

EPBC Act referral



Australian Government

Department of the Environment and Energy

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Title of proposal	2019/8583 - Eyre Peninsula Transmission Line
Section 1	
Summary of your proposed action	
1.1 Project industry type	Energy Generation and Supply (non-renewable)
1.2 Provide a detailed description of the proposed action, including all proposed activities	
<p>ElectraNet propose to construct and operate an electricity transmission line from the existing Cultana electricity substation near Whyalla, to Port Lincoln, on the Eyre Peninsula, South Australia (SA). The new transmission line will replace the existing single-circuit 132 kilovolt (kV) transmission line which has been in service since 1967 and contains several sections which now require major replacement works.</p> <p>The Eyre Peninsula (EP) has a single main radial electrical transmission supply 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. Electricity supply to Port Lincoln is supported by three generators located at the Port Lincoln substation and in recent years, demand has steadily increased as a result of agricultural, residential, commercial, mining and industrial development. In addition, forecasted demand has also increased due to proposed spot load mining developments and associated infrastructure projects such as new ports and processing facilities. Therefore, it is anticipated that current electricity network infrastructure will become insufficient to accommodate for future load at Port Lincoln and across the EP. Furthermore, the age and condition of the existing 132 kV radial line means that replacement of sections of conductor will likely be required from 2019 onwards, with replacement works between Yadnarie and Port Lincoln substations anticipated to take approximately 10 years to complete. As such and after significant investigation of various options to ensure adequate supply, ElectraNet propose to construct a new transmission line from Cultana to Port Lincoln to replace the existing and soon to be insufficient transmission line. The new transmission line will involve:</p> <ul style="list-style-type: none">- a new double-circuit line from Cultana to Yadnarie that is initially energised at 132 kV (which has 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. <p>Approximately 262 km of transmission line will be constructed on the western side of the existing transmission line. The new transmission line will involve a 100 m wide easement, located immediately west of the existing 40 m wide transmission line easement. The infrastructure associated with the project is outlined below.</p> <p>Transmission Line Poles/Towers (structures) Approximately 536 poles/towers (structures) will be installed to support the transmission line along the 262 km alignment as follows:</p> <ul style="list-style-type: none">- Cultana to Yadnarie section (approximately 136 km) Each span length is approximately 400-500 m in length and approximately 280 poles/towers will be required. Each pole/tower will require a maximum construction footprint of 30 m x 40 m (1200 m²) (restricted to 30 m x 30 m within native vegetation) and within this, a permanent footprint of 15 m x 15 m (225 m²).- Yadnarie to Port Lincoln section (approximately 126 km) Each span length is approximately 400-500 m in length and approximately 256 poles/towers will be required. Each pole/tower will require a maximum construction footprint of 30 m x 30 m (900 m²) and within this, a permanent footprint of 10 m x 10 m (100 m²). <p>Pole/Tower access Access to each pole/tower site will be required during construction and operation/maintenance activities. Existing access tracks associated with the existing transmission line will be used where possible and practicable, reducing the need to create new access tracks. However, new access tracks will be required and the following two options are currently being considered:</p> <ul style="list-style-type: none">- Construction of new individual access tracks (referred to as spur tracks) from the existing transmission line access track to each new pole/tower; and- A 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). <p>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 poles/towers will be achieved via a combination of existing access tracks, new spur tracks and sections with a new longitudinal access track.</p> <p>Transmission Line (electrical cable) Stringing Construction works will involve stringing (installation) of electrical cables along the 262 km transmission line. This is most likely to be undertaken by ground crews, but may be undertaken by helicopter in certain situations where possible and practicable (this would help reduce/minimise stringing impacts). Approximately 1 pole/tower every 3 km will require two</p>	



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stringing pads/areas approximately 50 m x 50 m (2500 m²) in size. Approximately 141 stringing areas will be required along the 262 km alignment.

A 10 m wide stringing access corridor will also be required along the 262 km alignment. In native vegetation or habitat areas, the stringing access corridor will be established using low-impact clearing methods. For example, trees and overhanging vegetation will be trimmed rather than cleared wherever possible and only larger trees and shrubs will be removed (i.e. where impact is 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 conductor and optical ground wires.

The total area of the stringing access corridor is approximately 262 ha (of which only approximately 6.76 ha impacts on native vegetation or habitat). The stringing access corridor is only required temporarily during stringing works and will be allowed to regenerate post construction works.

Where an existing longitudinal track exists or is required to be constructed (see Pole/Tower access), the stringing access corridor will be limited to 5 m wide.

Substations

Existing substations at Whyalla (Cultana), Yadnarie and Port Lincoln will be upgraded. A new substation (Yadnarie North) will also be built. Substation sites will also be used as major laydown sites during construction.

Construction camps/compounds and materials and equipment laydown areas

At least two temporary construction camps/compounds approximately 2 ha in size each, will be required during construction works, with one in the north and one in the south. They will include site construction offices, parking areas, lunch rooms, toilets and other similar facilities, as well as materials and equipment laydown areas, which will be used during construction. Ten other temporary construction laydown areas will be required at various locations along the transmission line alignment to store construction materials and equipment during construction. Where possible, these will be located in existing cleared areas or cropping areas to avoid/minimise impacts to native vegetation and habitat.

Temporary transmission lines

Temporary transmission lines will be installed at three locations during construction to maintain electricity supply to the Eyre Peninsula while the new transmission line is being established. These temporary transmission lines will be removed once they are no longer required.

Please refer to the attached file 'Infrastructure Impact Requirements' for a summary of the construction impact areas and permanent impact areas associated with the Project.

1.3 What is the extent and location of your proposed action?

See Appendix B

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland)

The proposed action is located on the eastern side of the Eyre Peninsula, SA and occurs over a distance of approximately 290 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: the City of Whyalla, the District Council (DC) of Franklin Harbour, the DC of Cleve, the DC of Tumby Bay and the DC of Lower Eyre Peninsula, as well as a section of the Pastoral Unincorporated Area.

Landforms across the project area are dominated by undulating limestone plains overlain by longitudinal dune systems in the more arid northerly sections, with shallow, low hills and ranges and shallow freshwater creeks and drainage lines through the Cleve Hills and Koppio Hills. The region supports some sensitive environmental areas, including large tracts of remnant vegetation, conservation parks and reserves.

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

Based on the current concept design, the construction impact (footprint) of the proposed action has been calculated as 454.35 hectares, while the permanent impact (footprint) has been calculated as 37.99 hectares, with 26.91 hectares within native vegetation. The final impact of the transmission line is expected to be further reduced during the detailed design phase.

1.7 Proposed action location

Lot - Please refer to attachment: Property List



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1.8 Primary jurisdiction		South Australia
1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?		
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
1.10 Is the proposed action subject to local government planning approval?		
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
1.10.1 Is there a local government area and council contact for the proposal?		
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
1.10.1.0 Council contact officer details		
1.10.1.1 Name of relevant council contact officer	Please refer to attachment: Council Contacts	
1.10.1.2 E-mail	mail@dclep.sa.gov.au	
1.10.1.3 Telephone Number	Please refer to the attachment: Council Contacts.	
1.11 Provide an estimated start and estimated end date for the proposed action		
Start Date	06/01/2020	
End Date	31/12/2021	
1.12 Provide details of the context, planning framework and state and/or local Government requirements		
<p>Relevant State Government plans include:</p> <ul style="list-style-type: none"> - Eyre and Western Region Plan: A volume of the South Australian Planning Strategy (2012); and - Strategic Plan for the Eyre Peninsula Natural Resources Management Region - 2017-2027; <p>A summary of relevant State legislation is provided below.</p> <p>Development Act 1993</p> <p>The Development Act 1993 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 subject to approval under the Development Act 1993. As such, ElectraNet will apply for Development Approval under section 49 (crown development and public infrastructure) of the Development Act 1993. During the development assessment process, comments will be sought from all local governments affected by the project. The State Commission Assessment Panel within the Department of Planning, Transport and Infrastructure assesses the comments and incorporates conditions into the development approval/consent.</p> <p>Environmental Protection Act 1993</p> <p>Under Section 36 of the Environment Protection Act 1993 an environmental authorisation is required before undertaking certain prescribed activities listed in Schedule 1 of the Act. Some of these prescribed activities, which may be relevant to the project, include:</p> <ul style="list-style-type: none"> - Earthworks Drainage; - Concrete batching works; and - Operating a waste or recycling depot (e.g. a stockpile site). <p>The Act also requires the Environmental Protection Authority to be notified of any construction activities to be undertaken outside of normal construction hours.</p> <p>National Parks and Wildlife Act 1972</p> <p>Native plants and animals in South Australia are protected under the National Parks and Wildlife Act 1972 (NPW Act). It is an offence to take a native plant or protected animal without approval. Conservation rated flora and fauna species listed on Schedules 7, 8, or 9 of the NPW Act are known to or may occur within the project area.</p> <p>Native Vegetation Act 1991</p> <p>The Native Vegetation Act 1991 controls the clearance of native vegetation across the whole of South Australia, except for the inner area of Metropolitan Adelaide. If a project is likely to impact on native vegetation, approval must first be obtained under the Act.</p> <p>Native vegetation within the project area is protected by the Native Vegetation (NV) Act 1991 and Regulations 2017. The proposed clearance associated with the project is expected to comply with Regulation 5(1)(d) "Building or provision of infrastructure including infrastructure in the public interest" which means the project is considered 'exempt' under the NV Act subject to conditions. Projects considered exempt under this regulation still require an application to the Native Vegetation Council (NVC) and clearance approval is subject to demonstrated avoidance of high value vegetation where alternatives are available, and the achievement of a net Significant Environmental Benefit (SEB).</p> <p>Flora and fauna surveys have resulted in amendments to the design to avoid or minimise impacts to areas of significant value and impact areas considered to have lower biodiversity value, where possible. Where impacts to native vegetation are</p>		



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unavoidable, the achievement of an SEB is proposed. An application to clear native vegetation is currently being prepared and will be submitted to the NVC.

