

Most locations were in road and rail corridor remnant vegetation, such as that shown in Figure 29. The locations of records collected by EBS Ecology are mapped in Figure 2.

Table 16. Location of known populations of *Daviesia pectinata* in the Project Area. Location information from EBS Ecology (2014 and 2019a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 588679E 6199154N	20	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588816E 6199333N	20	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588731E 6199358N	15	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588778E 6199383N	20	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588833E 6199475N	>100	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588941E 6199542N	>50	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 590702E 6202839N	30	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 595330E 6211140N	5	*Eucalyptus odorata* +/- *Eucalyptus pileata* / *Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata*
53H 595366E 6211227N	6	*Eucalyptus odorata* +/- *Eucalyptus pileata* / *Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata*
53H 598312E 6216335N	3	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata*
53H 598290E 6216385N	5	*Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata*
53H 601106E 6221802N	2	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx* +/- *Eucalyptus leptophylla* Mallee

Location	Number of plants	Vegetation Association
53H 601064E 6221811N	5	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 601061E 6221823N	1	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 602996E 6225493N	1	*Eucalyptus peninsularis +/- Eucalyptus Dumosa* Mallee over *Gahnia deusta* and herbaceous annual spp.
53H 602897E 6225543N	1	*Eucalyptus peninsularis +/- Eucalyptus Dumosa* Mallee over *Gahnia deusta* and herbaceous annual spp.

Figure 28. *Daviesia pectinata*, photographed in the Project Area by EBS Ecology in 2013.

Figure 29. In the Project Area, *Daviesia pectinata* often occurs in roadside vegetation, such as *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee (photograph by EBS Ecology 2019a).

7.3 *Eremophila gibbifolia (Coccid Emubush)*

7.3.1 Conservation Status

Eremophila gibbifolia is listed as Rare under the NPW Act in South Australia. The plant is not threatened under the EPBC Act.

7.3.2 Ecology

Biology and description

Eremophila gibbifolia is a small shrub under 1 m high. The alternate leaves are very small (2-5 mm long and 1-2 mm wide), club-shaped and thick and warty. The lilac flowers are tube-shaped with a corolla up to 10.5 mm long (Royal Botanic Gardens Foundation Victoria, 2020d).

Flowering mainly occurs in August to January (Royal Botanic Gardens Foundation Victoria, 2020d).

Habitat

This species occurs in mallee, usually on sandy or sandy loam soils (Royal Botanic Gardens Foundation Victoria, 2020d).

7.3.3 Occurrence in the Project Area

Three records of *Eremophila gibbifolia* were collected in the Project Area by EBS Ecology in 2013 and 2019, as listed in Table 17. All occurred in *Eucalyptus cladocalyx* Woodland / Open Woodland (Figure 31) in the southern part of the Project Area (Figure 2).

Table 17. Location of known populations of *Daviesia benthamii* ssp. *humilis* in the Project Area. Location information from EBS Ecology (2014). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 585844E 6193976N	>5	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 585921E 6194090N	50	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588759E 6199194N	2	*Eucalyptus cladocalyx* Woodland / Open Woodland

Figure 30. *Eremophila gibbifolia*, photographed in the Project Area by EBS Ecology in 2013.

Figure 31. *Eucalyptus cladocalyx* Woodland / Open Woodland in the Project Area, habitat for *Eremophila gibbifolia* (photograph by EBS Ecology2019a).

7.4 *Goodenia benthamiana (Bentham's Goodenia)*

7.4.1 Conservation Status

Listed as Rare under the NPW Act, *Goodenia benthamiana* (Figure 32).

Goodenia benthamiana is not listed as threatened under the EPBC Act.

7.4.2 Ecology

Biology and description

Goodenia benthamiana is a small understorey shrub growing to only 40 cm tall. It is aromatic when crushed and has erect terete or sometimes slightly ridged stems. The ovate leaves, 0.8-2.5 cm long, are covered in short hairs and clasp the stem (Government of South Australia, 2020e).

Flowering in spring to summer, the flowers are yellow and occur in terminal racemes, having the typical Goodenia shape, as shown in Figure 32.

Habitat

Goodenia benthamiana is usually found in open forest, woodland and mallee Vegetation Associations.

7.4.3 Occurrence in the Project Area

In 2013 and 2019, EBS Ecology recorded *Goodenia benthamiana* at 13 locations in the Project Area, as listed in Table 18. All locations are in Mallee (Figure 33), including the following four Vegetation Associations:

- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee,
- *Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Melaleuca uncinata* and *Calytrix tetragona,*
- *Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona,*
- *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee.

Records included single plants and groups of several individuals. The locations of EBS Ecology records of *Goodenia benthamiana* are mapped in Figure 3.

Table 18. Location of known populations of *Goodenia benthamiana* in the Project Area. Location information from EBS Ecology (2014 and 2019a). Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53H 659359E 6298998N	5	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 659707E 6299293N	4	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660695E 6300124N	15	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660728E 6300185N	1	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660898E 6300252N	1	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660808E 6300285N	1	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660898E 6300362N	10	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 661025E 6300387N	1	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 661145E 6300478N	4	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 664069E 6303021N	1	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 665078E 6303781N	1	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Melaleuca uncinata* and *Calytrix tetragona*
53H 666896E 6305162N	>5	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona*
53H 672817E 6309897N	3	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee

Figure 32. *Goodenia benthamiana*, photographed in the Project Area by EBS in 2019.

Figure 33. The habitat of *Goodenia benthamiana* in the Project Area (photograph by EBS Ecology2019a).

7.5 *Olearia adenolasia (Musk Daisy-bush)*

7.5.1 Conservation Status

Listed as Rare under the NPW Act, *Olearia adenolasia* (Figure 34).

The species is not listed as threatened under the EPBC Act.

7.5.2 Ecology

Biology and description

A small understorey shrub to 50 cm high, *Olearia adenolasia* has erect, woody stems. The sessile leaves are crowded and linear being up to 14 mm long and 1.5 mm wide. They are deep green above and covered with velvety hairs (Government of South Australia, 2020f).

Flowers consist of 9-15 white to blue ray florets and 20-25 disk florets that are yellow in colour. Flowers usually occur from August until October (Government of South Australia, 2020f).

Habitat

The typical habitat for this species is sandy soils in mallee Vegetation Associations (Government of South Australia, 2020f).

7.5.3 Occurrence in the Project Area

Olearia adenolasia occurs as an understorey low shrub in two mallee Vegetation Associations in the Project Area (Figure 35):

- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee,
- *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee.

It was recorded by EBS Ecology in 2013 at 10 locations. In suitable habitat, the species was relatively common, with over 1000 plants at one location (Table 19). The species occurs in the following Vegetation Associations. The locations of EBS Ecology records are mapped in Figure 3.

Table 19. Location of known populations of *Olearia adenolasia* in the Project Area. Location information from EBS Ecology 2014. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53H 659357E 6299010N	19	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 659707E 6299293N	>1000	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660560E 6299959N	20	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660629E 6300038N	>500	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660693E 6300104N	>200	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660814E 6300198N	>150	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660772E 6300257N	20	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 660962E 6300329N	150	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee
53H 671858E 6309101N	>200	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee
53H 671913E 6309241N	10	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee

Figure 34. *Olearia adenolasia*, photographed in the Project Area by EBS Ecology in 2013.

Figure 35. Mallee vegetation in the Project Area, where *Olearia adenolasia* occurs (photograph by EBS Ecology 2019a).

7.6 *Olearia pannosa ssp. pannosa (Silver Daisy-bush)*

7.6.1 Conservation status

Olearia pannosa ssp. *pannosa* (Figure 36) is listed as Vulnerable under the EPBC Act. Populations on Eyre Peninsula are severely fragmented, with an estimated area of occurrence of less than 5000 km^2. Elsewhere, the species occurs in the Mount Lofty Ranges, Yorke Peninsula and south-east South Australia. Interstate, populations are found in Victoria and New South Wales (Pobke, 2007).

The species is also listed as Vulnerable under the NPW Act.

7.6.2 Ecology

Biology and description

Olearia pannosa ssp. *pannosa* is a low spreading shrub less than 1.5 m tall. The leaves, 3-9 cm long and 1.5-5 cm wide, are shiny above and white to rusty hairy below. Ray florets are usually white, although may be pale mauve, with yellow disk florets, with the plant flowering from August to October (Department for Environment and Heritage, 2008a).

Olearia pannosa ssp. *pannosa* is a long-lived perennial species, some plants thought to be over 100 years old. Adult plants shoot from any stems that lie in contact with the ground, often making the assessment of the number of plants at a location difficult (Department for Environment and Heritage, 2008a).

Habitat

This species grows on hill slopes with hard mottled-yellow and red duplex soils. It occurs in mallee, woodland and forest vegetation communities, often in association with *Eucalyptus cladocalyx*, *Allocasuarina verticillata* and *Melaleuca uncinata* (Pobke, 2007).

7.6.3 Occurrence in the Project Area

Three occurrences of *Olearia pannosa* ssp. *pannosa* in the Project Area have been recorded by EBS Ecology, in both 2013 and 2019 surveys (Table 20). The species was found in *Eucalyptus cladocalyx* Woodland and Very Open Woodland, such as that pictured earlier in Figure 31.

The species was recorded as single plants in the south of the Project Area, as shown in Figure 2, although 50 plants were recorded at one location (Table 20).

Table 20. Location of known populations of *Olearia pannosa* ssp. *pannosa* in the Project Area. Location information from EBS Ecology 2014. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53H 583549E 6189864N	1	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 587450E 6197050N	1	*Eucalyptus cladocalyx* Very Open Woodland over scattered native shrubs and exotics
53H 587784E 6198166N	50	*Eucalyptus cladocalyx* Woodland / Open Woodland

Figure 36. *Olearia pannosa* ssp. *pannosa*, photographed in the Project Area by EBS Ecology in 2013.

7.7 *Pultenaea trichophylla (Tufted Bush-pea)*

7.7.1 Conservation status

Pultenaea trichophylla (Figure 37) is listed as Endangered under the EPBC Act.

Pultenaea trichophylla is also listed as Rare under the NPW Act.

7.7.2 Ecology

Biology and description

Pultenaea trichophylla is a small slender shrub with reddish branches that are covered with white curly hairs when young. Leaves occur crowded at the end of small branchlets and are 8-10 mm long by 1-1.5 mm wide, lanceolate, hairless above but with long, soft hairs beneath (Department of Agriculture, Water and the Environment, 2020c).

Small yellow pea flowers, approximately 7 mm long, grow at the tips of short branchlets between November and February. Mass germination has been recorded after fire followed by good rain at one population (Pobke, 2007).

Habitat

Found in open woodland on hill crests, undulating plains and in gullies, *Pultenaea trichophylla* grows in pale brown or grey, acidic sandy clay-loam over ironstone. It also occurs in hard, red-brown gravelly clay-loam over laterite with outcroppings of quartzite. It is often associated with *Eucalyptus cladocalyx* and *Melaleuca uncinata* (Pobke, 2007).

7.7.3 Occurrence in the Project Area

The species is endemic to the Eyre Peninsula where it occurs as severely fragmented populations. Its area of occupancy is estimated to be less than 2000 km^2, with a continuing decline in population size (Pobke, 2007).

Pultenaea trichophylla occurs at 12 locations within the current Project Area (EBS Ecology 2014 and 2019a) (Table 21). It occurs in three *Eucalyptus* spp. dominated woodland and mallee Vegetation Associations and *Allocasuarina verticillata* woodland in the vegetation associations listed below:

- *Allocasuarina verticillata* Low Woodland (Figure 38),
- *Eucalyptus cladocalyx* Woodland / Open Woodland,
- *Eucalyptus incrassata* var*. angulosa* Mallee over *Melaleuca uncinata,*
- *Melaleuca uncinata* Shrubland,
- *Eucalyptus odorata* +/- *Eucalyptus pileata* / *Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata.*

Table 21. Location of known populations of *Pultenaea trichophylla* in the Project Area. Location information from EBS Ecology 2014. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of plants	Vegetation Association
53H 589610E 6200772N	50	*Allocasuarina verticillata* Low Woodland
53H 589796E 6201260N	20	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 589760E 6201058N	>1000	*Allocasuarina verticillata* Low Woodland
53H 589755E 6201129N	20	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 590333E 6202176N	150	*Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata (B5)*
53H 590377E 6202191N	30	*Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*
53H 590393E 6202211N	Throughout	*Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*
53H 590398E 6202231N	3	*Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*
53H 590603E 6202704N	1	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 590625E 6202755N	3	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 590663E 6202822N	4	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 594210E 6209214N	100	*Melaleuca uncinata* Shrubland (now outside the current Project Area)
53H 594246E 6209276N	70	*Melaleuca uncinata* Shrubland (now outside the current Project Area)
53H 594309E 6209439N	>100	*Melaleuca uncinata* Shrubland (now outside the current Project Area)
53H 595322E 6211157N	2	*Eucalyptus odorata* +/- *Eucalyptus pileata* / *Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata*

Figure 37. *Pultenaea trichophylla*, photographed in the Project Area by EBS Ecology in 2013.

Figure 38. *Allocasuarina verticillata* Low Woodland, one Vegetation Association where *Pultenaea trichophylla* occurs (photograph by EBS Ecology 2019a).

7.8 *Philotheca angustifolia ssp. angustifolia (Narrow-leaf Wax-flower)*

7.8.1 Conservation Status

Philotheca angustifolia ssp*. angustifolia* is listed as Rare under the NPW Act.

Philotheca angustifolia ssp*. angustifolia* is not listed as threatened under the EPBC Act.

7.8.2 Ecology

Biology and description

Philotheca angustifolia ssp*. angustifolia* is a small shrub to 60 cm high with warty branchlets and corky older branches. Leaves are small, 2-10 mm long and 0.5-0.8 mm wide, terete, rounded at the apex and glandular-warty. The terminal inflorescences are up to 4-flowered with white to pink petals 5-9 mm long. Flowering occurs mainly in spring, but has been recorded sporadically throughout the year (Government of South Australia, 2020g).

Habitat

Philotheca angustifolia ssp*. angustifolia* occurs in mallee on sandy soils (Royal Botanic Gardens Foundation Victoria, 2020b).

7.8.3 Occurrence in the Project Area

The species occurs as single plants in two locations in the south of the Project Area (EBS Ecology 2014 and 2019a), as shown in Table 22 and mapped in Figure 2. It has been recorded in two woodland vegetation associations:

- *Eucalyptus cladocalyx* Woodland / Open Woodland,
- *Allocasuarina verticillata* Low Woodland (Figure 39).

Table 22. Location of known populations of *Philotheca angustifolia* ssp*. angustifolia* in the Project Area. Location information from EBS Ecology (2014). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 585870E 6193981N	2	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 589600E 6200900N	20	*Allocasuarina verticillata* Low Woodland

Figure 39. *Allocasuarina verticillata* Low Woodland, one Vegetation Association where *Philotheca angustifolia* ssp. *angustifolia* occurs in the Project Area.

7.9 *Prostanthera chlorantha (Green Mintbush)*

7.9.1 Conservation Status

Prostanthera chlorantha (Figure 40) is listed as Rare under the NPW Act.

The species is not listed as threatened under the EPBC Act.

7.9.2 Ecology

Biology and description

Prostanthera chlorantha grows as a wiry, irregularly branched shrub generally less than 1 m high. Tiny, egg-shaped leaves occur at widely spaced intervals along short side branches. The leaves are covered with small, branching hairs. Flowering occurs between August and January, the corolla being tube-shaped, 15-25 mm long pale green, green-red to mauve (Government of South Australia, 2020h).

Habitat

Growing as small populations of a few scattered plants, *Prostanthera chlorantha* occurs on sandy and loamy soils. It is often associated with *Banksia, Daviesia* and *Leptospermum* shrubland (Department for Environment and Heritage, 2008b).

7.9.3 Occurrence in the Project Area

Endemic to South Australia, *Prostanthera chlorantha* occurs in the Eyre Peninsula, Murray Lands, Southern Lofty and Kangaroo Island regions (Department for Environment and Heritage, 2008b).

Within the Project Area, *Prostanthera chlorantha* occurs at two locations in the south (EBS Ecology, 2014a), as listed in Table 23 and mapped in Figure 2. The species occurs in road corridors in two mallee and shrubland Vegetation Associations:

- *Eucalyptus odorata +/- Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata,*
- *Melaleuca uncinata* Shrubland (Figure 41).

Table 23. Location of known populations of *Daviesia benthamii* ssp. *humilis* in the Project Area. Location information from EBS Ecology (2014a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 598308E 6216324N	1	*Eucalyptus odorata +/- Eucalyptus pileata* Mallee over *Acacia imbricata, Melaleuca uncinata*
53H 598996E 6217932N	1	*Melaleuca uncinata* Shrubland

Figure 40. *Prostanthera chlorantha*, photographed in the Project Area by EBS Ecology in 2013.

Figure 41. *Melaleuca uncinata* Shrubland in which *Prostanthera chlorantha* occurs (photograph by EBS Ecology2019a).

7.10 *Spyridium bifidum ssp. bifidum (Forked Spyridium)*

7.10.1 Conservation Status

Spyridium bifidum ssp. *bifidum* (Figure 42) is listed as Vulnerable under the NPW Act.

The species is not listed as threatened under the EPBC Act.

7.10.2 Ecology

Biology and description

Spyridium bifidum var. *bifidum* is a small shrub with slender, erect branches to 2 m high. Young stems are densely covered with white or greyish short hairs. Alternate leaves are Y-shaped, revolute, with a green upper surface covered in dense white hairs. The leaves are 3.2-10 mm long by 1.9-5 mm wide (Kellermann & Barker, 2012).

Flowering in June to September, the inflorescence is a dense globular head (10-12 mm diameter) of white flowers, covered in dense, long hairs. The 5-8 floral leaves are broader than the stem leaves and covered in a very dense white stellate (Kellermann & Barker, 2012).

Habitat

Typical habitat of *Spyridium bifidum* ssp. *bifidum* includes open mallee shrubland on sandy soils with quartzite and laterite (Kellermann & Barker, 2012).

7.10.3 Occurrence in the Project Area

Spyridium bifidum ssp. *bifidum* occurs only on Eyre Peninsula (Kellermann & Barker, 2012). The species was recorded by EBS Ecology in 2013 in an area now outside the Project Area (Table 24 and Figure 2). It was not recorded during surveys in the current Project Area in 2019. However, it is likely that the species occurs in *Melaleuca uncinata* Shrubland Vegetation Associations (Figure 43), where it was recorded in 2013.

Table 24. Location of known populations of *Spyridium bifidum* var. *bifidum* in the Project Area. Location information from EBS Ecology (2014a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 594302E 6209441N	Not counted	*Melaleuca uncinata* Shrubland
53H 594246E 6209276N	Not counted	*Melaleuca uncinata* Shrubland

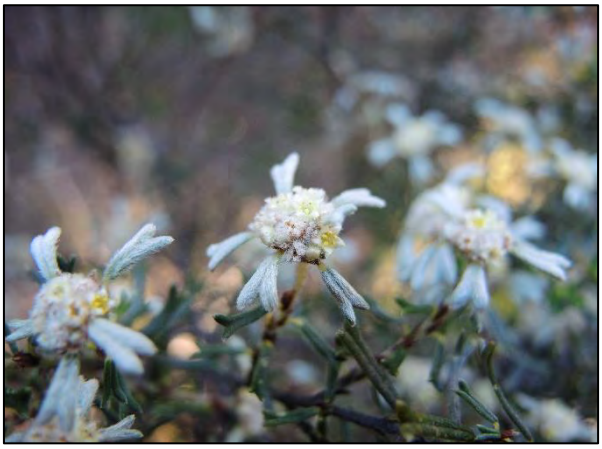

Figure 42. *Spyridium bifidum* var. *bifidum*, photographed in the Project Area by EBS Ecology in 2013.

Figure 43. *Melaleuca uncinata* Shrubland in which *Spyridium bifidum* var. *bifidum* was recorded in 2013.

7.11 *Spyridium leucopogon (Silvery Spyridium)*

7.11.1 Conservation Status

Spyridium leucopogon (Figure 44) is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

7.11.2 Ecology

Biology and description

Spyridium leucopogon is a small slender shrub with narrow linear leaves, 3-6 mm long and 0.5-0.75 mm wide. Leaves are revolute, hiding the under surface, glabrous and often crowded so as to hide the branches. Flower occur in heads, 5-10 mm in diameter, and appear very white and woolly. They are surrounded by two or three white, hairy floral leaves that are broader than the stem leaves (Government of South Australia, 2020i).

Habitat

Spyridium leucopogon occurs in woodland and mallee habitats (Government of South Australia, 2020i).

7.11.3 Occurrence in the Project Area

Endemic to the Eyre Peninsula, *Spyridium leucopogon* occurs in the south of the Project Area at three locations in mallee and shrubland Vegetation Associations (Table 25) (EBS Ecology 2014a and 2019a). All locations are in the south of the Project Area, with populations raging in size from one to 25 plants.

The plant has been found in two vegetation associations in the Project Area:

- *Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee *+/- Melaleuca uncinata* (Figure 45),
- *Melaleuca uncinata* Shrubland.

The locations of EBS Ecology records are indicated on the map in Figure 2.

Table 25. Location of known populations of *Daviesia benthamii* ssp. *humilis* in the Project Area. Location information from EBS Ecology (2014a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 581367E 6185823N	10	*Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee *+/- Melaleuca uncinata*
53H 594246E 6209276N	1	*Melaleuca uncinata* Shrubland (now outside the current Project Area)
53H 594302E 6209441N	3	*Melaleuca uncinata* Shrubland (now outside the current Project Area)
53H 598984E 621929N	8	*Melaleuca uncinata* Shrubland
53H 599114E 6217941N	25	*Melaleuca uncinata* Shrubland

Figure 44. *Spyridium leucopogon*, photographed in the Project Area by EBS Ecology in 2013.

Figure 45. *Spyridium leucopogon* occurs in *Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee *+/- Melaleuca uncinata.*

7.12 *Spyridium spathulatum (Spoon-leaf Spyridium)*

7.12.1 Conservation Status

Spyridium spathulatum is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

7.12.2 Ecology

Biology and description

Spyridium spathulatum is an erect shrub to 2 m tall. The alternate leaves are obovate, 5-15 mm long and 2-6 mm wide. They are smooth green or silky-hairy above, hairy beneath with silvery or rusty coloured hairs. Flowers occur in crowded heads sporadically throughout the year. Individual flowers are small, white and covered in silky hairs. Each flower head has a single, silky white floral leaf (Costermans, 1994).

Habitat

Spyridium spathulatum occurs in sandy soils in mallee and shrubland.

7.12.3 Occurrence in the Project Area

Two occurrences of *Spyridium spathulatum* have been recorded in the Project Area by EBS Ecology in 2013 and 2019 Table 26. Each occurrence consists of a small number of plants within *Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee *+/- Melaleuca uncinata* (Figure 45).

Occurrences of *Spyridium spathulatum* are mapped in Figure 2.

Table 26. Location of known populations of *Daviesia benthamii* ssp. *humilis* in the Project Area. Location information from EBS Ecology (2014a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 581592E 6186282N	4	*Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee *+/- Melaleuca uncinata*
53H 581361E 6185800N	5	*Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee *+/- Melaleuca uncinata*

7.13 *Management of Threats to Woodland and Mallee Shrubs*

Known threats to five flora species discussed above, including the EPBC listed *Olearia pannosa ssp. pannosa* and *Pultenaea trichophylla*, have been identified in the following documents:

- *Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia* (Department for Environment and Heritage, 2009).
- *Draft Recovery Plan for 23 Threatened Flora Taxa on Eyre Peninsula, South Australia 2007-2012* (Pobke, 2007)

Threats include threatening processes that are understood to be widely impacting on plants in fragmented landscapes, but also includes more species-specific threats.

There is no formal documentation of threats impacting on the following species:

- *Daviesia benthamii ssp. humilis,*
- *Goodenia benthamiana,*
- *Olearia adenolasia,*
- *Philotheca angustifolia ssp. angustifolia,*
- *Spyridium bifidum ssp. bifidum,*
- *Spyridium spathulatum.*

It has been assumed that they are impacted by similar widespread threatening processes but are probably not impacted by more specific threats. This is based on the following:

- All species described above are shrubs found in woodland, open woodland and mallee habitats.
- All occur within a highly cleared and fragmented landscape.
- Due to current and past land use in the Project Area, threatening processes such as weed invasion, changed fire regimes, grazing and habitat loss and fragmentation are widespread.

Table 27 identifies nine threats as impacting on threatened shrub species. Of these, the following seven have the potential to be exacerbated by the Project:

- Site disturbance,
- Weed invasion,
- Disease,
- Grazing and disturbance by stock and feral herbivores,
- Habitat fragmentation,
- Inappropriate fire regimes,
- Vegetation clearing/habitat loss.

How these threats are potentially exacerbated by the Project is discussed in Table 27.

Threats that are exacerbated by the construction phase of the Project will be managed by implementing Management Actions also listed in Table 27. While ElectraNet has endeavoured to avoid impact wherever possible, these management actions aim to minimise impact where it can't be avoided.

Management Actions are described in detail in Section 15.

Table 27. Threats to woodland and mallee shrubs and management actions to minimise impacts exacerbated by the Project.

Threat	Species	Discussion	Exacerbated by the Project	Management Action
Site disturbance[1, 2]	*Daviesia pectinata* *Olearia pannosa ssp. pannosa*	• Indirect impact (such as trampling) may damage individuals in a population caused by access to the site by people, vehicles, machinery etc.[1].	**Yes.** • Site disturbance to populations of plants may be caused by construction activities occurring nearby. • Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, creating more opportunity for disturbance.	**3.1** **3.2** **3.5** **3.6** **3.8**
Weed invasion[1, 2]	*Daviesia benthamii ssp. humilis* *Daviesia pectinata* *Eremophila gibbifolia* *Goodenia benthamiana* *Olearia adenolasia* *Olearia pannosa ssp. pannosa* *Philotheca angustifolia ssp. angustifolia* *Prostanthera chlorantha* *Pultenaea trichophylla* *Spyridium bifidum ssp. bifidum* *Spyridium leucopogon* *Spyridium spathulatum*	• Invasion by exotic weeds including *Asparagus aspargoides* (Bridal Creeper) and *Pinus halepensis* (Aleppo Pine) have the capacity to out-compete *Olearia pannosa ssp. pannosa* on Eyre Peninsula[2]. • Weed species have the potential to impact on the growth, recruitment and survival of native plant species[1]. • Weed species may cause exacerbation of other threats, such as increased risk of fire[1].	**Yes.** • Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand contaminated by weed seeds) is a vector of spread for weeds during construction. • Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7** **1.8** **1.9** **1.10** **1.11**
Road and rail corridor management[1, 2]	*Daviesia benthamii ssp. humilis* *Daviesia pectinata* *Eremophila gibbifolia* *Goodenia benthamiana* *Olearia pannosa ssp. pannosa* *Pultenaea trichophylla* *Prostanthera chlorantha* *Spyridium bifidum ssp. bifidum* *Spyridium leucopogon* *Spyridium spathulatum*	• Populations of plants listed occur in road and rail corridor vegetation. They are therefore susceptible to impacts from vegetation management carried out in these areas.	**No.** • The Project does not include any vegetation management activities within road or rail corridors	**Not exacerbated by the Project.**
Grazing and disturbance by stock and feral herbivores[1, 2]	*Daviesia benthamii ssp. humilis* *Daviesia pectinata* *Eremophila gibbifolia* *Goodenia benthamiana*	• Grazing by domestic stock is known to have restricted *Olearia pannosa ssp. pannosa* growth and recruitment.	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs	

Threat	Species	Discussion	Exacerbated by the Project	Management Action
	Olearia adenolasia *Olearia pannosa ssp. pannosa* *Philotheca angustifolia ssp. angustifolia* *Prostanthera chlorantha* *Pultenaea trichophylla* *Spyridium bifidum ssp. bifidum* *Spyridium leucopogon* *Spyridium spathulatum*	Domestic stock are also known to graze *Pultenaea trichophylla*[2]. • It is likely that all plants in this section are susceptible to either to direct impact of grazing activities by use as fodder, and/or indirectly through trampling by stock.	following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	
Small population/lack of recruitment[2]	*Olearia pannosa ssp. pannosa*	• Small populations of *Olearia pannosa ssp. pannosa* probably rely on cross-pollination and are at risk of slow decline[2].	**No.** It is unlikely that any action undertaken as part of the Project would influence recruitment in *Olearia pannosa ssp. pannosa.*	**Not exacerbated by the** Project
Disease[2]	*Olearia pannosa ssp. pannosa* *Pultenaea trichophylla*	• *Phytophthora* has the potential to infect both species listed opposite[2].	**Yes.** • Vehicles, machinery and personnel may act as a vector of spread for *Phytophthora* if carrying contaminated soil. • Contaminated construction materials brought into the Project Area (e.g. contaminated gravel/fill/sand) is a potential vector of spread.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7** **1.8** **1.9** **1.10** **1.11**
Habitat fragmentation[2]	*Daviesia benthamii ssp. humilis* *Daviesia pectinata* *Eremophila gibbifolia* *Goodenia benthamiana* *Olearia adenolasia* *Olearia pannosa ssp. pannosa* *Philotheca angustifolia ssp. angustifolia* *Prostanthera chlorantha* *Pultenaea trichophylla* *Spyridium bifidum ssp. bifidum* *Spyridium leucopogon*	• Populations of species listed opposite are already highly fragmented due to historical habitat clearance. The resulting small populations are susceptible to further fragmentation and the exacerbation of associated impacts, such as inbreeding and lack of recruitment[2].	**Yes.** • Vegetation clearing, although kept to the minimum possible, is required as part of the Project. Any clearing of native vegetation exacerbates threats associated with clearing of habitat and fragmentation.	**3.1** **3.4** **4.1** **4.2** **4.3** **4.4** **4.8** **4.9** **4.10** **4.11** **4.12**

Threat	Species	Discussion	Exacerbated by the Project	Management Action
	Spyridium spathulatum			**4.13** **4.14**
Inappropriate fire regimes[2]	*Daviesia benthamii ssp. humilis* *Daviesia pectinata* *Eremophila gibbifolia* *Goodenia benthamiana* *Olearia adenolasia* *Olearia pannosa ssp. pannosa* *Philotheca angustifolia ssp. angustifolia* *Prostanthera chlorantha* *Pultenaea trichophylla* *Spyridium bifidum ssp. bifidum* *Spyridium leucopogon* *Spyridium spathulatum*	• *Pultenaea trichophylla* is likely to require periodic fire events to enable successful recruitment. Long unburnt populations appear to be decreasing in size[2]. • Inappropriate fire management may impact all species listed opposite by causing changes in vegetation structure and increased weed invasion[1].	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction. • Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, increasing risk of ignition.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8** **3.5**
Vegetation clearing/habitat loss[2]	*Daviesia benthamii ssp. humilis* *Daviesia pectinata* *Eremophila gibbifolia* *Goodenia benthamiana* *Olearia adenolasia* *Olearia pannosa ssp. pannosa* *Philotheca angustifolia ssp. angustifolia* *Prostanthera chlorantha* *Pultenaea trichophylla* *Spyridium bifidum ssp. bifidum* *Spyridium leucopogon* *Spyridium spathulatum*	• Clearing of vegetation may directly impact species listed opposite by removing individuals. • Continuing clearance exacerbates other threats such as habitat fragmentation, lack of recruitment, weed invasion and site disturbance.	**Yes.** Vegetation clearing, although kept to the minimum possible, is required as part of the Project. Any clearing of native vegetation exacerbates threats associated with clearing of habitat and fragmentation.	**3.1** **3.4** **4.1** **4.2** **4.7** **4.8** **4.9** **4.10** **4.11** **4.12** **4.13** **4.14** **4.15**

1: ***Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia*** (Department for Environment and Heritage, 2009)**.**

2: ***Draft Recovery Plan for 23 Threatened Flora Taxa on Eyre Peninsula, South Australia*** (Pobke, 2007)**.**

8 TREES AND SHRUBS OF SEMI-ARID SHRUBLAND AND WOODLAND

The far northern part of the Project Area consists largely of semi-arid shrublands and woodlands, often with a sparse *Acacia papyrocarpa* overstorey over chenopod shrubs, particularly *Maireana* spp. and *Atriplex* spp.

Three threatened plants were recorded by surveys within this environment carried out by EBS Ecology and are covered by this management plan:

- *Santalum spicatum*
- *Maireana excavata*
- *Maireana suaedifolia.*

8.1 *Santalum spicatum (Sandalwood)*

8.1.1 Conservation Status

Santalum spicatum (Figure 46) is listed as Vulnerable under the NPW Act. The species is not listed as threatened under the EPBC Act.

8.1.2 Ecology

Biology and description

Santalum spicatum is a shrub or small tree, growing up to 8 m tall, with rough, grey-brown bark on the trunk and branches. The waxy leaves are opposite, broad lanceolate in shape, 2-7 cm long by 0.5-2.5 cm wide. They are dark green to pale blue-green in colour. The green or red flowers, up to 3 mm long, occur in clusters in the leaf axils in March to June. They are followed by the yellow to red-brown fruit in November to December. The non-succulent fruits are smooth to slightly wrinkled and 1.5-2.5 cm in diameter (Berkinshaw, 2010).

Santalum spicatum is a root parasite that relies on a host plant. Host plants are often *Acacia, Allocasuarina* or *Melaleuca* trees or shrubs, but plants from other genera, including some herbaceous species, may also be suitable hosts (Pobke, 2007).

Habitat

Santalum spicatum grows in sandy, loamy and gravelly soils, sometimes at the base of granite outcrops. It occurs on dune crests, dune slopes and inter-dunes, as well as on ridges and hill crests and plains with loam to clay loam soils. It is most often recorded in mallee and *Acacia* woodland and shrubland Vegetation Associations (Pobke, 2007).

8.1.3 Occurrence in the Project Area

There are an estimated 5000 individual trees in up to 48 populations on the Eyre Peninsula. It is suspected there has been a reduction in the population size by at least 50% over the last three generations (Pobke, 2007).

The distribution of *Santalum spicatum* within the Project Area is well documented, with a targeted survey undertaken by EBS Ecology in 2019. Plants are located in the north of the Project Area, from 40 km west-south-west of Whyalla to an area within 10 km north of the town (EBS Ecology, 2019a).

The species was recorded in the following four Vegetation Associations:

- *Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata,*
- *Maireana sedifolia* Low Shrubland +/- *Acacia papyrocarpa* over *Austrostipa* spp. and *Austrodanthonia caespitosa,*
- *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria / Maireana sedifolia* (Figure 47),
- *Maireana sedifolia* Low Shrubland +/- *Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *canescens*.

Across all survey periods, a total of 58 plants were recorded. Locations have been generalised in Table 28 for clarity. However, all locations are listed in Appendix 2 and mapped in Figure 3.

Table 28. Location of known populations of *Santalum spicatum* in the Project Area. Location information from EBS Ecology (2019a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 735869E 6352744N	1	*Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata*
53H 729954E 6348436N	1	*Maireana sedifolia* Low Shrubland +/- *Acacia papyrocarpa* over *Austrostipa* spp. and *Austrodanthonia caespitosa*
Between: 53H 728449E 6347029N And 53H 727355E 6345706N	45	*Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria / Maireana sedifolia*
Between: 53H 712532E 6337523N And 53H 711553E 6336987N	4	*Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata*
53H 704803E 6333406N	1	*Maireana sedifolia* Low Shrubland +/- *Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *canescens*
Between: 53H 702426E 6332219N And 53H 702440E 6332157N	4	*Maireana sedifolia* Low Shrubland +/- *Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *canescens*

Figure 46. *Santalum spicatum*, photographed by EBS Ecology during targeted surveys for the species in 2019.

Figure 47. *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria / Maireana sedifolia,* where most Santalum spicatum in the Project Area occur (Photographed by EBS Ecology 2019a).

8.2 *Maireana excavata (Bottle Fissure-plant)*

8.2.1 Conservation Status

Maireana excavata is listed as Vulnerable under the NPW Act. It is not listed as threatened under the EPBC Act.

8.2.2 Ecology

Biology and description

Maireana excavata is a low growing, compact perennial shrub to 20 cm high that develops a stout taproot. When young, branches are loosely woolly with alternate, narrowly-oblong to elliptic leaves, 7-12 mm long. The fruit is winged, with the wing 10 mm in diameter, faintly veined with a radial slit (Royal Botanic Gardens and Domain Trust, 2020b).

Habitat

Red-brown clay loam soils in open grasslands and shrublands (Cunningham et al, 1981).

8.2.3 Occurrence in the Project Area

In the Project Area, *Maireana excavata* is limited in occurrence to a small area of semi-arid shrubland and woodland west of Whyalla (EBS Ecology, 2019a). It occurs at the locations listed in Table 29 and shown in Figure 3 within three Vegetation Associations:

- *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria / Maireana sedifolia,*
- *Casuarina pauper* Woodland over *Maireana sedifolia / Atriplex vesicaria* (Figure 48),
- *Maireana sedifolia* Low Shrubland *+/- Acacia papyrocarpa* over *Austrostipa spp.* and *Austrodanthonia caespitosa.*

Table 29. Location of known populations of *Maireana excavata* in the Project Area. Location information from EBS Ecology (2014a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 721509E 6342343N	1	*Casuarina pauper* Woodland over *Maireana sedifolia / Atriplex vesicaria*
53H 722540E 6342830N	1	*Maireana sedifolia* Low Shrubland *+/- Acacia papyrocarpa* over *Austrostipa spp.* and *Austrodanthonia caespitosa.*
53H 725670E 6344570N	1	*Maireana sedifolia* Low Shrubland *+/- Acacia papyrocarpa* over *Austrostipa spp.* and *Austrodanthonia caespitosa.*
53H 727981E 6346339N	1	*Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria / Maireana sedifolia*

Figure 48. *Maireana excavata* occurs in semi-arid woodland and shrubland, such as *Casuarina pauper* Woodland over *Maireana sedifolia / Atriplex vesicaria,* shown here. Photographed by EBS Ecology in 2019.

8.3 *Maireana suaedifolia (Lax Bluebush)*

8.3.1 Conservation Status

Maireana suaedifolia is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

8.3.2 Ecology

Biology and description

Maireana suaedifolia is a low spreading, dark blue-green shrub to 0.5 m high, although individuals up to 2.5 m high have been recorded. The branches are glaucous and dry to a purple or slate-grey colour. Alternate leaves are succulent, being narrower at their base, 5 mm long on fruiting stems and up to 25 mm long on the main branches. The fruiting perianth is pink when fresh. The species normally occurs in slightly saline soils (Royal Botanic Gardens and Domain Trust, 2020c).

8.3.3 Occurrence in the Project Area

Maireana suaedifolia is likely to occur in areas of native vegetation within the vicinity of historical records of the species. These occur in the Northern Project Area within Ironstone Hill Conservation Park. It includes the following Vegetation Associations:

- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee.
- *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee.
- *Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata* Mixed Mallee over *Cratystylis conocephala* and *Atriplex vesicaria.*
- *Senna artemisioides ssp. coriacea, Dodonaea lobulata Tall Shrubland +/- Myoporum platycarpum, Dodonaea viscosa* ssp. *angustissima* and *Acacia oswaldii*.
- *Eucalyptus oleosa +/- Eucalyptus* spp. Mallee over *Maireana sedifolia*.
- *Maireana sedifolia* Low Shrubland +/- *Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius ssp. canescens* (Figure 49).
- *Acacia papyrocarpa* Low Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata* (Figure 50).

Figure 49. *Maireana sedifolia* Low Shrubland +/- *Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius ssp. Canescens*. Photographed by EBS Ecology in 2019.

Figure 50. *Acacia papyrocarpa* Low Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.* Photographed by EBS Ecology in 2019.

8.4 *Management of Threats to Trees and Shrubs of Semi-arid Shrubland and Woodland*

Threats known to impact on *Santalum spicatum* have been documented in the *Draft Recovery Plan for 23 Threatened Flora Taxa on Eyre Peninsula, South Australia 2007-2012* (Pobke, 2007). That document identifies five threats that impact on that species, as listed in Table 30.

Threats to *Maireana excavata* and *Maireana suaedifolia* have not been documented. However, other threatened *Maireana* species are threatened by weed invasion and grazing activities (Department of Agriculture, Water and the Environment, 2020b). Within the Project Area, both species occur in Chenopod shrublands in the north. These areas exist as large areas of uncleared vegetation and are utilised for pastoral activities, specifically sheep grazing.

Generally, fuel loads within chenopod shrublands prevent wildfires from occurring, with long-lived chenopod shrubs (e.g. *Maireana* spp.) not reaching maturity until 30 years after fire (Cheal, 2010). Frequent fires may therefore lead to a decline in the condition of chenopod shrublands.

It is likely that grazing and inappropriate fire regime are the largest threats to *Maireana* species in the Project Area.

Of the five threats listed in Table 30, four would possibly be exacerbated by the Project:

- Grazing,
- Inappropriate disturbance and fire regime,
- Habitat fragmentation,
- Illegal collection and harvest.

Table 30. Threats to semi-arid trees and shrubs identified by the relevant species recovery plans, indicating those that may be exacerbated by the Project.

Threat	Species	Discussion	Exacerbated by the Project	Management Actions
Grazing[1]	*Santalum spicatum* *Maireana excavata* *Maireana suaedifolia*	• Most *Santalum spicatum* populations show evidence of high grazing pressure by feral goats, such as canopy grazing lines and damage to trunks and branches.[1] • Heavy sheep grazing is known to be detrimental to Chenopod shrublands and *Maireana* spp.	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	
Inappropriate disturbance and fire regimes[1]	*Santalum spicatum* *Maireana excavata* *Maireana suaedifolia*	• *Santalum spicatum* is known to be fire sensitive. Large, intense fires have the potential to kill populations.[1] • Chenopod shrublands and *Maireana* spp. generally require long intervals between fire events (Cheal, 2010).	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction. • Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, increasing risk of ignition.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8** **3.1** **3.2** **3.5** **3.6** **3.8**
Habitat fragmentation[1]	*Santalum spicatum*	• Fragmented populations of *Santalum spicatum* have low genetic variability and flow. Low genetic variability may reduce the resilience of the species to other environmental changes.[1]	**Yes.** • Clearing of vegetation associated with the transmission line corridor and access roads may potentially fragment populations *Santalum spicatum*.	**4.1** **4.2** **4.3** **4.4** **4.8** **4.9** **4.10** **4.11** **4.12** **4.13**
Lack of recruitment/small population[1]	*Santalum spicatum*	• *Santalum spicatum* populations often show good seed set with no recruitment evident, although the reasons for this are undertermined.[1]	**No.** • The Project does not include any actions that are likely to further inhibit the recruitment of *Santalum spicatum* or *Maireana* spp.	**Not exacerbated by the Project.**

Illegal collection and harvest[1]	*Santalum spicatum*	• Illegal collection of seed and wood for the Sandalwood trade have threatened Santalum spicatum populations historically.[1]	**Yes.** • Construction of corridors and access roads may facilitate greater access by the public to *Santalum spicatum* populations in the Project Area.	**3.5**

1: ***Draft Recovery Plan for 23 Threatened Flora Taxa on Eyre Peninsula, South Australia 2007-2012*** (Pobke, 2007)**.**

9 MALLEE EUCALYPTS

Mallee Vegetation Associations are distributed throughout the Project Area, although they become more prevalent towards the north. These Vegetation Associations typically have an overstorey of one or more mallee *Eucalyptus* spp.

Most *Eucalyptus* spp. in the Project Area are common and widespread and not likely to be impacted by the Project. However, one species, *Eucalyptus cretata,* listed as threatened under the NPW Act was recorded by surveys in the Project Area.

9.1 *Eucalyptus cretata (Darke Peak Mallee)*

9.1.1 Conservation Status

Listed as Rare under the NPW Act, *Eucalyptus cretata* is endemic to the central Eyre Peninsula. It is not listed as threatened under the EPBC Act.

9.1.2 Ecology

Biology and description

Eucalyptus cretata is a multi-stemmed mallee growing up to 9 m tall. The lanceolate leaves are thick, dull and grey-green. The young buds, fruits and branchlets are characteristically waxy, making this a distinctive species. *Eucalyptus cretata* flowers spasmodically throughout the year, with buds occurring in umbels of 7-9, 8-14 mm long by 4-8mm wide with prominently ribbed opercula. Fruit is usually ribbed, 6-11 mm long by 7-11 mm wide, with 4 or 5 valves set below the rim (Nicolle, 2013).

Habitat

Eucalyptus cretata grows in mallee communities on low hills and plains, generally in loamy to clay soils. It is particularly common in the Darke Peak and Carappee Hill areas of Eyre Peninsula (Nicolle, 2013).

9.1.3 Occurrence in the Project Area

Eucalyptus cretata has previously been assessed as highly likely to occur in the Southern and Northern Project Area within the vicinity of Cleve. It is likely in the following Vegetation Associations:

- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee.
- *Eucalyptus diversifolia +/- Eucalyptus incrassata* Mallee over exotics and *Enchylaena tomentosa* (Figure 51).
- *Eucalyptus peninsularis +/- Eucalyptus dumosa* Mallee over *Enchylaena tomentosa* and emergents.
- *Eucalyptus peninsularis +/- Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual spp. (Figure 52).

- *Eucalyptus incrassata +/- Melaleuca uncinata +/- Melaleuca lanceolata* Mallee over *Ehrharta calycina.*
- *Eucalyptus calycogona ssp. calycogona +/- Eucalyptus phenax ssp. phenax* Mallee over *Maireana brevifolia* and exotics.

Figure 51*. Eucalyptus diversifolia +/- Eucalyptus incrassata* Mallee over exotics and *Enchylaena tomentosa.* Photographed by EBS Ecology in 2019.

Figure 52. *Eucalyptus peninsularis +/- Eucalyptus dumosa* Mallee over *Gahnia deusta* and herbaceous annual spp. Photographed by EBS Ecology in 2019.

9.2 *Management of Threats to Mallee Eucalypts*

Although well-conserved population occur in a number of reserves, *Eucalyptus cretata* populations in the Project Area occur mainly in small remnant vegetation patches such as road and rail reserves (Lang & Brooker, 1990). Although there are no documented threats for this species, it is likely that populations are threatened by similar factors that impact other plants occurring as small, fragmented populations in isolated habitat remnants, such as:

- Weed invasion,
- Inappropriate fire regimes,
- Further clearing and fragmentation of habitat,
- Road and rail management activities.

It is possible that the former three threats listed above may be exacerbated by the Project, as discussed in Table 31.

Table 31. Threats and Management Actions for *Eucalyptus cretata* within the Project Area, including those potentially exacerbated by the Project.

Threat	Exacerbated by the Project	Management Actions
Weed invasion	**Yes.** • Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand contaminated by weed seeds) is a vector of spread for weeds during construction.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7**

Threat	Exacerbated by the Project	Management Actions
	• Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.8** **1.9** **1.10** **1.11**
Inappropriate fire regimes	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction. Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, increasing risk of ignition.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8** **3.5**
Vegetation clearing and fragmentation	**Yes.** Vegetation clearing, although kept to the minimum possible, is required as part of the Project. Any clearing of native vegetation exacerbates threats associated with clearing of habitat and fragmentation.	**3.1** **4.1** **4.2** **4.3** **4.4** **4.8** **4.9** **4.10** **4.11** **4.12** **4.13** **4.14**
Road and rail management activities	**No** • The Project does not include any road and/or rail corridor maintenance activities.	**Not exacerbated by the Project.**

10 THREATENED GRASSES

Two threatened grass species were recorded in the Project Area during surveys carried out by EBS Ecology in 2012 and 2013: *Austrostipa breviglumis* (Bamboo Spear-grass) and *Austrostipa tenuifolia* (Long-awn Spear-grass).

Both species are listed as Rare under the NPW Act but are not listed as threatened under the EPBC Act.

10.1 *Austrostipa breviglumis (Bamboo Spear-grass)*

10.1.1 Conservation Status

Austrostipa breviglumis is listed as Rare under the NPW Act but is not listed as threatened under the EPBC Act.

10.1.2 Ecology

Biology and description

An often-rhizomatous grass, *Austrostipa breviglumis* has wiry culms, often branched, that 0.8-2 m high. Leaf blades are rolled, 4-30 cm long by 1-5 mm wide with a hairy upper surface. Panicles are 10-40 cm long and compact, the branches usually not spreading (Jessop, Dashorst, & James, 2006).

Habitat

Austrostipa breviglumis occurs in a range of soils including sandy to clay-loam and in rocky gullies and ridge tops. It grows in woodlands, often associated with *Eucalyptus odorata, Xanthorrhoea qudrangulata, Bursaria spinosa* and *Callitris glaucophylla* (Jessop, Dashorst, & James, 2006).

10.1.3 Occurrence in the Project Area

Austrostipa breviglumis is known to occur at one location in the Project Area, where more than 20 plants were recorded by EBS Ecology in 2013, as indicated in Table 32. It was found within a single Vegetation Association:

- *Melaleuca uncinata* Tall Shrubland +/- *Eucalyptus incrassata* and *Eucalyptus brachycalyx* (Figure 53).

The location of this population is shown in Figure 3.

Table 32. Location of known populations of *Austrostipa breviglumis* in the Project Area. Location information from EBS Ecology (2014a). Vegetation Associations are as they appear in EBS Ecology (2019a).

Location	Number of plants	Vegetation Association
53H 668628E 6306621N	>20	*Melaleuca uncinata* Tall Shrubland +/- *Eucalyptus incrassata* and *Eucalyptus brachycalyx*

Figure 53. *Melaleuca uncinata* Tall Shrubland +/- *Eucalyptus incrassata* and *Eucalyptus brachycalyx*, habitat in the Project Area for *Austrostipa breviglumis.* Photographed by EBS Ecology in 2019.

10.2 *Austrostipa tenuifolia (Long-awn Spear-grass)*

10.2.1 Conservation Status

Listed as Rare under the NPW Act, *Austrostipa tenuifolia* is not listed as threatened under the EPBC Act.

10.2.2 Ecology

Biology and description

Austrostipa tenuifolia is a tufted grass that does not usually develop a rhizome. The culms are unbranched and not wiry, 0.6-1 m tall with small hairs below each node. The leaf blades are usually rolled, 6-30 cm long and 0.5-2 mm wide and usually hairy on the upper surface. The sparse panicle is 10-35 cm long (Jessop, Dashorst, & James, 2006).

Habitat

Austrostipa tenuifolia is usually found in sandy soils in grasslands and is also often associated with *Callitris* or *Allocasuarina* species (Jessop, Dashorst, & James, 2006).

10.2.3 Occurrence in the Project Area

The species has previously been assessed as highly likely to occur in grassland and grassy open woodland Vegetation Associations and those where *Allocasuarina* sp. occurs. This includes the following associations:

- *Allocasuarina verticillata* Low Woodland (Figure 54).
- *Eucalyptus cladocalyx* Woodland / Open Woodland.
- *Rytidosprema* spp. / *Austrostipa* ssp. +/- *Themeda triandra* Tussock Grassland (Figure 55).
- *Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata* Open Grassy Woodland.

- *Callitris gracilis* Low Woodland over *Geijera linearifolia +/- Allocasuarina verticillata +/- Pittosporum angustifolium* (Figure 56).
- *Eucalyptus porosa* Open Woodland +/- *Acacia notabilis* (Figure 57).
- *Callitris gracilis* Very Open Woodland over *Austrostipa* spp.

Figure 54. *Allocasuarina verticillata* Low Woodland, potential habitat for *Austrostipa tenuifolia.* Photographed by EBS Ecology in 2019.

Figure 55. *Rytidosprema* spp. / *Austrostipa* ssp. +/- *Themeda triandra* Tussock Grassland. Photographed by EBS Ecology in 2019.

Figure 56. *Callitris gracilis* Low Woodland over *Geijera linearifolia +/- Allocasuarina verticillata +/- Pittosporum angustifolium.* Photographed by EBS Ecology in 2019.

Figure 57. *Eucalyptus porosa* Open Woodland +/- *Acacia notabilis.* Photographed by EBS Ecology in 2019.

10.3 *Management of Threats to Grasses*

There are no documented threats to the grasses described above. However, threats that are known to be detrimental to native grass species include:

- Weed invasion, including introduced grasses and woody shrubs,
- Vegetation management, including clearing and fragmentation of habitat,
- Inappropriate fire regimes and management,
- Grazing from domestic stock, feral and native herbivores.

These threats and the Management Actions that will be undertaken to minimise those exacerbated by the Project are further discussed in Table 33.

Table 33. Threats and Management Actions to minimise impacts to threatened grasses.

Threat	Species	Exacerbated by the Project	Management Actions
Weed invasion.	*Austrostipa breviglumis* *Austrostipa tenuifolia*	**Yes.** • Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand contaminated by weed seeds) is a vector of spread for weeds during construction. • Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7** **1.8** **1.9** **1.10** **1.11**
Vegetation clearing and fragmentation of habitat.	*Austrostipa breviglumis* *Austrostipa tenuifolia*	**Yes.** • Vegetation clearing, although kept to the minimum possible, is required as part of the Project. Any clearing of native vegetation exacerbates threats associated with clearing of habitat and fragmentation.	**3.1** **4.1** **4.2** **4.3** **4.4** **4.9** **4.10** **4.11** **4.12** **4.13** **4.14** **4.15**
Inappropriate fire management.	*Austrostipa breviglumis* *Austrostipa tenuifolia*	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction. • Clearing of vegetation and access tracks for construction may make some areas more accessible to the public, increasing risk of ignition.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8** **3.5**
Grazing.	*Austrostipa breviglumis* *Austrostipa tenuifolia*	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	

11 MAMMALS

Targeted surveys and habitat modelling for one threatened mammal species, Sandhill Dunnart (*Sminthopsis psammophila*), were undertaken in the Project Area between 2009 and 2013 by Ecological Horizons Pty Ltd. Results of these surveys indicate that the presence of tall *Triodia* spp. (Spinifex) within vegetation at least 20 years post fire is the most critical component of Sandhill Dunnart habitat.

11.1 *Sandhill Dunnart (Sminthopsis psammophila)*

11.1.1 Conservation Status

The Sandhill Dunnart (Figure 58) is listed as Endangered under the EPBC Act.

The Sandhill Dunnart is also listed as Endangered under the NPW Act.

11.1.2 Ecology

Biology and description

The Sandhill Dunnart is a small, carnivorous marsupial. It has a head-body length of 8-12 cm and a tail length of 10-12 cm. It has a pale grey head and upper body, with black marking extending from the shoulders to between the eyes. Feet and underside are white. Sandhill Dunnarts can be distinguished from other similar dunnart species by the ventral crest of blackish-grey hairs on the terminal quarter of the tail (Threatened Species Scientific Committee, 2015) .

Sandhill Dunnarts are largely nocturnal, sheltering during the day in nests built in the centre of large hummock grasses, typically *Triodia* spp. (spinifex). Females also dig burrows up to 90 cm long containing a nest of leaves and bark. Males also occasionally utilise other nesting sites, including burrows, hollow logs and burrows constructed by other species, such as Mitchell's Hopping-mouse (*Notomys mitchelli*) (Threatened Species Scientific Committee, 2015).

Habitat

Sandhill Dunnarts are found in sandy habitats in semi-arid to arid areas. In South Australia, habitat is generally low open mallee woodland with a diverse shrub layer and relatively dense cover of *Triodia* spp. (spinifex) hummock grasses. The presence of *Triodia* spp. hummocks in association with sand dunes appears a critical element of Sandhill Dunnart habitat (Department for Environment and Water, 2019). Fire frequency is also an important characteristic of habitat, with tall *Triodia* spp. hummocks preferred by the species for nesting only present in vegetation 20 – 40 years post fire (Moseby, 2014).

11.1.3 Occurrence in the Project Area

All vegetation with a *Triodia* spp. understorey and sandy substrate in the northern Project Area between Sheoak Hill Conservation Park and the Middleback Range is likely to be important habitat for Sandhill Dunnart (Moseby, 2014).

Mapping of suitable habitat for the Sandhill Dunnart in the Project Area was carried out by EBS Ecology in 2019 (EBS Ecology, 2019c). These maps are reproduced in Appendix 3. Habitat includes the following Vegetation Associations, as described in EBS Ecology 2019a:

- *Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona* (Figure 59),
- *Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia* spp. +/- *Eucalyptus incrassata +/- Eucalyptus brachycalyx* (Figure 60),
- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee (Figure 61).

Figure 58. The Sandhill Dunnart (Moseby, 2014).

Figure 59. Sandhill Dunnart habitat – *Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia* spp. and *Calytrix tetragona.* Photographed by EBS Ecology in 2019.

Figure 60. Sandhill Dunnart habitat – *Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia* spp. +/- *Eucalyptus incrassata +/- Eucalyptus brachycalyx.* Photographed by EBS Ecology in 2019.

Figure 61. Sandhill Dunnart habitat – *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee. Photographed by EBS Ecology in 2019.

11.2 *Management of Threats to Sandhill Dunnart*

The draft *National Recovery Plan for the Sandhill Dunnart (Sminthopsis psammophila) 2019* (Department for Environment and Water, 2019) considers that fragmentation and loss of habitat, predation by cats and foxes and altered and/or inappropriate fire regimes are the primary threats to Sandhill Dunnart populations. Fragmentation and loss of habitat is considered particularly relevant to Eyre Peninsula populations (Department for Environment and Water, 2019). These threats, together with other indirect threats identified by the Recovery Plan, are further discussed in Table 34.

Of the five threats listed in the table, all have the potential to be exacerbated by the Project:

- Predation by cats and foxes,
- Inappropriate fire regimes,
- Habitat loss and fragmentation,
- Weed invasion,
- Introduced herbivores (grazing).

How these threats relate to the Project is also discussed in Table 34.

This document identifies management actions that will be implemented by ElectraNet and its contractors to minimise the impact of the threatening processes exacerbated by the Project. These actions are discussed in detail in Section 15. Those actions that are relevant to the Sandhill Dunnart are listed in Table 34.

Table 34. Threats to the Sandhill Dunnart identified in the draft *National Recovery Plan for the Sandhill Dunnart (Sminthopsis psammophila)*. The table indicates those that may be exacerbated by the Project and management actions taken to minimise impact.

Threat	Discussion	Exacerbated by the Project	Management Action
Predation by cats and foxes	• Listed as a Key Threatening Process under the EPBC Act, due to their role in the decline and extinction of many Australian native mammals. • The extent of their impact on Sandhill Dunnart is unknown, with core populations surviving despite the presence of cats and foxes. • Research suggests that where a dense cover of *Triodia* spp. is maintained, impact of predation is greatly reduced. (Department for Environment and Water, 2019)	**Yes.** • Linear clearance of vegetation increases the ability of cats and foxes to access Sandhill Dunnart habitat from nearby areas. • Areas cleared of vegetation provide more suitable foraging areas for predators, increasing hunting success and predation pressure on native fauna. • Disposal of food waste and rubbish on site by personnel may attract feral predators to the Project Area.	**6.1** **6.2** **6.3** **6.4**
Inappropriate fire regimes	• Inappropriate fire regimes are considered a major threat to Sandhill Dunnarts in fragmented landscapes, such as on the Eyre Peninsula. • Large-scale, uncontrolled fires have the potential to render large areas of habitat unsuitable for several years following the fire event, due to the removal of hummock grasses. (Department for Environment and Water, 2019)	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8**
Habitat loss and fragmentation	• Particularly relevant to Eyre Peninsula populations, where over 50% of land has been cleared for agriculture and remaining vegetation is highly fragmented. • Fragmentation increases the likelihood of local populations being wiped out by events such as large wildfires and reduces the potential for re-colonisation of those areas. • Construction of linear developments such as roads and fence lines allows greater access by introduced predators and increases the chance of weed invasion. (Department for Environment and Water, 2019)	**Yes.** • The Project is a long, linear development that contributes to the fragmentation of vegetation patches where clearing is required.	**4.1** **4.2** **4.3** **4.4** **4.8** **4.9** **4.10** **4.12** **4.13** **4.14**
Weed invasion	• Invasion and establishment of *Cenchrus ciliaris* (Buffel Grass) is considered a major threat to Sandhill Dunnart. • Increasing dominance of *Cenchrus ciliaris* leads to changes in frequency and intensity of fire events that result in the loss of *Triodia* spp. hummocks. (Department for Environment and Water, 2019)	**Yes.** • Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand contaminated by weed seeds) is a vector of spread for weeds during construction.	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6** **1.7**

		• Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.8** **1.9** **1.10** **1.11**
Introduced herbivores (grazing)	• Grazing by introduced herbivores, including cattle, sheep, goats, rabbits and camels, may impact indirectly on Sandhill Dunnarts by altering habitat in the following ways: - Changing the structure of Triodia spp. hummocks, - Reducing floristic diversity of habitats over an extended time period, - Causing soil disturbance and compaction, - Changing fire regimes, - Sustaining higher numbers of introduced predators and encouraging their spread into areas that would otherwise only support very low population densities. (Department for Environment and Water, 2019)	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	

12 BIRDS OF WOODLAND AND MALLEE

Many birds found in woodland and mallee habitats are threatened by common threatening processes such as habitat loss and fragmentation and changed or inappropriate fire regimes. Ten threatened woodland or mallee bird species have been recorded in the Project Area by EBS Ecology surveys, including two that are listed under both the EPBC Act and NPW Act.

These ten species are listed below:

- Striated Grasswren (*Amytornis striatus*)
- Shy Heathwren (*Calamanthus cauta*)
- White-winged Chough (*Corcorax melanorhamphos*)
- Western Gerygone (*Gerygone fusca*)
- Purple-gaped Honeyeater (*Lichenostomus cratitius*)
- Malleefowl (*Leipoa ocellata*)
- Restless Flycatcher (*Myiagra inquieta*)
- Gilbert's Whistler (*Pachycephala inornata*)
- Diamond Firetail (*Stagonopleura guttata*)
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus*)

12.1 *Striated Grasswren (Amytornis striatus)*

12.1.1 Conservation Status

The Striated Grasswren (Figure 62) is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

12.1.2 Ecology

Biology and description

The Striated Grasswren is similar in appearance to the related fairy-wrens, though significantly larger (14.5 - 18.5 cm). The upperparts are a soft reddish-brown, with white streaks while the underparts are buff with heavy white streaking on the breast. The eyebrow is rufous-brown and a heavy black whisker-streak is present. The throat is white, the bill blackish and legs bluish-grey. The tail is long and held cocked and is blackish in colour (NSW Office of Environment and Heritage, 2020c).

Striated Grasswrens forage for small invertebrates and seeds, largely on the ground. Recorded in pairs or small parties, they are difficult to observe and are often first detected by their calls. Nests are built within large *Triodia* sp. hummocks (NSW Office of Environment and Heritage, 2020c).

Habitat

The Striated Grasswren occurs in areas where mature *Triodia* spp. (Spinifex) occurs, usually in association with mallee on sandy soils. It is thought that fire history is an important habitat constraint. Birds do not reoccupying burnt vegetation until 6 – 8 years post-fire, preferring areas with large *Triodia* hummocks that most often occur 25 – 40 years after a fire (NSW Office of Environment and Heritage, 2020c).

12.1.3 Occurrence in the Project Area

EBS Ecology recorded Striated Grasswrens at three locations while undertaking surveys in the Northern Project Area (Table 35). All records were collected in *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee (Figure 63).

Given the species' habitat constraints and known distribution on the Eyre Peninsula, it is likely the species occurs in Vegetation Associations with a *Triodia* sp. understorey on sandy substrates in the Northern Project Area.

The locations of EBS Ecology records are mapped in Figure 5.

Table 35. Locations of EBS Ecology records of Striated Grasswren in the Project Area. Location information from EBS Ecology 2014a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 678258E 6314184N	Not counted	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee
53H 690890E 6324233N	1	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee
53H 690826E 6324246N	1	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee

Figure 62. Striated Grasswren (*Amytornis striatus*), photographed by EBS Ecology in 2013.

Figure 63. Mallee with a *Triodia* sp. understorey on sandy soil. Striated Grasswrens are likely in similar habitat in the north of the Project Area. Photographed by EBS Ecology in 2019.

12.2 *Shy Heathwren (Calamanthus cauta)*

12.2.1 Conservation Status

Shy Heathwren (Figure 64) is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

12.2.2 Ecology

Biology and description

The Shy Heathwren is a small (13-16 g) brown bird with a strongly cocked tail. It has unstreaked, brown upperparts with pale underparts that are heavily marked with dark streaks. Other distinguishing features include a prominent white eyebrow and rufous rump (Menkhorst, et al., 2019).

The Shy Heathwren is a secretive species that occurs in singles, pairs and small family groups. They sometimes sing from the top of low shrubs but are usually seen foraging on the ground or in low shrubs. When disturbed, they will run or fly low into thick cover (Menkhorst, et al., 2019).

Habitat

The Shy Heathwren inhabits dense shrubby or heathy understorey in mall and woodlands. It is found throughout the Eyre Peninsula (Menkhorst, et al., 2019).

12.2.3 Occurrence in the Project Area

EBS Ecology recorded Shy Heathwren at two locations while undertaking surveys in the Southern Project Area and was found in two Vegetation Associations:

- *Melaleuca halmaturorum* Tall Open Shrubland over *Juncus krausii* and *Juncus pallidus* (Figure 65).
- *Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata.*

These locations are listed in Table 36. However, suitable habitat is widespread throughout and the bird's distribution includes all of Eyre Peninsula. It is likely that the species occurs throughout the Project Area where suitable habitat occurs.

The locations of EBS Ecology records are mapped in Figure 4.

Table 36. Location of EBS Ecology records of Shy Heathwren in the Project Area. Location information from EBS Ecology 2014a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 576713E 6178602N	Not counted	*Melaleuca halmaturorum* Tall Open Shrubland over *Juncus krausii* and *Juncus pallidus.*
53H 581677E 6186226N	Not counted	*Eucalyptus odorata +/- Eucalyptus pileata / Eucalyptus leptophylla* Mallee +/- *Melaleuca uncinata.*

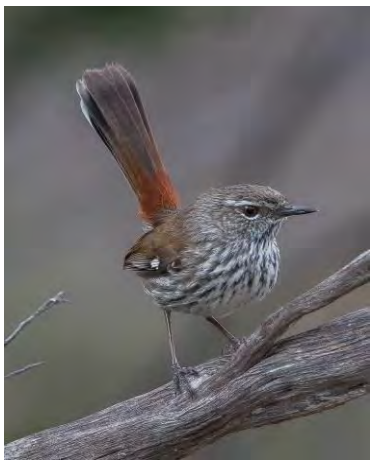

Figure 64. Shy Heathwren (*Calamanthus cauta*). Photograph provided by Peter Day.

Figure 65. Shy Heathwren was recorded in *Melaleuca halmaturorum* Tall Open Shrubland over *Juncus krausii* and *Juncus pallidus.* Photographed by EBS Ecology in 2019

12.3 *White-winged Chough (Corcorax melanorhamphos)*

12.3.1 Conservation Status

The White-winged Chough (Figure 66) is listed as Rare under the NPW Act and its population probably declining. It is not listed as threatened under the EPBC Act (Department for Environment and Heritage, 2008c).

12.3.2 Ecology

Biology and description

The White-winged Chough is a large, almost completely black, bird with a curved beak, white wing patch and red eye. The white wing patch is usually only visible in flight.

White-winged Choughs are sedentary, large territories (up to 1000 ha) occupied by a social group of seven to 10 individuals. A group normally consists of a breeding pair and offspring from previous years, young birds staying with the parents for up to four years.

White-winged Choughs forage mostly on the ground, raking through leaf litter for insects and seeds. They build characteristic bowl-shaped mud nests that can take several months to complete (Department for Environment and Heritage, 2008c).

Habitat

White-winged Choughs inhabit woodlands and tall mallee. They prefer damper areas with abundant leaf litter (Department for Environment and Heritage, 2008c).

12.3.3 Occurrence in the Project Area

The White-winged Chough was recorded at one location in the Southern Project Area (Table 37). It was recorded in *Eucalyptus cladocalyx* Woodland / Open Woodland where an active nest was found in roadside vegetation (Figure 67). The location of this record is shown in Figure 5, although it is likely that the species occurs elsewhere in the Project Area where suitable habitat occurs.

Table 37. Location of known populations of White-winged Chough in the Project Area. Location information from EBS Ecology 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 574858E 6166222N	4	*Eucalyptus cladocalyx* Woodland / Open Woodland

Figure 66. White-winged Chough. Photograph provided by Peter Day.

Figure 67. *Eucalyptus cladocalyx* Woodland / Open Woodland, habitat for the White-winged Chough. Photographed by EBS Ecology in 2019.

12.4 *Western Gerygone (Gerygone fusca)*

12.4.1 Conservation Status

The Western Gerygone is listed as Rare under the NPW Act. It is widely distributed throughout mainland Australia and is not listed as Threatened under the EPBC Act.

12.4.2 Ecology

Biology and description

The Western Gerygone is a small, dull grey-brown bird, paler below, weighing 5-7 g. It has a distinctive black and white tail pattern, including a white base to the outer tail feathers, and red eye that distinguish it from similar looking species. A broken white eye-ring and black loral stripe are also characteristic. The Western Gerygone has a distinctive song, calls often and can be readily identified by the call alone (Menkhorst, et al., 2019).

Western Gerygones are often seen singly or in pairs. Some populations are resident, while others are partially migratory, mostly moving from south to north in the winter (Menkhorst, et al., 2019).

Habitat

The Western Gerygone occurs in drier forests and woodlands and *Acacia* shrublands (Menkhorst, et al., 2019).

12.4.3 Occurrence in the Project Area

The Western Gerygone was recorded in 2019 by EBS Ecology at two locations, with a single bird detected at each (Table 38). The species was found in two woodland Vegetation Associations in the Southern Project Area, as listed below:

- *Eucalyptus cladocalyx* Woodland / Open Woodland,
- *Allocasuarina verticillata* Low Woodland (Figure 68).

The locations of EBS Ecology records are mapped in Figure 4.

Table 38. Locations of EBS Ecology records of Western Gerygone in the Project Area. Location information from EBS Ecology 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation association
53H 574927E 6165749N	1	*Eucalyptus cladocalyx* Woodland / Open Woodland
53H 588501E 6198791N	1	*Allocasuarina verticillata* Low Woodland

Figure 68. The Western Gerygone is found in drier woodlands, such as *Allocasuarina verticillata* Low Woodland shown here. Photographed by EBS Ecology in 2019.

12.5 *Purple-gaped Honeyeater (Lichenostomus cratitius)*

12.5.1 Conservation Status

The Purple-gaped Honeyeater is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

12.5.2 Ecology

Biology and description

The Purple-gaped Honeyeater is a grey-olive coloured bird. It has yellow edging to its tail and wing feathers and grey-yellow, unstreaked underparts. The diagnostic head pattern consists of a grey forehead and crown, black mask across the face and yellow-tipped ear tufts. Purple facial skin from the base of the black bill to below the eye is inconspicuous (Menkhorst, et al., 2019).

It is mostly sedentary, although it probably moves locally in response to food availability. It feeds on nectar, lerps and other insects, foraging in low trees and shrubs. The Purple-gaped honeyeater is usually encountered in pairs or small groups (Menkhorst, et al., 2019).

Habitat

The Purple-gaped Honeyeater occurs in mallee, tall heath and low woodlands throughout the Eyre Peninsula (Menkhorst, et al., 2019).

12.5.3 Occurrence in the Project Area

This species was recorded by EBS Ecology at one location while surveying the Northern Project Area (Table 39). However, it is likely that it occurs throughout suitable habitat in the Southern Project Area also. The single record was collected in the mallee Vegetation Association listed in Table 39 and pictured in Figure 69.

Table 39. Locations of EBS Ecology records of Purple-gaped Honeyeater in the Project Area. Location information from EBS Ecology 2014a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 659266E 6298811N	Not counted	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee.

Figure 69. The Purple-gaped Honeyeater is found in mallee Vegetation Associations, such as that shown here. Photographed by EBS Ecology in 2019.

12.6 *Malleefowl (Leipoa ocellata)*

12.6.1 Conservation Status

The Malleefowl is listed as Vulnerable under the EPBC Act. In South Australia, it has undergone a decline in all parts of its distribution and is listed as Endangered under the NPW Act.

12.6.2 Ecology

Biology and description

Malleefowl are large ground birds, weighing up to 2.2 kg, not likely to be confused with any other in the Project Area. Its wings and back are mottled and barred with grey, black, brown and white. The head and neck are grey, with a distinctive black stripe down the fore-neck. It has large, strong legs and feet (Menkhorst, et al., 2019).

Malleefowl are distinctive in that they incubate their eggs within a large nest mound, constructed of sand, leaves, bark and twigs. The mound is constructed by the male and can be up to 5 m in diameter and 1 m high. The male attends the mound constantly, maintaining the temperature within by adding or removing layers of material (Menkhorst, et al., 2019). Eggs are laid in the mound from September until late summer and hatch after about 60 days. Chicks receive no parental care after hatching (Benshemesh, 2007).

Malleefowl are generalist feeders, foraging on the ground for seeds, fruits, insects and other invertebrates (Benshemesh, 2007).

Habitat

Typical Malleefowl habitat includes semi-arid to arid low woodlands, mallee and shrublands. A sandy substrate with an abundance of leaf litter is required for construction of nest mounds (Benshemesh, 2007).

12.6.3 Occurrence in the Project Area

The Malleefowl is known to occur in suitable habitat along a 35 km section of the Northern Project Area (EBS Ecology, 2014a). ElectraNet has commissioned several Malleefowl mound surveys, including LiDAR and follow-up ground truthing investigations. This work resulted in 81 confirmed mounds being mapped within the vicinity of the Project Area (Figure 70), although many were inactive (Figure 71). Mound locations are listed by Vegetation Association in Table 40 and mapped in Figure XX. Mapping is based on EBS Ecology 2019d.

In addition, EBS Ecology recorded fresh Malleefowl tracks (Figure 72) at the locations listed in Table 41. Evidence of Malleefowl was detected in 13 Vegetation Associations as listed below and shown on the maps in Appendix 4:

- *Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee.
- *Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx.*
- *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee.

- *Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona* (Figure 73).
- *Geijera linearifolia +/- Senna artemisioides ssp. coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia* Shrubland (Figure 74).
- *Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata* mixed Mallee over *Cratystylis conocephala* and *Atriplex vesicaria.*
- *Senna artemisioides ssp. coriacea, Dodonaea lobulata* Tall Shrubland +/- *Myoporum platycarpum, Dodonaea viscosa ssp. angustissima* and *Acacia oswaldii*,
- *Melaleuca uncinata* Shrubland,
- *Eucalyptus brachycalyx +/- Callitris verrucosa* Mallee over *Calytrix involucrata,* and *Pheballium bullatum,*
- *Eucalyptus brachycalyx +/- Callitris verrucosa* Mallee over *Melaleuca uncinata* and *Calytrix tetragona*,
- *Melaleuca uncinata* Tall Shrubland *+/- Eucalyptus incrassata* and *Eucalyptus brachycalyx,*
- *Callitris gracilis* Low Woodland over *Alyxia buxifolia* and *Beyeria lechenaultii +/- Alectryon oleifolius ssp. canescens +/- Dodonaea viscosa ssp. angustissima*,
- *Eucalyptus porosa* Mallee over *Dodonaea viscosa ssp. angustissima, Senna artemisioides ssp. coriacea* and *Acacia wilhelmiana.*

Table 40. Confirmed Malleefowl mounds (EBS Ecology, 2014a) in the Project Area and Vegetation Associations (EBS Ecology, 2019a).

Mound No.	Vegetation Association
C001-004, C006-010, C046, C076-078	*Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla* Mallee.
C005	*Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx.*
C012, C040, C042-045, C062, C064, C065, C069-073, C075, C079-081	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee.
C016	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona.*
C051	*Geijera linearifolia +/- Senna artemisioides ssp. coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia* Shrubland.
C053, C055, C056, C059	*Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata* mixed Mallee over *Cratystylis conocephala* and *Atriplex vesicaria.*

Table 41. Location of Malleefowl records collected by EBS Ecology (EBS Ecology, 2019a).

Location	Record Type	Vegetation Association
53H 674182E 6310955N	Tracks	*Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona.*

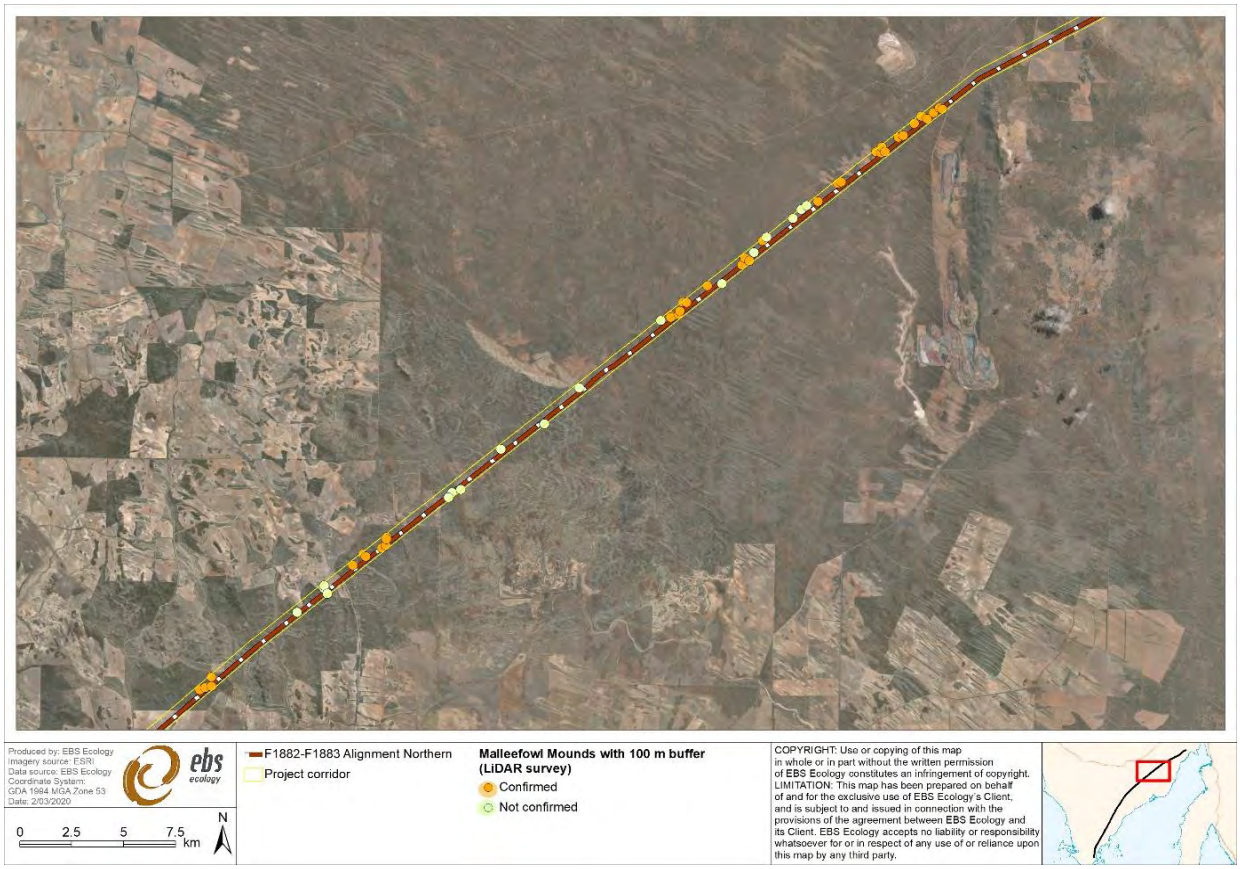

Figure 70. Location of Malleefowl mounds located by LiDAR and ground surveys.