Natural Resources Management Act 2004

Key components of the Natural Resources Management Act 2004 (NRM Act) include the establishment of regional Natural Resources Management (NRM) Boards and development of regional NRM Plans, the ability to control water use through prescription, allocations and restrictions and the requirement to control pest plants and animals and activities that might result in land degradation.

Majority of the transmission line is located within the Eyre Peninsula (EP) NRM Region, while a small section of the transmission line is located within the South Australian Arid Lands (SAAL) NRM Region.

Aboriginal Heritage Act 1988

The South Australian Aboriginal Heritage Act 1988 (AHA) outlines that any Aboriginal site, object or remains whether previously recorded or not, are protected by the AHA. ElectraNet has undertaken a cultural heritage survey (report attached) with the Barngarla People and plans to implement a Cultural Heritage Management Plan to avoid/minimise/mitigate potential heritage impacts.

Native Title Act 1993

Under the Native Title Act 1993 it is necessary to notify the Aboriginal Legal Rights Movement (ALRM) and any native title claimant groups if works are proposed in areas where Native Title may still exist. The proposed action is located within the Barngarla Native Title Claim area (Federal Court Reference No SAD6011/1998), where The Barngarla People hold Native Title in parts of the determination area.

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders

ElectraNet recognises the importance of effectively engaging with stakeholders throughout the duration of major projects. Given the number of affected landowners along the alignment, stakeholder engagement and inclusion plays an important role in securing project acceptance and approval. To date, the landowners and the broader community have been very supportive of the project, realising that critical public infrastructure of this nature is vital for the continued growth of the region.

A comprehensive communications and community engagement strategy was developed to support the planning phase of the project (2013 – 2014) which focussed on identifying a corridor for the transmission line. The strategy's specific community engagement objectives 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;
 - To provide stakeholders with the opportunity to be involved in the route selection process by helping to identify key opportunities, constraints and preferences;
 - To manage expectations among stakeholders of their role in the route selection process and how decisions will be made;
- and
- To foster positive and productive relationships with stakeholders to grow support for the project and help facilitate its planning and subsequent construction phases.

Community Engagement during the planning phase included comprehensive consultations with each individual land holder to ensure that they are provided with clear and consistent information about the project. These individual property meetings were complemented by route selection workshops, meetings with third parties such as councils, regular newsletters, factsheets and community open days.

Highlights of communications and community engagement activities to date include:

- A total of 730 engagement events recorded across 183 stakeholders;
- Individual face to face meetings conducted with 98 existing easement landowners;
- Hosting three community drop-in days attended by 34 people; and
- Cultural heritage survey of the entire route with The Barngarla People.

A Stakeholder Management Plan is being prepared for the construction phase of the project. Engagement tactics during the construction phase will include a second round of individual landholder consultation meetings to discuss specific impacts and management measures for each property, with an opportunity for landholders to have any additional concerns or issues addressed prior to the commencement of detailed design, and construction.

ElectraNet will undertake further negotiations with the local governments on issues such as local traffic management and development of camps and laydown yards.



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1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project

The Development Application being prepared under the Development Act 1993 (South Australia) includes a detailed assessment of environmental, social and economic impacts of the project, including soil and land systems, flora and fauna, non-Aboriginal heritage, cultural heritage, surface water, groundwater, air quality, noise, traffic and visual amenity.

In addition, specific investigations and detailed reports have been undertaken in the project study area for flora and fauna (including specific studies for EPBC listed species), cultural heritage and geotechnical investigations. Please refer to the attached reports for more information.

1.15 Is this action part of a staged development (or a component of a larger project)?

Yes No

1.16 Is the proposed action related to other actions or proposals in the region?

Yes No



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Section 2

Matters of national environmental significance

2.1 Is the proposed action likely to have any direct or indirect impact on the values of any World Heritage properties?

Yes No

2.2 Is the proposed action likely to have any direct or indirect impact on the values of any National Heritage places?

Yes No

2.3 Is the proposed action likely to have any direct or indirect impact on the ecological character of a Ramsar wetland?

Yes No

2.4 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 No

Species or threatened ecological community

Malleefowl (*Leipoa ocellata*)

The habitat range of Malleefowl (*Leipoa ocellata*) overlaps with good quality vegetation (high native species and structural diversity and low to nil weed cover) within the northern extent of the Project Area. Malleefowl are known to occur within the Project Area with several mounds recorded throughout Mallee associations in the northern extent of the Project Area in 2013/14. The stand of Mallee is large and mostly intact (i.e. not fragmented). More recently, a fresh Malleefowl track was observed by EBS Ecology in September 2019.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS Ecology 2014) and Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) for more information on this species.

Impact

The potential impacts of the proposed action on Malleefowl (*Leipoa ocellata*) individuals or populations may include the following:

- clearance of approximately 72.63 ha of suitable habitat during construction works, of which approximately 6.08 ha will be permanently impacted and the remaining 66.55 ha will be rehabilitated after construction;
- reduced reproduction rates (e.g. abandoned nests) during construction works;
- increased predation due to the creation of "predator highways" within new access tracks which allow predators such as foxes and feral cats to move through the area with ease; and
- increased predation due to the creation of additional roosting sites for birds of prey (i.e. poles/towers).

Species or threatened ecological community

Sandhill Dunnart (*Sminthopsis psammophila*)

Sandhill Dunnarts have been confirmed to occur within the Project Area. A total of 1236.4 ha of native vegetation within the Project Area contains *Triodia* habitat, of which 1213.3 ha is considered suitable habitat for Sandhill Dunnarts. The main area of Sandhill Dunnart habitat is located between the Middleback Range and Sheoak Hill Conservation Park (CP) in Ironstone Hill CP, Sheoak Hill CP, Secret Rocks Nature Reserve and adjacent heritage agreements. Patches of suitable *Triodia* habitat were interspersed with other habitat types which would likely be used by Sandhill Dunnarts for dispersal and feeding. The species' habitat is widespread and therefore given the set transmission line corridor, any micro-siting of infrastructure would have a negligible reduction in overall impacts on the species.

Please refer to EBS Ecology 2014 and EBS Ecology 2019 for more information on this species.



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Impact

The potential impacts of the proposed action on Sandhill Dunnart (*Sminthopsis psammophila*) individuals or populations may include the following:

- the direct removal (clearance) and/or degradation of approximately 39.08 ha of suitable habitat, of which approximately 3.55 ha will be permanently impacted and the remaining 35.53 ha will be rehabilitated after construction;
 - fragmentation of suitable *Triodia* habitat (optimal, future and unclassified) used for shelter and breeding;
 - the direct removal of individuals;
 - increased predation of the species via increased accessibility of suitable habitat to exotic species such as cats and foxes;
- and
- removal or modification of connective non-*Triodia* habitat used for dispersal and feeding.

Species or threatened ecological community

Western Grasswren (*Amytornis textilis myall*)

The Western Grasswren (WG) is distributed over the north-eastern Eyre Peninsula. The core range for the WG occurs in the southern area of their distribution, especially along Myall Creek and Pine Creek. The Project Area bisects the core distribution of WG, overlapping with Pine Creek and the Whyalla-Iron Knob Road, where the distribution of WG is almost continuous. The WG was recorded at three sites, totalling 5 individuals, within the Project Area in December 2012 by EBS. WG inhabit chenopod shrublands that have a dense structure. Suitable habitat is described as low-lying areas of Blackbush and spiny shrubs, particularly Australian Boxthorn, either as a shrubland or as an understorey of Western Myall low open woodland. Preferred habitats are expected to be restricted in their area of occurrence, but widespread in their extent within the northern most 20 km of the Project Area.

Please refer to EBS 2014 & EBS 2019 for more information.

Impact

The potential impacts of the proposed action on Western Grasswren (*Amytornis textilis myall*) individuals or populations may include the following:

- clearance of approximately 18.05 ha of suitable habitat, of which approximately 1.76 ha will be permanently impacted and the remaining 16.29 ha will be rehabilitated after construction;
- reduced reproduction rates (e.g. abandoned nests) during construction works; and
- increased predation due to the creation of additional roosting sites for birds of prey (i.e. poles/towers).

Species or threatened ecological community

Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*)

Suitable habitat for Southern Emu-wren (SEW), including shrubland, heathland, mallee and sedgeland, which have one or two low dense layers, occurs within the Project Area. However, a targeted survey to determine the presence of SEW within the Project Area in 2013, failed to record the species. The area targeted was within the Charlton Gully where the most recent SEW record occurred in 2004. However, no records of SEW have occurred within the Charlton Gully area since the 2005 Wangary bushfire. As such, it is presumed that the SEW are extinct where the alignment overlaps their potential habitat.

Although habitat within the Project Area has recovered following the 2005 fire, and could sustain the species, it is unknown whether SEW will re-habituate this area, particularly given the highly fragmented habitat between the sites and the species' poor long distance movements.

Please also refer to EBS 2014 & EBS 2019.

Impact

The potential impact of the proposed action on Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) individuals or populations may include the clearance of approximately 7.71 ha of suitable habitat, of which approximately 0.24 ha will be permanently impacted and the remaining 7.47 ha will be rehabilitated after construction.

Species or threatened ecological community

Acacia enterocarpa (Jumping-jack Wattle)

Twenty-eight (28) individuals were detected across three sub-populations during targeted surveys in 2013.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS Ecology 2014) and Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) for more information on this species.

Impact



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The potential impact of the proposed action on *Acacia enterocarpa* (Jumping-jack Wattle) may include clearance of approximately 1.68 ha of suitable habitat (100 m buffer from records).

Species or threatened ecological community

Acacia pinguifolia (Fat-leaf Wattle)

Five individuals were detected in one sub-population during targeted surveys in 2013.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS Ecology 2014) and Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) for more information on this species.