Figure 71. An inactive Malleefowl mound located in the Project Area by EBS Ecology in 2013.

Figure 72. Malleefowl tracks in the Project Area (EBS Ecology 2019a).

Figure 73. Confirmed Malleefowl mounds are found in Vegetation Association such as *Eucalyptus incrassata +/- Callitris verrucosa* Mallee over *Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona.* Photographed by EBS Ecology in 2019.

Figure 74. Malleefowl mounds were also confirmed in shrublands such as *Geijera linearifolia +/- Senna artemisioides ssp. coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia* Shrubland. Photographed by EBS Ecology in 2019.

12.7 *Restless Flycatcher (Myiagra inquieta)*

12.7.1 Conservation Status

The Restless Flycatcher (Figure 75) is listed as Rare under the NPW Act.

It is not listed as threatened under the EPBC Act.

12.7.2 Ecology

Biology and description

The Restless Flycatcher (Figure 75) has an unmarked glossy black head and upperparts and is white below. Females have a buff-coloured upper breast. Noisy and conspicuous, they occur in singles or pairs and forage for insects by pouncing from a low perch (Menkhorst, et al., 2019).

Habitat

Restless Flycatchers are found in open forests and woodlands and are often seen in adjacent farmland. They are also sometimes encountered in open mallee habitats (Department for Environment and Heritage, 2008e).

12.7.3 Occurrence in the Project Area

Restless Flycatchers were recorded by EBS Ecology at one location in the Northern Project Area (Table 42 and Figure 5). It was recorded in the following Vegetation Association:

- *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee (Figure 76).

The known distribution of the species includes northern and southern Eyre Peninsula. Given the extent of suitable habitat, it is not likely to occur throughout the Project Area.

Table 42. Locations of EBS Ecology records of Restless Flycatcher in the Project Area. Location information from EBS Ecology 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 684355E 6319033N	Not counted	*Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee

Figure 75. Restless Flycatcher (*Myiagra inquieta*). Photograph provided by Peter Day.

Figure 76. *Eucalyptus oleosa / Eucalyptus brachycalyx* Mallee, habitat for the Restless Flycatcher. Photographed by EBS Ecology in 2019.

12.8 *Gilbert's Whistler (Pachycephala inornata)*

12.8.1 Conservation Status

Gilbert's Whistler (Figure 77) is listed as Rare under the NPW Act.

It is not listed as threatened under the EPBC Act.

12.8.2 Ecology

Biology and description

Gilbert's Whistler is a stocky bird, 17 – 20 cm long, with a short, robust bill. Males are brown-grey with a black patch between red eye and bill and a distinctive rufous coloured chin and throat. The female lacks the black and rufous face markings and can be difficult to distinguish from more common whistler species (NSW Office of Environment and Heritage, 2020b).

Gilbert's whistler forages on the ground in shrub thickets as well as ion the tops of low trees. It mainly feeds on invertebrates, but also seeds and fruit. Pairs may hold and defend permanent territories, with no regular movements recorded. They breed between August and November (NSW Office of Environment and Heritage, 2020b).

Habitat

Gilbert's Whistler is found in a range of mallee, shrubland and woodland habitats, but always where a dense shrub layer is present. It is often found in mallee with an understorey of low shrubs over *Triodia* spp. (NSW Office of Environment and Heritage, 2020b).

12.8.3 Occurrence in the Project Area

Gilbert's Whistler was recorded at one location within the Northern Project Area (Table 43 and Figure 5). The bird was observed in *Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx* (Figure 78).

As suitable habitat for Gilbert's Whistler includes mallee and shrubland habitat more broadly and the species is widely distributed throughout the Eyre Peninsula, it is likely that the species occurs in the Project Area wherever a shrub layer occurs beneath mallee or woodland.

Table 43. Locations of EBS Ecology records of Gilbert's Whistler in the Project Area. Location information from EBS Ecology 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 681465E 6316738N	Not counted	*Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx.*

Figure 77. Gilbert's Whistler (*Pachycephala inornata*). Photograph provided by Peter Day.

Figure 78. Suitable habitat for Gilbert's Whistler in the Project Area (*Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata* Tall Shrubland over *Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx*). Photographed by EBS Ecology in 2019.

12.9 *Diamond Firetail (Stagonopleura guttata)*

12.9.1 Conservation Status

The Diamond Firetail (Figure 79) is listed as Rare under the NPW Act..

It is not listed as threatened under the EPBC Act.

12.9.2 Ecology

Biology and description

The Diamond Firetail is a distinctive, stocky finch with prominent white spots on black flanks and scarlet rump. It has a grey head with black lores and red bill, with brown back and wings. The birds underparts are white with a prominent black breast-band separating the white throat and belly (Menkhorst, et al., 2019).

It is often seen in pairs and small flocks at the edges of dry forests and woodlands. It feeds primarily on the seeds of native and introduced grasses, foraging mainly on the ground (Menkhorst, et al., 2019).

Habitat

Diamond Firetails are found in a wide range of grassy, *Eucalyptus* dominated Vegetation Associations, including woodland, forest and mallee. Availability of suitable seed throughout the year is required and a diversity of native grasses appears a critical element of habitat. Larger areas of habitat are important, and it persists only in areas of >50 ha (Department for Environment and Heritage, 2008d).

12.9.3 Occurrence in the Project Area

Diamond Firetails were recorded by EBS Ecology at four locations in the Southern Project Area (Table 44 and Figure 4). It was recorded in the following three Vegetation Associations:

- *Eucalyptus diversifolia* Mallee (Figure 80).
- *Melaleuca halmaturorum* Tall Open Shrubland over *Juncus kraussii* and *Juncus pallidus*.
- *Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata.*

Given the extent of similar habitat throughout, it is likely that the species occurs elsewhere in the Southern Project Area. Based on the known distribution of the species that includes only the southern Eyre Peninsula, it is not likely to occur in the north.

Table 44. Locations of EBS Ecology records of Diamond Firetail in the Project Area. Location information from EBS Ecology 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 574480E 6160341N	1	*Eucalyptus diversifolia* Mallee.
53H 575094E 6166316N	4	*Melaleuca halmaturorum* Tall Open Shrubland over *Juncus kraussii* and *Juncus pallidus*.
53H 575068E 6168650N	Not counted	*Melaleuca halmaturorum* Tall Open Shrubland over *Juncus kraussii* and *Juncus pallidus*.

Location	Number of individuals	Vegetation Association
53H 591750E 6204904N	5	*Eucalyptus incrassata* var. *angulosa* Mallee over *Melaleuca uncinata*

Figure 79. Diamond Firetail (*Stagonopleura guttata*). Photographed by Peter Day.

Figure 80. *Eucalyptus diversifolia* Mallee, habitat for the Diamond Firetail. Photographed by EBS Ecology in 2019.

12.10 *Southern Emu-wren (Eyre Peninsula) (Stipiturus malachurus parimeda)*

12.10.1 Conservation Status

The Southern Emu-wren (Eyre Peninsula) is listed as Vulnerable under the EPBC Act and Endangered under the NPW Act.

12.10.2 Ecology

Biology and description

The Southern Emu-wren is a small bird, with an overall length of 17–19 cm (including tail) and body mass of about 7 g. It has short rounded wings and a relatively long tail (11–13 cm) comprised of six emu-like feathers. Both sexes are tawny-brown with dark striations on the upperparts, and males are distinguished by their pale-blue upper-breast, throat and eyebrows (Pickett, 2006).

A secretive and cryptic species, it is a poor flier and tends to hop and scramble through its habitat. Short bursts of sustained flight between cover are often little more than a few metres. They feed mainly on insects, generally foraging amongst the foliage of dense vegetation and occasionally on the ground near dense cover (Pickett, 2006).

Southern Emu-wrens are sedentary, occupying territories of at least 1 ha in size. Due to their poor flight capabilities and reliance of dense, low shrub cover, they do not disperse widely.

Habitat

On Eyre Peninsula, Southern Emu-wrens are found in wet sedgeland/shrubland or dry heathy mallee/shrubland. They seem to use habitat based on structural rather than floristic composition – a dense cover of low shrubs and/or sedges is critical (Pickett, 2006).

12.10.3 Occurrence in the Project Area

The Sothern Emu-wren was not recorded by EBS Ecology in any surveys undertaken in the Project Area. However, suitable habitat for the species was mapped by EBS Ecology in 2019 (EBS Ecology, 2019e). Suitable habitat is limited to the Southern Project Area and includes the following three Vegetation Associations:

- *Gahnia spp. / Juncus krausii* Sedgeland *+/- Eucalyptus petiolaris.*
- *Melaleuca halmaturorum* Tall Open Shrubland over *Juncus krausii* and *Juncus pallidus.*
- *Juncus* spp. Sedgeland (Figure 81).

Maps of potential Southern Emu-wren habitat within the Project Area are reproduced in Appendix 5.

Figure 81. *Juncus* spp. Sedgeland (foreground). This represents potential habitat for the Southern Emu-wren. Photographed by EBS Ecology in 2019.

12.11 *Management of Threats to Birds of Woodland and Mallee*

Known threats to many of the bird species in Section 12 are documented in literature including species recovery plans and species profiles. These sources are listed in Table 45. There are no documented threats to Western Gerygone, however management of threats to other woodland birds of similar habitats is likely to also benefit this species.

Table 45. Documentation of threats to birds of woodlands and mallee.

Species	Reference
White-winged Chough	*Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia* (Wilson & Bignall, 2009).
Restless Flycatcher	
Diamond Firetail	
Purple-gaped Honeyeater	*Purple-gaped Honeyeater – Profile* (NSW Office of Environment and Heritage, 2020a).
Gilbert's Whistler	*Gilbert's Whistler – Profile* (NSW Office of Environment and Heritage, 2020b).
Striated Grasswren	*Striated Grasswren – Profile* (NSW Office of Environment and Heritage, 2020c).
Shy Heathwren	*Shy Heathwren – Profile* (NSW Office of Environment and Heritage, 2020d).
Southern Emu-wren	*Habitat Management Guidelines for the Eyre Peninsula Southern Emu-wren* (Pickett, 2006).
Malleefowl	*National Recovery Plan for Malleefowl* (Benshemesh, 2007).

The documents listed in Table 45 identify 10 threats and threatening processes as impacting on woodland and mallee birds. Of these, road and rail corridor management, habitat fragmentation and habitat loss threaten all nine species that might occur in the Project Area.

All documented threats to the bird species covered in Section 12 are discussed in Table 46. As shown in the table, seven are possibly or likely to be exacerbated by the Project. This document identifies management actions that will be implemented by ElectraNet and its contractors to minimise the impact of the threatening processes exacerbated by the Project. These actions are discussed in detail in Section 15.

Those actions that are relevant to the woodland and mallee birds are listed in Table 46.

Table 46. Threats to woodland and mallee birds as documented by the relevant literature. The table indicates those that may be exacerbated by the Project and lists the management actions that will be implemented to minimise impacts.

Threat	Species	Discussion	Exacerbated by the Project	Management Action
Grazing (stock and feral animals)	Striated Grasswren Shy Heathwren Southern Emu-wren Malleefowl Restless Flycatcher Diamond Firetail Gilbert's Whistler	• Overgrazing by stock and feral animals causes the loss of understorey vegetation, including shrubs and grasses[1]. • Changes in vegetation structure and composition caused by grazing influences the diversity and abundance of vertebrate prey and plant foods[2, 3]. • Removal of litter layer by over grazing reducing foraging habitat[4]. • Known to be a major threat to Southern Emu-wren, through decreased density of low vegetation due to trampling, especially by cattle[5].	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	
Introduced predators (including cats, foxes, dogs)	Striated Grasswren Shy Heathwren Malleefowl Gilbert's Whistler	• Predation by foxes, and to a lesser extent cats and raptors, is a major cause of mortality for Malleefowl[3]. • Predation by introduced predators may be increasingly threatening for small bird species whose populations are already small and fragmented and impacted by other processes[2, 6].	**Yes.** • Linear clearance of vegetation increases the ability of cats and foxes to access habitat from nearby areas. • Areas cleared of vegetation provide more suitable foraging areas for predators, increasing hunting success and predation pressure on native fauna. • Disposal of food waste and rubbish on site by personnel may attract feral predators to the Project Area.	**6.1** **6.2** **6.3** **6.4**
Competition from introduced birds	Gilbert's Whistler	• Aggressive exclusion from habitat by over-abundant Noisy Miners (*Manorina melanocephala*) is thought to be a threat to populations of Gilbert's Whistler in NSW[4].	**No.** • Eyre Peninsula is not within the distribution of the Noisy Miner. The closely related Yellow-throated Miner (*Manorina falvigula*) occurs but has not been identified as a threat to Gilbert's Whistler, or any other species in this management plan.	**Not exacerbated by the Project.**
Weed invasion	Southern Emu-wren White-winged Chough Diamond Firetail Gilbert's Whistler	• Invasion by weed species such as *Asparagus asparagoides, Senecio pterophorous* and grassy species can cause changes in vegetation structure and diversity[5]. • Invasion of exotic grasses may be detrimental to the prevalence of native species, which are	**Yes.** • Movement to, from and within the Project Area by machinery, vehicles and personnel is a vector of spread for weeds during construction. • Contaminated construction materials brought into the Project Area (e.g. gravel/fill/sand	**1.1** **1.2** **1.3** **1.4** **1.5** **1.6**

Threat	Species	Discussion	Exacerbated by the Project	Management Action
		often an important food source in winter/spring[7].	contaminated by weed seeds) is a vector of spread for weeds during construction. • Land newly cleared of vegetation increases the opportunity for weed establishment, particularly colonising species that are advantaged by disturbance.	**1.7** **1.8** **1.9** **1.10** **1.11**
Inappropriate fire management	Striated Grasswren Shy Heathwren Southern Emu-wren Malleefowl Restless Flycatcher Diamond Firetail Gilbert's Whistler	• Large fires are a major threat to Malleefowl and other mallee birds. Populations may be eliminated from large areas by such fires, with limited opportunity for re-colonisation in fragmented habitats[3, 5]. • Fire at high frequency impacts density of shrub layer, vegetation structure and composition[4, 6]. • Removal of dead timber and leaf litter by fire reduces foraging suitability of habitat for some species (e.g. Restless Flycatcher)[8].	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8** **3.5**
Road and rail corridor management	Striated Grasswren Shy Heathwren Southern Emu-wren Malleefowl White-winged Chough Purple-gaped Honeyeater Restless Flycatcher Diamond Firetail Gilbert's Whistler	• Where remnant habitat is located within road and rail corridors, maintenance of the infrastructure and associated vegetation management may contribute to further habitat loss/fragmentation.	**No.** • ElectraNet is not responsible for the maintenance or management of any road or rail corridors.	**Not exacerbated by the Project.**
Habitat fragmentation	Striated Grasswren Shy Heathwren Southern Emu-wren Malleefowl White-winged Chough Purple-gaped Honeyeater Restless Flycatcher Diamond Firetail Gilbert's Whistler	• Clearing of mallee and woodlands for agriculture has resulted in the fragmentation of habitats that were once contiguous over extensive landscapes resulting in small populations of species isolated by intervening areas of non-suitable habitat[3, 5] • Reduces dispersal opportunities and gene flow between populations[3, 5] • Fragmentation is likely to exacerbate the effects of other threats such as poor fire management[3]	**Yes.** • The Project is a long, linear development that contributes to the fragmentation of vegetation patches where clearing is required.	**4.1** **4.2** **4.3** **4.4** **4.8** **4.9** **4.10** **4.11** **4.12** **4.13**

Threat	Species	Discussion	Exacerbated by the Project	Management Action
Habitat Loss	Striated Grasswren Shy Heathwren Southern Emu-wren Malleefowl White-winged Chough Purple-gaped Honeyeater Restless Flycatcher Diamond Firetail Gilbert's Whistler	• Historically, clearing of woodland and mallee is likely to have been the greatest threat to these species leading to decline[3]. • Habitat loss has been greatest in higher rainfall areas on fertile soils, which coincide with the best habitat for species like Malleefowl, with remnants mostly occurring in marginal habitat less suitable for agriculture[3]. • Clearing habitat removes food resources and nesting sites[9].	**Yes.** • The Project requires clearing of vegetation and thus contributes to loss of habitat.	**4.14**
Infrastructure development	Southern Emu-wren	• Particularly relevant to Southern Emu-wren, where construction of infrastructure such as roads, powerlines and fences occurs near limited habitat patches[5].	**Yes.** • The Project includes the construction of a transmission line close to potential habitat for Southern Emu-wren.	
Site disturbance	Striated Grasswren Shy Heathwren Southern Emu-wren Malleefowl White-winged Chough Purple-gaped Honeyeater Restless Flycatcher Diamond Firetail Gilbert's Whistler Western Gerygone	• While not identified in any of the literature referenced, site disturbance may impact bird species indirectly.	**Yes.** • Nesting birds may respond to disturbance by abandoning eggs and/or chicks. • Increased vehicle traffic on access roads and transmission line easement increases the risk of mortality or injury due to vehicle strikes.	**3.2** **3.3** **3.4** **3.5** **3.6** **3.7** **3.8**

[1]***Amytornis textilis myall (Western Grasswren (Gawler Ranges)) Conservation Advice*** (Threatened Species Scientific Committee, 2014).
[2]***Striated Grasswren – Profile*** (NSW Office of Environment and Heritage, 2020c).
[3]***National Recovery Plan for Malleefowl Leipoa ocellata*** (Benshemesh, 2007).
[4]***Gilbert's Whistler – Profile*** (NSW Office of Environment and Heritage, 2020b).
[5]***Habitat Management Guidelines for the Eyre Peninsula Southern Emu-wren*** (Pickett, 2006).
[6]***Shy Heathwren – Profile*** (NSW Office of Environment and Heritage, 2020d).
[7]***Adelaide and Mount Lofty Ranges South Australia Threatened Species Profile – Diamond Firetail*** (Department for Environment and Heritage, 2008d).
[8]***Adelaide and Mount Lofty Ranges South Australia Threatened Species – Restless Flycatcher*** (Department for Environment and Heritage, 2008e).
[9]***Purple-gaped Honeyeater – Profile*** (NSW Office of Environment and Heritage, 2020a).

13 BIRDS OF CHENOPOD SHRUBLANDS

13.1 *Slender-billed Thornbill, (western subspecies) (Acanthiza iredalei iredalei)*

13.1.1 Conservation Status

The western subspecies of Slender-billed Thornbill is listed as Rare under the NPW Act. It is not listed as threatened under the EPBC Act.

13.1.2 Ecology

Biology and description

The Slender-billed Thornbill is a small bird about 10 cm in length and weighing only 5-6 g. They are olive-grey/brown in colour with a black patch with white edges on their forehead. While they are usually seen in pairs or in small groups of up to 10 birds, they occasionally form flocks of up to 60. They feed on invertebrates and leaves and stems of some plants, foraging in low shrubs and on the ground (Natural Resources Adelaide and Mt Lofty Ranges).

Habitat

The Slender-billed Thornbill's preferred habitat includes shrublands, sometimes near mangroves, salt lakes, or salt flats. They usually choose chenopod shrublands dominated by *Sarcocornia* spp., *Maireana* spp. or *Atriplex* spp. Sometimes they have been seen in low heath on sand plains as well (Natural Resources Adelaide and Mt Lofty Ranges).

13.1.3 Occurrence in the Project Area

The species was recorded at three locations in the Northern Project Area. These locations, listed in Table 47 and mapped in Figure 5, were all within woodland or shrubland with a chenopod understorey, including the following associations:

- *Maireana sedifolia* Low Shrubland *+/- Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *canescens* (Figure 82).
- *Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.*
- *Acacia papyrocarpa +/- Alectryon oleifolius ssp. canescens +/- Myoporum platycarpum* mixed Low Open Woodland *over Atriplex vesicaria / Austrostipa spp.*

Table 47. Locations of EBS Ecology records of Slender-billed Thornbill in the Project Area. Location information from EBS Ecology 2014a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 703167E 6332520N	Not counted	*Maireana sedifolia* Low Shrubland *+/- Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *canescens.*
53H 704210E 6333185N	Not counted	*Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.*

53H 710761E 6336547N	>5	*Acacia papyrocarpa +/- Alectryon oleifolius ssp. canescens +/- Myoporum platycarpum* mixed Low Open Woodland *over Atriplex vesicaria / Austrostipa spp.*

Figure 82. *Maireana sedifolia* Low Shrubland *+/- Myoporum platycarpum, Acacia papyrocarpa, Eucalyptus gracilis, Alectryon oleifolius* ssp. *Canescens.* Photographed by EBS Ecology in 2019.

13.2 *Western Grasswren (Gawler Ranges) (Amytornis textilis myall)*

13.2.1 Conservation Status

The Western Grasswren (Gawler Ranges) is listed as Vulnerable under the EPBC Act and Vulnerable under the MPW Act.

13.2.2 Ecology

Biology and description

Western Grasswrens are medium-sized, thickset grasswrens with long bills and long tails. The upperparts are dark brown to rufous with paler streaks, while the underparts are pale grey-buff with fine streaking from the chin to the breast. They have a white patch on the centre of the belly (Threatened Species Scientific Committee, 2014).

It is usually seen in pairs or small groups, but sometimes occurs singly. They feed primarily on seeds, fruits and insects, foraging on the ground at the base of in leaf litter (Threatened Species Scientific Committee, 2014).

Habitat

Chenopod shrublands in the Gawler Ranges and northern Eyre Peninsula are the primary habitat of the Western Grasswren, most commonly low shrublands, chiefly comprising *Maireana pyramidata* and *Lycium australe* They are also known to occur in low woodlands, mostly comprising *Acacia papyrocarpa*. Most of the subspecies habitat is found along drainage lines but occasionally habitat also includes low rocky hills and semi-arid low woodlands (Threatened Species Scientific Committee, 2014).

13.2.3 Occurrence in the Project Area

Western Grasswrens have been recorded at four locations in the Northern Project Area by EBS Ecology (Table 48 and Figure 5). In addition, EBS Ecology carried out mapping of suitable habitat in 2014. These maps are provided in Appendix 6, overlaid with vegetation mapping from EBS Ecology 2019a. This indicates that potential Western Grasswren habitat includes the following Vegetation Associations:

- *Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.*
- *Maireana pyramidata* Low Shrubland *+/- Myoporum platycarpum, Acacia papyrocarpa, Alectryon oleifolius* ssp*. Canescens* (Figure 83).
- *Maireana sedifolia* Low Shrubland *+/- Acacia papyrocarpa* over *Austrostipa* spp. and *Austrodanthonia caespitosa.*

About 20% of the population of Western Grasswren is known to occur within the Cultana Training Area (Threatened Species Scientific Committee, 2014).

Table 48. Locations of EBS Ecology Western Grasswren records in the Project Area. Location information from EBS Ecology 2014a and 2019a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 704048E 6332983N	Not counted	*Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.*
53H 708780E 6335487N	Not counted	*Maireana pyramidata* Low Shrubland *+/- Myoporum platycarpum, Acacia papyrocarpa, Alectryon oleifolius* ssp*. canescens.*
53H 727124E 6345050N	Not counted	*Acacia papyrocarpa* Open Woodland over *Maireana sedifolia / Atriplex vesicaria / Maireana pyramidata.*
53H 728591E 6349537N	1	*Maireana sedifolia* Low Shrubland *+/- Acacia papyrocarpa* over *Austrostipa* spp. and *Austrodanthonia caespitosa.*

Figure 83. *Maireana pyramidata* Low Shrubland in the Cultana training area. This is habitat for Western Grasswren. Photographed by EBS Ecology in 2019.

13.3 *Management of Threats to birds of Chenopod Shrublands*

Known threats to the Slender-billed Thornbill (western subspecies) and Western Grasswren (Gawler Ranges) are documented in the following sources:

- *Slender-billed Thornbill (Western)* (Natural Resources Adelaide and Mt Lofty Ranges).
- *Amytornis textilis myall (Western Grasswren (Gawler Ranges)) Conservation Advice* (Threatened Species Scientific Committee, 2014).

These documents identify three threats as impacting on the two species. All are potentially exacerbated by the Project. These are discussed in Table 49.

Table 49. Threats and management of impacts to birds of chenopod shrublands, indicating those that may be exacerbated by the Project.

Threat	Species	Discussion	Exacerbated by the Project	Management Actions
Grazing (stock and feral animals)	Slender-billed Thornbill Western Grasswren	• Intensive grazing by sheep and rabbits is thought to be the greatest threat to Slender-billed Thornbill due to the changes in vegetation structure and composition that results[1]. • Overgrazing by stock and feral animals (goats and rabbits) causes the loss of understorey vegetation and has been shown to cause declines in Western Grasswren populations[2]. • The extinction of other subspecies of Western Grasswren in Western Australia and Northern Territory has been directly attributed to grazing pressures[2].	**Yes.** • There is anecdotal evidence (John Read pers. Com.) that an increase in the local impact of grazing occurs following vegetation management activities related to the transmission line. • Increased impact results from native and feral grazers preferentially grazing areas of new growth that follows clearing.	
Inappropriate fire management	Slender-billed Thornbill Western Grasswren	• Chenopod shrublands generally don't burn very frequently. Long-lived *Maireana* spp. may take up to 50 years to mature (Cheal, 2010). • Mature shrubs are an important component of habitat for both species.	**Yes.** • Increased access to areas during construction presents an increased risk of ignition sources. • Operation of machinery, tools and vehicles increases ignition sources during construction.	**2.1** **2.2** **2.3** **2.4** **2.5** **2.6** **2.7** **2.8**
Introduced predators	Western Grasswren	• It is thought that extinction of the Western Grasswren from the Yellabinna region may be due to predation by foxes and/or cats, as the area has not been subjected to livestock grazing[2].	**Yes.** • Linear clearance of vegetation increases the ability of cats and foxes to access habitat from nearby areas. • Areas cleared of vegetation provide more suitable foraging areas for predators, increasing hunting success and predation pressure on native fauna. • Disposal of food waste and rubbish on site by personnel may attract feral predators to the Project Area.	**6.1** **6.2** **6.3** **6.4**

[1] ***Slender-billed Thornbill (Western)*** (Natural Resources Adelaide and Mt Lofty Ranges)**.**

[2] ***Amytornis textilis myall (Western Grasswren (Gawler Ranges)) Conservation Advice*** (Threatened Species Scientific Committee, 2014)**.**

14 THREATENED RAPTORS

14.1 *Peregrine Falcon (Falco peregrinus)*

14.1.1 Conservation Status

The Peregrine Falcon (Figure 84) is listed as Rare under the NPW Act.

14.1.2 Ecology

Biology and description

The Peregrine Falcon is a powerfully built bird of prey with black hood, blue-black upperparts and creamy white chin, throat and underparts with fine barring from the breast to the tail. The long, tapered wings have a straight trailing edge in flight and tail is relatively short. The bird has a heavy yellow, black-tipped bill and yellow eye ring. Its legs and feet are also yellow (Department for Environment and Heritage, 2008f).

Birds are often observed flying high, with each pair occupying a large, permanent territory. The breeding season is August to December, with pairs nesting in the same location, often a cliff or rock ledge, for many years. Peregrine Falcons feed on birds, but also mammals such as rabbits (Department for Environment and Heritage, 2008f).

Habitat

Peregrine Falcons are found in most habitats in Australia. In South Australia, most records are from woodlands and habitats within the vicinity of gorges with rock faces and cliffs (Department for Environment and Heritage, 2008f).

14.1.3 Occurrence in the Project Area

Peregrine Falcons were recorded at two locations in the Northern Project Area by EBS Ecology in 2013 (Table 50 and Figure 4). Birds were observed perched on transmission line structures, which possibly serve as nest sites within the shrubland Vegetation Association in which they were recorded.

However, since this species can occur in almost any habitat where abundant prey occurs, it is likely that it is widely distributed throughout the north and south of the Project Area, including areas of cleared agricultural land.

Table 50. Location of EBS Ecology records of Peregrine Falcon in the Project Area. Location information from EBS Ecology 2014a. Vegetation Associations are as they appear in EBS Ecology 2019a.

Location	Number of individuals	Vegetation Association
53H 685109E 6319642N	1	*Geijera linearifolia +/- Senna artemisioides ssp. coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia* Shrubland.
53H 685447E 6319899N	2	*Geijera linearifolia +/- Senna artemisioides ssp. coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia* Shrubland.

Figure 84. A Peregrine Falcon perched on a transmission line structure in the Project Area. Photographed by EBS Ecology in 2012.

14.2 *Management of Threats to the Peregrine Falcon*

Peregrine Falcons are naturally rare and were threatened in the past by the widespread use of some pesticides that are now not in use (Department for Environment and Heritage, 2008f). Nevertheless, two potential threats to the Peregrine Falcon have been identified by the *Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia* (Wilson & Bignall, 2009) and *The Peregrine Falcon (Falco peregrinus)* (Department of Agriculture, Water and the Environment, 2020d). Both threats have the potential to be exacerbated by the Project, as discussed in Table 51.

Table 51. Threats to the Peregrine Falcon, including those exacerbated by the Project.

Threat	Discussion	Exacerbated by the Project	Management Actions
Site disturbance	• Peregrine Falcons are vulnerable to disturbance, particularly at nest sites where disturbance can cause birds to abandon eggs or chicks[2].	**Yes.** • Construction works and associated activities have the potential to disturb falcons utilising existing transmission line towers and structures in the Project Area. • Increased vehicle traffic on access tracks and transmission line easement increases the risk of impacts from vehicle strikes.	**3.2** **3.3** **3.4** **3.5** **3.6** **3.7** **3.8**
Pollution and poisoning	• Historically, the greatest threat to the Peregrine Falcon has been secondary poisoning from pesticides, specifically DDT[2]. • Accidental and secondary poisoning from baits left during for foxes/dogs/dingoes can occur[2].	**Yes.** • Incorrect disposal or chemical spills on site may cause pollution. • Any predator control programme implemented risks non-target kills and secondary poisoning of native fauna.	**9.1** **9.2** **9.3** **9.4** **9.5**

[2]***The Peregrine Falcon (Falco peregrinus)*** (Department of Agriculture, Water and the Environment, 2020d).

15 CONSTRUCTION MANAGEMENT MEASURES

ElectraNet and its contractors will endeavour to avoid impact to threatened species during construction of the Project by undertaking the following:

- Project design – micro siting of infrastructure, access roads and other activities requiring vegetation clearing will occur to avoid known occurrences of threatened species and communities.
- The Project Area generally follows existing electricity infrastructure easements, using existing access roads and in-easement tracks.

Where impacts cannot be avoided, ElectraNet and its contractors will implement Management Actions that address threats and threatening processes discussed in this TSMP. By implementing these actions, unavoidable impact will be minimised. Management Actions are listed in Table 52.

While the majority of Management Actions are required wherever native vegetation occurs in the Project Area, some actions are specific to the Southern or Northern Project Areas, as indicated in the table.

Table 52. Management Actions for the minimisation of impacts to threatened species and communities as a result of the Project.

Threat	Management Action	Location	Timing	Responsibility
1. Weed Invasion and disease	1.1 Construction contractor to have a Weed, Pest and Disease Management Plan (including Phytophthora) approved by ElectraNet. The plan will be developed based on baseline winter and summer weed surveys undertaken prior to construction.	Project Area	Planning Construction	Principal Contractor
	1.2 Limit entry/exit points to the Project Area to the minimum number possible.	Project Area	Planning Construction	Principal Contractor
	1.3 Undertake weed surveys of all proposed disturbance areas prior to commencement of construction works.	Project Area	Planning	Principal Contractor
	1.4 Relocate entry/exit points and stockpile/laydown areas that have a high risk for the spread of weeds . If not possible, take corrective action (e.g. weed control).	Project Area	Planning	Principal Contractor
	1.5 Designate/establish vehicle and machinery washdown and inspection sites.	Project Area	Planning	Principal Contractor
	1.6 All fill materials required for construction (e.g. sand, soil, gravel) will be sourced from certified weed and phytophthora free sites.	Project Area	Construction	Principal Contractor
	1.7 Restrict all vehicle and machinery traffic to designated (existing and new) roads and access tracks that are approved by landowners.	Project Area	Construction	Principal Contractor
	1.8 All vehicles and machinery accessing the Project Area will be washed down and inspected by a trained responsible officer in accordance with the Weed Management Plan. This will occur at the designated washdown/inspection sites. Heavy vehicles/machinery must be certified weed and soil free by the responsible officer prior to entering the Project Area.	Project Area	Construction	Principal Contractor
	1.9 Location of entry and exit points, laydown areas and vehicle and machinery washdown and inspection procedures will form part of toolbox meetings for site crews.	Project Area	Planning Construction	Principal Contractor
	1.10 The Project Area and construction sites will be regularly surveyed for weed outbreaks. Outbreaks and recommended corrective action will be communicated to ElectraNet.	Project Area	Construction	Principal Contractor
	1.11 New weed outbreaks will be controlled in accordance with the Weed, Pest and Disease Management Plan. Any weed control will be undertaken only after consent from landowners.	Project Area	Construction	Principal Contractor
2. Inappropriate fire regimes	2.1 Construction contractor to have a Bushfire Management Plan approved by ElectraNet.	Project Area	Planning	Principal Contractor

Threat	Management Action	Location	Timing	Responsibility
	2.2 All vehicles accessing Project Area will be fitted with fire extinguishers or other suitable firefighting equipment such as water carts that are inspected regularly.	Project Area	Construction	Principal Contractor
	2.3 Hot works will only occur on days of total fire ban under appropriate permit, in compliance with the documented plan and regulations. Restrictions will be in place on catastrophic rating days.	Project Area	Construction	Principal Contractor
	2.4 Contractors' work safety documentation will include emergency response procedures for the event of fire.	Project Area	Construction	Principal Contractor
	2.5 Personnel will be informed of daily CFS Fire Danger Rating at daily toolbox meetings. The Fire Danger Rating will form part of the daily risk analysis at these meetings.	Project Area	Construction	Principal Contractor
	2.6 At all times during the declared Bushfire Danger Season, or on days of Total Fire Ban outside the declared season, light vehicles will carry fire-fighting backpacks for each personnel in vehicle. From spring to autumn, all light vehicles will carry one fire fighting backpack and shovel as a minimum regardless of the fire danger rating.	Project Area	Construction	Principal Contractor
	2.7 Any incidents of unplanned ignition will be immediately (or as soon as practicable) reported to the CFS and ElectraNet.	Project Area	Construction	Principal Contractor
	2.8 Procedures relating to fire management in the Project Area, including contact details of relevant authorities (e.g. CFS) and information sources, will be clearly communicated to all personnel during inductions.	Project Area	Construction	Principal Contractor
3. Site disturbance	3.1 Construction contractor to have a Sedimentation, Erosion and Drainage Management Plan approved by ElectraNet.	Project Area	Planning Construction	Principal Contractor
	3.2 Threatened EPBC listed plant individuals or populations in proximity to vegetation being cleared will be fenced using temporary flagging or otherwise clearly marked.	Project Area	Planning Construction	Principal Contractor
	3.3 Construction activities will occur during daylight hours wherever possible so as not to disturb nocturnal wildlife or roosting raptors.	Project Area	Construction	Principal Contractor
	3.4 Where access to structures is required on the existing transmission line where raptor nests are located, nest locations will be mapped and temporary flagging and signage installed.	Project Area	Planning	Principal Contractor

Threat	Management Action	Location	Timing	Responsibility
	3.5 No vegetation clearing or construction activity shall be undertaken until Management Actions 3.1 and 3.2 are certified as complete by ElectraNet (or Principal Contractor).	Project Area	Planning	Principal Contractor
	3.6 Where access points and tracks intersect public roads, they will be fenced with access restricted by locked gates where possible and only with landholder agreement.	Project Area	Construction	Principal Contractor
	3.7 The following speed limits will be imposed on all access roads and within the transmission line easement: - On farm roads 60 kph - On pasture 30 kph; and - Near houses, sheds and water points 20 kph.	Project Area	Construction	Principal Contractor
	3.8 Maintain log of incidents involving fauna injury/death resulting from construction activities.	Project Area	Construction	Principal Contractor
	3.9 Designated Construction Activity Zones will be planned and approved by ElectraNet via a Land Disturbance Permit. All works will be confined to those approved activity zones.	Project Area	Construction	ElectraNet/Principal Contractor
4. Vegetation clearing / habitat loss / fragmentation / infrastructure development / loss of hollow-bearing trees	4.1 Construction contractor to have a Biodiversity Management Plan, that includes clearing procedures, approved by ElectraNet. This will include the use of geospatial data and mapping for identification of protected areas and establishment of No-Go zones and recommendations for clearing of different vegetation types.	Project Area	Planning	Principal Contractor
	4.2 Construction contractor to have a Rehabilitation Management Plan approved by ElectraNet including rehabilitation targets and recommendations for different vegetation types	Project Area	Planning Construction	Principal Contractor
	4.3 Vegetation clearing will be restricted to the smallest area possible to allow construction, as documented in Eyre Peninsula Transmission Line – EPBC Assessment (EBS Ecology, 2019b).	Project Area	Planning Construction	Principal Contractor
	4.4 Areas of vegetation within the Construction Activity Zone to be retained will be clearly delineated using fencing, flagging, roping off and/or signage.	Project Area	Planning Construction	Principal Contractor
	4.5 Where vegetation being cleared adjoins *Eucalyptus petiolaris* woodland EEC, the EEC will be clearly delineated using fencing, flagging, roping off and/or signage.	Southern Project Area	Planning	Principal Contractor
	4.6 Areas of vegetation likely to have hollow-bearing trees being removed will be surveyed for hollow- bearing trees prior to clearing. Hollow-bearing trees will be mapped and clearly	Southern Project Area	Planning	Principal Contractor

Threat	Management Action	Location	Timing	Responsibility
	marked in the field. Where the removal of a hollow-bearing tree is required, the hollows will be retained on site to provide fauna habitat. Bush rocks and tree barrels will also be retained where they are identified as providing valuable habitat.			
	4.7 An ecologist or suitably qualified person in the identification and handling of fauna will be present during the removal of any hollow-bearing trees to remove/relocate any fauna displaced as a result.	Southern Project Area	Construction	Principal Contractor
	4.8 4.8 No vegetation clearing shall be undertaken on a property until Management Action 4.2, 4.3, 4.4, and 4.5 is certified as complete by ElectraNet (or Principal contractor). Vegetation clearance will be managed through a Land Disturbance Permit (LDP) issued by ElectraNet to the Principal Contractor.	Project Area	Planning	Principal Contractor
	4.9 All vehicle and machinery parking, laydown areas and stockpiles will be restricted to designated construction activity zones (CAZ). No clearing, parking, laydown, stockpiles or other disturbance of native vegetation outside of CAZ	Project Area	Planning Construction	Principal Contractor
	4.10 Unless clearance is required for access, stability or safety reasons, ground vegetation will be rolled rather than cleared to minimise disturbance to topsoil, seedstock and rootstock.	Project Area	Construction	Principal Contractor
	4.11 All areas not required for ongoing operational access will be rehabilitated. Progressive rehabilitation will be implemented where it does not impede the progress or safety of construction.	Project Area	Construction	Principal Contractor
	4.12 Residual impact of vegetation clearing will be offset by ElectraNet's SEB contribution and other offsetting as approved under the EPBC Act.	Project Area	Operation	ElectraNet
	4.13 All personnel will be inducted as to the locations of sensitive vegetation and threatened flora species.	Project Area	Construction	Principal Contractor
	4.14 Where earthworks are required, topsoil and vegetation cleared will be stockpiled on site and respread over areas to be rehabilitated on completion of construction.	Project Area	Construction	Principal Contractor
	4.15 An ecologist or suitably qualified person in the identification and handling of fauna will be present on site to inspect native vegetation for fauna including active nests prior to clearance and arrange for relocation where impacts cannot be avoided.	Project Area	Construction	Principal Contractor
	4.16 Malleefowl mounds will be managed in accordance with the Malleefowl Management Plan (see separate plan) including	Project Area	Construction	Principal Contractor/ElectraNet

Threat	Management Action	Location	Timing	Responsibility
	delineation, avoidance of impacts in protection buffers, fauna inspections and rehabilitation of habitat within 50m of a mound.			
5. Spray drift	5.1 Any weed control will be undertaken in accordance with the Weed Control Handbook for Declared Plants in South Australia (Invasive Species Unit, Biosecurity SA, 2018) and the Weed, Pest and Disease Management Plan	Project Area	Construction	Principal Contractor
	5.2 Herbicides and chemicals will only be stored and used in accordance with the manufacturers' directions and with the consent of the relevant landowners.	Project Area	Construction	Principal Contractor
	5.3 Populations of threatened plants will be identified as per Management Actions 3.2 and 4.1.	Project Area	Planning	Principal Contractor
6. Predation by foxes and cats	6.1 All contractors to have a Weed, Pest and Disease Management Plan approved by ElectraNet.	Project Area	Planning Construction	Principal Contractor
	6.2 Construction contractor to have a Waste Management Plan approved by ElectraNet.	Project Area	Planning Construction	Principal Contractor
	6.3 All waste, including food wrappers and food scraps, will be removed and disposed of within a licensed waste disposal facility and in accordance with a Waste Management Plan.	Project Area	Construction	Principal Contractor
	6.4 ElectraNet will investigate undertaking a predator baiting and monitoring programme as part of their offset as approved under the EPBC Act.	Project Area	Operation	Principal Contractor
7. Illegal harvest and collection	7.1 Signage will be installed at entry/exit points that intersect public roads to minimise trespass. Where required by the landholder, entry/exit points will be fenced and gated.	Northern Project Area	Construction	Principal Contractor
	7.2 Gates will be left as they are found (i.e. don't close and lock a gate that was found open on arrival).	Northern Project Area	Construction	Principal Contractor
	7.3 Access will be further restricted under direction from landowners if required.	Northern Project Area	Construction	Principal Contractor
	7.4 Access tracks that are not required during the operational phase of the Project will be ripped and rehabilitated, unless otherwise directed by a landowner.	Northern Project Area	Construction	Principal Contractor
8. Lack of pollination and loss of genetic diversity	8.1 Manage vegetation clearing associated with the Project according to Management Actions 4.1 to 4.13.	Project Area	Planning Construction	Principal Contractor

Threat	Management Action	Location	Timing	Responsibility
9. Pollution and poisoning	9.1 All construction contractors to have a Waste Management Plan approved by ElectraNet.	Project Area	Planning Construction	Principal Contractor
	9.2 Refuelling of machinery and vehicles will occur in a designated area only. Spill kits will be installed at these locations.	Project Area	Construction	Principal Contractor
	9.3 Any chemicals used during construction or for vegetation management will be disposed of off-site and in accordance with the product directions.	Project Area	Construction	Principal Contractor
	9.4 Any incident of fuel or chemical spill will be managed in accordance with the Principal Contractor's Construction Environmental Management Plan.	Project Area	Construction	Principal Contractor
	9.5 Any predator control programme will be designed to include monitoring for non-target kills and secondary poisoning, following an adaptive management approach.	Project Area	Planning Construction	Principal Contractor

16 MONITORING AND ADAPTIVE MANAGEMENT

Throughout the construction phase of the Project it is possible that, despite the best efforts to consider all threats and impacts to threatened species, unforeseen impacts could occur. For this reason, ElectraNet and its contractors will take an adaptive management approach through continual monitoring and improvement, as documented in the CEMP and its sub-plans.

Monitoring undertaken for these components and any subsequent adaptive management will support the management of threatened species and their habitats, as specified in ElectraNet's offset strategy approved under the EPBC Act.

Specific Monitoring Measures have been developed to monitor success of the Management Actions and are listed by threat/impact as shown in Table 53.

Table 53. Threats and impacts caused by the Proposal and references for monitoring measures.

Threat	Monitoring Measure Reference
Weed invasion and disease	Table 54
Inappropriate fire regimes	Table 55
Site disturbance	Table 56
Vegetation clearing / habitat loss / fragmentation / infrastructure development / loss of hollow-bearing trees	Table 57
Spray drift	Table 58
Predation by foxes and cats	Table 59
Illegal harvest and collection	Table 60
Lack of pollination and loss of genetic diversity	Table 61
Pollution and poisoning	Table 62

Table 54. Adaptive management approach to impacts associated with weed invasion and disease.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
1.1	ElectraNet approved Weed, Pest and Disease Management Plan (including Phytophthora).	Complete Weed, Pest and Disease Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
1.2	Entry/exit points approved by ElectraNet, mapped and documented in relevant material.	Where additional entry/exit points are deemed necessary, undertake Management Actions 1.3, 1.4 and 1.9.	Planning	Principal Contractor
	Undertake periodic review of entry/exit point requirements.		Construction	Principal Contractor
	Toolbox meetings for site crews to include overview of site access and daily toolbox meetings to include location of entry/exit points and stockpile/laydown areas.	Toolbox meetings completed to ElectraNet's standards.	Planning Construction	Principal Contractor
1.3	Weed survey report and risk assessment of proposed entry/exit points and stockpile/laydown areas.	Locate entry/exit points and stockpile/laydown areas in accordance with weed risk assessment.	Planning	Principal Contractor
1.4	Undertake periodic weed monitoring of all proposed disturbance areas.	Where new outbreaks of weeds are detected, undertake Management Actions 1.10.	Construction	Principal Contractor
1.5	Vehicle and machinery washdown and inspection sites documented in Weed Management Plan.	Complete Weed Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
1.6	Certification documentation from supplier.	Discontinue use of supplier if documents can't be supplied	Construction	Principal Contractor
1.7	Network of approved access tracks mapped and maintained by ElectraNet	Complete required maps.	Planning Construction	Principal Contractor
	Undertake periodic review of access track requirements, including landowner consultations.	Communicate any changes in access agreements/arrangements to all contractors and update relevant documentation.	Construction	Principal Contractor
	Toolbox meetings for site crews to include location of approved access tracks.	Toolbox meetings completed to ElectraNet's standards.	Planning Construction	Principal Contractor
1.8	Inspection log of vehicles accessing the Project Area is maintained.	Vehicles/machinery that fails inspection will not be allowed to access the Project Area	Construction	Principal Contractor

1.9	Records of toolbox meetings and attendees maintained.	Undertake additional meetings where required.	Planning Construction	Principal Contractor
1.10	Periodic weed survey reports submitted to ElectraNet.	Where new weed outbreaks are detected, undertake Management Actions 1.3, 1.4 and 1.9.	Construction	Principal Contractor
1.11	Weed, Pest and Disease Management Plan approved by landowners. Periodic monitoring of weed control sites to determine success.	Modify Weed, Pest and Disease Management Plan to accommodate landowner recommendations. Undertake follow-up weed control if required.	Planning Construction	Principal Contractor

Table 55. Adaptive management approach to impacts associated with inappropriate fire regimes.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
2.1	ElectraNet approved Bushfire Management Plan	Complete Bushfire Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
2.2	All vehicles accessing the Project Area will be inspected for the presence of a fire extinguisher. Fire extinguishers must be full, in good working order and accompanied by a fire shovel or rake.	Vehicles that fail inspection will not be allowed to access the Project Area.	Construction	Principal Contractor
2.3	ElectraNet approved Bushfire Management Plan	Complete Bushfire Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
2.4	Construction contractors' emergency response procedures approved by ElectraNet.	Emergency response procedure approved by ElectraNet prior to commencement of construction.	Planning	Principal Contractor
2.5	Log of daily fire danger ratings maintained by construction contractor and reviewed by ElectraNet.	Enforce compliance if required.	Construction	Principal Contractor
2.6	PPE and facilities available in accordance with the Bushfire Management Plan.	Complete Bushfire Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
2.7	Log of incidents maintained by construction contractor and ElectraNet.	Should an incident occur, Fire Management Actions will be immediately reviewed and modified as required.	Construction.	Principal Contractor
2.8	ElectraNet to approve contractors' induction procedure and documents.	Ensure induction process includes fire management procedures.	Planning Construction	Principal Contractor

Table 56. Adaptive management approach to impacts associated with site disturbance.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
3.1	Approved Sedimentation, Erosion and Drainage Management Plan.	Complete Sedimentation, Erosion and Drainage Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
3.2	Audit of flagged/marked threatened plant populations.	Undertake any recommendations made by environmental contractor.	Planning	Principal Contractor
3.3	ElectraNet to approve contractors' Vegetation Management Plan and clearing procedures.	Vegetation Management Plan and clearing procedures specify that clearing will occur only during daylight hours.	Planning Construction	Principal Contractor
3.4	Audit of mapped raptor nests and buffer areas.	Undertake any recommendations made by environmental contractor.	Planning	Principal Contractor
3.5	Management Actions 3.1 and 3.2 completed.	Complete Management Actions 3.1 and 3.2, including any recommendations made following audit.	Planning	Principal Contractor
3.6	Installation of gates and locks confirmed by ElectraNet audit of access points.	Undertake any recommendations made by auditor.	Planning Construction	Principal Contractor
3.7	Contractors' induction process includes speed restrictions.	Contractors' induction programme completed to ElectraNet's standards.	Planning	Principal Contractor
3.8	ElectraNet to undertake periodic review of fauna incident log.	Where incidents have occurred, seek advice from suitable qualified contractor and implement any additional management actions recommended.	Construction	Principal Contractor
3.9	Land Disturbance Permit obtained.	Obtain Land Disturbance Permit	Construction	ElectraNet/Principal Contractor

Table 57. Adaptive management approach to impacts associated with vegetation clearing, habitat loss, fragmentation, infrastructure development and the loss of hollow-bearing trees.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
4.1	Approved Biodiversity Management Plan.	Complete Biodiversity Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
4.2	Approved Rehabilitation Management Plan.	Complete Rehabilitation Management Plan that conforms to ElectraNet's standards.	Planning	Principal Contractor
4.3	Environmental contractor to undertake periodic inspection of vegetation clearing.	Where over-clearing is detected, report to ElectraNet and recommend corrective management action.	Construction	Principal Contractor

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
4.4	Audit of flagged/marked vegetation.	Undertake any recommendations made by environmental contractor.	Planning	Principal Contractor
4.5	Audit of flagged/marked EEC.	Undertake any recommendations made by environmental contractor.	Planning	Principal Contractor
4.6	Audit of marked hollow-bearing trees.	Undertake any recommendations made by environmental contractor.	Planning	Principal Contractor
4.7	Hollow-bearing tree reports completed by environmental contractor and submitted to ElectraNet.	ElectraNet to enforce compliance if required.	Construction	Principal Contractor
4.8	Audit by ElectraNet of Management Actions 4.1 – 4.5 indicates they're complete.	Complete Management Actions as required.	Planning	Principal Contractor
4.9	Locations of parking, laydown and stockpile sites approved by ElectraNet.	Re-locate sites if required.	Planning	Principal Contractor
4.10 4.11	Biodiversity Management Plan approved by ElectraNet.	Edit Biodiversity Management Plan as directed by ElectraNet. ElectraNet to enforce compliance with Biodiversity Management Plan where required.	Planning Constrcution	Principal Contractor
4.12	Impact offsets approved by ElectraNet and State and Commonwealth regulators.	Undertake recommendations made by regulators.	Planning	ElectraNet
4.13	Induction documentation and procedures approved by ElectraNet. Log of personnel inductions maintained by contractor and periodically reviewed by ElectraNet.	Complete induction documents and procedures to standard required by ElectraNet. Enforce compliance with inducted personnel log if required.	Planning	Principal Contractor
4.14	Biodiversity Management Plan approved by ElectraNet.	Edit Biodiversity Management Plan as directed by ElectraNet. ElectraNet to enforce compliance with Biodiversity Management Plan where required.	Planning Construction	Principal Contractor
4.15	Ecologist's report or similar record of inspection complete.	Undertake pre-clearing surveys	Construction	Principal Contractor
4.16	Malleefowl Management Plan complete.	Complete Malleefowl Management Plan.	Planning	Principal Contractor/ElectraNet

Table 58. Adaptive management approach to impacts associated with spray drift.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
5.1	Weed, Pest and Disease Management Plan approved by ElectraNet.	Complete Weed, Pest and Disease Management Plan that conforms to ElectraNet's standards. ElectraNet to enforce compliance with Weed Management Plan where required.	Planning Construction	Principal Contractor
5.2				
5.3	Audit completion of Management Actions 3.2 and 4.1.	Complete Management Actions.	Planning	Principal Contractor

Table 59. Adaptive management approach to impacts associated with predation by foxes and cats.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
6.1	Approved Weed, Pest and Disease Management Plan.	Complete Weed, Pest and Disease Management Plan that conforms to ElectraNet's standards.	Planning Construction	Principal Contractor
6.2	Approved Waste Management Plan.	Complete Waste Management Plan that conforms to ElectraNet's standards. ElectraNet to enforce compliance with Waste Management Plan where required.	Planning	Principal Contractor
6.3				
6.4	As directed by approved ElectraNet offset strategy			

Table 60. Adaptive management approach to impacts associated with illegal harvest and collection.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
7.1	Installation of gates and locks confirmed by ElectraNet audit of access points.	Undertake any recommendations made by auditor.	Planning Construction	Principal Contractor
7.2				
7.3	Signed landowner access agreements.	Negotiate access agreements with landowners.	Planning Construction	Principal Contractor
7.4	Biodiversity Management Plan approved by ElectraNet.	Edit Biodiversity Management Plan as directed by ElectraNet.	Planning Construction	Principal Contractor

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
		ElectraNet to enforce compliance with Biodiversity Management Plan where required.		

Table 61. Adaptive management approach to impacts associated with lack of pollination and loss of genetic diversity.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
8.1	Biodiversity Management Plan approved by ElectraNet.	Edit Biodiversity Management Plan as directed by ElectraNet. ElectraNet to enforce compliance with Biodiversity Management Plan where required.	Planning Construction	**Principal Contractor**

Table 62. Adaptive management approach to impacts associated with pollution and poisoning.

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
9.1	Waste Management Plan approved by ElectraNet.	Edit Waste Management Plan as directed by ElectraNet. ElectraNet to enforce compliance with Waste Management Plan where required.	Planning Construction	Principal Contractor
9.2	Audit location of refuelling locations and placement of spill kits.	Undertake any recommendations specified by audit.	Planning Construction	Principal Contractor
9.3	Waste Management Plan approved by ElectraNet.	Edit Waste Management Plan as directed by ElectraNet. ElectraNet to enforce compliance with Waste Management Plan where required.	Planning Construction	Principal Contractor
9.4	ElectraNet to review incident reports.	Clean-up spills as directed within Waste Management Plan. Undertake additional management actions as determined by review.	Construction	Principal Contractor
9.5	Monitoring survey of non-target kills from any predator baiting programme.	Implement management recommendations.	Predator control programme.	Principal Contractor

Management Action	Monitoring Measure	Corrective Action (where applicable)	Timing	Responsibility
	Report on results, including recommended actions for improvement, submitted to ElectraNet.			

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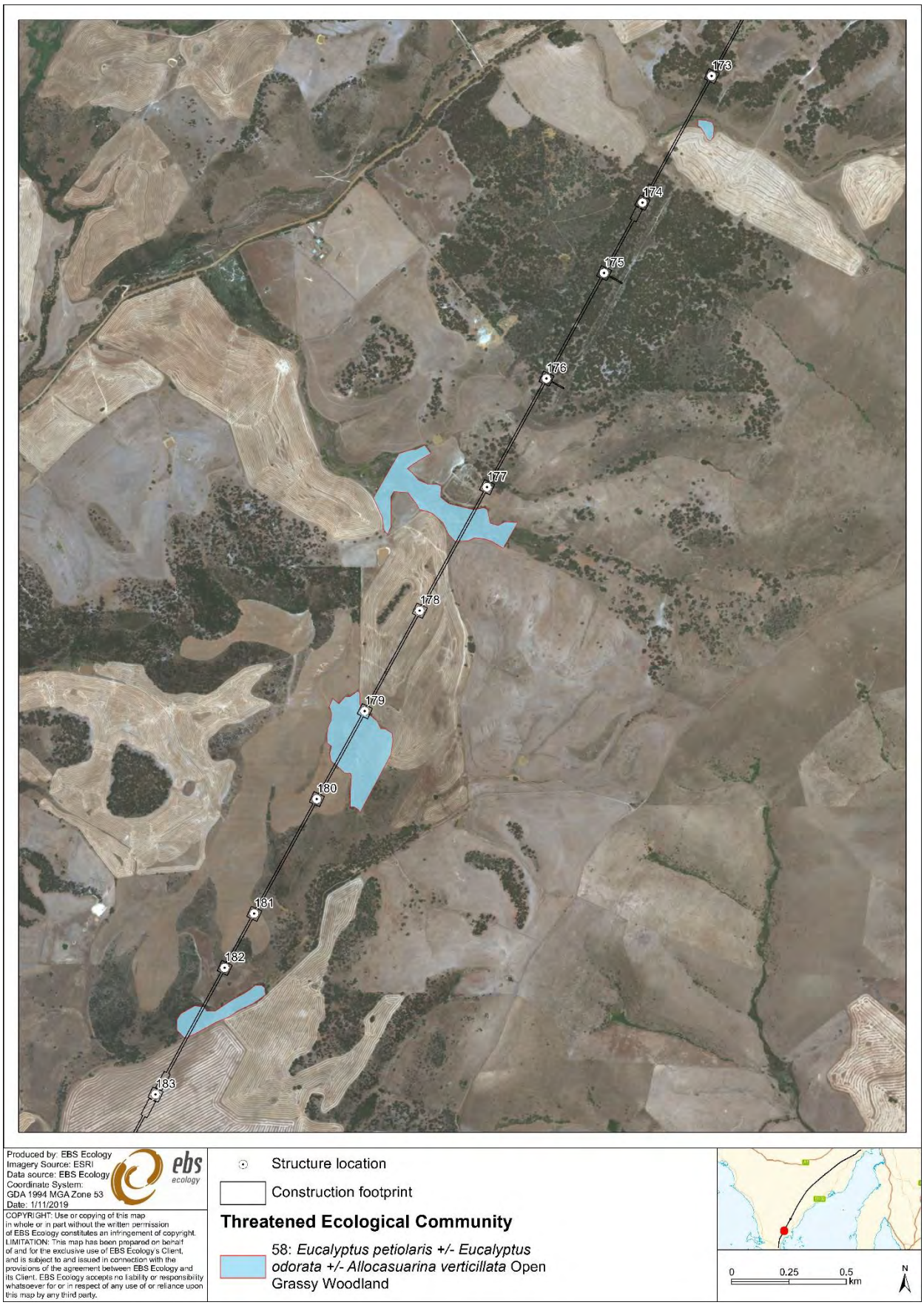
18APPENDICES

Appendix 1. Mapping of Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland EEC.


173
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183
Produced by: EBS Ecology
Imagery Source: ESRI
Data source: EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 53
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Structure location
Construction footprint
Threatened Ecological Community
58: Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata Open Grassy Woodland
0
0.25
0.5
km
N


160
161
162
163
164
165
166
167
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Structure location
Construction footprint
Threatened Ecological Community
58: Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata Open Grassy Woodland
0
0.25
0.5
km
N

Produced by: EBS Ecology
Imagery Source: ESRI
Data source: EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 53
Date: 1/11/2019

Structure location

Construction footprint

Threatened Ecological Community

58: *Eucalyptus petiolaris +/- Eucalyptus odorata +/- Allocasuarina verticillata* Open Grassy Woodland

0 0.25 0.5 km N

Appendix 2. The location of Santalum spicatum (Sandalwood) records within the Project Area collected by EBS Ecology in 2013 and 2019 surveys.

Species Name	Common Name	Easting	Northing
Santalum spicatum	Sandalwood	729954	6348436
Santalum spicatum	Sandalwood	727355	6345706
Santalum spicatum	Sandalwood	727420	6345684
Santalum spicatum	Sandalwood	727489	6345783
Santalum spicatum	Sandalwood	727525	6345812
Santalum spicatum	Sandalwood	727893	6346204
Santalum spicatum	Sandalwood	727938	6346224
Santalum spicatum	Sandalwood	727962	6346297
Santalum spicatum	Sandalwood	727905	6346292
Santalum spicatum	Sandalwood	727862	6346291
Santalum spicatum	Sandalwood	727871	6346306
Santalum spicatum	Sandalwood	727882	6346314
Santalum spicatum	Sandalwood	727877	6346330
Santalum spicatum	Sandalwood	728277	6346580
Santalum spicatum	Sandalwood	728273	6346610
Santalum spicatum	Sandalwood	728255	6346615
Santalum spicatum	Sandalwood	728259	6346646
Santalum spicatum	Sandalwood	728229	6346645
Santalum spicatum	Sandalwood	728216	6346648
Santalum spicatum	Sandalwood	728413	6346670
Santalum spicatum	Sandalwood	728410	6346681
Santalum spicatum	Sandalwood	728435	6346686
Santalum spicatum	Sandalwood	728417	6346715
Santalum spicatum	Sandalwood	728627	6346866
Santalum spicatum	Sandalwood	728636	6346844
Santalum spicatum	Sandalwood	728597	6346837
Santalum spicatum	Sandalwood	728059	6346474
Santalum spicatum	Sandalwood	727851	6346234
Santalum spicatum	Sandalwood	727823	6346212
Santalum spicatum	Sandalwood	735869	6352744
Santalum spicatum	Sandalwood	735930	6352791
Santalum spicatum	Sandalwood	728449	6347029
Santalum spicatum	Sandalwood	728216	6346637
Santalum spicatum	Sandalwood	728080	6346619
Santalum spicatum	Sandalwood	728086	6346525
Santalum spicatum	Sandalwood	728029	6346512
Santalum spicatum	Sandalwood	727970	6346495
Santalum spicatum	Sandalwood	727956	6346415
Santalum spicatum	Sandalwood	727948	6346400
Santalum spicatum	Sandalwood	727854	6346399
Santalum spicatum	Sandalwood	727849	6346372

Santalum spicatum	Sandalwood	728275	6346579
Santalum spicatum	Sandalwood	727963	6346301
Santalum spicatum	Sandalwood	728062	6346477
Santalum spicatum	Sandalwood	728086	6346525
Santalum spicatum	Sandalwood	728096	6346579
Santalum spicatum	Sandalwood	728258	6346645
Santalum spicatum	Sandalwood	728270	6346609
Santalum spicatum	Sandalwood	728256	6346613
Santalum spicatum	Sandalwood	702426	6332219
Santalum spicatum	Sandalwood	702421	6332204
Santalum spicatum	Sandalwood	702442	6332162
Santalum spicatum	Sandalwood	702440	6332157
Santalum spicatum	Sandalwood	704803	6333406
Santalum spicatum	Sandalwood	711553	6336987
Santalum spicatum	Sandalwood	711740	6337084
Santalum spicatum	Sandalwood	712157	6337361
Santalum spicatum	Sandalwood	712532	6337523

Appendix 3. Suitable habitat for the Sandhill Dunnart in the Project Area as mapped by EBS Ecology 2019c.


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F1882-F1883 Alignment Northern
Project corridor
Vegetation Association
17: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over Triodia scariosa / Triodia lanatus
24: Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx
26: Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona
0
1
2
km
N


126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
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146
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Produced by: EBS Ecology
Imagery Source: ESRI
Data source: EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 53
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F1882-F1883 Alignment Northern
Project corridor
Vegetation Association
17: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over Triodia scariosa / Triodia lanata
24: Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx
26: Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona
0
1
2
km
N


86
87
88
89
90
91
92
93
93a
94
95
96a
97
98
99
100
101
102
103
104
105
106
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107a
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Produced by: EBS Ecology
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Data source: EBS Ecology
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GDA 1994 MGA Zone 53
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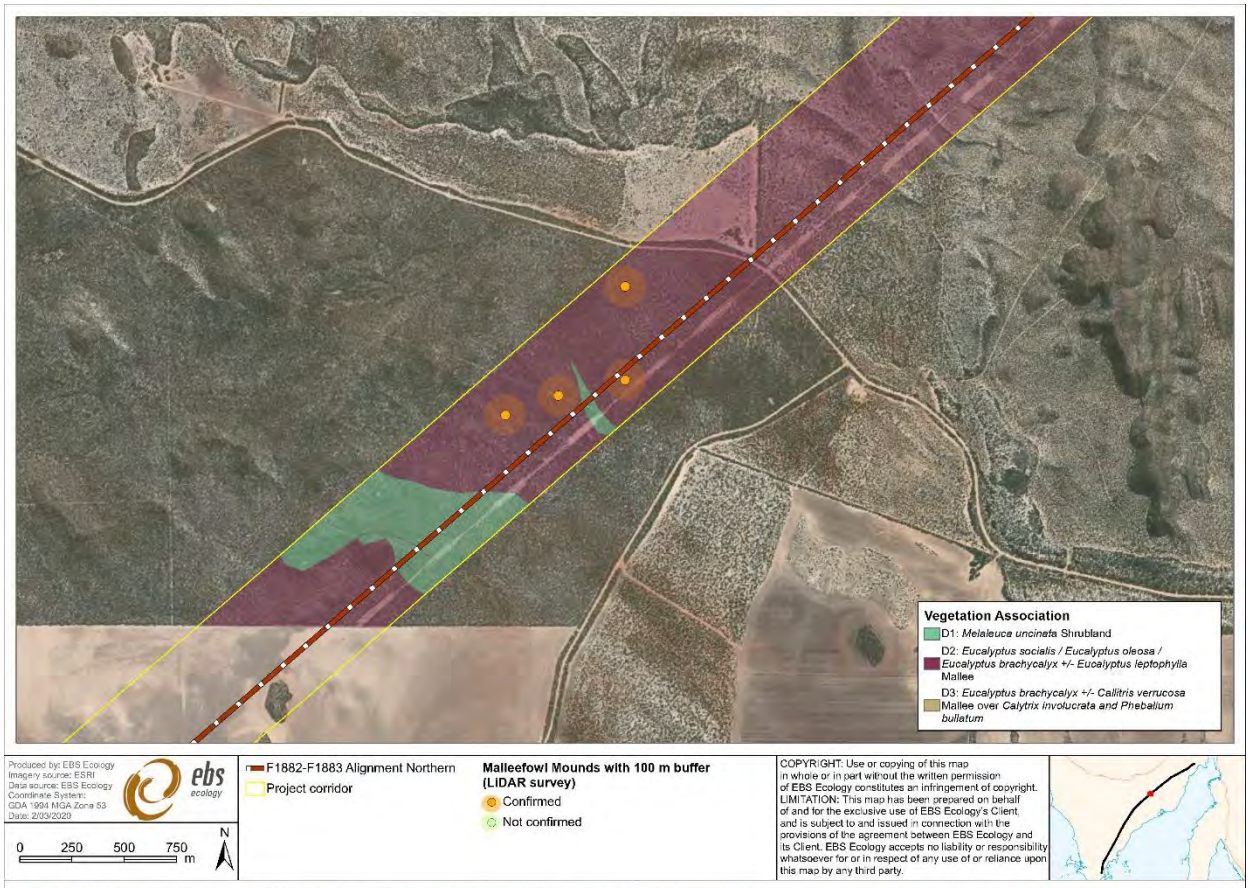
F1882-F1883 Alignment Northern
Project corridor
Vegetation Association
17: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over Triodia scariosa / Triodia lanatus
0
1
2
km
N

Appendix 4. Potential Malleefowl mounds identified by LiDAR and confirmed by on-ground survey (EBS Ecology, 2019d).