Impact

The potential impact of the proposed action on *Acacia pinguifolia* (Fat-leaf Wattle) may include clearance of approximately 0.04 ha of suitable habitat (100 m buffer from records).

Species or threatened ecological community

Caladenia macroclavia (Large-club Spider-orchid)

Three individuals were detected in one sub-population during targeted surveys in 2013.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS Ecology 2014) and Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) for more information on this species (previously known as *Arachnorchis macroclavia*).

Impact

The potential impact of the proposed action on *Caladenia macroclavia* (Large-club Spider-orchid) may include clearance of approximately 0.40 ha of suitable habitat (100 m buffer from records).

Species or threatened ecological community

Caladenia tensa (Inland Green-comb Spider-orchid / Rigid Spider-orchid)

Twenty-five (25) individuals detected in one sub-population during targeted surveys in 2013.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS Ecology 2014) and Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) for more information on this species (previously known as *Arachnorchis tensa*).

Impact

The potential impact of the proposed action on *Caladenia tensa* (Inland Green-comb Spider-orchid / Rigid Spider-orchid) may include clearance of approximately 0.07 ha of suitable habitat (100 m buffer from records).

Species or threatened ecological community

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

One individual was detected during targeted surveys in 2013 and one individual was detected during 2019 native vegetation clearance assessment field survey.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS Ecology 2014) and Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) for more information on this species.

Impact

The potential impact of the proposed action on *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) may include clearance of approximately 0.38 ha of suitable habitat (100 m buffer from records).

Species or threatened ecological community

Pultenaea trichophylla (Tufted Bush-pea)

Several individuals detected across 50 sub-populations during targeted surveys in 2013.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS Ecology 2014) and Eyre



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Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) for more information on this species.

Impact

The potential impact of the proposed action on *Pultenaea trichophylla* (Tufted Bush-pea) may include clearance of approximately 1.55 ha of suitable habitat (100 m buffer from records).

Species or threatened ecological community

Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland Threatened Ecological Community (TEC)

Eyre Peninsula (EP) Blue Gum Woodland is endemic to the Eyre Peninsula and a number of patches occur along the alignment. Seven patches of this TEC 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. 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.

Please refer to the Eyre Peninsula Transmission Line - Biodiversity Assessment Report (EBS 2014) and EPBC Assessment (EBS 2019) for more information on this TEC.

Impact

The potential impact of the proposed action on Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland may include clearance of approximately 1.44 ha of the Threatened Ecological Community.

2.4.2 Do you consider this impact to be significant?

Yes No

2.5 Is the proposed action likely to have any direct or indirect impact on the members of any listed migratory species or their habitat?

Yes No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

Yes No

2.7 Is the proposed action likely to be taken on or near Commonwealth land?

Yes No

2.7.1 Is the proposed action likely to have any direct or indirect impact on the Commonwealth land?

Yes No

2.7.2 Describe the nature and extent of the likely impact on the whole of the environment

A portion of the transmission line corridor impacts on land owned by the Commonwealth Department of Defence. ElectraNet is negotiating an easement through this property for the purposes of the transmission line. The property details are:

Lot Plan(Plan/Allotment or Hundred/Section):D85850AL33
Title ID:CR6140/89
Property Address:IRON KNOB RD WHYALLA BARSON

Lot Plan(Plan/Allotment or Hundred/Section):D85850QP32
Title ID:CL6164/360
Property Address:1178 EYRE HWY CULTANA 5700



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Lot Plan (Plan/Allotment or Hundred/Section): D93251AL67
Title ID: CL6164/360
Property Address: EYRE HWY CULTANA 5700

Lot Plan (Plan/Allotment or Hundred/Section):H835200 B1146
Title ID: N/A
Property Address: N/A

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

- combined arms maneuvering 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 is not expected to be any worse than that of the current land use.

2.7.3 Do you consider this impact to be significant?

Yes No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

Yes No

2.9 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?

Yes No

2.10 Is the proposed action a nuclear action?

Yes No

2.11 Is the proposed action to be taken by a Commonwealth agency?

Yes No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage place overseas?

Yes No

2.13 Is the proposed action likely to have any direct or indirect impact on any part of the environment in the Commonwealth marine area?

Yes No



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Section 3

Description of the project area

3.1 Describe the flora and fauna relevant to the project area

A thorough flora and fauna desktop assessment has been completed, including a search of the online Protected Matters Search Tool (PMST) and a search of the Biological Database of South Australia (BDBSA). In addition to this, the following field surveys have been undertaken:

- Three baseline flora surveys (December 2012, January 2013 and February 2013) which were aimed at ground truthing BDBSA floristic data and recording the condition of the vegetation within the assessment corridor. Opportunistic threatened species records were also collected as well as species lists for each vegetation association.

- Four threatened species targeted surveys (August, October and early November 2013).

- Three bird surveys (December 2012, January 2013 and February 2013), including 85 individual point count surveys. Opportune sightings of other fauna species were also recorded.

- Malleefowl targeted survey (using LiDAR remote sensing methods followed by ground truthing) between 30 November 2013 and 26 February 2014.

- Sandhill Dunnart targeted surveys between April 2009 and May 2013.

The following information is summarised from the Eyre Peninsula Transmission Line Biodiversity Assessment Report (draft report, version 4; EBS Ecology 2014) and the Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019).

Flora

Approximately 45% of the assessment corridor (120 m wide) consists of remnant native vegetation, in the form of large continuous tracts of mallee and Western Myall / chenopod low woodlands, fragmented patches, roadside and rail reserves, and scattered trees. The dominant native vegetation communities include mallee which covers 20% of the project area, followed by woodlands (13%), chenopod shrublands (6.5%), tall shrublands (4%) and native grasslands and sedgeland (0.7%). The remainder of the area has been cleared, predominantly for agricultural purposes and is not considered to contain significant flora and fauna implications. The level of remnancy of native vegetation in the northern half of the project and the corresponding IBRA sub-region (Myall Plains) is relatively high (98% and 97% respectively) whereas the southern areas which are subject to much higher levels of intensive farming, have much lower remnancy levels within the project area and the IBRA sub-regions of Eyre Hills and Eyre Mallee (17%, 30% and 35% respectively).

Seventy-five vegetation associations have been recorded across the project area, with the condition of the vegetation communities ranging from very poor (SEB 1:1) to excellent (SEB 10:1). Over 350 flora species were recorded during the baseline and targeted field surveys, including five flora species of national conservation significance and 19 of State conservation significance. Most occurrences were found in intact vegetation or on roadside reserves.

One Threatened Ecological Community, Eyre Peninsula (EP) Blue Gum (*Eucalyptus petiolaris*) Woodland occurs within the Project area. EP Blue Gum Woodland is endemic to the Eyre Peninsula and a number of patches occur along the alignment. Seven patches of this TEC 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. 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.

Fauna

A total of 36 nationally threatened fauna species were identified by the PMST, including:

- 28 birds;
- 4 mammals;
- 3 reptiles; and
- 1 shark.

The following three nationally threatened fauna species are known to occur within the project area:

- *Amytornis textilis myall* (Western Grasswren (Gawler Ranges)) - nationally Vulnerable
- *Leipoa ocellata* (Malleefowl) - nationally Vulnerable
- *Sminthopsis psammophila* (Sandhill Dunnart) - nationally Endangered

One other nationally threatened fauna species, *Stipiturus malachurus parimeda* (Southern Emu-wren (Eyre Peninsula)) is considered to possibly occur within the Project Area. However, the Eyre Peninsula Southern Emu-wren population located in the Koppio Hills was decimated in the 2005 fire and no individuals have been observed since. As such, it is presumed that Southern Emu-wren are extinct where the transmission line alignment overlaps with their potential habitat.



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Refer to the Eyre Peninsula Transmission Line Biodiversity Assessment Report (EBS Ecology 2014) and the Eyre Peninsula Transmission Line EPBC Assessment (EBS Ecology 2019) (both already attached) for more detailed information on flora and fauna relevant to the proposed action.

3.2 Describe the hydrology relevant to the project area (including water flows)

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.

Most streams in the region are seasonal (dry during the summer months) and range from saline to brackish waters. They generally occupy the eastern side of the peninsula, with the larger streams, including the highly saline Dutton River and Salt Creek, located north of Arno Bay. The only significant surface water resource in the region is the Tod River, with a catchment area of about 395 km² to the north of Port Lincoln.

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 a few sites on Salt Creek near Mangalo. Other creeks, including Meadows Creek, Rock Valley Creek, parts of Tod River, and one site from Salt Creek at Yorkies Crossing, 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 eight surface water catchments, including, from north to south:

- Salt Creek - Franklin Harbour;
- Driver River;
- Dutton River;
- Salt Creek;
- Tumby Bay;
- Tod River;
- Boston Bay; and
- Little Swamp.

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.

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. 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.

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. 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.

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. 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. While the project corridor also traverses a very small section of the Boston Bay catchment, there are no watercourses in that section.

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 itself is the only permanent flowing drainage line on Eyre Peninsula, and is therefore an important habitat and refuge for many wetland organisms. 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 water supply due to the water's high salinity levels.



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The Tumbly 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 Tumbly Bay Township. They consist of marine waters, seagrass meadows, sandbars, estuarine waters, intertidal mud and sand flats, intertidal marshes and mangrove swamps.

For groundwater information refer to the attached Geotechnical Investigation Report.

3.3 Describe the soil and vegetation characteristics relevant to the project area

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, which are described below.

Gawler IBRA bioregion

The Gawler IBRA bioregion contains 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 gibbersand rocky quartzite hills with colluvial footslopes, erosional and depositional plains and salt encrusted lake beds, with black oak (belah) 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.

Eyre Yorke Block IBRA bioregion

The Eyre Yorke Block bioregion contains 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.

The project traverses three IBRA sub-regions, which are described below.

Myall Plains IBRA sub-region

The Myall Plains sub-region contains gently undulating calcrete plains and occasional quartzite or granite hills. It 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.

- Remnant vegetation: Approximately 97% (1 050 684 ha) of the sub-region is mapped as remnant native vegetation, of which 8% (86 146 ha) is formally conserved.

- Soil: Red calcareous earths, sandy soils with mottled yellow clayey subsoils.

Eyre Hills IBRA sub-region

The Eyre Hills sub-region 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. leucoxydon. 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. incrassata / Melaleuca uncinata mallee on the plains or Melaleuca lanceolata woodland along the coastal fringe. Lincoln National Park occupies the south eastern tip of the sub-region and consists of 15 971 ha of coastal mallee.

- Remnant vegetation: Approximately 29% (338 248 ha) of the sub-region is mapped as remnant native vegetation, of which 44% (149 029 ha) is formally conserved.

- Soil: Sands soils of minimal pedologic development, brown calcareous earths, brown sand soils, shallow red brown sandy soils, sandy soils with yellow clayey mottled subsoil.

Eyre Mallee IBRA sub-region

The Eyre Mallee sub-region is distinguished climatically by being more arid than regions to the south. The mallee that once dominated this sub-region 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.

- Remnant vegetation: Approximately 38% (877 417 ha) of the sub-region is mapped as remnant native vegetation, of



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which 54% (473 079 ha) is formally conserved.

- Soil: Sand soils with weak pedologic development, red calcareous earths, red siliceous sands.

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area

The Eyre Peninsula region supports some extremely sensitive environmental areas, including large tracts of remnant vegetation, numerous conservation parks and reserves, five Threatened Habitat Areas (THAs) and numerous Heritage Agreements and Significant Environmental Biodiversity (SEB) offset areas managed for conservation. From north to south the transmission line passes through Whyalla Conservation Park, Middleback Ranges, Ironstone Hill Conservation Park, Secret Rocks Nature Reserve (privately owned), Sheoak Hill Conservation Park, Cleve Hills Threatened Habitat Area, Wharminda Conservation Park, Koppio Hills Threatened Habitat Area and the Tod River Wetland System (wetland of National Importance).

The alignment passes within approximately 1.3 km east of the far eastern extent of the East meets West NatureLink corridor, which is one of five NatureLinks biodiversity corridors developed by DEW. East meets West aims to assist the species and ecosystems within central and northern Eyre Peninsula and the Far West of SA to survive, evolve and adapt to environmental change by connecting habitats, through a comprehensive system of core protected areas (such as parks and reserves) that are buffered and linked by lands which have complementary land management objectives. In addition, DEW, in partnership with the EP NRM Board and other conservation bodies, have been involved in recovery efforts for priority threatened flora and fauna on Eyre Peninsula. Within the vicinity of the proposed transmission line, priority work areas include Barwell Conservation Park (CP), the large heritage agreement adjacent to Barwell CP (north of Lock), Hambridge Wilderness Area (WA), Hincks WA, and coastal areas near Sheep Hill.

The transmission line passes through two of Eyre Peninsula's five THAs: the Cleve Hills and Koppio Hills.

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. 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.

A large number of nationally threatened flora species have been recorded from the Koppio Hills including *Acacia enterocarpa* (Jumping-jack wattle), *Acacia whibleyana* (Whibley Wattle), *Acacia pinguifolia* (Fat-leaved Wattle), *Pultenaea trichophylla* (Tufted Bush-pea), *Haloragis eyreana* (Prickly Raspwort), *Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush), *Arachnorchis tensa* (Rigid Spider-orchid), *Arachnorchis brumalis* (Winter Spider-orchid), *Ptilotus beckerianus* (Ironstone Mulla Mulla), *Thelymitra epipactoides* (Metallic Sun-orchid), *Prasophyllum goldsackii* Goldsack's (Leek-orchid). In addition, a large number of State listed flora species have also been recorded.

3.5 Describe the status of native vegetation relevant to the project area

The following information is provided in addition to the information provided in section 3.1 and 3.3.

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



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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, the lower the remnancy figures. A number of the more southern IBRA Environmental Associations exhibit remnancy figures of less than 10%.

Construction works for the project will impact (clear) approximately 200.26 ha of remnant vegetation within the Eyre and Yorke Block IBRA bioregion, which equates to 0.0033 % of the 2,011,646.26 ha (33 %) of remnant vegetation within the IBRA bioregion. Similarly, the proposed action is expected to impact (clear) approximately 109.13 ha (0.0093 %) and approximately 10.15 ha (0.0004 %) of remnant vegetation within the Eyre Hills and Eyre Mallee IBRA sub-regions, respectively.

Native vegetation within the project area is protected by the South Australian Native Vegetation Act 1991 and Native Vegetation Regulations 2003. However, it is considered that the project complies with Regulation 5(1)(d) Building or provision of infrastructure including infrastructure in the public interest and therefore the project is considered 'exempt' under the NV Act, subject to conditions, including demonstrated avoidance of high value vegetation, for example where design alternatives are available. Projects considered exempt under this regulation still require an application to the Native Vegetation Council (NVC) and clearance approval is subject to demonstrated avoidance of high value vegetation where available and the achievement of a net Significant Environmental Benefit (SEB).

Flora and fauna assessment has resulted in amendments to the design to avoid and/or minimise impacts to areas of significant value (such as native vegetation) and impact areas considered to have lower biodiversity value (such as cropping land), where possible. Where impacts to native vegetation are unavoidable, the achievement of an SEB is proposed. An application to clear native vegetation is currently being prepared and will be submitted to the Native Vegetation Council.

ElectraNet is currently investigating potential options to achieve on-ground SEB offset areas within and/or adjacent to the project. In the event that on-ground SEB offset areas cannot be found or the full SEB requirement cannot be satisfied, a payment will be made into the Native Vegetation Fund.

The SEB calculation will be based on the clearance footprint using the current design and therefore is considered to be a worse-case scenario. Mirco-sighting will refine final infrastructure footprints and will aim to minimise clearance of trees, high value areas and threatened species, where possible. The SEB offset will require re-calculation once the final footprint is determined.

Please also refer to section 3.1 and 3.3 above for other information on native vegetation relevant to the project area.

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area

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 290 km long alignment, elevation ranges from a minimum of approximately 40 m (metres above sea level) to a maximum of approximately 350 m.

3.7 Describe the current condition of the environment relevant to the project area

Land use in the northern section of the transmission line is mainly confined to pastoral activities and conservation, whilst in the southern sections, land is utilised for cropping, grazing and rural residential properties, with a few small areas devoted to revegetation and conservation.

Vegetation

Almost 7095 ha of native vegetation was recorded within the assessment corridor (120 m width), representing approximately 45% of the Project Area (120 m assessment width). 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.

The significant tracts of intact vegetation communities occupying the northern sections of the Project Area were largely 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.



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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 attributed 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.

Refer to the Eyre Peninsula Transmission Line Biodiversity Assessment Report (EBS Ecology 2014) for more information on vegetation and habitat condition.

Weeds

Twenty-four weed species were recorded during the field surveys, including five weed species declared under the Natural Resources Management Act 2004 and eleven species recognised as environmental weed species.

Water

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 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. Salinity is a major issue with 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.

3.8 Describe any Commonwealth Heritage places or other places recognised as having heritage values relevant to the project

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

There is one State Heritage Place, the Tod Reservoir, located approximately 1.14 km west of the proposed corridor:

- State Heritage ID: 14213; Heritage Number: 16602;
- Address: Off White Flat - Koppio Road, White Flat, via Port Lincoln; Lower Eyre Peninsula Council
- Parcel ID: H510700 S306; Title/Volume/Folio: CT/5841/603

The proposed new transmission line is not expected to impact upon the Tod Reservoir.

The following two Local Heritage Places are located within and across the proposed corridor:

1). Local Heritage Place: Dwelling (Old Pillaworta Homestead)

- Located partly within and across the proposed alignment to the eastern side.
- 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
- Local Heritage status: "it has played an important part in the lives of local residents" and "it displays aesthetic merit, design characteristics or construction techniques of significance to the local area".

2). Local Heritage Place: Cottage - cottage and outbuilding behind School House.

- Located within and across the proposed alignment.
- 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
- Local Heritage status: "it displays historical, economic or social themes that are of importance to the local area" and "it represents customs or ways of life that are characteristic of local area".

While the proposed new transmission line alignment is likely to pass through the two land parcels containing these Local



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Heritage Places, it is not expected to impact upon either of the individual structures (i.e. Dwelling and Cottage) or their local heritage values. Furthermore, the existing transmission line already passes through both of the land parcels.

One other Local Heritage Place, a Cottage previously called 'Beecroft' but now called 'Altocha', is located approximately 600 m west of the proposed corridor:

- Heritage Number: 16625
 - Address: Part Section 341, Hundred Louth, GreenPatch. Lower Eyre Peninsula
 - Parcel ID: F8545 A1; Title/Volume/Folio: CT/5331/215
 - Local Heritage status: "it displays historical, economic or social themes that are of importance to the local area", "it represents customs or ways of life that are characteristic of local area" and "it is a notable landmark in the area".
- The proposed new transmission line is not expected to impact upon Altocha.

3.9 Describe any Indigenous heritage values relevant to the project area

The Barngarla people have been identified as the key indigenous stakeholders for the project area. The project area is located wholly within the Barngala Native Title Claim area, where Native Title was determined on 23/6/2016 (determination registration date 27/4/2018) and exists in parts of the determination area. As part of the project planning process ElectraNet have undertaken Aboriginal cultural heritage assessment, including field survey, to understand potential impacts to Aboriginal heritage.

The following information is summarised from the Eyre Peninsula Reinforcement Project: Aboriginal Cultural Heritage Survey Report (AECOM 2014).