Vegetation Association
D1: Melaleuca uncinata Shrubland
D2: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee
D3: Eucalyptus brachycalyx +/- Callitris verrucosa Mallee over Calytrix involucrata and Phebalium bullatum
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
0 250 500 750 m
N
F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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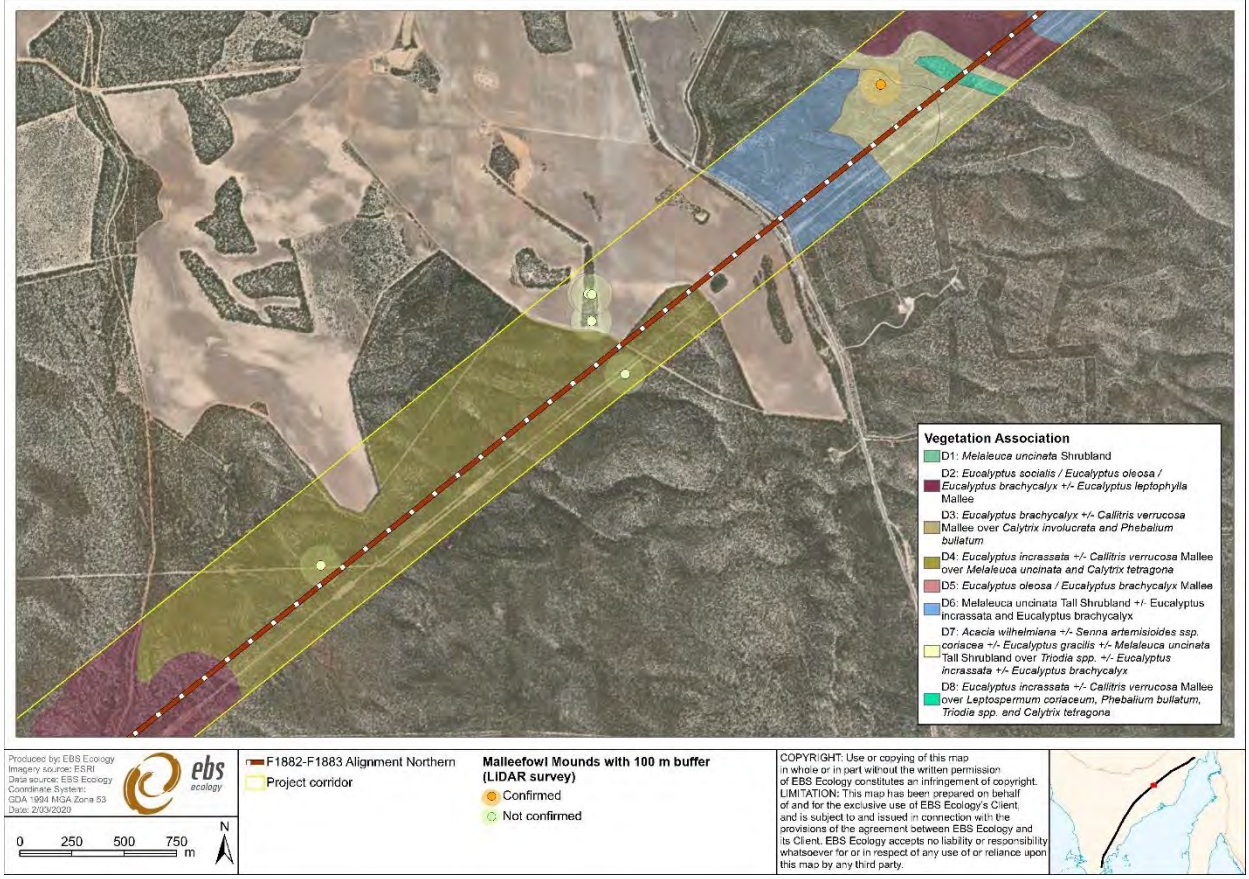
Vegetation Association
D1: Melaleuca uncinata Shrubland
D2: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee
D3: Eucalyptus brachycalyx +/- Callitris verrucosa Mallee over Calytrix involucrata and Phebalium bullatum
D4: Eucalyptus incrassata +/- Callitris verrucosa Mallee over Melaleuca uncinata and Calytrix tetragona
D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D6: Melaleuca uncinata Tall Shrubland +/- Eucalyptus incrassata and Eucalyptus brachycalyx
D7: Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx
D8: Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
0 250 500 750 m
N
F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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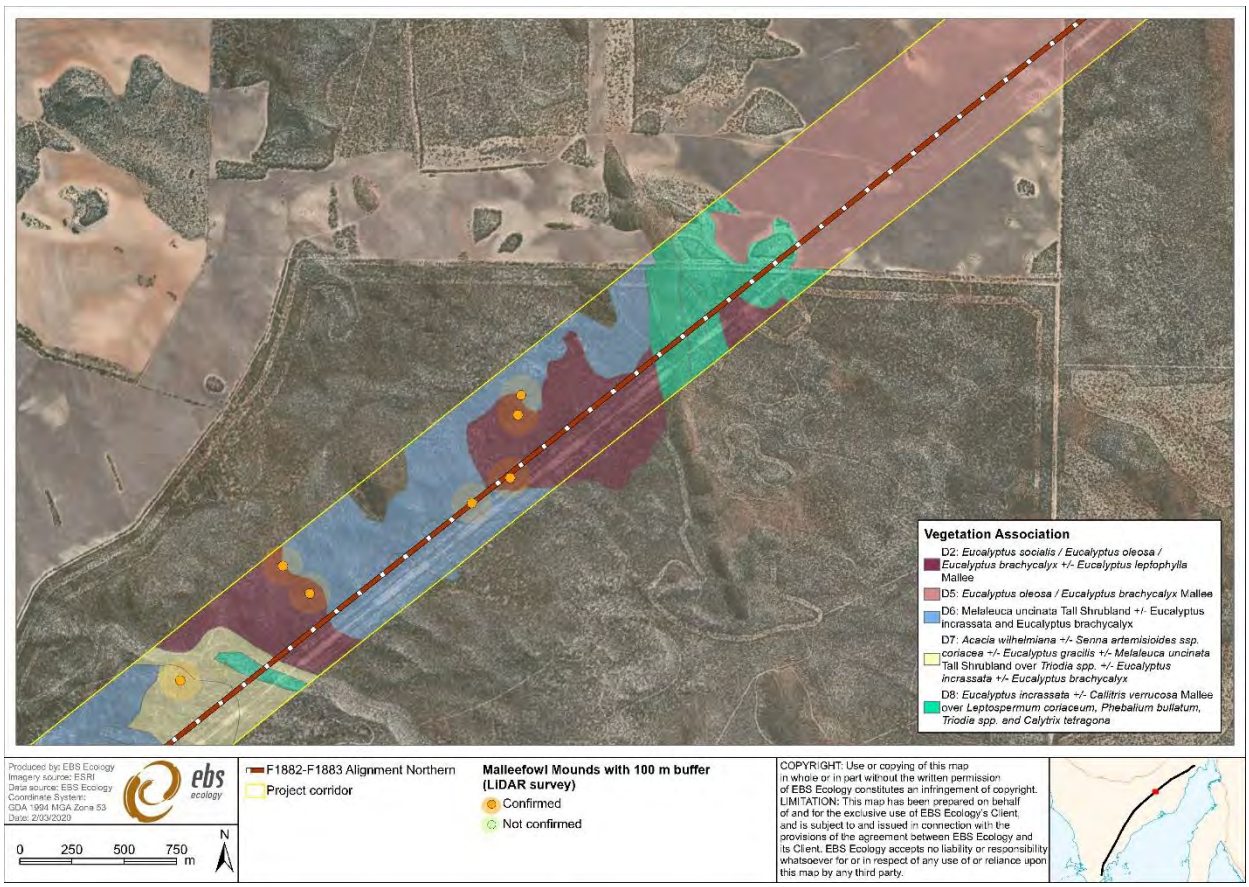
Vegetation Association
D2: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee
D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D6: Melaleuca uncinata Tall Shrubland +/- Eucalyptus incrassata and Eucalyptus brachycalyx
D7: Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx
D8: Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
0 250 500 750 m
N
F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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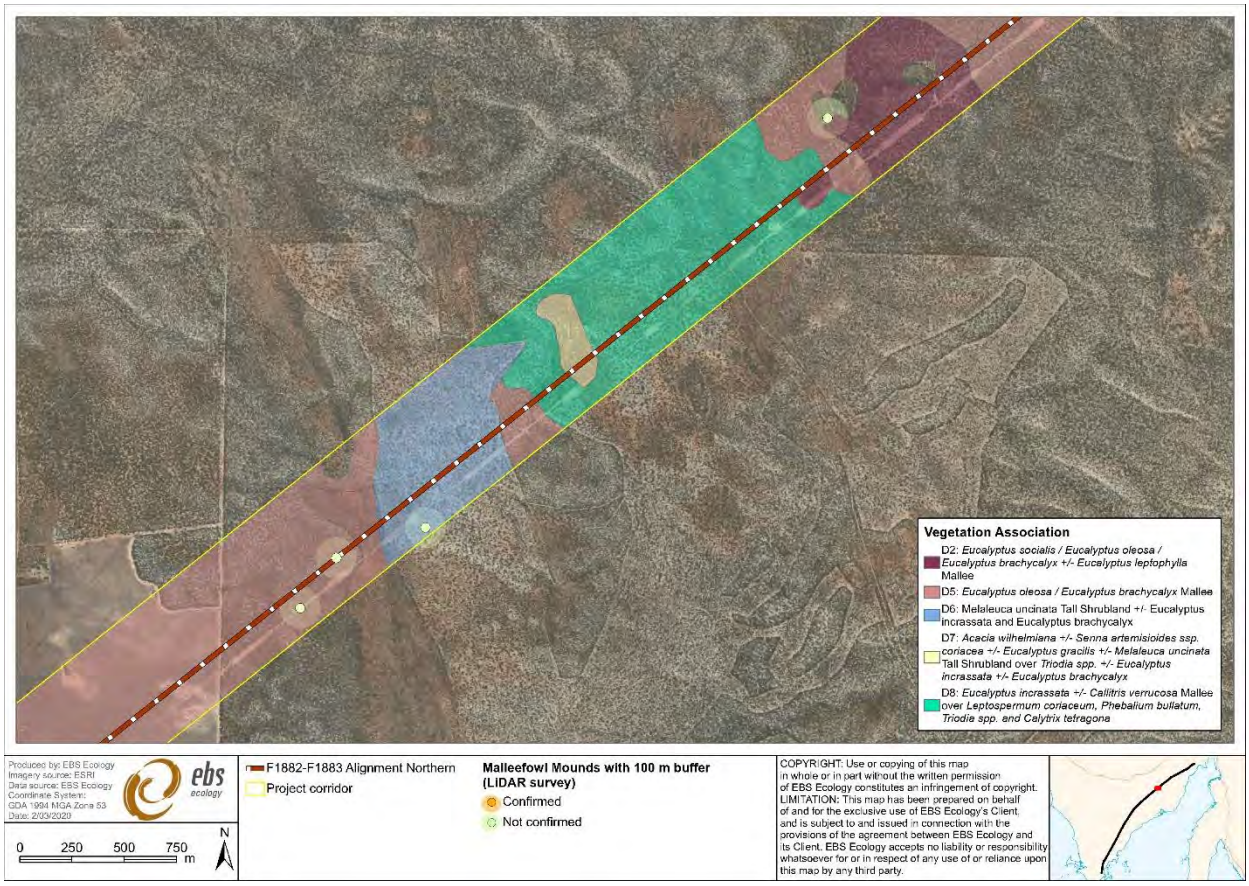
Vegetation Association
D2: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee
D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D6: Melaleuca uncinata Tall Shrubland +/- Eucalyptus incrassata and Eucalyptus brachycalyx
D7: Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx
D8: Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
0 250 500 750 m
N
F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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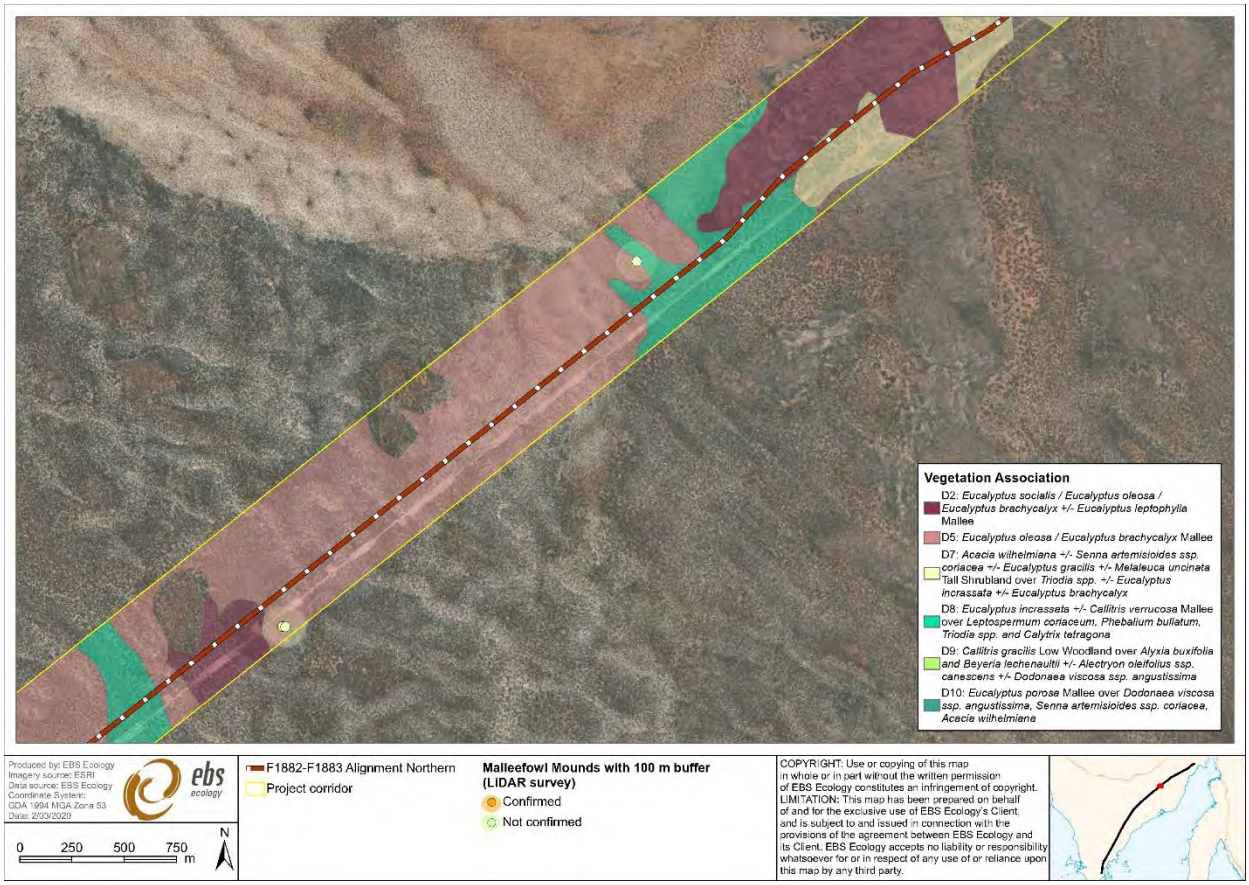
Vegetation Association
D2: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee
D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D7: Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx
D8: Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, Triodia spp. and Calytrix tetragona
D9: Callitris gracilis Low Woodland over Alyxia buxifolia and Beyeria lechenaultii +/- Alectryon oleifolius ssp. canescens +/- Dodonaea viscosa ssp. angustissima
D10: Eucalyptus porosa Mallee over Dodonaea viscosa ssp. angustissima, Senna artemisioides ssp. coriacea, Acacia wilhelmiana
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
0 250 500 750 m
N
F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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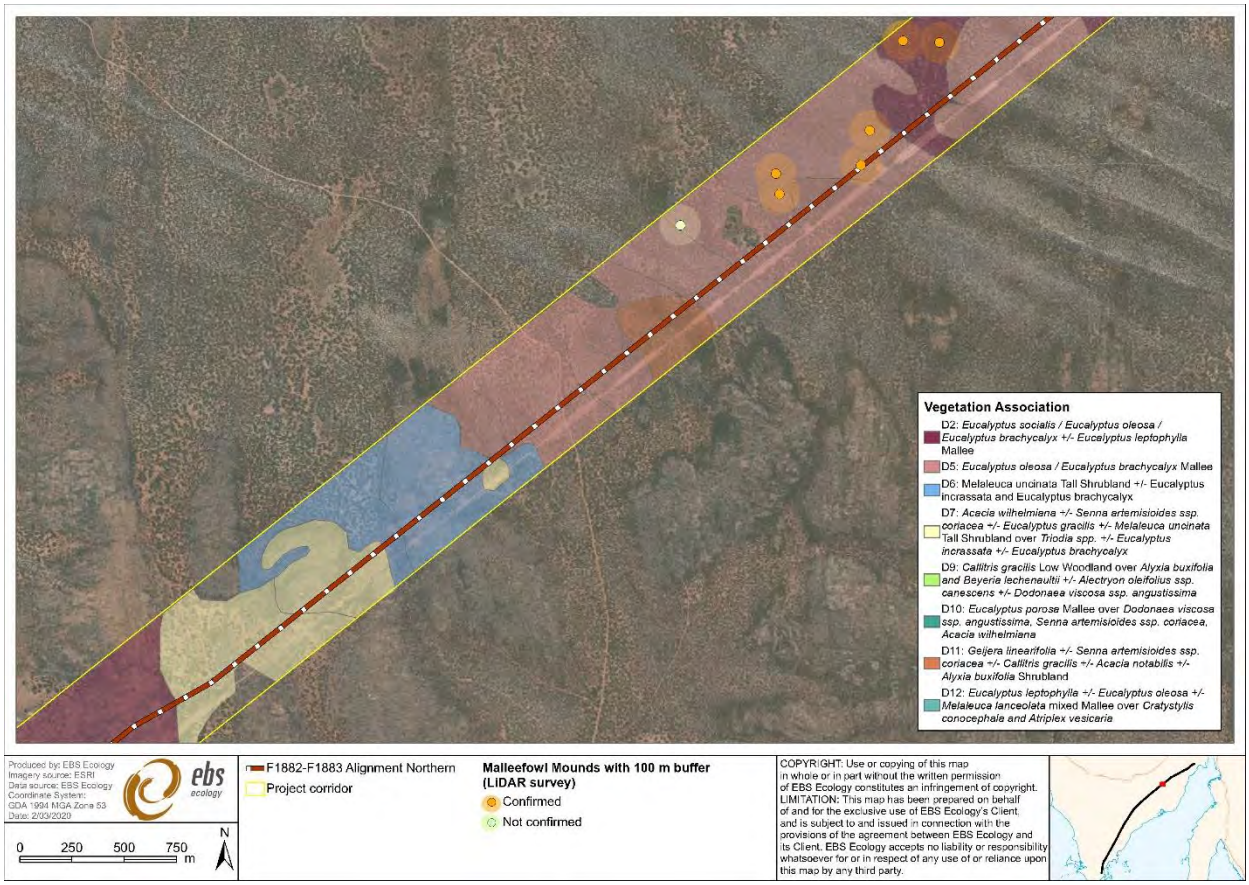
Vegetation Association
D2: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee
D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D6: Melaleuca uncinata Tall Shrubland +/- Eucalyptus incrassata and Eucalyptus brachycalyx
D7: Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over Triodia spp. +/- Eucalyptus incrassata +/- Eucalyptus brachycalyx
D9: Callitris gracilis Low Woodland over Alyxia buxifolia and Beyeria lechenaultii +/- Alectryon oleifolius ssp. canescens +/- Dodonaea viscosa ssp. angustissima
D10: Eucalyptus porosa Mallee over Dodonaea viscosa ssp. angustissima, Senna artemisioides ssp. coriacea, Acacia wilhelmiana
D11: Geijera linearifolia +/- Senna artemisioides ssp. coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia Shrubland
D12: Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata mixed Mallee over Cratystylis conocephala and Atriplex vesicaria
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
0 250 500 750 m
N
F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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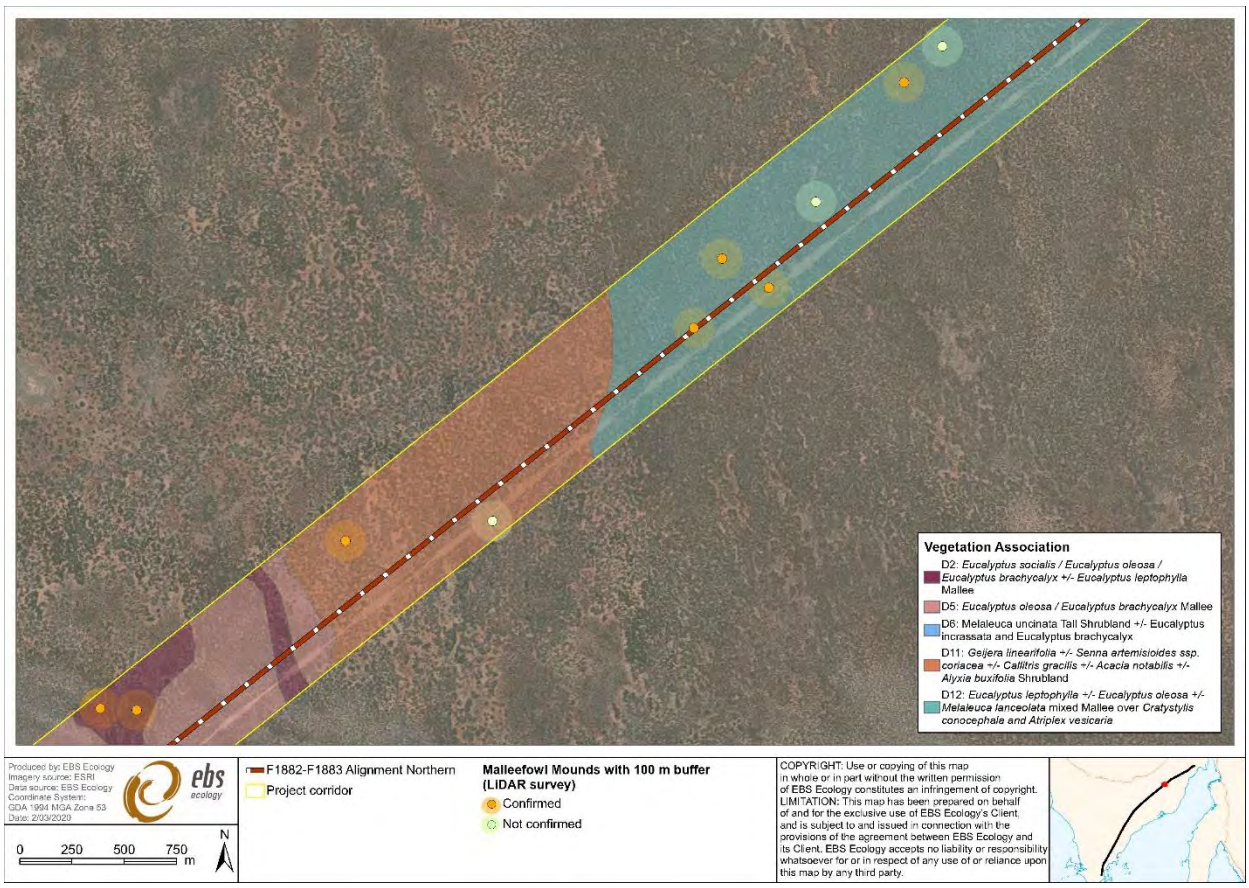
Vegetation Association
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D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D6: Melaleuca uncinata Tall Shrubland +/- Eucalyptus incrassata and Eucalyptus brachycalyx
D11: Geijera linearifolia +/- Senna artemisioides ssp. coriacea +/- Callitris gracilis +/- Acacia notabilis +/- Alyxia buxifolia Shrubland
D12: Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata mixed Mallee over Cratystylis conocephala and Atriplex vesicaria
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
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F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
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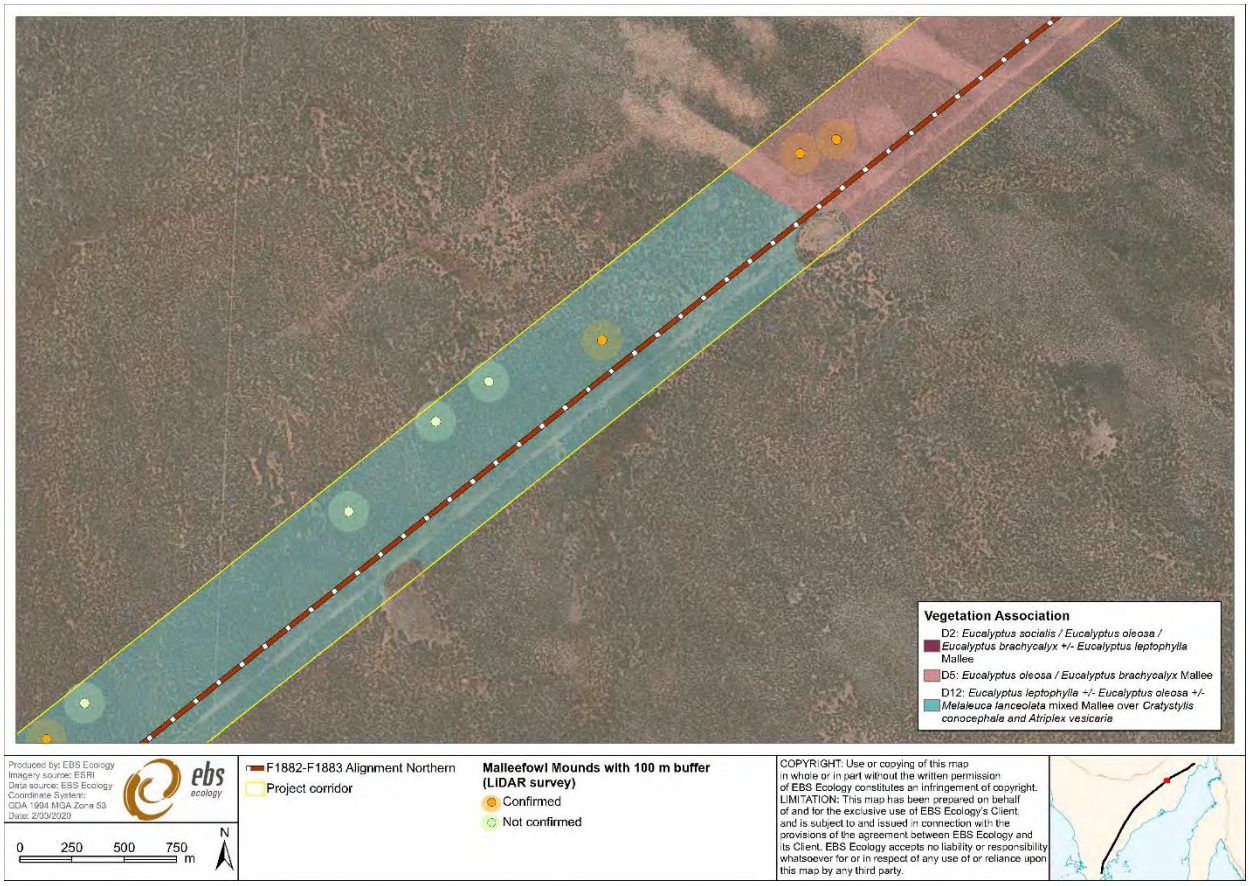
Vegetation Association
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D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D12: Eucalyptus leptophylla +/- Eucalyptus oleosa +/- Melaleuca lanceolata mixed Mallee over Cratystylis conocephala and Atriplex vesicaria
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
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N
F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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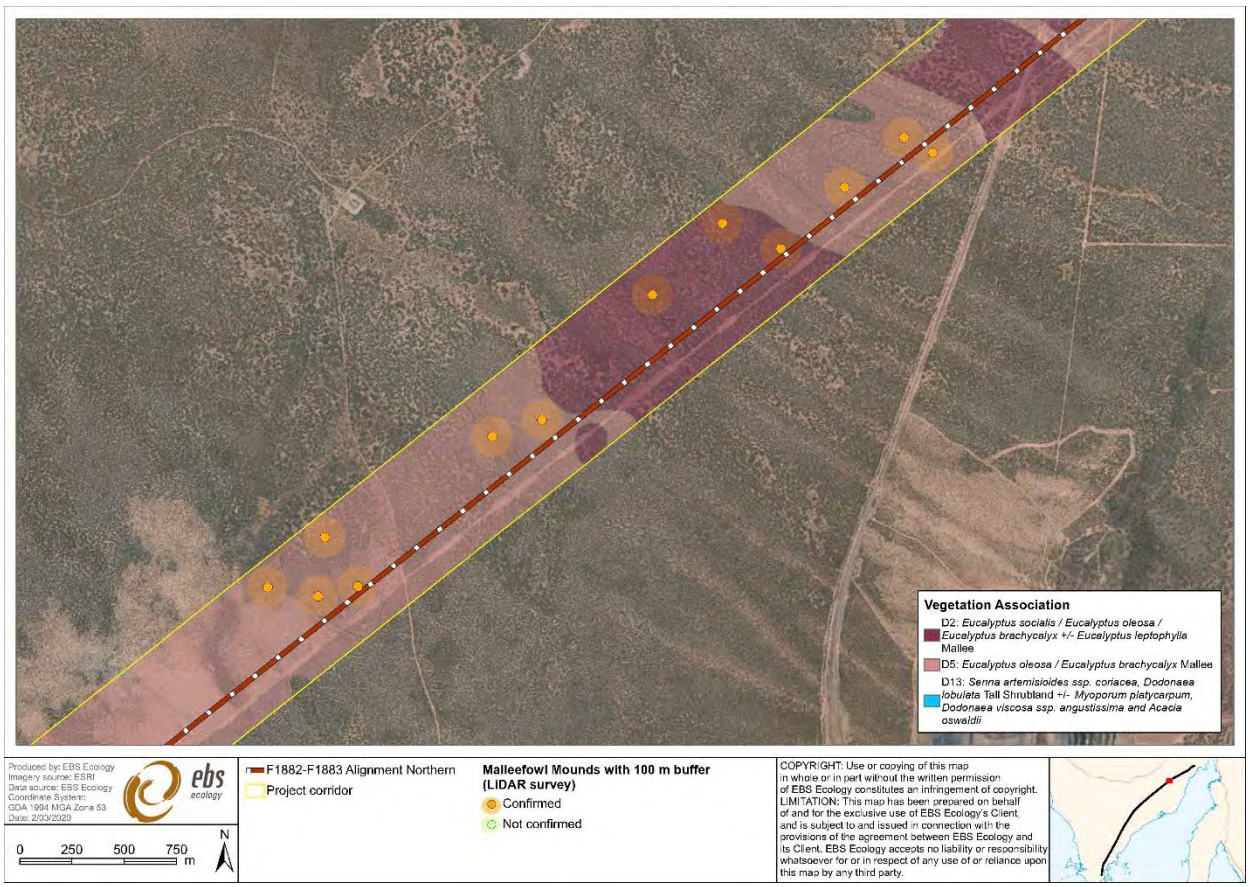
Vegetation Association
D2: Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee
D5: Eucalyptus oleosa / Eucalyptus brachycalyx Mallee
D13: Senna artemisioides ssp. coriacea, Dodonaea lobulata Tall Shrubland +/- Myoporum platycarpum, Dodonaea viscosa ssp. angustissima and Acacia oswaldii
Produced by: EBS Ecology
Imagery source: ESRI
Data source: EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
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F1882-F1883 Alignment Northern
Project corridor
Malleefowl Mounds with 100 m buffer (LIDAR survey)
Confirmed
Not confirmed
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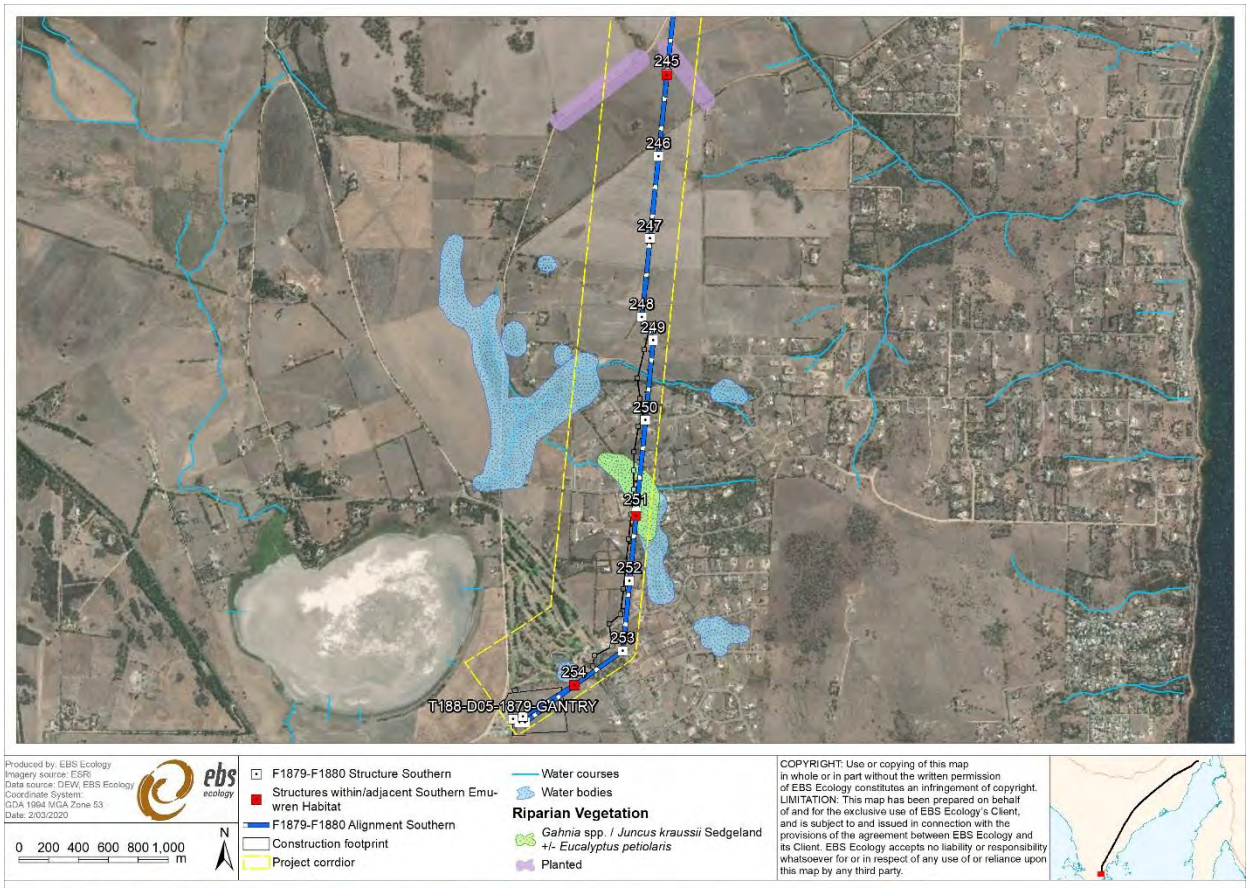
Appendix 5. Suitable habitat for the Southern Emu-wren in the Project Area as mapped by EBS Ecology 2019e.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Produced by: EBS Ecology
Imagery source: ESRI
Data source: DEW, EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
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N
F1879-F1880 Structure Southern
Structures within/adjacent Southern Emu-wren Habitat
F1879-F1880 Alignment Southern
Construction footprint
Project corrdior
Water courses
Water bodies
Riparian Vegetation
Gahnia spp. / Juncus kraussii Sedgeland +/- Eucalyptus petiolaris
Planted
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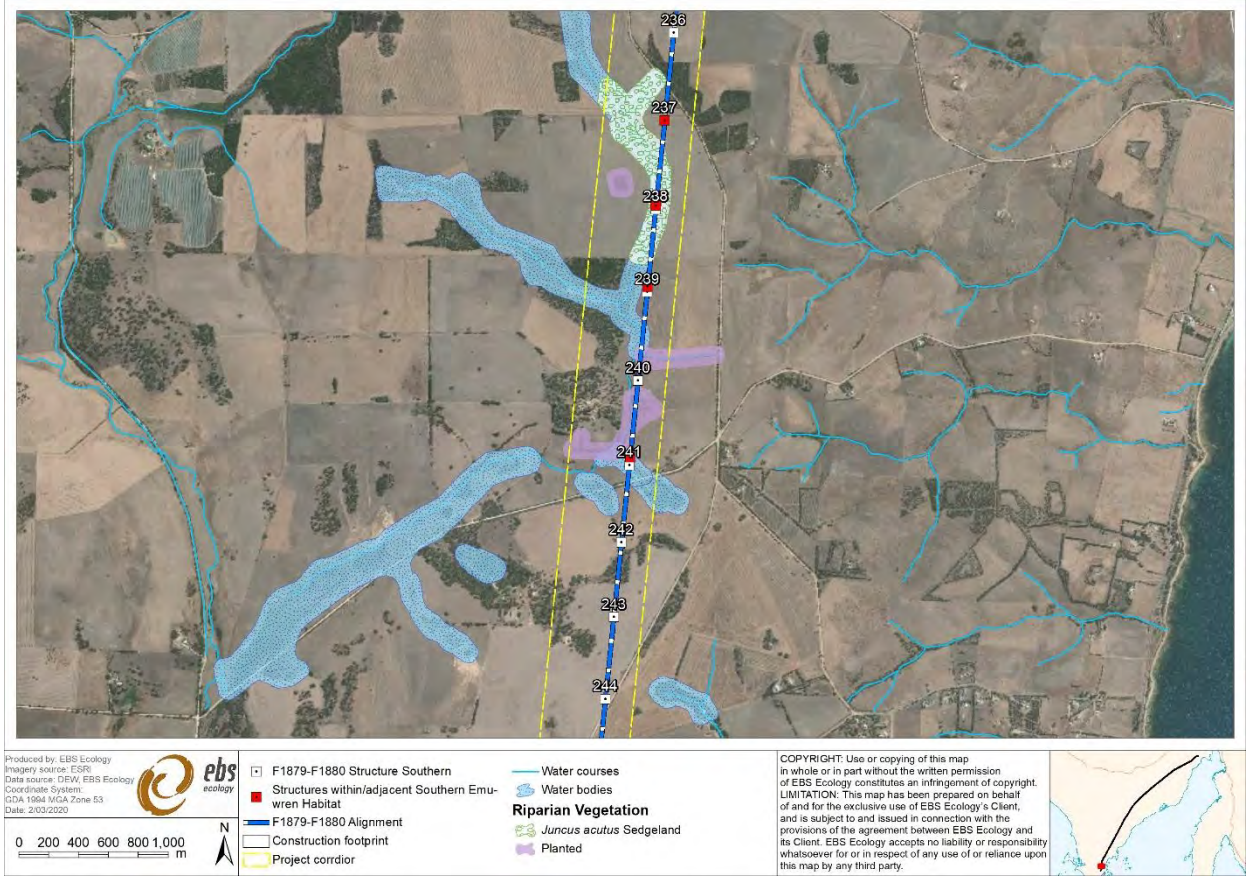
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Imagery source: ESRI
Data source: DEW, EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
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F1879-F1880 Structure Southern
Structures within/adjacent Southern Emu-wren Habitat
F1879-F1880 Alignment
Construction footprint
Project corrdior
Water courses
Water bodies
Riparian Vegetation
Juncus acutus Sedgeland
Planted
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Produced by: EBS Ecology
Imagery source: ESRI
Data source: DEW, EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
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F1879-F1880 Structure Southern
Structures within/adjacent Southern Emu-wren Habitat
F1879-F1880 Alignment
Construction footprint
Project corrdior
Water courses
Water bodies
Riparian Vegetation
Juncus spp. Sedgeland
Planted
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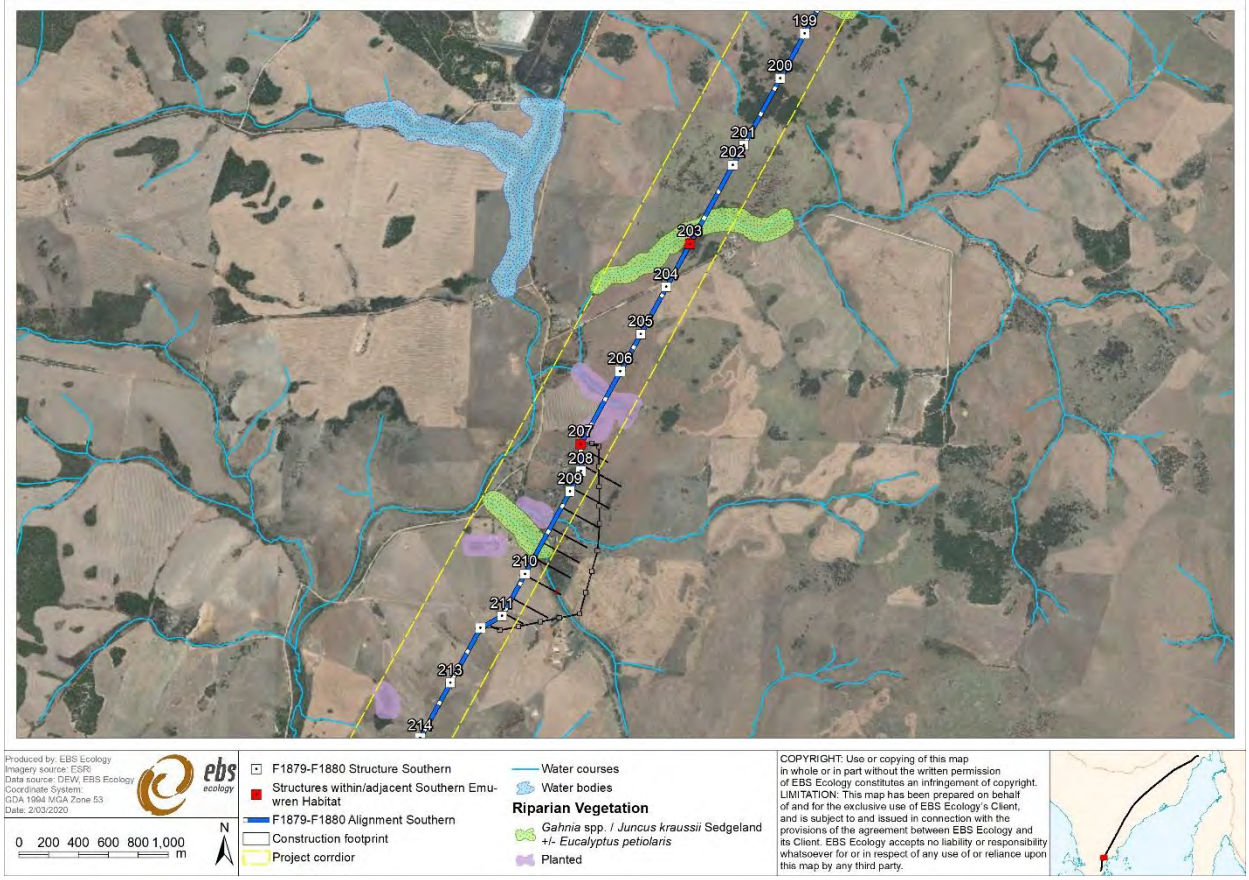
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Data source: DEW, EBS Ecology
Coordinate System: GDA 1994 MGA Zone 53
Date: 2/03/2020
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F1879-F1880 Structure Southern
Structures within/adjacent Southern Emu-wren Habitat
F1879-F1880 Alignment Southern
Construction footprint
Project corrdior
Water courses
Water bodies
Riparian Vegetation
Gahnia spp. / Juncus kraussii Sedgeland +/- Eucalyptus petiolaris
Planted
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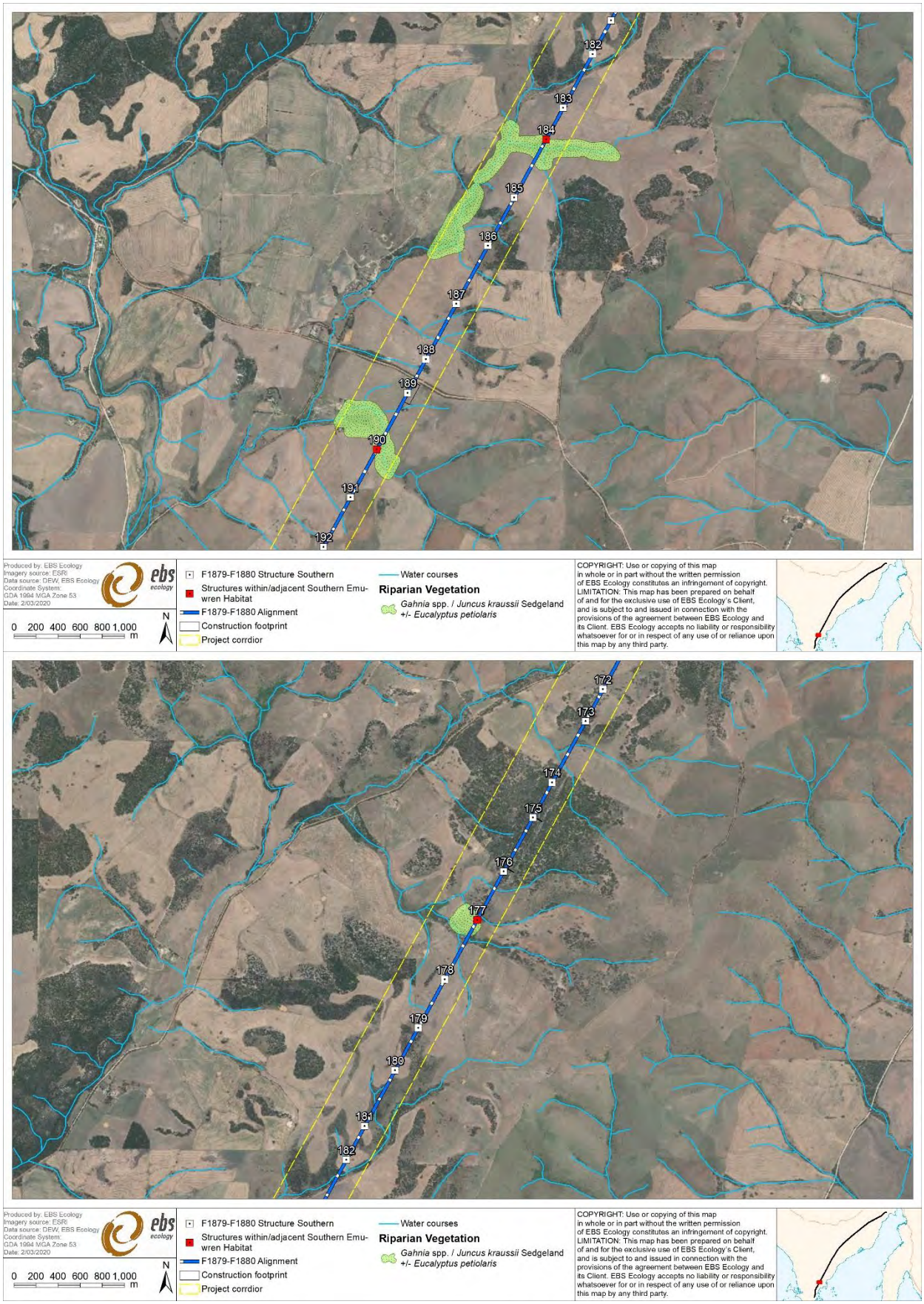
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Produced by: EBS Ecology
Imagery source: ESRI
Data source: DEW, EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
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F1879-F1880 Structure Southern
Structures within/adjacent Southern Emu-wren Habitat
F1879-F1880 Alignment
Construction footprint
Project corrdior
Water courses
Riparian Vegetation
Gahnia spp. / Juncus kraussii Sedgeland +/- Eucalyptus petiolaris
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Imagery source: ESRI
Data source: DEW, EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
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F1879-F1880 Structure Southern
Structures within/adjacent Southern Emu-wren Habitat
F1879-F1880 Alignment
Construction footprint
Project corrdior
Water courses
Riparian Vegetation
Gahnia spp. / Juncus kraussii Sedgeland +/- Eucalyptus petiolaris
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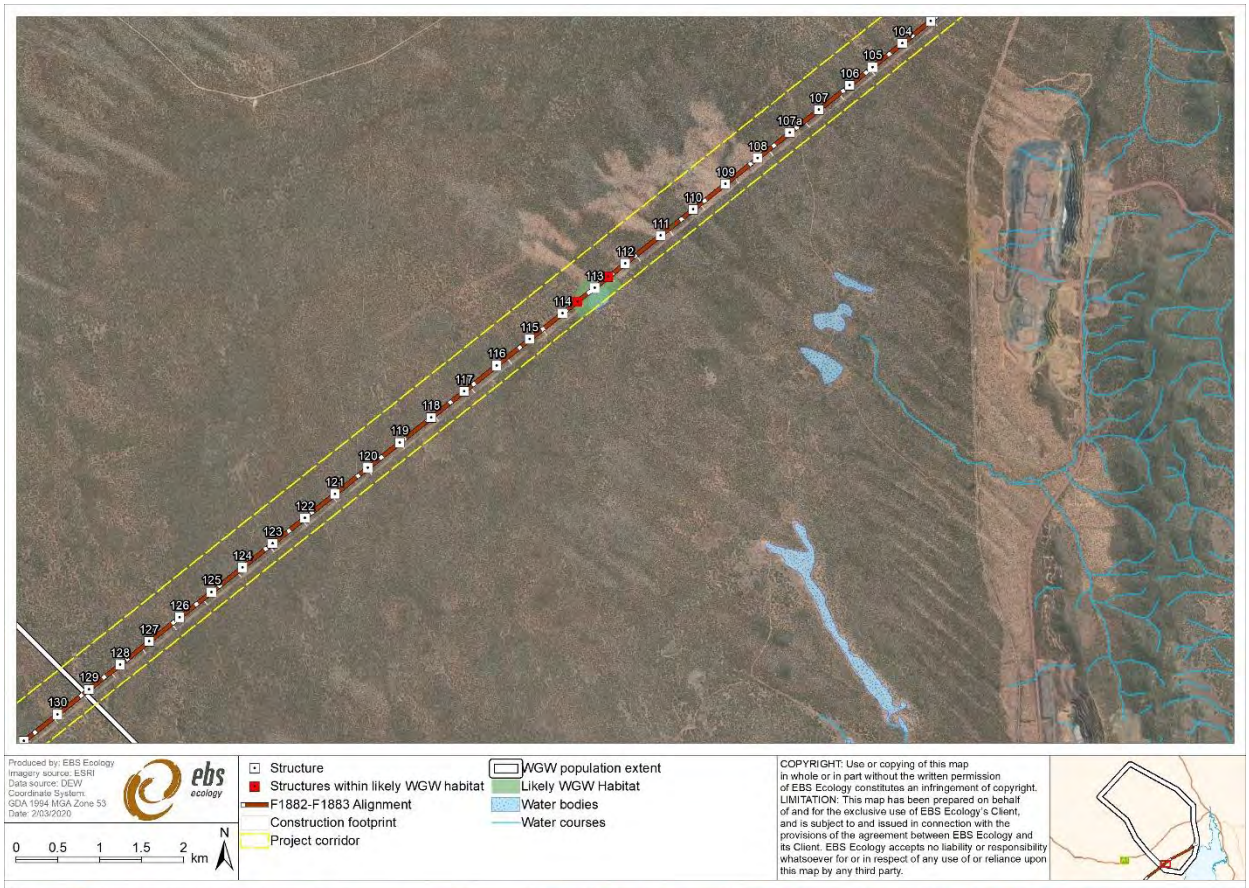
Appendix 6. Suitable habitat for the Western Grasswren in the Project Area as mapped by EBS Ecology 2019f.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Produced by: EBS Ecology
Imagery source: ESRI
Data source: DEW
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
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Structure
Structures within likely WGW habitat
F1882-F1883 Alignment
Construction footprint
Project corridor
WGW population extent
Likely WGW Habitat
Water bodies
Water courses
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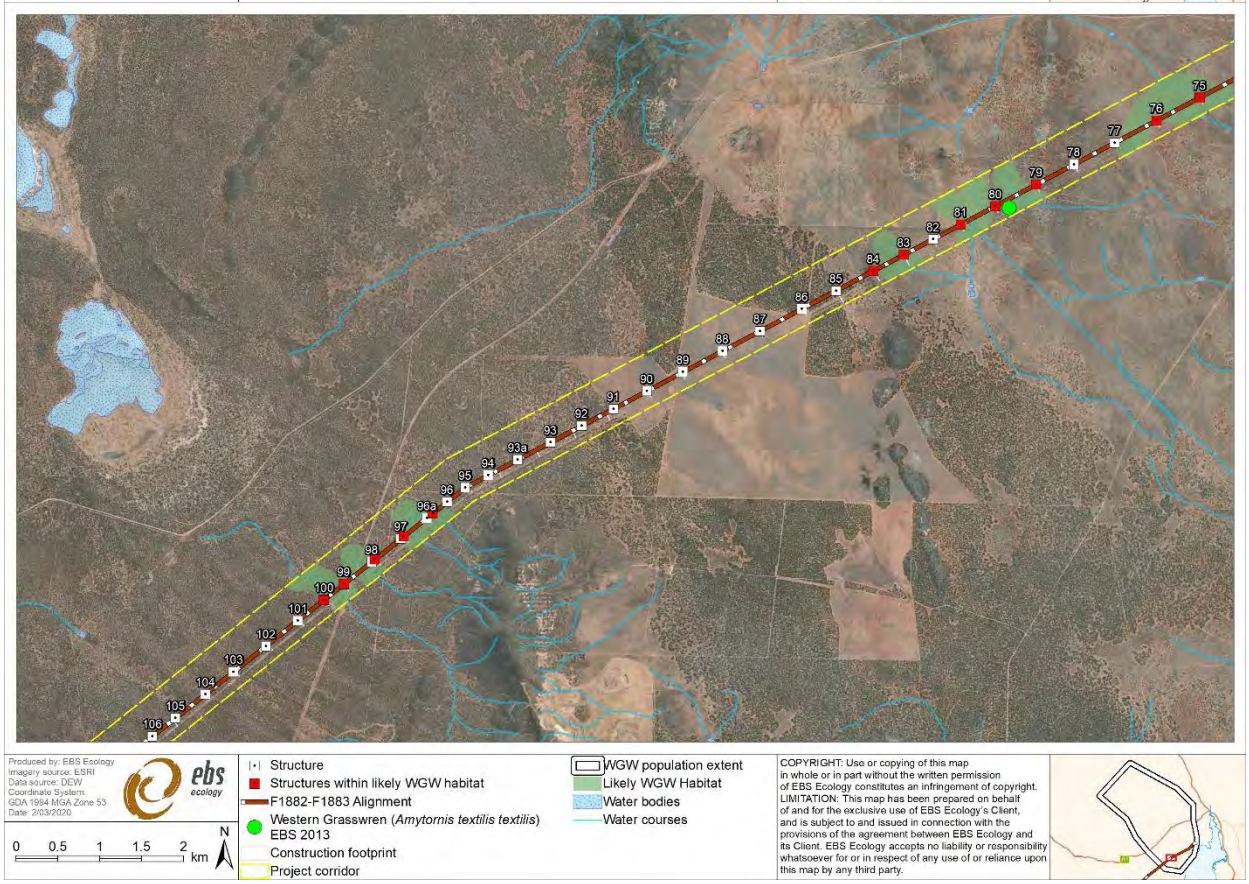
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Produced by: EBS Ecology
Imagery source: ESRI
Data source: DEW
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
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Structure
Structures within likely WGW habitat
F1882-F1883 Alignment
Western Grasswren (Amytornis textilis textilis) EBS 2013
Construction footprint
Project corridor
WGW population extent
Likely WGW Habitat
Water bodies
Water courses
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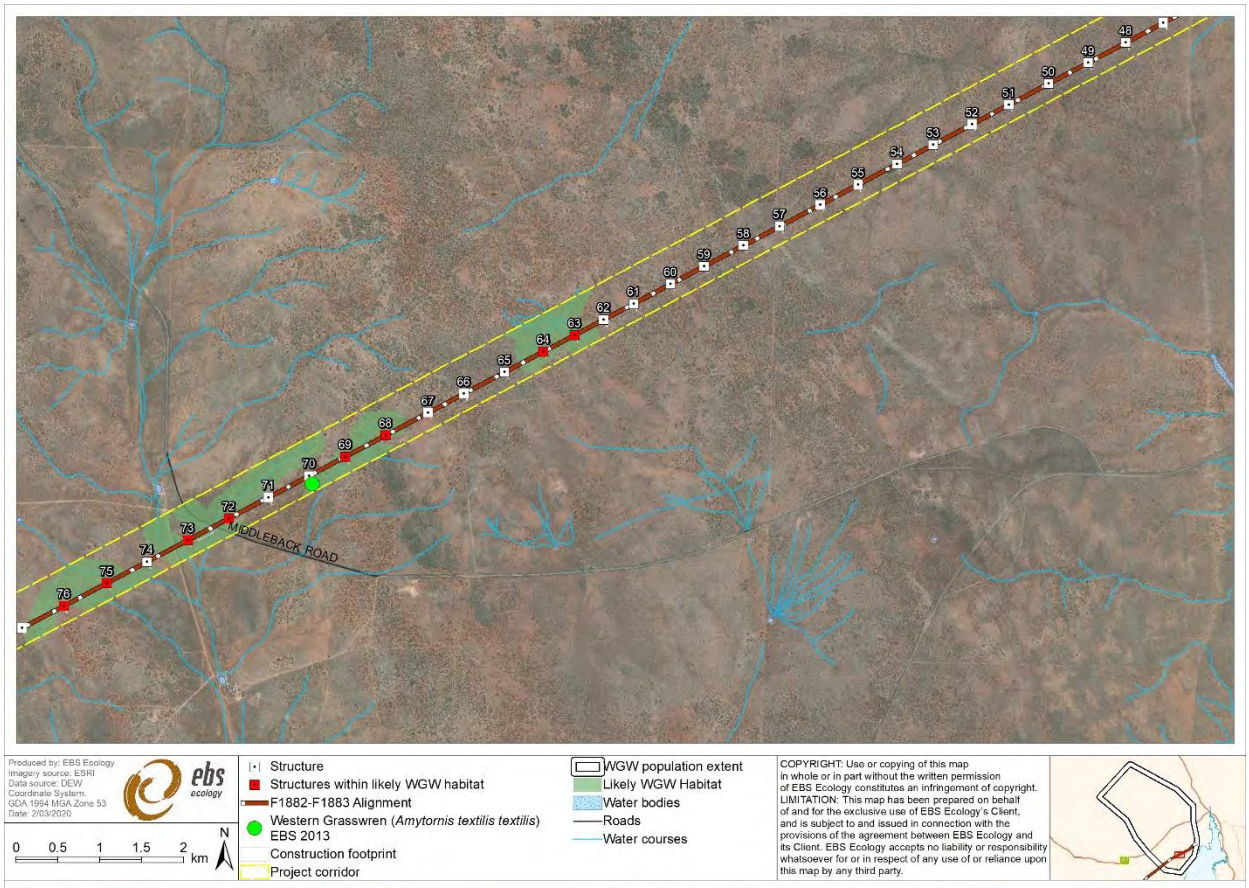
MIDDLEBACK ROAD
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Imagery source: ESRI
Data source: DEW
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
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Structure
Structures within likely WGW habitat
F1882-F1883 Alignment
Western Grasswren (Amytornis textilis textilis) EBS 2013
Construction footprint
Project corridor
WGW population extent
Likely WGW Habitat
Water bodies
Roads
Water courses
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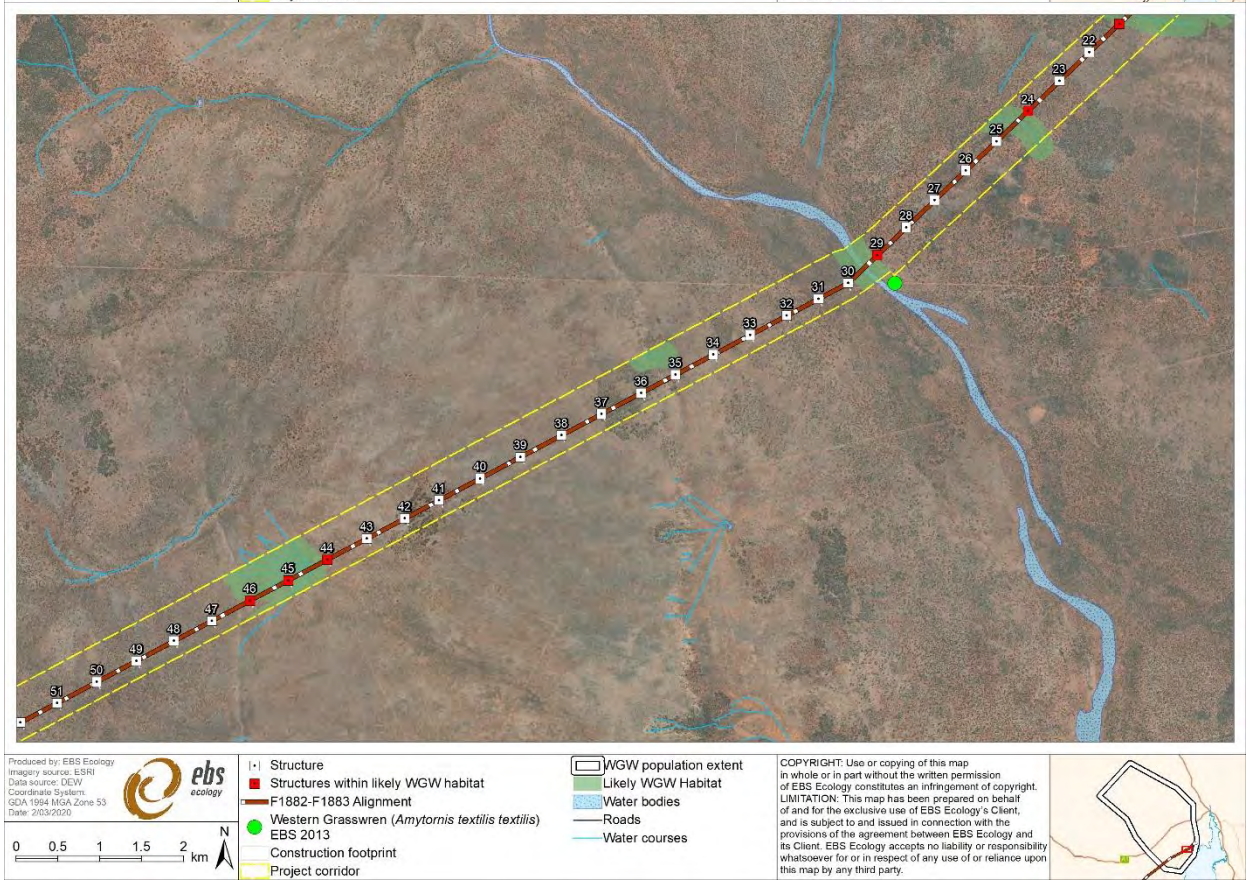
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Structures within likely WGW habitat
F1882-F1883 Alignment
Western Grasswren (Amytornis textilis textilis) EBS 2013
Construction footprint
Project corridor
WGW population extent
Likely WGW Habitat
Water bodies
Roads
Water courses
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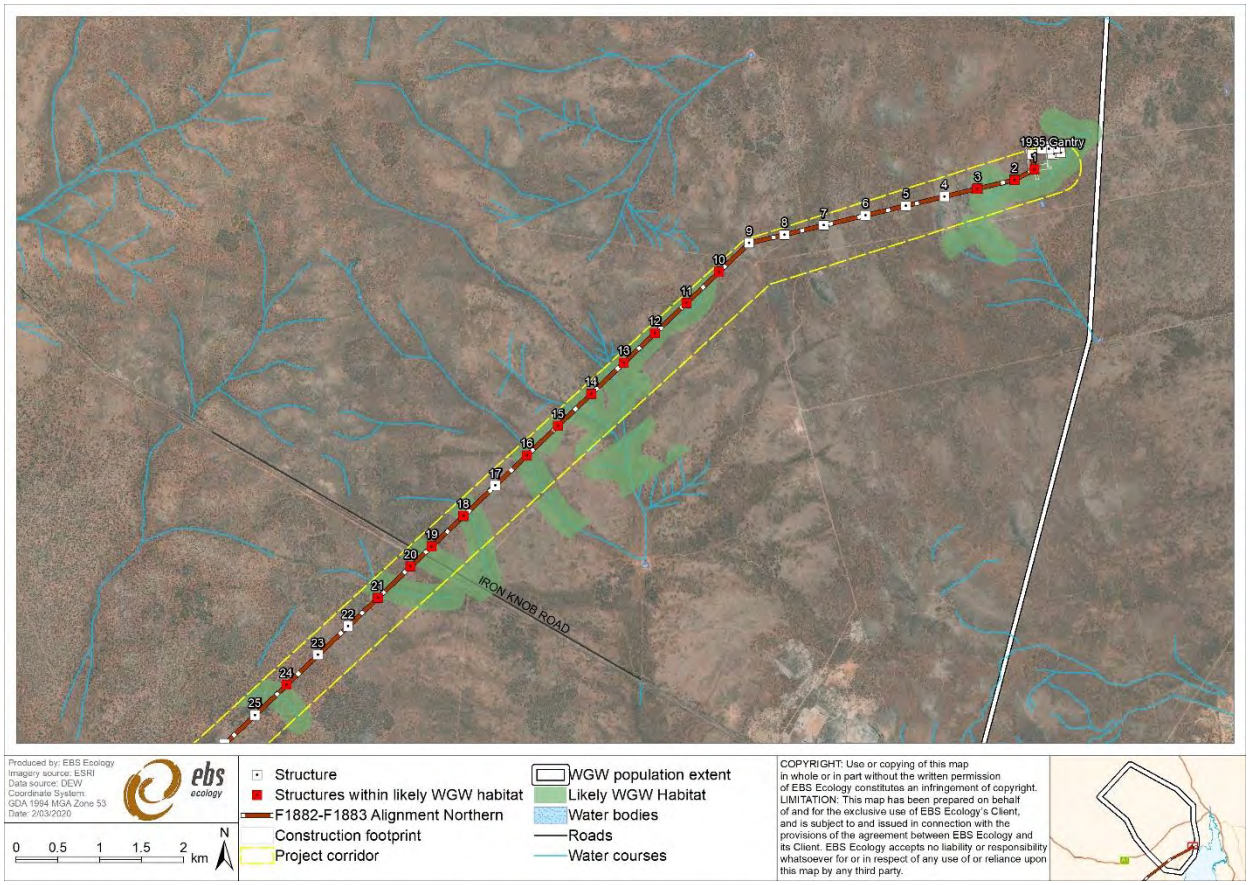
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IRON KNOB ROAD
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Imagery source: ESRI
Data source: DEW
Coordinate System:
GDA 1994 MGA Zone 53
Date: 2/03/2020
ebs ecology
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Structure
Structures within likely WGW habitat
F1882-F1883 Alignment Northern
Construction footprint
Project corridor
WGW population extent
Likely WGW Habitat
Water bodies
Roads
Water courses
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Torrensville, SA 5031
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Appendix F Scope for Environmental Management Plans (SEMP)

Scope for Environmental Management Plan (SEMP)

14172B – EPLink Major Works Contract – Design and Construct

Project Document Code: 14172-ENV-PLN-001

November 2020

Version 2.2

Security Classification: Commercial in Confidence

ElectraNet Corporate Headquarters
52-55 East Terrace, Adelaide, South Australia 5000 • PO Box 7096, Hutt Street Post Office, Adelaide, South Australia 5000
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Project Number: EC.14172

Project Title: Eyre Peninsula Link

Contract: 14172B – EPLink Major Works Contract – Design and Construct

Document Title: Scope for Environmental Management Plan (SEMP)

Document Code: 14172-ENV-PLN-001

First Issue Date: 24 January 2020

Revision Record

Date	Version	Description	Author	Checked By	Approved By
24/01/2020	0.1	Initial	Alecia Wright	Andrew Johnston	Jon Mussared
31/01/2020	1.0	Issued for Tender	Alecia Wright	Andrew Johnston	Jon Mussared
14/10/2020	2.0	Revised during ECI: - Revised to include Safety and Sustainability Standards (replacing EORs) - Revised to include updated approvals requirements - Revised to include updated additional requirements	 Alecia Wright Senior Development Adviser	 Antony Lockyer Field Environment Advisor	 Jon Mussared Project Manager
16/10/2020	2.1	Revised 'Principal' to 'ElectraNet'. Revised wording in section 2 item 10. Amended reference to EOR in section 3 item 14. Additional explanatory text in section 4 item 9. Minor changes to clauses 5.5.1, 5.5.2 and 5.6.2	 Alecia Wright Senior Development Adviser	 Antony Lockyer Field Environment Advisor	 Jon Mussared Project Manager
11/11/2020	2.2	Minor revision to clause 5.7 (to include baiting of feral animals) Amended 'flag' to 'delineate' throughout Minor revision to 5.5.5.3 (management of topsoil).	Alecia Wright Senior Development Adviser	Antony Lockyer Field Environment Advisor	Jon Mussared Project Manager

Contents

Glossary of Terms

Term	Description
BDAC	Barngarla Determination Aboriginal Corporation
CAZ	Construction Activity Zone
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
DoD	Department of Defence
ECC	Environmental Clearance Certificate
ECI	Early Contractor Involvement
ECS	ElectraNet's Engineering Contract Specification
EPBC	The Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act*)
EPLink	ElectraNet's Eyre Peninsula Link, or Eyre Peninsula Transmission Supply, Project
GIS	Geographic Information System
IMS	Incident Management System
LAP	Land Access Permit
LiDAR	Light Detection and Ranging
PAN	Property Access Notification
PCA	Potentially Contaminating Activity
SEDMP	Sedimentation, Erosion and Drainage Management Plan
SEMP	Scope for Environmental Management Plan (this Document)
UXO	Unexploded Ordinance

1. Documents Provided by ElectraNet

The following information (updated from time to time) has been provided to assist in the development of the design and development of the Construction Environmental Management Plan:

No.	File Name	Description
1	14172-LND-GIS-001.zip 14172-LND-GIS-010.zip	ElectraNet Spatial data (updated from time to time)
2	EC.14172_ALS_Imagery_v1.0.zip EC.14172_ALS_Survey Data_v1.0.zip	ElectraNet LiDAR data
3	Lodged DA_secured.pdf	Development Application for the Eyre Peninsula Transmission Supply Project; and ElectraNet draft Construction Environmental Management Plan
4a	14172-LND-PER-001	Development Approval and Conditions and Approval
4b	14172-LND-PER-005	Development Approval Stamped Plans
5	NOT PROVIDED – NOT YET AVAILABLE	Crown Lands Construction Licences
7	E90106A_EP Trans_Line_Native Veg Assmt_Final.pdf E90106A_Attachment 2_EBS Ecology_2014_Eyre Peninsula Transmission Line - Biodiversity Assessment Report_Final.pdf	Native Vegetation Application for the Eyre Peninsula Transmission Supply Project including the 2014 (initial) Biodiversity Assessment
8	NOT PROVIDED – NOT YET AVAILABLE	Native Vegetation Removal Approval
9	14172-LND-PLN-001	ElectraNet Threatened Species Management Plan
10	14172-LND-PLN-002	ElectraNet Weed Management Plan

No.	File Name	Description
11a	EC14172_EP_EPBC Referral_2019-8583.pdf EPBC Act Referral Attachments.zip	Referral under the *Environment Protection and Biodiversity Conservation Act 199 (Cth)* for the Eyre Peninsula Transmission Supply Project
11b	14172-LND-RPT-002_1.0	EPBC Preliminary Documentation Report (draft)
12	NOT PROVIDED – NOT YET AVAILABLE	Commonwealth Government EPBC Act determination
13	AECOM_ElectraNet_Cultural_Heritage_Survey_Report_FINAL_2013_01_23.pdf	2013 Cultural Heritage Report (AECOM)
14	NOT PROVIDED – NOT YET AVAILABLE	February 2020 BDAC Cultural Heritage Report
15	NOT PROVIDED – NOT YET AVAILABLE	Barngarla Determination Aboriginal Corporation (BDAC) Cultural Heritage Management Protocol
16	14172-LND-PLN-005_1.1	ElectraNet Draft Cultural Heritage Management Plan
17	14172-LND-PLN-004	ElectraNet Draft Non-Aboriginal Heritage Management Plan
18	14172-LND-PLN-003	ElectraNet Landholder Management Plan
19	14172-LND-LST-003_2.0	Landholder Special Requirements
20	Eyre Peninsula Fact Sheet_190806.pdf	Landholder Factsheet provided August 2019
21	Route Selection_Desktop Studies.pdf	Desktop Studies for route selection process (2012)
22	Route Selection_Community Engagement Report.pdf	Community Engagement Report from route selection process (2013)
23	NOT PROVIDED – NOT YET AVAILABLE	Late 2020 Cultural Heritage Report and Spatial Data
24	14172-LND-PRO-001_1.0	Defence Environmental Incident Reporting Form

2. Approvals to be Obtained by ElectraNet

The following approvals are the responsibility of ElectraNet:

No.	Approval	Required	Details
1	Land Acquisition	Yes ☒ No ☐	ElectraNet will acquire the necessary easements, licences and/or Right of Ways to construct the project.
2	Landholder Notification (Initial)	Yes ☒ No ☐	ElectraNet will undertake Property Access Notification in accordance with ElectraNet Landholder Management Plan. For early works and minor works, ElectraNet will send quarterly Property Access Notifications (PANs) to landholders (including access required by the Contractor).
3	Native Title Consent	Yes ☒ No ☐	ElectraNet will obtain Native Title consent from the Native Title owners under the *Native Title Act 1993 (SA*) and *Crown Lands Management Act 2016.*
4	Cultural Heritage Assessment	Yes ☒ No ☐	ElectraNet will undertake Cultural Heritage surveys with the Barngarla Determination Aboriginal Corporation (BDAC) and obtain the required approvals under the Aboriginal Heritage Act 1988. Further cultural heritage surveys will be undertaken by ElectraNet during detailed design development and construction period if required.
5	Crown Lands Construction Licence	Yes ☒ No ☐	If required, ElectraNet will obtain Construction Licences for infrastructure works on Crown Land under the *Crown Lands Management Act 2016*.
6	Development Consent	Yes ☒ No ☐	ElectraNet has obtained development consent under the *Development Act 1993 (SA) / Planning, Development and Infrastructure Act 2016 (SA).* The following conditions of the development consent are the responsibility of ElectraNet: **Condition 5** - Any sections of the site that require rehabilitation should be monitored and maintained for a period of at least five years to ensure areas have stabilised fully post rehabilitation. **Condition 10** - Any power lines crossing a rail corridor owned by the Minister for Transport, Infrastructure and Local Government shall be located within an easement. **Condition 13** - Within two years of the existing overhead transmission line and associated infrastructure being de- energised (including any staged decommissioning process or failure to appropriately maintain), such structures and equipment shall be removed from the land and the impacted areas rehabilitated in accordance with best environmental practices to the reasonable satisfaction of the Minister for Planning.

No.	Approval	Required	Details
7	Native Vegetation Clearance	Yes ☒ No ☐	ElectraNet will obtain Native Vegetation clearance approval under the *Native Vegetation Act 1991 (SA)*.
8	EPBC Act Referral	Yes ☒ No ☐	ElectraNet will obtain consent under the *Environment Protection and Biodiversity Conservation Act 1993 (Cth).*
9	Infrastructure Works Program Amendments	Yes ☒ No ☐	ElectraNet shall be responsible for obtaining landholder consent for changes to Infrastructure Works Programs for those design change events nominated to be ElectraNet responsibility in Appendix B of ElectraNet Landholder Management Plan.
10	Department of Defence Environmental Clearance Certificate	Yes ☒ No ☐	ElectraNet shall be responsible for obtaining an Environmental Clearance Certificate (ECC) from the Department of Defence (DoD) prior to commencing construction on DoD land (Cultana Training Area). To obtain an ECC, a proponent must supply environmental assessment reports, an ECC application form and a CEMP in a form suitable to the DoD. ElectraNet will supply the environmental assessment reports and ECC application to DoD. The Contractor shall provide a CEMP to ElectraNet to supply to DoD.
11	Rail Permits	Yes ☒ No ☐	ElectraNet will obtain construction permits from rail authorities (Simec and OneRail) to provide access to rail corridors.

3. Approvals to be Obtained by the Contractor

The following approvals are the responsibility of the Contractor:

No.	Approval	Required	Details
1	Landholder Notification (ongoing)	Yes ☒ No ☐	The Contractor shall undertake Property Access Notification in accordance with ElectraNet Landholder Management Plan. For early works and minor works, the Contractor shall make telephone calls to landholders not less than 2 business days in advance of the plan to enter the site to advise of the intent to enter including the proposed time of access and the purpose for entering the property. For construction activities resulting in land disturbance, the Contractor shall send written Property Access Notifications (PANs) to landholders. Landholders must receive the PANs at least 10 business days prior to the commencement of the construction works. A Contractor representative is also required to telephone the landholder not less than two business days prior to accessing the site.
2	Land Access Permit (LAP)	Yes ☒ No ☐	The Contractor shall obtain LAPs from ElectraNet prior to commencement of any ground disturbing activities including geotechnical investigation work. The LAPs will be issued by ElectraNet based on review of the CAZ drawings/spatial data received from the Contractor. The Contractor may be required to update the CAZ drawings/spatial data if the design does not comply with the Landholder Requirements, the SEMP, the Contractor's CEMP or any other part of the Contract. The Contractor shall not undertake any ground disturbance without an approved LAPs and are required to comply with any/all conditions of the LAP.
3	Development Consent – Compliance Submission	Yes ☒ No ☐	The Contractor shall be responsible for compliance with the following Conditions of Development Approval provided in the Crown Development Decision Notification Form: **Condition 1** - The development granted Development Approval shall be undertaken and completed in accordance with the stamped plans and documentation, except where varied by conditions below. **Condition 2** - Prior to the commencement of site works, final detailed plans - including relevant site plans, cross sections, floor plans, elevations, cut and fill details, access arrangements - of the development shall be submitted to the satisfaction of the Minister for Planning. The plans shall include: a) the final design, specification and layout of all temporary construction components of the development including (but not limited to) compounds/ yards , camps, workshops/ maintenance areas, outbuildings, warehouses, site office, amenities, generators, electrical connections, laydown areas, waste storage areas, water storages, fuel storages, car parking

No.	Approval	Required	Details
			areas, refuelling areas, and clean-down facilities; b) the final alignment, layout, design and specifications of the above-ground transmission lines; and c) the final design, specification and layout of all new, upgraded or expanded substations. **Note** that this condition requires the Contractor to be responsible for the resubmission of the following final documents (as a minimum) to Mr Lee Webb, Senior Specialist (Environmental) Planner, Planning and Land Use Services, Attorney General's Department for assessment and approval of the Attorney General's Department prior to commencement of earthworks: - Detailed drawings showing the layout and components of camps, site offices and laydown yards; - Final project route (overview map(s) showing project centreline); - Earthworks design drawings showing all proposed land disturbance (i.e. Construction Activity Zones); And the following drawings prior to commencement of foundations, tower erection and stringing: - Foundation design drawings; - Structure design drawings; - Stringing line schedule and plan and profile drawings. **Condition 3** - A Construction Environmental Management Plan (CEMP) for the construction phase of the development shall be prepared in consultation with relevant State Government Agencies and local Councils and submitted to the satisfaction of the Minister for Planning prior to the commencement of site works. Construction of the development must be in accordance with the approved CEMP, which as a minimum shall include specific management measures or plans for the following environmental aspects: - Air quality (including dust, noise and vibration); - Aboriginal and non-indigenous heritage; - Native flora and fauna (including threatened species); - Weeds and pests; - Traffic and access; - Erosion and stormwater management;

No.	Approval	Required	Details
			- Waste management; - Storage and handling of hazardous substances; - Water quality; - Fire and hazard risk; - Contamination; - Site rehabilitation (post construction); - Public safety; - Emergency response planning; - Complaints management. **Condition 4** - Any imported substrate or engineered fill shall be free of weeds and pathogens. **Condition 5** - Following the completion of construction works on-site, any tracks and disturbed areas (excluding those used for ongoing access and maintenance) must be rehabilitated and bare areas re- vegetated as soon as possible, taking advantage of natural rainfall. **Condition 6 -** All Council, utility or state agency-maintained infrastructure (i.e. roads, drains, crossovers etc.) that is demolished, altered, removed or damaged during the construction of the development shall be reinstated to council, utility or state agency specifications. **Condition 7** - See **Item 4 Traffic Management Plan** below. **Condition 8** - Any road works on arterial roads shall be designed and constructed in accordance with Austroads Guidelines and Australian Standards and to DPTI's satisfaction, with all associated costs to be borne by the applicant. The applicant should contact Mr Bonaventure Tan, Asset Enhancement Engineer, DPTI on 8648 5243 or bonaventure.tan@sa.gov.au to discuss the department's requirements for any proposed works. **Condition 9** - Overhead transmission lines crossing arterial roads shall have a minimum vertical clearance of 7.2m over the road (any clearance envelope associated with other Electricity Regulations will be in addition to this requirement). Transmission poles/towers shall not be installed within road reserves. **Condition 11** - All vehicles shall enter and exit the site in a forward direction. **Condition 13** - No stormwater from this development shall be permitted to discharge on-surface to the adjacent roads. In addition, any existing drainage of the adjacent roads shall be accommodated by the development and any alterations to road drainage infrastructure as a result of this development are to be at

No.	Approval	Required	Details
			the expense of the applicant.
4	Traffic Management Plan	Yes ☒ No ☐	The Contractor shall be responsible for compliance with Condition 7 of the Crown Development Decision Notification Form: **Condition 7** - A Traffic Management Plan (TMP), prepared in consultation with Commissioner of Highways and affected Councils, shall be submitted for approval by the Minister for Planning prior to the commencement of site works. The TMP shall address matters including, but not limited to, the following: - Traffic volumes and distributions, and types of vehicles to be used in both construction and operational phases of the development; - Transport routes to be used for the construction phase of the development; - Assessment of risks associated with the expected transport movements and determines appropriate mitigation measures; - Transport asset upgrades/modifications, asset maintenance requirements, and operational management requirements that may be necessitated by the project, including: a) Any road modifications (temporary or permanent) to enable safe and efficient access to/from the arterial road network; b) Any structural improvement requirements (e.g. bridge/culvert improvements); c) Any operational management measures required to ensure safety for other transport users (e.g. temporary road closures/detours), including for transport of plant and equipment to/from the site; - Identify staging/timing of transport asset upgrades/modifications. In addition to Condition 7, the Contractor's Traffic Management Plan must comply with the following DPTI guidelines available at www.dpti.gov.au: - SA Standard for Workzone Traffic Management; - Field Guide: Traffic Control Devices for Workzone Traffic Management. Dilapidation reports and pre/post construction impacts to roads may be required by the transport authorities. Where work is required on Local Government roads, the Contractor shall provide the Traffic Management Plan to the relevant Local Council for approval. The Contractor must ensure that all necessary approvals from the National Heavy Vehicle Regulator (https://www.nhvr.gov.au/) are obtained for all transportation of material requiring the use of Restricted Access Vehicles.

No.	Approval	Required	Details
5	Amendments to Statutory Approvals	Yes ☒ No ☐	Where the Contractor makes a change to the preliminary design or construction methodology which results in the need to amend an existing statutory approval obtained by ElectraNet, the Contractor shall be responsible for preparing the amendment and obtaining the amended approval, including all costs associated with preparation and any fees and charges payable to Government agencies.
6	Water Affecting Activities Permit	Yes ☒ No ☐	Where specific activities have not been contemplated and approved in ElectraNet Development Application and subsequent Development Consent, the Contractor may be required to obtain a permit pursuant to Section 104 of the *Landscape South Australia Act 2019 (SA)* and the Landscape SA Eyre Peninsula Regional Plan for water affecting activities. This may include the construction of access tracks through ephemeral creek beds, removal of trees and vegetation in or near watercourses or discharge of surface or underground water into a watercourse. The Contractor shall meet with and seek advice from the Eyre Peninsula NRM Board prior to finalisation of the CEMP and prior to construction to determine the need for a Water Affecting Activities Permit: Landscape SA Eyre Peninsula Level 1, 86 Tasman Terrace Port Lincoln SA 5606 T: (08) 8688 3111 naturalresources.sa.gov.au/eyrepeninsula
7	Earthworks Drainage	Yes ☒ No ☐	If required, the Contractor shall obtain a licence pursuant to s.36 and Schedule 1 of the *Environmental Protection Act 1993 (SA)* where the volume of dewatering for the project will exceed 100KL.
8	Groundwater Wells	Yes ☒ No ☐	If groundwater wells are proposed, the Contractor shall obtain a Well Construction Permit pursuant to s.104 of the *Landscape South Australia 2019 (SA).* Groundwater wells shall be installed by a driller licenced pursuant to s.112 *Landscape South Australia 2019 (SA),* with locations accurately surveyed and supplied to ElectraNet. Landholder consent is required prior to installing a groundwater well. The contractor shall liaise with ElectraNet prior to decommissioning any groundwater wells, who may elect to retain them as permanent assets.

No.	Approval	Required	Details
9	Wastewater Treatment Plant (WWTP)	Yes ☒ No ☐	The Contractor shall obtain approval from the SA Department of Health for approval of installation of wastewater treatment plant/s pursuant to the *South Australian Public Health (Wastewater) Regulations 2013 (SA)* and further detailed in the Prescribed Code: *On-site Wastewater Systems Code* (only required if wastewater treatment plants are not pre-approved by SA Health).
10	Concrete Batching	Yes ☒ No ☐	If concrete batching is proposed, the Contractor shall obtain a licence pursuant to s.25 and Schedule 1 of the *Environmental Protection Act 1993 (SA)* where the plant capacity is greater than 0.5m^3 of concrete product per production cycle.
11	Extractive Industries (Borrow Pits)	Yes ☒ No ☐	The Contractor shall obtain all relevant authorisations for borrow pits. These may include: - Landholder agreement and compensation; - Native Title agreement and compensation (if located on Crown Land or other land subject to Native Title); - Cultural Heritage clearance; - Native Vegetation clearance; - Approvals pursuant to the Mining Act 1971 (SA) and Mines and Works Inspection Regulations 2013 (SA); - A license pursuant to s.36 and Schedule 1 of the Environmental Protection Act 1993 (SA) where extraction of borrow material on the project will exceed 100,000 tonne.
12	Water	Yes ☒ No ☐	The Contractor shall be responsible for obtaining access to construction and potable water for the project.
13	Camps and Offices	Yes ☒ No ☐	The Contractor shall be responsible for all aspects of planning, design, approvals, permits, establishment, operation, dis-establishment and rehabilitation of the camp and office sites. For the proposed camp at Tumby Bay this includes Development Approval and native vegetation clearance approval if required.
14	Unexploded Ordinance (UXO)	Yes ☒ No ☐	The Contractor shall undertake the necessary investigations and assessments using a suitably qualified UXO consultant approved by the Department of Defence to enable safe construction through the Department of Defence land (e.g. Cultana Training Area). See also section 5.18 Safety and Sustainability Standard 9.23 – Soil Management.