A survey of the proposed transmission line corridor was conducted between 14th and 17th October 2013 by a combined team of three (consultant) heritage specialists, two ElectraNet personnel and six Barngarla Native Title Claimants (BNTC) field representatives. A total of 12 cultural heritage sites were identified during the survey, including three Women's sites, seven Men's sites and two archaeological sites, consisting of an artefact scatter associated with Women's Site 1 and an isolated stone artefact associated with Men's Site 1. 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 12 cultural heritage sites, 40 landscape features within and surrounding/outside the proposed transmission line corridor were identified by the BNTC 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 (<200m), key landscape 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 (<200m);
- Lakes and the surrounding banks (<200m);
- Soaks; and
- Saltflats.

The BNTC 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. 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.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area

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 landuse being freehold pastoral landowners and farmers, as well as South Australian Government properties (Crown Land).

3.11 Describe any existing or any proposed uses relevant to the project area



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The proposed new transmission line will be located on the western side of the existing transmission line which runs from Whyalla to Port Lincoln.

Land within the project area is mainly used for agriculture (mostly cropping, but with some grazing of livestock) as well as conservation parks and reserves, and some rural residential.

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.

-Campona 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 Tumbly Bay and 35 km north of Port Lincoln, consisting of a conventional open-cut mine producing high grade graphite (due to start in 2019).

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. The new transmission line will provide more electricity to the Eyre Peninsula, including Port Lincoln and other townships, which will contribute to enabling an increase in industrial, commercial and agricultural activities.



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Section 4

Measures to avoid or reduce impacts

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action

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 minimising impacts, with a particular focus on Matters of National Environmental Significance (MNES). A Mitigation Hierarchy consisting of "Avoid", "Minimise" and "Rehabilitate" has been incorporated into the project as follows:

Avoid

Where practicable, impact 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:

- Maximum span distances between towers;
- Topography;
- Watercourses and/or drainage areas; and
- Avoiding other infrastructure (i.e. roads).

Therefore a number of management measures have been defined to detect and avoid important habitat for MNES. 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. Significant environmental constraints analysis, including identification of MNES and their habitat, has been undertaken to avoid impacts, where possible.

Minimise

A number of design controls and environmental management measures have been identified to minimise impacts upon ecological values.

~ Design

Vegetation and MNES habitat have been mapped using GIS and provided to the design team as a constraint. Where possible, impact to these areas has been avoided. The alignment of the in-easement access track, location of spur tracks and the position of the towers and stringing pads has been adjusted to avoid or minimise the clearance of MNES habitat. Further micro-siting of structure pads and tracks during the Detailed Design phase is anticipated to further reduce clearance within higher value habitat and also reduce the overall clearance footprint. 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 engineering phase to design 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.

All efforts will be made to minimise clearance of native vegetation.

~ Construction

A Construction Environmental Management Plan will be implemented during construction works. It will identify land clearance mitigation measures to minimise impacts on vegetation and habitat, including:

- Restricting the disturbance footprint to the minimum necessary to safely carry out the required construction activities;
- Using existing access tracks wherever possible;
- Preferential rolling and/or trimming of vegetation for structure pads, stringing pads, laydowns and camps (i.e. no dozer blades in the ground) to maintain the topsoil, seedbank and low vegetation (grasses, herbs and shrubs);
- Using existing disturbed or degraded areas where practicable (e.g. for laydown areas);
- If habitats for MNES are detected, demarcate the area with flagging and create a buffer to avoid clearance or disturbance where practicable; and
- If habitats for MNES cannot be avoided, site specific mitigation measures will be provided in the CEMP to manage those specific areas (e.g. walking stringing cables through an area to avoid vehicle impacts).

While rolling will be preferred over dozing wherever possible, in some cases clearance of vegetation/habitat will be required. The following clearance limitations will be implemented:

- Clearance for structure pads will be limited to 30m x 30m in areas where native vegetation/habitat is present;
- Final width of permanent access tracks will be limited to 5m wide (including shoulder and windrow); and
- Stringing access will be provided by rolling and/or trimming of vegetation wherever possible, which will enable regrowth.

Where clearance cannot be avoided, it will be temporary and will be rehabilitated (i.e. with topsoil and/or cleared vegetation).

Vegetation/habitat at structure and stringing pads will be rolled where possible to enable regrowth. Spur tracks from the existing transmission line access track to the new poles/towers will be used where practicable to minimise the clearance of vegetation/habitat from the creation of a new longitudinal access track along the alignment. Temporary construction laydown/storage areas will be located outside of vegetation/habitat where possible.

Rehabilitate

Disturbed areas which are not required for the operation and maintenance of the transmission line will be rehabilitated with cleared topsoil and vegetation material at the end of the construction phase and left to naturally revegetate, and monitored for success.



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved

The potential impact of the project on EPBC Act listed species has been assessed (based on the preliminary design) in order to estimate likely offset requirements which will be implemented to offset the impacts of the project and achieve a positive environmental outcome. The EPBC offset calculator has been used to calculate 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.

Based on the potential impacts of the preliminary design, the minimum direct offset area required for each MNES is:

- Malleefowl (*Leipoa ocellata*) - 267 ha
- Sandhill Dunnart (*Sminthopsis psammophila*) - 153 ha
- Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*) - 61.5 ha
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) - 40.5 ha
- Acacia *enterocarpa* (Jumping-jack Wattle) - 9.0 ha
- Acacia *pinguifolia* (Fat-leaf Wattle) - 0.15 ha
- *Caladenia macroclavia* (Large-club Spider-orchid) - 2.5 ha
- *Caladenia tensa* (Inland Green-comb Spider-orchid) - 0.3 ha
- *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) - 1.7 ha
- *Pultenaea trichophylla* (Tufted Bush-pea) - 8.9 ha
- *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Woodland TEC - 6.1 ha

Total offset = 555.65 ha. Refer to the attached offset calculation and rationale files for details.

Note that potential impacts and therefore associated proposed offset to Malleefowl have been calculated based on habitat information and Malleefowl mound data from 2013/2014. Although the location of individual Malleefowl mounds mapped within the Project area is not expected to have changed significantly since 2013/2014, ElectraNet are currently obtaining new LiDAR data to locate Malleefowl mounds within the Project alignment. This new LiDAR data will then be ground-truthed to confirm the location of Malleefowl mounds and eliminate anomalies (non Malleefowl mounds picked up by the LiDAR) and then used in the detailed design process to micro-site project infrastructure to avoid impacting Malleefowl mounds. Updated Malleefowl mound information, including any revision to the proposed offset, will be provided to the Department of Environment as soon as it is available.

ElectraNet are currently investigating 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.

Offset may involve protection of native vegetation and habitat via Heritage Agreement which is subject to the SA Native Vegetation Act 1991. 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. 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.

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 native fauna species, particularly the EPBC Act listed species relevant to this project. Control of foxes and feral cats in particular, will alleviate potential predation impacts on Malleefowl, as well as Sandhill Dunnart, Western Grasswren and Southern Emu-wren, caused by the creation of predator highways within access tracks. Such a program is likely to involve monitoring in accordance with a specific monitoring plan.

A Threatened Species Management Plan is currently being produced, which will be implemented to avoid, minimise and/or mitigate the potential impacts of construction and operation of the project on EPBC Act listed species. The plan will detail 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.



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Section 5

Conclusion on the likelihood of significant impacts

5.1 You indicated the below ticked items to be of significant impact and therefore you consider the action to be a controlled action

- World Heritage properties
- National Heritage places
- Wetlands of international importance (declared Ramsar wetlands)
- Listed threatened species or any threatened ecological community
- Listed migratory species
- Marine environment outside Commonwealth marine areas
- Protection of the environment from actions involving Commonwealth land
- Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development
- Protection of the environment from nuclear actions
- Protection of the environment from Commonwealth actions
- Commonwealth Heritage places overseas
- Commonwealth marine areas

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action

The proposed action is not likely to have a significant impact on the MNES identified in this referral and therefore not a controlled action due to the extensive effort that ElectraNet has undertaken to avoid and/or minimise impacts as much as possible, including but not limited to:

- detailed ecological investigations to identify and understand MNES within the project area and potential impacts:
 - ~ three baseline flora surveys (Dec 2012, Jan 2013 and Feb 2013);
 - ~ four threatened species targeted surveys (between 12 Aug and 7 Nov 2013);
 - ~ three bird surveys (Dec 2012, Jan 2013 and Feb 2013) where Southern Emu-wren was targeted and a total of 85 individual point count surveys were undertaken;
 - ~ targeted Malleefowl survey (using LiDAR remote sensing methods followed by ground truthing) between 30 Nov 2013 and 26 Feb 2014;
 - ~ targeted Sandhill Dunnart survey between Apr 2009 and May 2013;
- investigation and implementation of specific design options (where possible) such as spur tracks (rather than a longitudinal access track) to minimise predator highways;
- micro-siting (i.e. shifting) of infrastructure (where possible) to avoid and/or minimise impacts; and
- use of minimal impact construction methods (where possible) such as:
 - ~ rolling of vegetation and/or pruning of vegetation (rather than total clearing); and
 - ~ locating construction camps and laydowns in cropping/non-native vegetation.

More specific information for each MNES is provided below.

Malleefowl

Although the project may impact (clear) 72.63 ha of suitable habitat, only 6.08 ha will be permanently impacted, while the other 66.55 ha will regenerate or be rehabilitated, as majority of the impact will be from the stringing works which are only temporary. Furthermore, the impact to 72.63 ha is not considered to be significant as it is comprised of many small impact (clearance) areas along approximately 50 km of the transmission line, and it is estimated that there is approximately 841.61 ha of suitable habitat available within the transmission line corridor alone. In addition, the species is still expected to inhabit the project area post construction as numerous Malleefowl mounds are located within close proximity to the existing transmission line and the species can still use areas where vegetation has been rolled (i.e. for stringing works) for feeding.