No.	Approval	Required	Details
15	Nightworks	Yes ☒ No ☐	Where required, the Contractor shall be responsible for obtaining all statutory approvals relating to nightworks (defined as works outside of the hours of 7am to 7pm).
16	Infrastructure Works Program Amendments	Yes ☒ No ☐	The Contractor shall be responsible for obtaining landholder consent for changes to Infrastructure Works Programs for those design change events nominated to be the Contractor's responsibility in Appendix B of ElectraNet Landholder Management Plan.
17	Railway Consent	Yes ☒ No ☐	OneRail The Contractor shall be responsible for submitting an 'Application to Cross Railway Line with Electric Power Cables' to One Rail for the crossings of the rail corridors under their control. The Contractor shall ensure that the proposed infrastructure will comply with the 'Specifications and Conditions for the Erection of Electric Power Cables Across Railways and Land' or as otherwise directed by One Rail. Simec The Contractor shall be responsible for complying with conditions for railway access provided by Simec.
18	Department of Defence Environmental Clearance Certificate	Yes ☒ No ☐	The Contractor shall be responsible for preparing a Construction Environmental Management Plan (CEMP) for works within the Department of Defence property (Cultana Training Area) in accordance with the Defence Estate environmental management system documented here: https://defence.gov.au/estatemanagement/Governance/Policy/Environment/Default.asp And in accordance with DoD CEMP Guidance Material documented here: https://defence.gov.au/estatemanagement/Governance/Policy/Environment/EIA/Guidance/CEMPGuidance.doc The CEMP shall include the DoD incident reporting requirements (including the form) provided in the Defence Environmental Incident Reporting Form (14172-LND-PRO-001_1.0). The DoD CEMP shall either be the Project CEMP or a separate CEMP responding directly to DoD CEMP requirements. Construction cannot commence on DoD land until the DoD CEMP is approved by DoD. The Contractor is responsible for amending the DoD CEMP to meet DoD requirements in sufficient time to commence construction by the agreed construction commencement date.

No.	Approval	Required	Details
19	Building Rules Certification	Yes ☒ No ☐	The Contractor shall be responsible for compliance with the following Planning, Development and Infrastructure Act 2016 Requirements provided in the Crown Development Decision Notification Form: (i) Pursuant to Section 131(21) of the Planning, Development and Infrastructure Act 2016 before any building work is. undertaken, the building work is to be certified by a private certifier, or by some person determined by the Minister for the purposes of this provision, as complying with the provisions of the Building Rules (or the Building Rules as modified according to criteria prescribed by the Regulations).

4. Environmental and Land Access Design Requirements

The following design constraints shall be considered in development of the design:

No.	Design Constraint	Relevant	Details
1	Property Boundary	Yes ☒ No ☐	Refer to Clause 3.5 of 14172-ECS-002 Section 3.2a.
2	Existing Infrastructure and Services	Yes ☒ No ☐	The Contractor shall minimise impacts on existing infrastructure and services. The Contractor shall be responsible for the relocation, replacement or reconstruction of any existing infrastructure (including tracks, roads, fences, gates, cattlegrids and services) required as a result of the design.
3	Requirements from Legislative Approvals	Yes ☒ No ☐	The Contractor shall include any design requirements specified in applications for statutory approvals and the statutory approval conditions (including the native vegetation clearance application and approval, EPBC Act 1999 referral and Preliminary Documentation Report and approval development approval application and development consent). When these approvals are finalised and provided to the Contractor by ElectraNet, the Contractor shall make any required changes to the design to comply with the requirements.
4	Requirements from Landholder Agreements	Yes ☒ No ☐	The Contractor shall implement design requirements specified in landholder agreements and provided to the Contractor by ElectraNet as landholder design changes. The Contractor shall include any Special Requirements provided by ElectraNet in the final design.
5	Requirements to avoid or minimise impacts to Cultural Heritage	Yes ☒ No ☐	Refer to Clause 3.6 of 14172-ECS-002 Section 3.2a.
6	Requirements to avoid or minimise impacts to Native Vegetation or habitat	Yes ☒ No ☐	Refer to Clause 3.7 of 14172-ECS-002 Section 3.2a.
7	Requirements to avoid or minimise impacts to Watercourses or waterbodies	Yes ☒ No ☐	Refer to Clause 3.7 of 14172-ECS-002 Section 3.2a.

No.	Design Constraint	Relevant	Details
8	Structure Pads	Yes ☒ No ☐	Refer to Clause 2.4.5 *Earthworks Design* of 14172-ECS-002 Section 3.2a.
9	Stringing Pads	Yes ☒ No ☐	Refer to Clause 2.4.5 *Earthworks Design* of 14172-ECS-002 Section 3.2a.
10	Centreline Stringing Access	Yes ☒ No ☐	Refer to Clause 2.4.5 *Earthworks Design* of 14172-ECS-002 Section 3.2a.
11	Access Tracks	Yes ☒ No ☐	Refer to Clause 2.4.5 *Earthworks Design* of 14172-ECS-002 Section 3.2a.
12	Camps and offices	Yes ☒ No ☐	Refer to Clause 2.4.5 *Earthworks Design* of 14172-ECS-002 Section 3.2a.
13	Laydowns	Yes ☒ No ☐	Refer to Clause 2.4.5 *Earthworks Design* of 14172-ECS-002 Section 3.2a.
14	Substations	Yes ☒ No ☐	Refer to Clause 2.4.5 *Earthworks Design* of 14172-ECS-002 Section 3.2a.

5. Additional Environmental Operating Requirements

The following supplementary requirements are provided in addition to the Safety and Sustainability Standards, sub-headed below. The Contractor's CEMP shall respond to these requirements in addition to the standard requirements in the Safety and Sustainability Standards.

5.1 Safety and Sustainability Standards Section 3.3 – Environmental Management Plan

The Contractor shall prepare a tailored, project-specific Construction Environmental Management Plan (CEMP) for the project.

A draft project specific (not generic) CEMP shall be developed during the ECI stage and be provided with the Design and Construction tender submission.

The CEMP shall include (as a minimum) the following sub-plans (or equivalent plans agreed by ElectraNet):

- Biodiversity Management Plan;
- Rehabilitation Management Plan;
- Weed, Pest and Disease Management Plan;
- Sedimentation, Erosion and Drainage Management Plan;
- UXO Management Plan;
- Landholder Liaison Plan;
- Cultural Heritage Management Plan;
- Bushfire Management Plan including Lightening Management Plan;
- Waste Management Plan.

The Contractor shall ensure that project camps and offices comply with the *SA EPA Environment Protection (Noise) Policy 2007* and General Environmental Duty regarding dust and illumination pursuant to section 23 of the *Environmental Protection Act 1993 (SA)*.

All construction works associated with the development are required to be undertaken in accordance with section 25(1) of the *Environment Protection Act 1993*, which requires that a person must not undertake any activity, which pollutes, or may pollute without taking all reasonable and practical measures to prevent or minimise harm to the environment.

Noise emissions associated with the operation of the transmission line (i.e. corona), including any tonal characteristics of noise that is audible at a noise effected premises and has a perceptible and definite pitch or tone that is fundamental to the nature and impact of the noise, must comply with the *Environment Protection (Noise) Policy 2007*, including both day and night criteria.

5.2 Safety and Sustainability ElectraNet Support Standard 8.2 – Site Specific Inductions

The Contractor shall ensure the following items are included in the mandatory Site Induction for all staff, sub-contractors, drivers, and visitors:

- Overview of CEMP requirements;
- Weed identification and weed management on the easement;
- Land access requirements and protocols for behaviour on the easement;
- Fire season education and associated risks and restrictions;
- Cultural Heritage Management including the location of Cultural Heritage sites and the need to have monitors present for initial ground disturbance in some locations (see Section 5.6 Safety and Sustainability Standard 9.7 below);
- CAZ management including advice that no one is permitted leave the approved CAZ or existing access tracks for any reason;
- Provision for delivering this induction to subsequently hired personnel shall be the responsibility of the Contractor, with records of attendees maintained.

Work crews shall be briefed on the environmental issues relevant to the work being undertaken (e.g. drilling crews shall be inducted into the dewatering procedure).

The Contractor shall allow for a one off 3-hour Cultural Heritage Induction (which may include Cultural Awareness Training) for all site staff by members of the Barngarla Determination Aboriginal Corporation (BDAC) prior to the commencement of site works.

The Contractor shall allow for a 3-hour Environmental Management meeting one month into construction to review and recalibrate the CEMP and amend any issues identified (by the Contractor or ElectraNet) in the early construction phase.

5.3 Safety and Sustainability Section 11.3 – Audits and Inspections

The Contractor shall plan and document the frequency of site / activity environmental inspections and formal audits in the CEMP for approval by ElectraNet. Results of inspections and formal Environmental Audits shall be provided to ElectraNet and included in monthly reporting to ElectraNet as agreed during the ECI process.

5.4 Safety and Sustainability Standard 9.2 – Activity Zone Management

5.4.1 Construction Activity Zone Drawings and Spatial Data

The Contractor shall prepare spatial data (.shp files) and PDF maps showing Construction Activity Zones (CAZs) for all ground disturbing activities, including:

- New tracks, pads and facilities associated with the project;
- Existing access tracks where existing tracks will be graded, widened, stabilised or otherwise altered for the project;
- Areas of disturbance associated with demolition works and rehabilitation works;
- Areas of disturbance relating to landholder activities including gates and fences;

CAZs shall be no larger than the minimum area required to successfully construct the project and shall be no larger than the dimensions stipulated in Clause 2.4.5 *Earthworks Design* of the document 14172-ECS-002 - Section 3.2a.

The Contractor shall indicate on CAZ drawings the type of land disturbance, for example low-impact clearance methods (rolling) or clearing and grubbing.

5.4.2 Land Access Permits

The Contractor shall request a Land Access Permit (LAP) from ElectraNet prior to commencement of ground disturbance works. The request for a LAP Permit shall include:

1. Spatial data showing the proposed CAZs for the project. The spatial data shall be compatible with ESRI ArcGIS Pro using the following:
    (i) Datum - All spatial data and maps shall use the GDA 2020 datum, EPSG:7844;
    (ii) Projection - All spatial data and maps shall use the GDA 2020 SA Lambert projection;
    (iii) The spatial data shall contain the following information:
        - Structure locations and transmission line centreline;
        - CAZ for all earthworks including spur tracks, centreline tracks, stringing corridor, structure pads, stringing pads, laydowns, camps and offices;
        - Existing access tracks (to be used for project ingress/egress);
        - CAZ for existing track upgrades including turnouts and overtaking lanes;
        - CAZ for demolition works; and
        - CAZ for rehabilitation and make-good works.
2. A3 PDF CAZ drawings showing the following information as a minimum:
    (i) Legend;
    (ii) Cultural Heritage sites – cleared and non-cleared areas;
    (iii) Property details (from cadastre);
    (iv) CAZs;
    (v) Traditional Owner and contacts;
    (vi) Landowner and contacts;
    (vii) Landholder special requirements;
    (viii) Other sensitive areas or constraints;
    (ix) Construction Notes.

ElectraNet will review the LAP request and provide a LAP prior to commencement of site works. The LAP will confirm any landholder and environmental conditions for construction (including Cultural Heritage management). No site works shall commence without an ElectraNet approved LAP.

ElectraNet will propose a strategy for packaging LAP (for instance to align with the Contractor's work packs) for agreement during the ECI phase.

5.4.3 Amendments

Where a change is required to a CAZ, the Contractor shall provide ElectraNet with a revised CAZ drawing and spatial data for approval. ElectraNet will provide a revised LAP for the amended CAZ.

5.4.4 Final As-built Data

The Contractor shall provide final spatial data at the end of construction showing the surveyed location of all newly constructed permanent access tracks, structure pads and other approved permanent infrastructure in a format that is acceptable to ElectraNet.

5.5 Safety and Sustainability Standard 9.25 – Vegetation and Fauna Management

The Contractor shall prepare a Biodiversity Management Sub-Plan. The Biodiversity Management Sub-Plan shall be an appendix to the CEMP.

5.5.1 Fauna

The Contractor shall include the following mitigation measures in the Biodiversity Management Sub-plan of the CEMP:

- The Contractor shall delineate sensitive fauna areas that need protection as No-Go Zones with green bunting and signage ('Protected area – Keep Out' or similar) prior to commencement, including Malleefowl Mounds and Raptor nests in or adjacent to CAZs.
- (including Malleefowl Mounds);
- The management measures contained in ElectraNet's Threatened Species Management plan and Malleefowl Management Plan;
- Measures to ensure that fauna are not killed, harassed or disturbed during construction work;
- Report any injury to or death of a threatened species to ElectraNet. All fauna strikes to be logged in the IMS;
- Development of factsheets identifying key fauna species for dissemination to site staff;
- Minimise vehicle movement and machinery disturbance within and around retained vegetation;
- Minimise impacts to species of significance by micro-siting of the infrastructure within habitat areas;
- Minimisation of habitat fragmentation for threatened species particularly for sandhill dunnarts;
- Restrict vehicle movement to defined tracks;

- Ensure no excavations are left open overnight. When not in use the Contractor shall cover drill holes with a solid or fine weave material (i.e. not open mesh) to prevent fauna ingress;
- Undertake visual inspections of excavations for fauna prior to works recommencing;
- Ensure that personnel do not feed any wildlife that may be encountered on construction sites (especially birds and lizards);
- Contact the relevant authority in the event of encountering trapped or injured fauna.

The Contractor shall ensure a licensed fauna ecologist or wildlife carer is on site during removal of all native vegetation to undertake fauna checks and fauna relocation. A fauna check of the stringing alignment is also required prior to the commencement of stringing in the Department of Defence land (Cultana Training Area). All bird's nests shall be relocated prior to clearing.

Work zones shall be delineated with a visible barrier to prevent construction plant and equipment driving outside of the cleared areas in areas adjacent native vegetation.

The Contractor shall make contact with an animal rescue agency/wildlife care group or veterinarian prior to construction to check they are willing and available to be involved in fauna rescue and assist with injured animals. The Contractor shall ensure the contact details of the animal rescue agency/wildlife care group or veterinarian are provided to Construction Managers, displayed in site offices and included in the CEMP.

The Contractor shall ensure fauna handling is only carried out by people who are appropriately licensed (e.g. a fauna ecologist or wildlife carer). The Contractor may consider training some field personnel to become competent fauna handlers to aid management during construction.

In areas of Native Vegetation, the Contractor shall ensure that cleared trees that have hollows, tree barrels and bush rocks are left on site for fauna habitat.

5.5.2 Flora

The Contractor shall include the following mitigation measures in the Biodiversity Management Sub-plan of the CEMP:

- The Contractor shall delineate sensitive flora areas that need protection as No-Go zones with green bunting and signage ('Protected area – Keep Out' or similar) prior to commencement, including individual EPBC-listed flora species and Sandalwood Trees identified in or adjacent to CAZs.
- The management measures contained in ElectraNet's Threatened Species Management plan;
- Development of factsheets identifying key flora species for dissemination to site staff;
- Minimise vehicle movement and machinery disturbance within and around retained vegetation;
- Minimise impacts to species of significance by micro-siting of the infrastructure within habitat areas;

The Contractor shall refer to the clearance and rehabilitation requirements provided in Clause 4 of the document 14172-ECS-002 Section 3.2b.

The Contractor shall take a 'before' photograph of all areas of ground disturbance prior to clearance, and an 'after' photograph at completion of rehabilitation and submit labeled photographs to ElectraNet at the conclusion of rehabilitation.

The Contractor shall use low-impact clearance methods wherever possible (i.e. rolling rather than clearing) to ensure that root stock, topsoil and seeds are left in situ as far as practicable.

5.5.3 Vegetation Clearance in Monthly Reporting

The Contractor shall provide ElectraNet the following data (m^2) within the agreed monthly report template:

- Area cleared during the previous reporting period (permanent disturbance);
- Total project area cleared (permanent disturbance);
- Area cleared during the previous reporting period (temporary disturbance);
- Total project area cleared (temporary disturbance).

5.5.4 Rehabilitation Management Plan

The Contractor shall prepare a Rehabilitation Management Plan. The Rehabilitation Management Plan shall be an appendix to the CEMP. The Rehabilitation Management Plan shall:

1. Detail the proposed rehabilitation works, how they will be undertaken, their sequence and timing and responsibilities, including:
   (i) Methodology for clearing and stockpiling topsoil and vegetation;
   (ii) Methodology for management of stockpiles;
   (iii) Methodology for site preparation prior to rehabilitation;
   (iv) Methodology for rehabilitation;
2. Specify rehabilitation standards or completion criteria which shall be achieved assuming a 5 year rehabilitation period;
3. Address any difference in methodology depending on habitat type or land use (e.g. cropped paddocks will have different rehabilitation actions to dunes);
4. Address any specific landholder requirements for rehabilitation.

5.5.5 General Requirements for Rehabilitation Management Plan:

5.5.5.1 Clearing

The rehabilitation plan shall document the clearing methods for each habitat type and proposed plant and equipment to be used. All clearing shall be micro-sited to minimise impacts to vegetation, followed by preferential trimming of vegetation with appropriate tools, followed by earthworks with an excavator/dozer. The type of clearing implemented shall be documented for each CAZ as this may affect the rehabilitation strategy.

5.5.5.2 Landscaping and scarification

Landscaping shall leave a final landform visually compatible with the surrounding natural landscapes, ensure that the land is stable and will not erode, and provide an adequate substrate for revegetation. This will include alleviation of compaction and scarification.

The plan shall document the methods for landscaping, ripping and scarifying sites including depth of scarification, direction of scarification (horizontal to slope) and equipment / plant required.

All temporary clearance areas such as structure pads, laydowns, stringing pads and access tracks shall be scarified.

5.5.5.3 Soil removal, respreading and stockpiling

The rehabilitation plan shall document the plan for the removal, storage/stockpiling and respreading of topsoil. Topsoil shall be appropriately managed and stabilised (which may include covering or hydro-seeding) to prevent weed growth, loss of topsoil from wind and water erosion and minimise dust. The location of topsoil stockpiles shall be documented.

In weed infested areas topsoil shall be removed from site and disposed of. Topsoil stockpiles shall be treated for weeds where weed infestation has occurred.

In the event that topsoil not be adequately stored and lost during the duration of the project, the plan shall document the measures that will be taken to compensate for any losses of seed bank/topsoil quality.

Soil shall be respread as soon as possible after stripping in order to maximise its fertility, seed viability and microbial activity. This shall be factored into scheduling such that rehabilitation begins as soon as all works are completed on a structure by structure basis.

The rehabilitation plan shall indicate the approximate depth of respread soil and where it will be spread.

5.5.5.4 Revegetation

The rehabilitation plan shall indicate the proposed methods for respreading of vegetation including techniques used and how to minimise soil compaction during these works as this can inhibit later revegetation. Respreading of vegetation shall be evenly distributed throughout the temporarily cleared area and shall be used to block off access to the stringing track where possible.

5.5.5.5 Roads, tracks and other compacted areas

Permanent and temporary access tracks shall be documented in the plan, including the methods used to rehabilitate temporary tracks. Access tracks shall not be left with deep wheel ruts, windrows, inadequate water drainage or pooling at the completion of the project. Rehabilitated access tracks shall be ripped, scarified and vegetation respread to minimise access.

5.5.5.6 Runoff and erosion control

The plan shall document the proposed rehabilitation of benched pads (noting that they are unlikely to be un-benched due to exposure of the foundations). The rehabilitation plan shall outline permanent and temporary erosion controls measures for benched pad. No slopes

shall be left at an angle greater than 25% (1V:4H) without permanent erosion controls. Temporary controls such as biodegradable jute matting shall be used for stabilisation of slopes where the likelihood of vegetation regrowth and stabilisation is high.

5.5.5.7 Removal of plant and equipment

The rehabilitation plan shall cover removal of plant, equipment and rubbish at the completion of works (i.e. no litter, plant, spools, tower sections or equipment is to be left on site).

5.5.5.8 Site safety and security

The rehabilitation plan shall cover the security of the site and public safety, following cessation of operations.

5.5.5.9 Maintenance and monitoring

The rehabilitation plan shall propose schedules for maintenance and monitoring (to be undertaken by ElectraNet).

At conclusion of the project, the Contractor shall provide ElectraNet with a final surveyed spatial layer showing the extent of clearance, and extent of rehabilitation.

5.6 Safety and Sustainability Standard 9.7 – Cultural Heritage

5.6.1 Aboriginal Cultural Heritage Management Plan

The Contractor shall prepare a stand-alone Cultural Heritage Management Plan (CHMP) for endorsement from ElectraNet and Barngarla Determination Aboriginal Corporation (BDAC).

The CHMP shall include (as a minimum):

- The Contractor requirements outlined in ElectraNet Cultural Heritage Management Plan;
- The requirements outlined in BDAC cultural heritage reports;
- Management measures for known Cultural Heritage sites (including monitoring);
- Aboriginal Heritage Discovery Protocol detailing the process and procedures should suspected cultural material be discovered during construction work;
- Aboriginal Remains Discovery Protocol detailing the process and procedures should skeletal remains be discovered during construction works;
- Physical Demarcation of Heritage Sites Protocol detailing the process and procedures for demarcating heritage sites so as to avoid damage or disturbance;
- Procedure for minor design changes (in field).

5.6.2 Demarcation of Aboriginal Cultural Heritage Sites

The Contractor shall ensure Cultural Heritage sites are physically demarcated to ensure their location is known. Cultural Heritage sites shall be delineated as No-Go Zones with green bunting and signage (‘Protected area – Keep Out’ or similar) prior to

commencement of earthworks. Signage shall not identify sites as being cultural heritage sites to maintain confidentiality.

The Contractor shall maintain the demarcation for the life of construction and remove the bunting, star pickets and signage when construction is complete.

5.6.3 Discovery Procedure

If Aboriginal sites, objects or remains are discovered during excavation works, the Discovery Procedure detailed in ElectraNet Cultural Heritage Management Plan must be followed.

5.6.4 Non-Aboriginal Heritage

There are two local heritage listed properties in the vicinity of the project alignment. These include a cottage and outbuilding located at 689 White Flat Road in the District Council of Lower Eyre Peninsula and a dwelling located at Section 126, Hundred of Koppio, Yallunda Flat in the District Council of Tumby Bay. ElectraNet has made initial contact with the relevant Councils and has confirmed that, based on the preliminary design, the proposed project works will not impact on the heritage value of these places.

The Contractor shall include non-Aboriginal heritage management measures in the CEMP to ensure that project works do not impact on these heritage places. In drafting the CEMP, the Contractor shall liaise with the relevant Councils to ensure the proposed management measures are adequate to ensure construction will not impact on the heritage values of the heritage places.

If an archaeological artefact believed to be of (non-Aboriginal) heritage significance is encountered during excavation works, disturbance in the vicinity shall cease and the SA Heritage Council shall be notified. Where it is known in advance (or there is reasonable cause to suspect) that significant archaeological artefacts may be encountered, a permit is required prior to commencing excavation works.

5.7 Safety and Sustainability Standard 9.29 – Weed, Pest and Pathogens

The Contractor shall:

- Control and keep controlled all declared plants and animals within the Transmission Line Corridor; and
- Implement weed management measures which minimise the risk of weeds, weed infested soil, or soil borne pathogens being brought onto the property.

Weed management shall be undertaken in accordance with the *Weed Control Handbook for Declared Plants in South Australia July 2018* found at:

- https://www.pir.sa.gov.au/biosecurity/weeds_and_pest_animals/weeds_in_sa

Landholder consent is required prior to using any weed control chemical on the easement.

The List of South Australian declared plants and animals is found at:

- https://www.pir.sa.gov.au/__data/assets/pdf_file/0003/231924/animal_and_plant_declaration_list_extracted_fom_Gazette.pdf

The Contractor shall provide landholders of grazing properties with details of chemicals brought onto the project site to enable landholders to comply with the Livestock Production Assurance accreditation.

For grazing properties, the Weed, Pest and Disease Management Sub-Plan shall, where relevant, implement the requirements of the *National Farm Biosecurity Manual – Grazing and Livestock Production April 2018* located here:

- https://www.farmbiosecurity.com.au/wp-content/uploads/2019/02/National-Farm-Biosecurity-Manual-Grazing-Livestock.pdf

The Contractor shall prepare a Weed, Pest and Disease Management Sub-Plan. The Weed, Pest and Disease Management Sub-Plan shall be an appendix to the CEMP. The Contractor's Weed, Pest and Disease Management Plan shall contain as a minimum the management measures contained in ElectraNet Weed Management Plan.

The Contractor shall include the following minimum requirements in the Weed, Pest and Disease Management Sub-Plan:

- Identification of weeds, pest and diseases relevant to the project site;
- An assessment of Phytophthora risk and relevant mitigation strategies;
- Management measures to ensure construction machinery is clean and free from weed or plant materials and soil pathogens (such as Phytophthora) before entering or leaving Project area;
- Management of entry / exit points so that site soils (potentially containing soil pathogens or weed propagules) are not tracked to or from the project site or between landholders (adjoining land parcels owned by the same owner can be considered one landholder);
- Measures to ensure imported fill is clean and free of weed propagules;
- Regular monitoring of the project site (especially cleared areas) to identify weed outbreaks;
- Regular spot spraying or physical removal where declared weeds are identified (with the consent of the landholder);
- Rehabilitation of cleared areas as soon as practicable after the area is no longer required;
- Covering of soil stockpiles (including topsoil stockpiles) to ensure they do not become weed infested;
- Restriction of vehicle access to defined tracks and access/egress points (so as not to track weeds);
- Ensure waste is appropriately stored to discourage pest animals including covering putrescible and organic storages associated with crib rooms and offices;
- Prepare information, factsheets and posters of weed and pest species for dissemination to site staff (including via project induction, site office noticeboards and pre-start/toolbox meetings);
- Management measures should a landholder complain about weed infestation in or adjacent to the easement;

- Movement, control and destruction of declared plants to be in accordance with the *Landscape South Australia Act 2019* and the *Weed Control Handbook for Declared Plants in South Australia July 2018*. This includes obtaining appropriate approvals prior to transporting declared plants on public roads.
- Baiting for relevant feral animals that may impact on Western Grasswren during the construction period in the Cultana Training Area (Department of Defence)

5.8 Safety and Sustainability Standard 9.3 – Air Quality and Emissions

The Contractor must minimise impacts to air quality such as dust, vehicle emissions and odours and comply with the *National Environmental Protection (Ambient Air Quality) Measure 1998, SA EPA Environmental Protection (Air Quality) Policy 2016*, and SA EPA guidance.

The Contractor shall ensure active dust suppression is implemented for all dust generating activities. The CEMP shall include a detailed dust management plan, including a matrix to determine when active dust suppression (e.g. water trucks) will be used, including consideration of:

- Proximity of sensitive receptors;
- Prevailing weather conditions;
- Potential for dust generation from activities.

The Contractor shall include the following mitigation measures in the CEMP:

- Maintain plant machinery and equipment for efficient operation and minimise engine idle times and queuing;
- Designated vehicle access routes and protocols to be determined and communicated to all contractors;
- Ensure plant / vehicle speeds are limited to minimise dust generation;
- Cover or wet-down soil and construction material stockpiles to minimise dust mobilisation;
- Stop work in areas where construction activities are generating levels of dust that are deemed unacceptable by ElectraNet, the landholder, or authorities;
- Minimise use of on-site cutting and grinding. Where used, employ equipment and techniques such as dust extractors and surface wetting to minimise dust. Consider use of specific plant such as wet cutting saws, vacuum extraction or block/slab splitters;
- Regularly water exposed surfaces, including exposed stockpiles and unsealed roadways, or seal high use access tracks with biodegradable agents to suppress dust generation;
- Maintain transparent communication lines for community members to contact the Construction Manager (or delegate).

5.9 Safety and Sustainability Standard 9.11 – Hazardous Substances

The Contractor shall identify all Potentially Contaminating Activities (PCAs) along the transmission line easement (noting that some farming practices are classified as PCAs) prior to construction and consider any PCAs in the use of fill and dewatering procedures.

The Contractor shall:

- Handle fuels in accordance with relevant standards and guidelines;
- Ensure diesel fuel storages at laydown areas are bunded;
- Clean up spills if they occur, according to guidelines;
- Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies;
- Store chemicals and fuels in appropriate containers suitable for purpose;
- Ensure hydrocarbon, polychlorinated biphenyl, and chemical storage, handling and disposal meets the standards outlined in AS:1940 and SA-EPA Standards (incorporate in Waste Management Sub-Plan);
- Ensure current, hard copy Safety Data Sheets are on-site for each substance;
- Ensure refuelling activities occur >50m from any watercourse or sensitive area;
- Ensure spill kits are available where potentially contaminating activities will be undertaken;
- Ensure spills >5L are reported to ElectraNet;
- Smoking policies shall include a management plan for cigarette butts (cigarette butts shall be disposed of in bins and not on the ground);
- Designated refuelling areas shall be marked on CAZ drawings and on GIS.

5.10 Safety and Sustainability Standard 9.16 – Noise and Vibration Management

5.10.1 Noise

The Contractor shall ensure the operational noise (corona) meets the requirements of the *SA EPA Environment Protection (Noise) Policy 2007* (both day and night criteria).

The Contractor shall take all reasonable measures to minimise construction noise and limit noisy activities adjacent to sensitive receivers to between 7am to 7pm Monday to Saturday where possible. The CEMP shall outline the noise mitigation and landholder notification procedures that will be undertaken for noise activities outside of these hours (where a sensitive received may be impacted).

The Contractor shall include the following mitigation measures in the CEMP:

- Ensure SA Government approvals for night works are obtained if required;

- Machinery at the site to operate in accordance with relevant sections of the *SA Environment Protection (Noise) Policy 2007* and the *SA EPA Noise Information Sheet (2014)*;
- Implement proactive noise control strategies if required, such as shielding for compressors, power generators and other fixed plant; and temporary acoustic barriers or enclosures;
- Substitution of alternative processes if excessive noise or vibration is produced;
- Truck movements to be limited to the designated freight route;
- All vehicles and equipment will be appropriately serviced and maintained;
- Ongoing communication with the community regarding times of excessive noise or vibration if required.

5.10.2 Visual Amenity

The Contractor shall maintain good housekeeping at all project sites and ensure that work sites are neat and tidy (including laydowns), including regular removal of refuse and surplus materials. Bins shall be available for site personnel at active worksites.

The Contractor shall use street sweepers to remove any material from the construction site deposited onto public roads.

5.10.3 Vibration

The Contractor is responsible for appropriate vibration management, including ensuring that construction activities do not cause vibration-induced damage to structures, buildings or services located within or near the project site.

The Contractor shall bear all costs associated with any damage caused to existing structures, buildings and services as a result of any construction activity. This extends to responding to any claims of vibration induced damage, which may involve providing evidence that vibration levels associated with construction activities were insufficient to cause damage.

5.11 Safety and Sustainability Standard 9.27 – Waste Management

The Contractor shall:

- Ensure wastes are minimised and segregated with appropriate storage / disposal strategies;
- Manage Listed Wastes appropriately;
- Regularly remove all wastes from the project site;
- Dispose of wastes to duly authorised landfills or recycling facilities.

The Contractor shall remove all waste spoil from areas that require rehabilitation, include spoil from foundation drilling and excavation.

The Contractor shall be responsible for removal and disposal of all rubbish and wastes in the easement at the commencement of construction, even where the rubbish or waste is historical waste resulting from landholder activities or illegally dumped waste.

The Contractor shall include the following mitigation measures in the Waste Management Sub-plan of the CEMP:

- Integration of the Waste Hierarchy – where possible eliminate waste generation and reuse packaging materials / surplus materials where appropriate (provision to local Men's Shed or other community organisations is encouraged);
- Site personnel inductions to include appropriate storage (including separation) and disposal / recycling of waste;
- Work areas to be maintained in a neat and orderly manner;
- Waste will be disposed of regularly by the persons/organisation undertaking the activities, with appropriate signage and separation of hard organic material from putrescible organic material;
- Off-site waste disposal will be in accordance with SA EPA and Zero Waste SA guidelines / requirements;

If a septic tank or other wastewater control system is to be installed at the temporary construction compounds / camps, a wastewater control system application must first be lodged with and approved by the State Commission Assessment Panel. When the development is decommissioned, any wastewater control system installed on the site will also need to be decommissioned to State Commission Assessment Panel requirements.

The Contractor shall ensure that turkeys nests/dams, sumps and disposal pits are appropriated lined and located within clearance footprints. Disposal pits must be emptied, removed and rehabilitated when full. All turkey's nests, sumps and disposal pits must be removed and rehabilitated at the end of concreting activities. All plastic and concrete waste must be removed from site.

The Contractor shall ensure that spill and waste mitigation controls are implemented where maintenance activities are undertaken, including appropriate management and disposal of waste oil, filters, and rags impregnated with residues which are classed as Listed Wastes.

5.12 Safety and Sustainability Section 8.3 – ElectraNet Transmission Asset Access

5.12.1 Existing Access Tracks

The Contractor shall provide a spatial layer indicating which existing access tracks are proposed to be used for the project for approval by ElectraNet. The Contractor shall adhere to access tracks agreed between ElectraNet and landholders. The Contractor shall not access tracks labelled as private access tracks in ElectraNet Spatial Data.

5.12.2 Pegging

The Contractor shall peg and delineate structure pads with a visible barrier and maintain the visible barrier after clearance to ensure that a visual reminder of CAZ boundaries can be seen by site staff.

5.12.3 Landholder Liaison Plan

ElectraNet shall provide the Contractor with details of landholder agreements including any Special Requirements.

The Contractor shall prepare a Landholder Liaison Plan. The Landholder Liaison Plan shall be a sub-plan to the CEMP. The Contractor's Landholder Liaison shall respond to the requirements of ElectraNet Landholder Management Plan.

The Contractor's Landholder Liaison Plan shall include:

- Process to manage landholder Special Requirements;
- Proposed communication strategy with landholders;
- Process to respond to queries and complaints;
- Procedures for the Contractor to contact individual landholders prior to entry to ensure that any specific requirements due to stock or cropping activities are considered;
- Methodology for recording interactions/discussions with landholders;
- Protocol for site behaviour and adherence to the Farm Rules;
- Management of LAPs;
- Management of Infrastructure Works Programs in accordance with ElectraNet Management Plan.

The Contractor shall make allowance in the construction program to allow for lead time for landholder contact prior to entry to land.

The Contractor shall make every endeavour to schedule works to minimise disruption to the operations of the landholder. The Contractor shall make allowance in the construction schedule to accommodate access constraints requested by the landholder.

5.13 Safety and Sustainability Standard 9.28 – Water Management

5.13.1 Water Quality

The Contractor shall:

- Ensure works are undertaken in a manner compliant with applicable Water Affecting Activity (WAA) permits;
- Undertake the works in a way that does not block, damage or interfere with waterways or waterbodies (whether or not there is water present);
- Ensure water crossings minimise interference with natural channel form and capacity.

5.13.2 Sedimentation, Erosion and Drainage Management

The Contractor shall:

- Prepare a Sedimentation, Erosion and Drainage Management Plan (SEDMP);
- Plan and schedule construction activities to manage erosion risk;
- Undertake earthworks in a manner that conserves topsoil and minimises disturbance;

- Where possible, avoid disturbance to areas of high or extreme erosion risk;
- Schedule earthworks to retain as much protective ground cover as possible at all times;
- Stabilise disturbed areas;
- Program site stabilisation and revegetation as soon as possible after completion of earthworks.
- Install erosion and sediment control structures before commencement of site disturbance and construction works, including Sedimentation, Erosion and Drainage management measures for earthworks including site clearance, soil stockpiling, benching, new tracks and other infrastructure on slopes, management of existing tracks and earthworks in or adjacent waterways or water bodies;
- Install erosion and sediment control structures around topsoil storage stockpiles to ensure topsoil is protected for future reuse during rehabilitation;
- Implement a regular inspection and monitoring program;
- Ensure site workers, subcontractors and delivery drivers are made aware of their responsibilities in relation to erosion and water quality protection.

5.13.3 Water Use and Management

The Contractor shall ensure that all reasonable efforts to minimise water usage are implemented.

The Contractor shall:

- Undertake dewatering and disposal activities in accordance with the SA EPA guideline 'Environmental management of dewatering during construction activities;
- Undertake advance testing of groundwater prior to undertaking dewatering on PCA land;
- Plan ahead to understand where dewatering will be required, and where the proposed disposal location will be;
- Detail in the CEMP the methodology for measuring and testing dewatered water prior to disposal. The Contractor shall plan to undertake testing of water prior to disposal, mid-flow, and at the end of disposal as a minimum;
- Ensure management measures are implemented to minimise the disposal of particulates (e.g. a dewatering sock). Dewatering socks shall be removed immediately after conclusion of the dewatering activity.
- Maintain records of kL of produced water and make them available to ElectraNet upon request;
- Obtain Water Affecting Activity permits for construction of access tracks across watercourses, bore extraction, and construction of culverts or erosion control measure where required by Landscape SA Eyre Peninsula.

The Contractor shall consider the following mitigation measures adjacent waterways and waterbodies:

- Progressive stabilisation of soil and areas disturbed by earthworks using vegetation (hydro seeding), matting or other techniques;
- Treatment measures such as sediment fences, silt socks and temporary swales and basins placed to manage erosion and drainage;
- A water diversion berm on the uphill side of pads/laydowns to minimise erosion risk;
- Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies;
- Storage of construction materials and hazardous waste at least 50m from drainage lines or watercourses;
- Control the entry and exit of stormwater runoff from work areas including clean stormwater diversion away from and around materials storage areas;
- Stop work in the event of encountering potentially contaminated soil and reassess site drainage to ensure sediments from potentially contaminated soils are contained.

5.14 Safety and Sustainability Standards Section 6.5 – Emergency Response

The Contractor's Emergency Management Plan shall include environmental emergency procedures.

The Contractor shall prepare a Bushfire Management Plan with additional measures to prevent and manage fire risk, in consultation with the CFS and State Emergency Service (SES). The Contractor shall liaise with the State Bushfire Co-ordination Committee (SBCC) regarding project development.

5.15 Safety and Sustainability Standards Section 2.3 – Consultation, Communication, Leadership and Worker Participation

The Contractor's CEMP shall include a procedure for managing external complaints and feedback.

5.16 Safety and Sustainability Standards Section 11 – Event Notification, Reporting and Investigation Process

The Contractor shall:

- Obtain access to ElectraNet reporting systems;
- All incidents and near misses must be reported to your ElectraNet supervisor immediately, with entry into IMS within 24 hours. Ensure this task is assigned to an accountable person, and ensure information is shared with sub-contractors;
- Ensure that all project related incidents / near-misses / hazards are communicated to ElectraNet via the agreed monthly reporting template;
- For medium risk level or above (as classified/assessed by ElectraNet) – the environmental incident investigation report should be provided to ElectraNet within 28 days.

5.17 Safety and Sustainability Standards Section 6.6 – Management for Bushfire

Refer to standard requirement outlined in the Safety and Sustainability Standards.

5.18 Safety and Sustainability Standard 9.23 – Soil Management

The Contractor shall prepare an UXO Management Plan for construction work with the Department of Defence land.

The Contractor shall ensure that any fill brought onto the project site meets the SA EPA 'Waste Fill' criteria. The CEMP shall detail the proposed source of borrow material or fill for the project. The Contractor shall seek approval from ElectraNet to re-use soil excavated during construction works on site.

If there is a proposal to use sand, gravel, stone, shell, shale or clay from an adjacent landholder (and not a licenced quarry), the Contractor shall ensure that the extraction has approval pursuant to the Mining Act 1971 where required by the Department of Energy and Mining (contact Alistair Walsh, ElectraNet Regulator Mining on 0477 743 836 or alistair.walsh@sa.gov.au).

The Contractor shall include the following mitigation measures in the CEMP:

- Undertake risk review of potential contaminants that could be encountered during construction;
- Spill kits to be available on site;
- Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies;
- Hazardous substances to be appropriately stored on sealed areas with bunding, and away from drainage pathways;
- Refuelling to be undertaken on sealed areas at least 50m away from drainage pathways;
- Mixing of soil types to be avoided (i.e. contaminated/non-contaminated);
- Material removed from the site to landfill, or for reuse at another site, will be undertaken in accordance with SA EPA regulatory requirements, such as a Waste Soil Assessment on surplus soils;
- Cultana Training Area is classified as a Potentially Contaminating Activity (PCA). The Contractor shall implement appropriate management where surplus fill requires off-site removal / disposal;
- Soil or other material deposited onto roadways having originated from project plant / vehicles to be removed;
- Emergency response plan to be followed for accidental spills.

5.19 Safety and Sustainability Standard 9.4 – Asbestos Management

The Contractor shall ensure that procedures are in place should any asbestos or asbestos containing material be encountered. The Contractor shall be responsible for management removal of any asbestos or Asbestos Containing Materials (ACMs) encountered on the project site in accordance with SA EPA Guidelines.

Appendix G Construction Environmental Management Plan (Draft)

This is a subordinate management plan to be used in conjunction with the Project Management Plan

EPLink
Environmental Management Plan

Customer: ElectraNet

Contract Number: EC.14172B

Document Preparation and Control	Document Review
Melanie Dixon - Environmental Advisor	Matthew Hargreaves - Zero Harm Advisor
Document Approval	**Signature**
Darren Pegram - Construction Manager	

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A		Draft	First version for ElectraNet review

TABLE OF CONTENTS

1 PURPOSE

This plan defines the environmental management principles, processes, procedures, systems, tools and templates implemented for use throughout the duration of the project.

This plan is subordinate to the Project Management Plan (PMP). This plan has been developed to:

- satisfy the requirements of the ElectraNet contract and other ElectraNet environmental and heritage requirements;
- satisfy the requirements of the relevant approvals and management plans for the project; and
- support the project team in completing the requirements of the project.

2 DOCUMENT SCOPE

The scope of this management plan applies to the EPLink. This plan applies to all aspects of environmental and heritage management for this scope of the project.

The target audiences for this plan are all Downer and Coffey workers, and any other relevant stakeholders.

3 PROJECT MANAGEMENT FRAMEWORK

The Downer project management framework aligns and integrates the project functions which define the project's delivery methodologies and processes. The Project Management Plan (PMP), as a key element of the project management framework, is the integration document which identifies and details both the standard Downer project management practices, structure, and execution methods and any project specific requirements for the project.

The PMP incorporates a number of subordinate management plans which provide the specific functional detail required to successfully deliver the project. The relationship between the Downer IMS, the PMP and subordinate management plans is illustrated in the following figure.

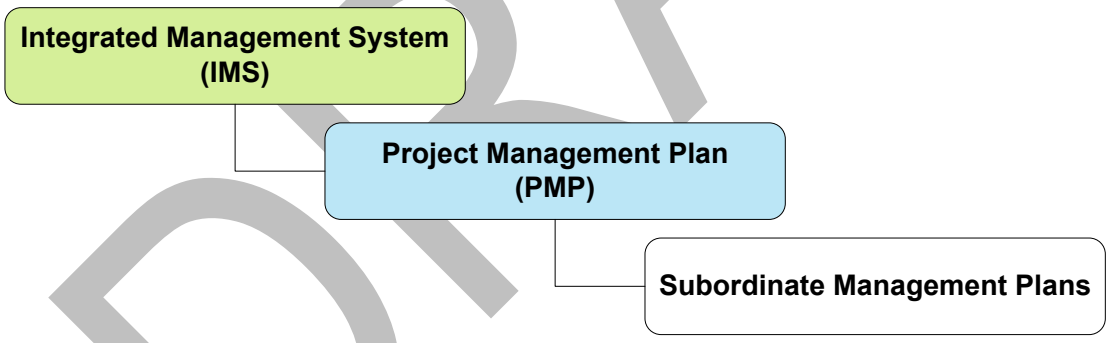

Figure 1: Project Management Plan Structure

The plans reference any IMS documents (including but not limited to, procedures, work instructions, and forms), customer specific requirements, and project specific documents required to execute the project.

The PMP provides project specific details including, but not limited to, the following:

- Project information, i.e. background, project location, and project description
- Scope of work, i.e. scope of work narrative, basis of design, battery limits, and scope of services; and
- Project objectives and values, i.e. objectives, overarching principles, values, and key performance indicators (KPIs) for the project.

All positions in the project team have a clearly defined role and set of responsibilities that are included either in the PMP or relevant subordinate management plan. All members of the project team are made aware of and understand their responsibilities prior to commencing work on the project. Refer to *Annex A – Project Roles & Responsibilities* for the roles and responsibilities for environmental management.

The PMP and subordinate management plans are audited throughout the duration of the project to maintain compliance and updated as required. Updates to the PMP and subordinate management plans are subject to the document review and approval process detailed in the PMP.

Project Specific Requirements

The following sub-plans have been developed with supporting information to this Plan:

- Weed, Pest and Disease Management sub-plan
- Soil and Water Management sub-plan
- Landholder Liaison sub-plan
- Flora and Fauna Management sub-plan

The Cultural Heritage Management sub-plan is still to be developed.

4 REFERENCED & ASSOCIATED DOCUMENTS

GROUP DOCUMENTS	
POLICIES	
DG-ZH-PO200	Environmental Sustainability Policy
PRINCIPLES	
DG-ZH-PN002	10 Environmental Principles
PROCEDURES	
DG-DM-PR003	Operational Change Management Procedure
DG-QA-PR003	Internal Audits Procedure
DG-RM-PR003	Project Risk and Opportunity Management
DG-ZH-PR006	Incident Management Procedure
DG-ZH-PR007	Zero Harm Performance Monitoring and Reporting Procedure
DG-ZH-PR015	Emergency Management Procedure
DG-ZH-PR077.1	Sustainability Data Collection and Reporting Procedure
DG-ZH-PR116.1	Inspections Procedure
STANDARDS	
DG-HR-ST013	Training & Competency Management Standard
DG-ZH-ST002	Legislative and Other Requirements Standard
DG-ZH-ST013	Zero Harm Worker Consultation Standard
DG-ZH-ST063	Waste Management Standard
DG-ZH-ST071.1	Biosecurity Management Standard
DG-ZH-ST071.2	Flora and Fauna Management Standard
DG-ZH-ST076	Heritage Management Standard
DG-ZH-ST069	Environmental Noise and Vibration Standard
DG-ZH-ST070	Air Quality Management Standard
REGISTERS	
Downer Group Definitions Register	

PROJECT SPECIFIC DOCUMENTS	
PLANS	
14172B-DOW-PLN-PRM-000-0002	Project Management Plan
14172B-DOW-PLN-PRM-000-0003	Safety Management Plan
14172B-DOW-PLN-PRM-000-0004	Quality Management Plan
14172B-DOW-PLN-PRM-000-00015	Emergency Preparedness Management Plan
PROJECT APPROVALS AND CLIENT DOCUMENTS	
CA	921/V003/19 Crown Development Decision Notification for Eyre Peninsula Transmission Supply Project (June 2020)
DA	Eyre Peninsula Transmission Supply Project Development Application (November 2019). Prepared by Golder Associates for ElectraNet
EPBC	2019/8583 - Eyre Peninsula Transmission Line EPBC Act Referral
EOR	ElectraNet Section 4.3 Environmental Operating Requirements for Capital & Operational Works Projects and Asset Maintenance Service Providers (September 2019)
SEMP	ElectraNet Scope of Environmental Management Plan EC.14172 – Eyre Peninsula Transmission Supply (January 2020)
S&S	ElectraNet Safety and Sustainability Standards (July 2020)
REFERENCE PLANS AND REPORTS	
BAR	Eyre Peninsula Transmission Line - Biodiversity Assessment Report (July 2014). Prepared by EBS Ecology for ElectraNet
LMP	ElectraNet Landholder Management Plan EC.14172 – Eyre Peninsula Transmission Supply (June 2020)
NVA	Eyre Peninsula Transmission Line - Native Vegetation Assessment (December 2019). Prepared by EBS Ecology for ElectraNet
TSMP	Draft Eyre Peninsula Transmission Line – Threatened Species Management Plan (Construction) (April 2020). Prepared by EBS Ecology for ElectraNet
WPD Plan	Eyre Peninsular Reinforcement Project - Weed, Pest and Disease Management Plan (February 2020). Prepared by Golder Associates for ElectraNet

5 DEFINITIONS

The following terms are used in this document and are included in ***Downer Group Definitions Register***.

Downer Worker	All individuals working for Downer as: employees, contingent labour hire, contractors, subcontractors, apprentices, trainees, and work experience students.
Integrated Management System (IMS)	A document library controlled by Downer that: ▪ is designated as the IMS repository(s) for the single source of truth for all business processes ▪ is designed to provide consistent process controls, meet the requirements of external standards, and link and integrate core business processes; and ▪ requires documents to be version controlled and identified by a document code and approved prior to releasing or removing from the document library.
INX	The Zero Harm database used to record, investigate and follow-up events, including audits, hazards, incidents, inspections, meetings, observations, risk assessments, reviews, and suggestions.

Subcontractor	An individual or organisation that signs a contract with Downer to perform part or all of the obligations of a Downer contract, including the performance of work, i.e. provision of labour and/ or labour services. Examples of subcontractors include contingent labour hire, independent contractors, consultants and cartage contractors.
Task-based Risk Assessment	A risk assessment for a specific task or work activity, e.g. Job Hazard Analysis (JHA), and Job Safety and Environmental Analysis (JSEA).
Zero Harm (ZH)	Health, safety, environment and community.

6 STANDARDS & LEGISLATION

6.1 Legislation & Regulatory Requirements

Downer is aware of the importance of complying with all applicable environmental measures, and where practicable, exceeds the minimum legislative and regulatory requirements.

Downer's obligations include conditions of regulatory approvals as well as applicable environmental legislation. Downer and the project team monitor changes to environmental legislation through monthly updates on environmental law changes provided by EnviroLaw, and ensure compliance is maintained throughout the project's lifecycle.

The specific legislation applicable to this project are listed in the following table as well as detailed in each of the sub-plans.

Environmental Legislation
Commonwealth Legislation
Environment Protection and Biodiversity Conservation Act 1999
Environment Protection and Biodiversity Conservation Regulations 2000
Aboriginal and Torres Strait Islander Heritage Protection Act 1984
Native Title Act 1993
State-based Legislation
Native Vegetation Act 1991
Environment Protection Act 1993
Landscape South Australia Act 2019
National Parks and Wildlife Act 1972
Aboriginal Heritage Act 1988
Heritage Places Act 1993

6.2 Compliance Tracking

Compliance tracking is undertaken on a continuous nature during execution using Downer's compliance management system **INX**, which allows authorised users to:

- access the Compliance Tracking Database, Incident Reporting Database, and Complaints Register; and
- sort and evaluate the compliance status of all conditions at any time.

The Compliance Tracking Database includes a protocol to address:

- auditing requirements
- reporting requirements; and
- incident response mechanisms.

Project Specific Requirements

All environmental incidents and hazards will be verbally reported to ElectraNet within 1 hour of identification outlining factual information.

An investigation report from INX will be provided to ElectraNet within 24 hours.

Environmental incidents and hazards will be reported through ElectraNet's online Incident Management System (IMS) or SAP system.

7 PROJECT DESCRIPTION

The existing electrical infrastructure servicing the Lower Eyre Peninsula region consists of a main radial transmission supply of 132 kV extending from Whyalla to Yadnarie Substation located approximately 8.5 km west of Cleve. A radial line also extends west to Wudinna and another one south to the Port Lincoln Substation. Emergency supply to Port Lincoln is provided by Synergen's three distillate-fired gas turbine generators located at Port Lincoln.

Electranet Project EC.14172 "Eyre Peninsula Transmission Supply" has been initiated to provide a new, high reliability overhead transmission line connection to satisfy increased demand and replacement of the existing asset which is nearing end-of-life.

7.1 Background

The transmission lines component of the project scope comprises new double-circuit lines to replace the existing 132 kV single circuit feeders F1801 & F1810 as follows:

- 136 km Double Circuit 275 kV line construction from Cultana to Yadnarie
- 126 km Double-circuit 132 kV line from Yadnarie to Port Lincoln

New line corridors have been defined that are generally immediately adjacent to the existing easement.

Further project and background information is provided in each of the sub-plans.

8 ENVIRONMENTAL MANAGEMENT OVERVIEW

8.1 Objectives & Targets

In consideration of ***DG-ZH-PO200 Environmental Sustainability Policy***, contractual requirements and any identified hazards and/ or risks for the project, Downer has developed a standard set of objectives and targets that are applicable to all projects, as per the following table.

These objectives and targets are managed to ensure that all identified, as well as potential environmental impacts that could reasonably be expected to occur during the works, fall within acceptable and agreed limits. This is achieved through proactive environmental management planning prior to carrying out particular elements of work.

Focus Area	Objective	Target
Legal Compliance	▪ Compliance with all legal requirements. ▪ Undertake the project in accordance with environmental approvals.	▪ No regulatory infringements, including PINS and prosecutions. ▪ 100% compliance with statutory approvals.
Monitoring	Complete internal environmental audits in accordance with the pre-planned audit schedule.	Complete 100% of scheduled environmental audits.
Reporting	Promote a positive reporting culture. Ensure all environmental observations, hazards and near misses and incidents are entered into **INX**. Ensure actions are closed out by the nominated due dates.	0 actions arising from incident overdue >30 days.

Focus Area	Objective	Target
Planning	Ensure that Downer workers are provided with regular and up-to-date information on environmental aspects for the duration of the project.	Review the content of the Environmental Management Plan prior to 25% of the scheduled project duration to maintain the currency of information provided to Downer workers and others.
Risk Management	Ensure that Downer workers are familiar with hazards and risks associated with the execution of the scope of work (work under contract).	The Project Risk & Opportunity Register, controls, and treatment plans are regularly reviewed and communicated to the project team in accordance with ***DG-RM-PR003 Project Risk and Opportunity Management Procedure***.
Consultation	Ensure that Downer workers are regularly consulted on matters that affect the environment.	Conduct pre-start meetings (daily), and toolbox meetings (monthly).
Training	Ensure Downer workers are provided with training to enable work practices to be undertaken that are safe and minimise risk to the environment.	All Downer workers undertake, as a minimum, the two levels of induction training, i.e. project specific induction and Downer site specific induction.

Project Specific Requirements

After review of the relevant documents there are no project specific requirements.

8.2 Hazards and Risk Management

Throughout the duration of the project, risks are identified, assessed and controlled using of a number of different tools. The identification of environmental activities and the respective potential impact to the environment is determined following a review of the:

- contract and its associated environmental conditions
- consent conditions as applied by the State and Federal governments; and
- actual scope of work and consideration of all applicable legislation, standards, and other conditions.

Risk is managed during the project's phases in accordance with the PMP. While onsite, the processes, tools, and control hierarchy used to manage risk are defined in the project's Zero Harm risk management processes and procedures. Risk assessments are completed as follows:

- Project Risk & Opportunity Register is developed by relevant members of the project team, in consultation with the client. Unless specified otherwise by the customer, the project team is responsible for maintaining the Project Risk & Opportunity Register.
- all high-risk tasks are assessed by having a task-based risk assessment (e.g. SWMS, JSEA etc.) developed for them as per the project's Zero Harm risk management processes and procedures.
- register of task-based risk assessments is developed for the project as per the project's Zero Harm risk management processes and procedures.
- Zero Harm start-up (i.e. pre-commencement) toolbox talks are conducted to communicate key hazards, risks, and the task-based risk assessment, and are documented accordingly.
- Zero Harm pre-start and risk control assessments are conducted prior to commencing work each day.

Project Specific Requirements

All environmental incidents and hazards will be verbally reported to ElectraNet within 1 hour of identification outlining factual information.

An investigation report from INX will be provided to ElectraNet within 24 hours.

Project Specific Requirements

Environmental incidents and hazards will be reported through ElectraNet's online Incident Management System (IMS) or SAP system.

8.3 Change Management

Zero Harm related changes in the workplace are managed using ***DG-DM-PR003 Operational Change Management Procedure***, which describes the change management process of:

- initiate and plan the change
- consult on the change
- approve the change
- implement the change; and
- review the change.

Project Specific Requirements

After review of the relevant documents there are no project specific requirements.

8.4 Subcontractor Management

Subcontractors comply with the requirements of the subcontract agreement which includes the details of all environmental requirements while performing works under the control and direction of Downer. Subcontractor personnel adopt the same responsibilities as outlined for Downer personnel, inclusive of reporting all matters relating to health, safety, and the environment.

Pre-qualification evaluation and assessment, engagement, review and onsite management and monitoring of subcontractors is undertaken as per the project's Project Management Plan (PMP).

Project Specific Requirements

After review of the relevant documents there are no project specific requirements.

9 TRAINING & AWARENESS

Downer recognises the importance of employee training and induction, and the critical role it plays in supporting the safe and environmentally responsible conduct of project operations.

Downer promotes the following:

- A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm.
- In determining what activities are required to be taken, the following are considered (amongst other things):
  - The nature of the pollution or potential pollution and the sensitivity of the receiving environment.
  - The current state of technical knowledge and likelihood of successful application of the activities that might be taken.
  - The financial implications of the activities that might be taken, as those implications relate to the class of person undertaking activities of the same or a similar kind.

Downer manages project activities in such a manner as to:

- minimise impact to the environmental; and
- educate personnel on their responsibilities relating to protecting the environment.

All personnel have environmental management responsibilities, and Downer ensures that these responsibilities are communicated to all personnel via appropriate environmental management training, including the initial environment induction.

Project Specific Requirements

All personnel must be fully informed of their specific environmental obligations and are suitably trained and competent to undertake works in accordance with ElectraNet and Downer requirements.

Specific training for key operational staff prior to the commencement of works will be:

- Spill management
- Weed and disease hygiene

9.1 Environmental Principles

Downer has established ***DG-ZH-PN002 10 Environmental Principles*** that is a set of fundamental principles that all projects adhere to at all times. The Environmental Principles are prominently displayed on-site in communal areas, on notice boards and the Downer **IMS**.

Project Specific Requirements

After review of the relevant documents there are no project specific requirements.

9.2 Inductions

Environmental awareness training is provided to all personnel involved with the project, including all subcontractors and visitors, via inductions, as per ***DG-HR-ST013 Training & Competency Management Standard***.

A project specific induction is delivered to all personnel and subcontractors highlighting the hazards specific to the site, and the controls necessary to manage them appropriately. Induction handbooks and associated training presentations may be used for the induction. Personnel are re-inducted annually. The environmental component of the induction is tailored for each group of inductees (as applicable) to ensure that specific components of work are adequately addressed. This method of environmental awareness training ensures that all personnel are aware of:

- the importance of conformance with environmental policy and procedures and the requirements of the Environmental Management Plan and associated sub-plans (if applicable)
- ***DG-ZH-PN002 10 Environmental Principles***
- the significant environmental aspects of the project works and the environmental benefits of improved work performance
- their roles and environmental responsibilities for achieving conformance with environmental policy and procedures and with the Environmental Management Plan, including site emergency preparedness and response requirements; and
- the potential consequences of departure from specified operating procedures.

The project's environmental induction is valid for a period of 12 months, after such time the person undertakes refresher training.

All personnel, including subcontractors, attend inductions prior to commencing work on the project. Records of inductions are recorded in the project's training matrix.

Project Specific Requirements

The following topics are covered by the induction with the aim of instilling an understanding of the environmental impacts of daily work practices and activities, and to encourage alternative practices, where feasible. The site induction program will include the following:

Project Specific Requirements

- Details of this EMP
- Regulations and compliance
- Waste management
- Cultural heritage areas and management
- Water management
- Weed, pest and disease management
- Hydrocarbon and hazardous substances
- Event/incident management

9.2.1 Visitor Inductions

Subcontractors that attend site on an intermittent basis, e.g. a delivery driver, are typically inducted on a visitor basis. Subcontractors are assessed by the relevant member of the project team on a case-by-case situation to determine if a subcontractor is required to undertake a visitor induction or full site induction.

A visitor induction is valid for a period of 2 weeks.

Project Specific Requirements

Short Term Access is required for any person needing access to the project that either:

- Does not hold a current ElectraNet Access Authorisation; or
- Is employed by a company who does not have current ElectraNet endorsed status; or
- Is required to perform work at a level for which their current authorisation does not allow.

This access must be directly supervised and controlled at all times and will require induction training. Short Term Access can be done in advance and is valid for seven (7) days.

9.3 Training

Employee training and competency requirements are reviewed annually, or as an employee's role changes.

Downer maintains a database of training records and employee competencies that provides capabilities such as tracking expiry of time limited competencies and programming of training requirements. Personnel who undertake activities with significant environmental risk complete specialist environmental training, which is conducted by Downer (with support of the customer), in addition to the environmental induction.

Specialist training includes, but is not limited to:

- vehicle inspection and wash down procedures
- erosion and sediment control principles and practice
- dust control procedures
- response in heavy rain events
- emergency response procedures; and
- hazardous materials spill response.

Selected personnel, including all plant service personnel, undertake awareness training in the correct use of spill response kits.

Project Specific Requirements

All personnel must be fully informed of their specific environmental obligations and are suitably trained and competent to undertake works in accordance with ElectraNet and Downer requirements.

A training register will be maintained which lists the following as a minimum: name, contact number, date of training and position/activities.

10 COMMUNICATIONS

10.1 General Communication

Achieving effective communication between all parties is critical to ensure that the requirements of this EMP are met. Downer uses a number of methods to communicate with employees, subcontractors, and visitors. The requirements, frequency, information, and methods of recording communication are outlined in the PMP, ***DG-ZH-ST013 Zero Harm Worker Consultation Standard***, and the project's Zero Harm risk management processes and procedures.

Typical methods of communication on site:

- pre-start meetings
- Zero Harm start-up (i.e. pre-commencement) toolbox talks
- Zero Harm inductions
- noticeboards
- toolbox talks; and
- environment alerts.

Pre-start and toolbox meetings include delivering key environmental messages and audit and inspection results and communicating environmental risks for the scheduled activities.

Pre-start meetings are minuted, and the minutes reviewed and signed by the meeting chairperson and made available to all Downer workers and visitors (if applicable) onsite.

The Zero Harm Manager ensures that relevant documentation is filed electronically, and hard copies made available to personnel. Hard copy documentation made available to personnel typically includes:

- the project's Emergency Preparedness Management Plan
- standard operating procedures
- work instructions
- client procedures/policies
- fatal risk control standards
- risk assessments
- minutes of meetings; and
- copies of pertinent legislation and codes of practice.

Project Specific Requirements

After review of the relevant documents there are no project specific requirements.

10.2 Dispute Resolution

Downer's dispute resolution process meets the requirements of the Work Health and Safety Regulation 2011 and is included in ***DG-ZH-ST013 Zero Harm Worker Consultation Standard***.

Project Specific Requirements

After review of the relevant documents there are no project specific requirements.

10.3 External Communication

Direct communication with the media and general public is not permitted by Downer. Any requests from the media or general public will be referred to ElectraNet. All direct communication with statutory authorities will be undertaken by ElectraNet.

Project Specific Requirements

Details of communications with landholders is provided in the Landholder Liaison sub-plan.

11 MONITORING & CORRECTIVE ACTION

11.1 Audit & Inspection

Downer conducts internal environmental audits in accordance with ***DG-QA-PR003 Internal Audits Procedure*** to ensure the ongoing adequacy and effectiveness of this EMP and **IMS**, and to facilitate continuous improvement. Environmental audits are planned and scheduled with all other project audits, and detail the type of audit, duration, auditors (including the Lead Auditor), and dates. Refer to the project's Quality Management Plan for further information. Audits are conducted by the Environmental Manager or nominated qualified delegate.

The findings from internal audits on the implementation of this EMP and **IMS** for the project are provided to the Project Manager. Any client requirements for audits are also defined in the project's Quality Management Plan.

In addition to planned internal audits, the project team verifies environmental conformance to the Environmental Management Plan as per the reviews in the following table and ***DG-ZH-PR116.1 Inspections Procedure***.

Type of Review	Goal	Frequency
Solid Wastes	▪ Recycling where practical and economically feasible. ▪ Appropriate use of landfill site for disposal. ▪ Appropriate placement and use of site amenities.	▪ Spot checks of recycling facilities. ▪ Informal daily, formal fortnightly inspections
Flora and Fauna	Compliance with section Flora and Fauna Management sub-plan.	Informal daily, formal fortnightly inspections
Erosion and Sediment Control Measures	Implementation, monitoring and maintenance of all soil erosion and sediment control measures defined in Soil and Water sub-plan.	Informal daily, formal fortnightly inspections.
Work Site Storage and Handling of Fuels, Oils, Chemicals, and Paints	Compliance with dangerous substances regulations and hydrocarbons and chemicals procedures defined in Soil and Water sub-plan.	Informal daily, formal fortnightly inspections.
Hydrocarbon and Oil Spills	Compliance with Soil and Water sub-plan.	Continuous monitoring by Environmental Advisor and/ or Site Supervisor. Spot checks of sites and formal fortnightly inspections

Type of Review	Goal	Frequency
Air Quality and Dust Management	Compliance with Soil and Water sub-plan.	Continuous monitoring by Environmental Advisor and/ or Site Supervisor. Spot checks of sites and formal fortnightly inspections
Applicable Impact Mitigation Strategies	Compliance to task-based risk assessment requirements and the Environmental Management Plan.	Informal daily, formal fortnightly
Housekeeping	▪ Tidy work site with no litter and all waste contained in appropriate containers. ▪ Containers to be emptied and disposed of at appropriate intervals.	Informal daily, formal fortnightly inspections

Whenever practicable, personnel conducting an audit address identified deficiencies during the course of the inspection. In all other cases the Supervisor is responsible for ensuring action and a date for completion is assigned to each outstanding action. The Environmental Advisor monitors the progress of rectification of any outstanding corrective actions.

Results of all audits are made available to personnel via pre-start, and/or toolbox meetings.

Project Specific Requirements

The following will be implemented in regards to audits:

- Ensure personnel are trained and competent to undertake environmental inspections and audits
- Address any non-conformance and/or corrective actions requirements

The following will be implemented in regards to inspections:

- Undertake regular site environmental inspections using this checklist and provide records to ElectraNet upon request
- Address any non-conformance and/or corrective actions requirements

11.2 Third Party Audits

Any third-party audit requirements to verify the effectiveness of the EMP are captured in the audit schedule as per the project's Quality Management Plan.

Project Specific Requirements

After review of the contract documents there are no project specific requirements.

11.3 Subcontractor Audits

Subcontractors are required to undertake audits of their workspace, as communicated to the subcontractor through the tender and contract. Compliance with this requirement is a contract deliverable and is defined in the Vendor Data Requirements. Refer to the Project Management Plan for further information on project procurement management. The environmental audit requirements are communicated to procurement personnel for inclusion in the tender documents.

The reviews listed in the table in section *11.1 Audit & Inspection* also apply to subcontractor activities and workspaces.

Project Specific Requirements

Subcontractors will be audited in accordance with the Table in Section 11.1.

11.4 Environmental Non-compliance

Non-compliances raised by the client and via internal project audits are registered and controlled in accordance with ***DG-ZH-PR006 Incident Management Procedure*** and using **INX**. Possible non-compliances include non-compliance with the management measures outlined in this EMP. All non-compliances are registered and controlled using **INX**.

Where detected, any non-compliance or environmental impact are investigated by the Environmental Advisor to determine the extent of possible non-conformance. The non-compliance is corrected as soon as possible with necessary action taken to prevent recurrence.

All non-compliances are reported to the client and clearly identify the corrective/preventative actions to be taken and the close-out date.

Project Specific Requirements

All environmental incidents and hazards will be verbally reported to ElectraNet within 1 hour of identification outlining factual information.

An investigation report from INX will be provided to ElectraNet within 24 hours.

Environmental incidents and hazards will be reported through ElectraNet's online Incident Management System (IMS) or SAP system.

11.5 Complaints

Landholder complaints will be managed in accordance with the Landholder Liaison sub-plan.

Environmental complaints will be managed in accordance with ***DG-ZH-ST014 Zero Harm Communication Standard***. Specifically, the Environmental Advisor:

- records complaints as an incident in **INX**
- investigates and verifies complaints, and assesses if excessive off-site impacts have occurred
- implements corrective measures including modification of execution methods and operational techniques to avoid recurrence or minimise ongoing adverse impacts
- completes monitoring/additional investigations to verify the adequacy of the recommendations, as required
- notifies the complainant of actions taken; and
- continues to monitor activity, if required.

Project Specific Requirements

Details of landholder complaints management is provided in the Landholder Liaison sub-plan.

11.6 Environmental Breach

Subcontractors found to be in breach of this EMP are managed in accordance with the subcontract under which they have been engaged.

Employees who breach the requirements of this EMP are managed in accordance with the employee relations management processes defined in the PMP. Personnel found to be grossly negligent or commit an intentional environmental breach are removed from site and managed in accordance with the project's employee relations management processes.

Project Specific Requirements

After review of the contract documents there are no project specific requirements.

11.7 Reporting

Environmental performance is reported for the project in accordance with ***DG-ZH-PR007 Zero Harm Performance Monitoring and Reporting Procedure***. Environmental performance is reviewed and documented via minutes of scheduled project meetings utilising inputs from the Environmental Manager, Project Manager and Zero Harm Manager.

As per ***DG-ZH-PR077.1 Sustainability Data Collection and Reporting Procedure***, monthly reporting for Downer includes:

- greenhouse gas and energy data; and
- waste generation and water consumption data, gathered using the Environmental Data Collection Record described in ***DG-ZH-PR077.1 Sustainability Data Collection and Reporting Procedure***.

Project Specific Requirements

Project specific reporting requirements are detailed in the sub-plans.

12 EMERGENCY AND INCIDENT MANAGEMENT

In accordance with ***DG-ZH-PR015 Emergency Management Procedure***, the project team establishes an Emergency Preparedness Management Plan (EPMP) for the project which addresses all emergency response scenarios. Common types of environmental emergencies include:

- sewage spills (to land or to water)
- emulsion spills (to land or to water)
- hydrocarbon spills (to land or to water)
- sediment discharge (to land or to water)
- unexpected finds (cultural heritage); and
- damage to heritage items or protected flora and fauna.

Project Specific Requirements

An Emergency Preparedness Management Plan (EPMP) for the project will be developed which includes:

a) Emergency contacts (including EPA, CFS, Police and other relevant authorities)
b) Key personnel
c) Project/site specific hazard information
d) Action procedures
e) Communication requirements.

In the event of an incident that may have resulted in a near miss or an impact to the environment or community, Downer employees are expected to respond appropriately in accordance with ***DG-ZH-PR006 Incident Management Procedure***.

The Project Manager (or Site Manager), Supervisor(s), Zero Harm Manager and environmental personnel workshop and identify the potential for and responses to environmental incidents and emergency situations for the project. The workshop includes:

- a review of all audit findings, including external audits
- a review of the operation of environmental procedures, processes, forms, checklists, and any other documents referenced in the Environmental Management Plan and sub-plans
- a review of any design or activity modifications
- a review of environmental incidents and community complaints; and
- modifications to the Environmental Management Plan and/ or sub-plans, as required.

The outcomes of the workshop are registered in **INX**, and any actions assigned are followed-up through to completion.

Project Specific Requirements

All environmental incidents and hazards will be verbally reported to ElectraNet within 1 hour of identification outlining factual information.

An investigation report from INX will be provided to ElectraNet within 24 hours.

Environmental incidents and hazards will be reported through ElectraNet's online Incident Management System (IMS) or SAP system.

13 DOCUMENT CONTROL & MANAGEMENT REVIEW

All project documents are generated, numbered, approved, revised, transmitted, and stored in accordance with the document management and control processes defined in the Project Management Plan.

This EMP will be reviewed to ensure the suitability, effectiveness, and adequacy of the plan. This EMP is formally reviewed annually (as a minimum) and whenever the risk and/ or activities change from the scope/ content. The review is conducted by a review team comprising the Project Manager (or delegate) and Environmental Advisor and considers performance of the plan with respect to incident trends and findings from internal and external audits.

The Project Manager (or delegate) ensures any changes to this EMP as a result of review/change is communicated to personnel.

Project Specific Requirements

Project records will be maintained and provided to ElectraNet upon request.

14 MANAGING ENVIRONMENTAL ASPECTS

The following sub-plans detail the controls and supporting information for the environmental risk aspects for the project:

- Weed, Pest and Disease Management sub-plan
- Soil and Water Management sub-plan
- Landholder Liaison sub-plan
- Flora and Fauna Management sub-plan

ANNEX A – PROJECT ROLES & RESPONSIBILITIES

The Project Manager works with the relevant functional managers and human resources personnel to ensure adequate resources are in place for the project, as per the project's PMP. The Project Manager ensures that the specific roles, inter-relationships, and lines of reporting for the project are defined in the project's organisational structure, and may assign:

- an individual to a specific role
- the responsibilities for the specific role to themselves; or
- the responsibilities for the specific role to other project team members.

Refer to the PMP for further information.

Project Manager

- Visibly committing to and implementing environmental practices as defined in this EMP.
- Overseeing project delivery compliance to this EMP and ensuring environmental records are maintained and made available upon request to the client.
- Reporting project environmental status and incidents to the Environmental Advisor and client.

Construction Manager

- Ensuring works are carried out in accordance with this EMP and Downer procedures.
- Reporting environmental incidents to the Project Manager and Environmental Advisor as they are identified.
- Reviewing and participating in environmental incident investigations and nominated corrective measures.
- Attending project and environmental meetings.
- Participating in environmental audits.
- Initiating environmental reviews with the Environmental Advisor to facilitate continual improvement.
- Co-ordinating and facilitating task-based risk assessment activities for their area of responsibility.
- Ensuring all personnel, including subcontractors and visitors, undertake project defined induction and training, and are aware of any evacuation and emergency procedures.
- Ensuring environmental inspections are carried out and actions identified are implemented immediately.
- Ensuring environmental issues are raised at site toolbox meetings.
- Participating in emergency response as part of the Emergency Response Team.
- Ensuring environmental issues are raised at site toolbox meetings.

Environmental Sustainability Manager (Governance Role)

- Providing senior support to the Project Manager and Environmental Advisor to ensure the works are carried out in accordance with this EMP and Downer procedures.
- Conducting periodic reviews and audits to verify compliance with this EMP.
- Providing technical support to site staff.
- Assisting in the investigation of any incidents.
- Consulting, as necessary, with the client on environmental matters.

Environmental Advisor

- Providing support to the Construction Manager and Site Supervisor to ensure works are carried out in accordance with this EMP and Downer procedures.
- Consulting with the client on environmental matters, as required.
- Maintaining effective Zero Harm systems in the field by developing maximum employee and subcontractor participation.
- Participating actively in project team Zero Harm meetings.
- Maintaining a useable library of environmental documentation.
- Undertaking environmental inspections and presenting alerts or findings at toolbox meetings.
- Undertaking environmental audits and producing high quality environment audit reports.
- Provide environmental guidance in resolving issues with a view to continuous improvement and elimination of any environmental incidents.
- Co-ordinating and delivering environmental training and inductions.
- Assisting field personnel in the development of project specific documentation, e.g. task-based risk assessments.
- Assisting in the preparation of the Project Risk & Opportunity Register.
- Assisting in the investigation of any incidents.
- Monitoring and reporting on energy, greenhouse gas and waste management, including sewage disposal.
- Complying with any regulations or statutory obligations for environmental management

Site Supervisor

- Ensuring works are carried out in accordance with this EMP and Downer procedures.
- Reporting environmental incidents to Construction Manager or Environmental Advisor as they are identified.
- Participating with the Environmental Advisor in the investigation of incidents in their area of responsibility.
- Ensuring environmental issues are raised at site toolbox meetings.

Site Worker

- Visibly committing to environmental procedures and instruction.
- Completing required inductions as specified in this EMP.
- Attending environmental training and awareness sessions.
- Implementing environmental controls as detailed in inductions, task-based risk assessments, all aspects of this EMP, compliance documents, procedures, and standards.
- Reporting environmental incidents to the Site Supervisor or Environmental Advisor.
- Complying with all aspects of this EMP and all associated compliance documents, permits, procedures, and standards.
- Conducting task-based risk assessments prior to commencing works.
- Reporting environmental incidents to the Site Supervisor or Environmental Advisor as they are identified.

ANNEX B – PROJECT RISK & OPPORTUNITY REGISTER EXCERPT

Line item	Risk or Opportunity	Opportunity/Risk Description	Disciplines affected	Reference document	Section of Referenced document	Included by;
1	Risk	Allowance for appropriate firefighting equipment to accompany mobile plant	All disciplines	TAAM Rules and Procedures	13.4.2	Darren Pegram
2	Risk	Exhaust protection required when driving within 2 m of flammable bush or grass during bushfire season	Access and clearing or accessing farmers paddocks	TAAM Rules and Procedures	13.5.2	Darren Pegram
3	Risk	Access restrictions during bushfire season - No access is permitted on fire ban days and Downer must apply for Electranet Senior Management Approval on days of Extreme and Severe Fire Danger.	All disciplines	TAAM Rules and Procedures	13.4.1	Darren Pegram
4	Risk	Midspan joints need to be in accessible locations e.g. not in CH area or valley. Do not understand that we need to construct tracks to these locations.	Stringing	TBC	TBC	Darren Pegram
5	Risk	Foundation design nominations and geotech not at actual footing locations	Foundations	NA	NA	Darren Pegram
6	Risk	Unknown weed hygiene requirements - could involve multiple property washdowns	All disciplines	NA	NA	Darren Pegram/ Melanie Dixon
7	Risk	If weed survey conducted at Phase 2 award in Nov time then likely weed survey will not provide any meaningful results at back end of winter - During Spring/summer, weeds could all then flourish post survey and we do not have any meaningful data to show that we did not introduce.	All disciplines	NA	NA	Melanie Dixon

Appendix H EPLink EPBC Referral Documentation (2019)