Western Grasswren (Gawler Ranges)

Although the project may impact (clear) approximately 18.05 ha of suitable habitat, only 1.76 ha will be permanently impacted, while the other 16.29 ha will regenerate or be rehabilitated, as majority of the impact will be from the stringing works which are only temporary. Furthermore, the impact to 18.05 ha of suitable habitat is not considered to be significant as the species core range is distributed over an estimated area of approximately 1,371,198.45 ha in the north-eastern Eyre Peninsula. In addition, the species is still expected to inhabit the project area post construction, as they are known to inhabit areas amongst the existing transmission line.

Southern Emu-wren

Although the project may impact (clear) approximately 7.71 ha of suitable habitat (which is not currently inhabited by the species due to the 2005 fire), only 0.24 ha will be permanently impacted, while the other 7.47 ha will regenerate or be rehabilitated, as majority of the impact will be from stringing works which are only temporary. Furthermore, the impact to 7.71



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ha of suitable habitat is not considered to be significant as it is estimated that there is approximately 257.73 ha of suitable habitat available within the transmission line corridor alone.

Sandhill Dunnart

Although the project may impact (clear) approximately 39.08 ha of suitable habitat, only 3.55 ha will be permanently impacted, while the other 35.53 ha will regenerate or be rehabilitated, as majority of the impact will be from stringing works which are only temporary. Furthermore, the impact to 39.08 ha of suitable habitat is not considered to be significant as it is estimated that there is approximately 1213.3 ha of suitable habitat available within the transmission line corridor alone. In addition, this species is less susceptible to vehicle tracks and is used to moving across open areas and as such is still expected to inhabit the project area post construction.

Flora

Although the project may impact (clear) between 0.04 - 1.68 ha of suitable habitat for each of the six flora species during construction, the impact is not considered to be significant due to the small size of the impact and because most of these species occur in/near disturbed areas of vegetation and so are also expected to occur in/near the transmission line post construction. Similarly, the potential impact (clearance) of 1.44 ha of EP Blue Gum Woodland TEC is not considered to be significant as it is a small impact and it is estimated that there is approximately 53.90 ha of the TEC within the transmission line corridor alone.



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Section 6

Environmental record of the person proposing to take the action

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Explain in further detail

Yes. ElectraNet has an environmental management system which is certified to ISO14001. ElectraNet's environmental policy and framework are discussed below.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application

N/A.

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

Yes No

6.3.1 If the person taking the action is a corporation, provide details of the corporation's environmental policy and planning framework

The key elements of ElectraNet's Environmental Policy include:

- Developing and maintaining our environmental management system at a scale appropriate to our activities;
- Assessing our assets and activities to identify environmental risks and prevent pollution;
- Complying with local, state and national environmental requirements;
- Training our staff in the management of environmental issues facing the energy and infrastructure industries; and
- Participating in initiatives that contribute to understanding and addressing the impacts of climate change

ElectraNet has developed a detailed range of Environmental Operating Requirements 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.

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

Yes No

6.4.1 EPBC Act No and/or Name of Proposal

ElectraNet has previously referred and been responsible for undertaking the following actions referred under the EPBC Act:

~ 2019/8468 - ElectraNet Pty Ltd/Energy generation and supply (renewable)/Multiple lots/South Australia/SA-NSW Energy Interconnector, Robertstown to NSW Border, SA;

~ 2009/4948 – ElectraNet Pty Ltd/Energy generation and supply (non-renewable)/Adelaide/SA/Construction of substation and 18km of underground cable;

~ 2005/2463 – ElectraNet Pty Ltd/Energy generation and supply/Cherry Gardens/SA/Electrical infrastructure, Cherry Gardens, SA;

~ 2004/1903 – ElectraNet SA/Energy generation and supply/Bungama/SA/Upgrade existing Bungama substation and install 7km transmission line; and

~ 2002/726 – ElectraNet SA/Energy generation and supply/Monash-Robertstown/SA/SA-NSW Electricity Interconnector, Monash-Robertstown Section (proposal withdrawn 18/03/2015).



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Section 7

Information sources

Reference source

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.

Reliability

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. Therefore 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.

Uncertainties

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.

Reference source

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.

Reliability

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. Therefore 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.

Uncertainties

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.

Reference source

Numerous searches of NatureMaps, which is an interactive online mapping tool that provides geographic information about South Australia's natural resources and maintained by the South Australian Department for Environment and Water (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).

Reliability

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 would have been subject to validation, it is possible that it may contain errors.

Uncertainties

There may be some environmental features that are not included in NatureMaps data.

Reference source

EBS Ecology (2014) Eyre Peninsula Transmission Line - Biodiversity Assessment Report. Report to ElectraNet. EBS Ecology, Adelaide.
and
EBS Ecology (2019) Eyre Peninsula Transmission Line EPBC Assessment. Report to ElectraNet. EBS Ecology, Adelaide.



Australian Government

Department of the Environment and Energy

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Reliability

The findings and conclusions expressed by EBS Ecology are based solely 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 flora and fauna that occurs, within the project area.

Uncertainties

Please refer to section 4.4 Limitations within the Biodiversity Assessment Report by EBS Ecology for discussion on limitations of the report.



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Section 8

Proposed alternatives

Do you have any feasible alternatives to taking the proposed action?

Yes No

8.0 Provide a description of the feasible alternative

Although not undertaking the proposed action is an alternative option, it is not considered to be a feasible alternative as the overall objective of the project is to deliver, or continue to deliver, reliable electricity supply to the Eyre Peninsula.

Electricity demand has steadily increased on the Eyre Peninsula in recent years as a result of agricultural, residential, commercial, mining and industrial development. In addition, forecasted demand has also increased due to proposed spot load mining developments and associated infrastructure projects such as new ports and processing facilities. Therefore, it is anticipated that current electricity network infrastructure will become insufficient to accommodate for future load at Port Lincoln and across the Eyre Peninsula. Furthermore, the age and condition of the existing 132 kV radial line means that replacement of sections of conductor will likely be required from 2019 onwards, with replacement works between Yadnarie and Port Lincoln substations anticipated to take approximately 10 years to complete. Therefore, installation of a new transmission line is considered to be the most commercially viable and socially and environmentally acceptable option.

Once the need for the Project was determined, detailed technical investigations and conceptual design work commenced. Extensive assessments have been undertaken to understand environmental constraints, particularly MNES, associated with the proposed action. As a result, various design options have been considered during the conceptual design phase and numerous iterations have occurred to the concept design to minimise impacts to onsite environmental constraints, particularly MNES. Furthermore, it is anticipated that further design changes and iterations will occur during the detailed design phase, particularly as a result of micro-siting of infrastructure, to further minimise impacts to MNES.

8.1 Select the relevant alternatives related to your proposed action

- Timeframes
- Locations
- Activities



Australian Government

Department of the Environment and Energy

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

8.25 Do you have another alternative?

Yes

No



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 9

Person proposing the action

9.1.1 Is the person proposing the action a member of an organisation?
 Yes No

Organisation

Organisation name	ELECTRANET PTY LIMITED
Business name	ELECTRANET SA
ABN	41094482416
ACN	
Business address	PO Box 7096, Hutt Street Post Office, Adelaide, 5000, South Australia, Australia
Postal address	
Main Phone number	0439 758 888
Fax	
Primary email address	wright.alecia@electranet.com.au
Secondary email address	

9.1.2 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:
 Small business
 Not applicable

9.1.2.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations *
 Yes No

9.1.3 Contact

First name	Alecia
Last name	Wright
Job title	Senior Development Adviser
Phone	
Mobile	0439 758 888
Fax	
Email	wright.alecia@electranet.com.au
Primary address	PO Box 7096, Hutt Street Post Office, Adelaide, 5000, South Australia, Australia
Address	

Declaration: Person proposing the action

I, _____, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity.

Signature: Date:

I, _____, the person proposing the action, consent to the designation of _____ as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature:.....Date:



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Proposed designated proponent

9.2.1 Is the proposed designated proponent a member of an organisation?
 Yes No

Organisation	
Organisation name	ELECTRANET PTY LIMITED
Business name	ELECTRANET SA
ABN	41094482416
ACN	
Business address	PO Box 7096, Hutt Street Post Office, Adelaide, 5000, South Australia, Australia
Postal address	
Main Phone number	0439 758 888
Fax	
Primary email address	wright.alecia@electranet.com.au
Secondary email address	

9.2.2 Contact	
First name	Alecia
Last name	Wright
Job title	Senior Development Adviser
Phone	0439 758 888
Mobile	0439 758 888
Fax	
Email	wright.alecia@electranet.com.au
Primary address	PO Box 7096, Hutt Street Post Office, Adelaide, 5000, South Australia, Australia
Address	

Declaration: Proposed Designated Proponent
 I, _____, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

 Signature: Date:



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Referring party (person preparing the information)	
9.3.1 Is the referring party (person preparing the information) a member of an organisation?	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Organisation	
Organisation name	ENVIRONMENTAL AND BIODIVERSITY SERVICES PTY LTD
Business name	EBS ECOLOGY
ABN	82105535822
ACN	
Business address	125 Hayward Ave, Torrensville, 5031, SA, Australia
Postal address	
Main Phone number	(08) 7127 5607
Fax	
Primary email address	info@ebsservices.com.au
Secondary email address	
9.3.2 Contact	
First name	Emma
Last name	Tremain
Job title	Environment Officer
Phone	(08) 7127 5607
Mobile	
Fax	
Email	Emma.Tremain@ebsecology.com.au
Primary address	125 Hayward Ave, Torrensville, 5031, SA, Australia
Address	
Declaration: Referring party (person preparing the information)	
I, _____, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.	
Signature: Date:	



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Appendix A	
Attachment	
Document Type	File Name
action_area_images	Constructionfootprint_23102019.zip
action_area_images	Infrastructure Impact Requirements.pdf
action_area_images	EPBC_Flora_Map_1-3.pdf
action_area_images	EPBC_Flora_Map_4-6.pdf
action_area_images	EP Blue Gum Woodland_Map_1.pdf
action_area_images	EP Blue Gum Woodland_Map_2.pdf
action_area_images	EP Blue Gum Woodland_Map_3.pdf
action_area_images	Malleefowl_Map_1-2.pdf
action_area_images	Malleefowl_Map_3-4.pdf
action_area_images	Malleefowl_Map_5-6.pdf
localgov_approval_consent	Property List.pdf
localgov_approval_consent	Council Contacts.pdf
public_consultation_reports	EP Aboriginal Cultural Heritage Survey Report.pdf
prj	Constructionfootprint_23102019[1].prj
shp	Constructionfootprint_23102019[1].shp
shx	Constructionfootprint_23102019[1].shx
supporting_tech_reports	E90106_PMST.pdf
supporting_tech_reports	EPBC_Assessment_Report_Final.pdf
supporting_tech_reports	Biodiversity Assessment Report 2014 Final_Part1.pdf
supporting_tech_reports	Biodiversity Assessment Report 2014 Final_Part2.pdf
supporting_tech_reports	Biodiversity Assessment Report 2014 Final_Part3.pdf
supporting_tech_reports	Biodiversity Assessment Report 2014 Final_Part4.pdf
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supporting_tech_reports	SandhillDunnart_1.pdf
supporting_tech_reports	SandhillDunnart_2.pdf
supporting_tech_reports	SandhillDunnart_3.pdf
flora_fauna_investigation	SEW_habitat_Map_1-3.pdf
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flora_fauna_investigation	WGW_habitat_Map_3-4.pdf
flora_fauna_investigation	WGW_habitat_5.pdf
flora_fauna_investigation	SEW_habitat_Map_4-5.pdf
flora_fauna_investigation	SEW_habitat_Map_6.pdf
hydro_investigation_files	Geotechnical Investigation Report_Part1.pdf
hydro_investigation_files	Geotechnical Investigation Report_Part2.pdf
impact_reduction_docs	EPBC Flora Species Offset Calculations and Rationale.pdf
impact_reduction_docs	E petiolaris Woodland Offset Calculation and Rationale.pdf
impact_reduction_docs	EPBC Fauna Species Offset Calculations and Rationale.pdf
corp_env_policy_docs	ElectraNet Env Man Policy.pdf
corp_env_policy_docs	ElectraNet Env Man Policy Statement 2016.pdf
corp_env_policy_docs	ElectraNet Env Operating Requirements.pdf

Appendix B
Coordinates



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- Structure location
- ▭ Construction footprint

Threatened Ecological Community
 58: *Eucalyptus petiolaris* +/- *Eucalyptus odorata* +/- *Allocasuarina verticillata* Open Grassy Woodland





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- Structure location
- ▭ Construction footprint

Threatened Ecological Community
 58: *Eucalyptus petiolaris* +/- *Eucalyptus odorata* +/- *Allocasuarina verticillata* Open Grassy Woodland



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- Structure location
- ▭ Construction footprint

Threatened Ecological Community
 58: *Eucalyptus petiolaris* +/- *Eucalyptus odorata* +/- *Allocasuarina verticillata* Open Grassy Woodland



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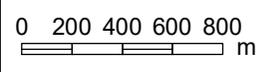


- Threatened Flora**
- *Acacia pinguifolia* (Fat-leaf Wattle) AUS: EN, SA: E
 - *Caladenia macroclavia* (Large-club Spider-orchid) AUS: EN, SA: E
 - ★ *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) AUS: VU, SA: V

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- Project corridor
- EPBC Threatened Flora within 100 m of infrastructure zone
- Structure locations
- Proposed clearance area



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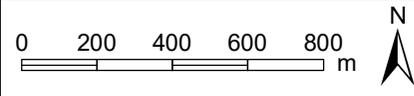


Threatened Flora
 ★ *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) AUS: VU, SA: V

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-  Project corridor
-  EPBC Threatened Flora within 100 m of infrastructure zone
-  Structure locations
-  Proposed clearance area



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Threatened Flora
 + *Pultenaea trichophylla* (Tufted Bush-pea) AUS: EN, SA: R

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0 200 400 600 800 m

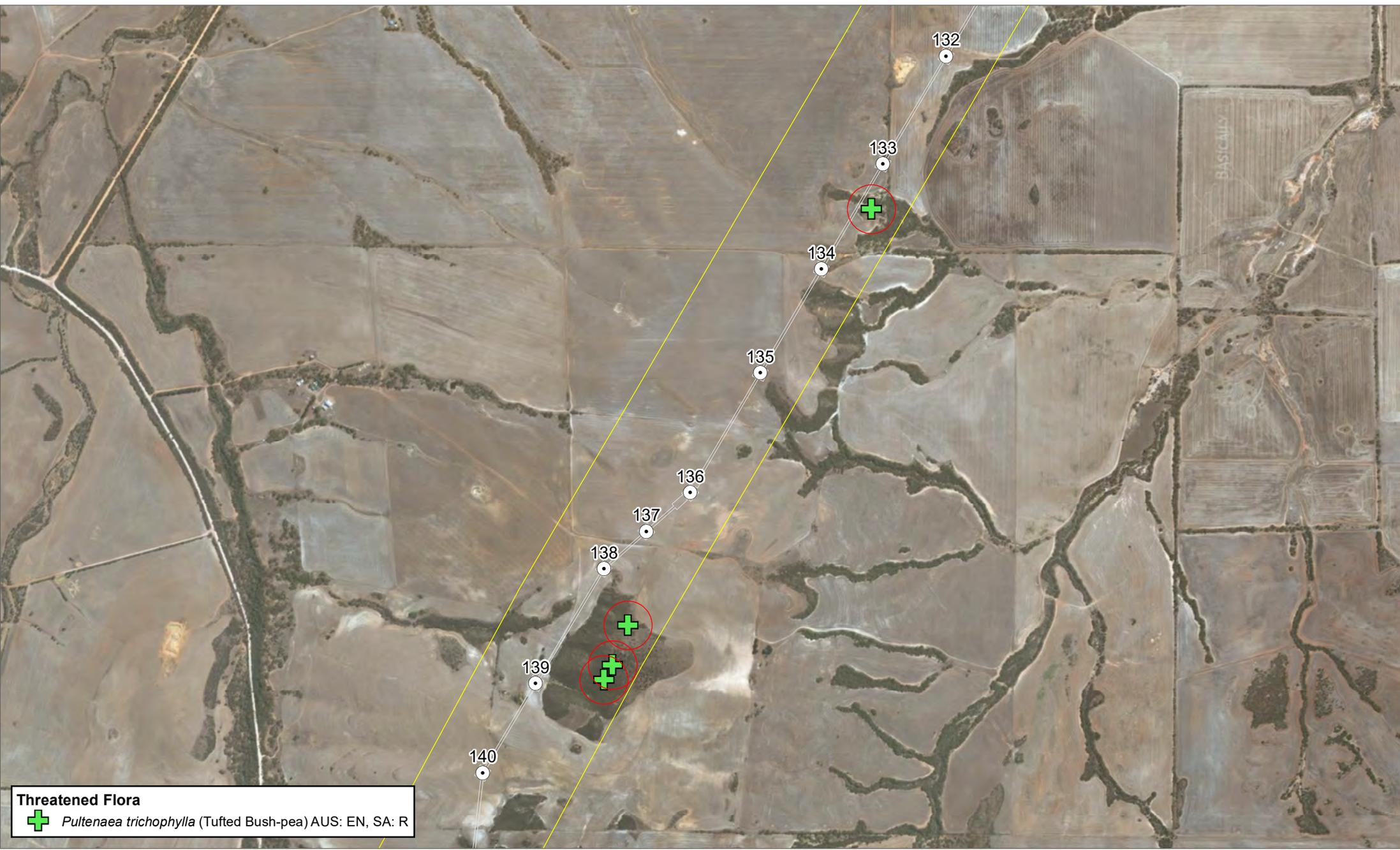


-  Project corridor
-  EPBC Threatened Flora within 100 m of infrastructure zone
-  Structure locations
-  Proposed clearance area

Page 3 of 6

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Threatened Flora
 + *Pultenaea trichophylla* (Tufted Bush-pea) AUS: EN, SA: R

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0 200 400 600 800 m



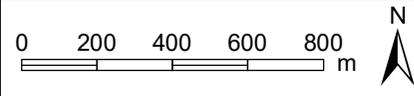
-  Project corridor
-  EPBC Threatened Flora within 100 m of infrastructure zone
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- Project corridor
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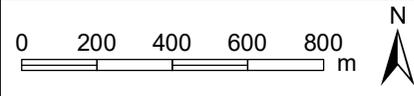


Threatened Flora
 ● *Acacia enterocarpa* (Jumping-jack Wattle) AUS: EN, SA: E

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-  Project corridor
-  EPBC Threatened Flora within 100 m of infrastructure zone
-  Structure locations
-  Proposed clearance area



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0 200 400 600 800 m



- Structure locations
- ▭ Construction footprint
- ▭ Project corridor

- Malleefowl Mounds with 100 m buffer (LiDAR survey)**
- Confirmed
 - Not confirmed
 - Malleefowl mounds 100 m buffer intersected with infrastructure footprint

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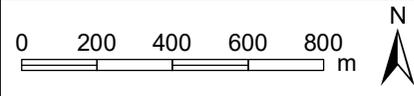


- Structure locations
- ▭ Construction footprint
- ▭ Project corridor

Malleefowl Mounds with 100 m buffer (LiDAR survey)

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- Not confirmed
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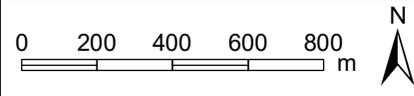


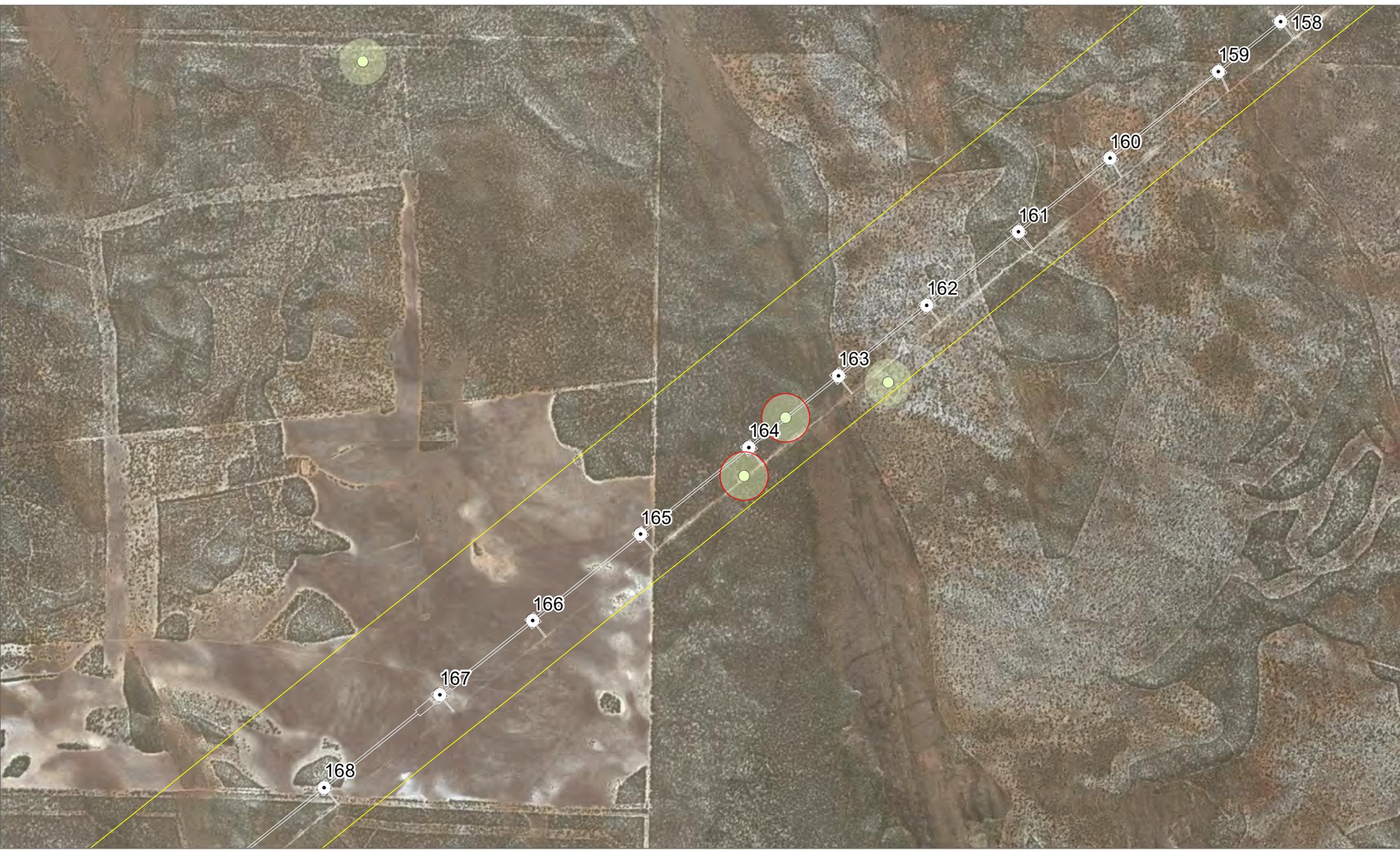
- Structure locations
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Malleefowl Mounds with 100 m buffer (LiDAR survey)

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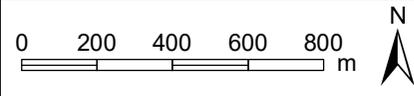
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- Structure locations
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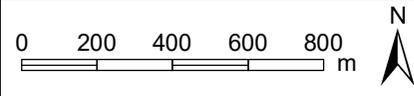
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- Structure locations
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- ▭ Project corridor

Malleefowl Mounds with 100 m buffer (LiDAR survey)

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- Malleefowl mounds 100 m buffer intersected with infrastructure footprint

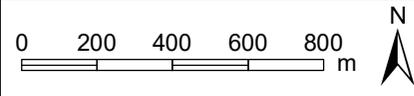


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- Structure locations
- Construction footprint
- ▭ Project corridor

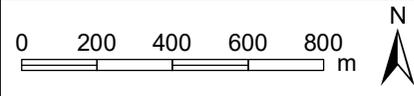
- Malleefowl Mounds with 100 m buffer (LiDAR survey)**
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 - Malleefowl mounds 100 m buffer intersected with infrastructure footprint

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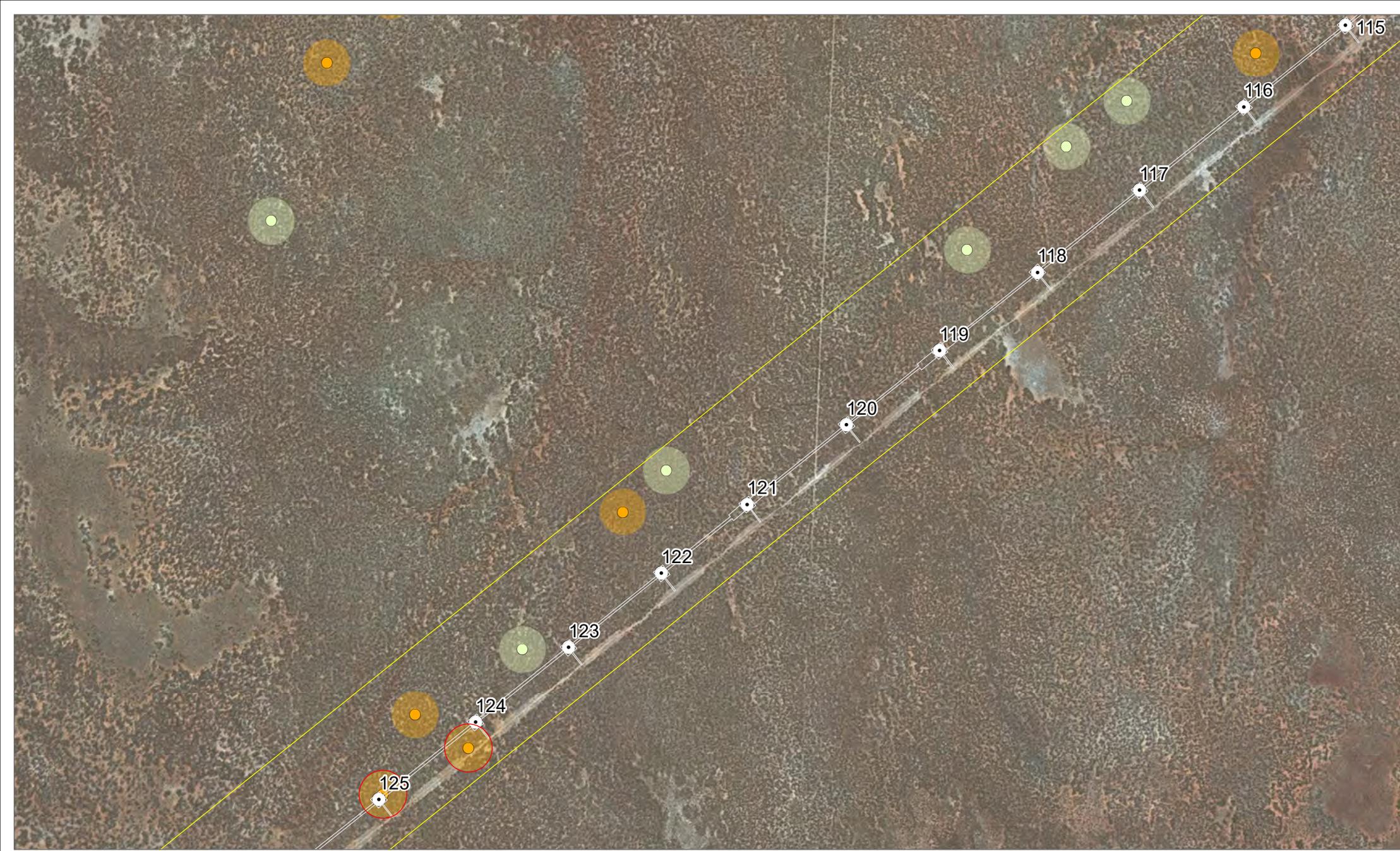
- Structure locations
- ▭ Construction footprint
- ▭ Project corridor

Malleefowl Mounds with 100 m buffer (LiDAR survey)

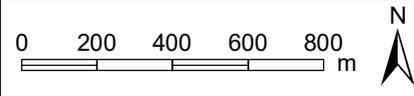
- Confirmed
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- Structure locations
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- ▭ Project corridor

Malleefowl Mounds with 100 m buffer (LiDAR survey)

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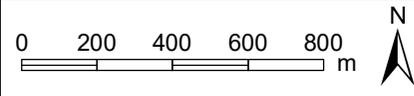
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- Structure locations
- ▭ Construction footprint
- ▭ Project corridor

Malleefowl Mounds with 100 m buffer (LiDAR survey)

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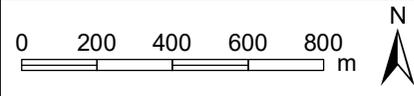
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- Structure locations
- ▭ Construction footprint
- ▭ Project corridor

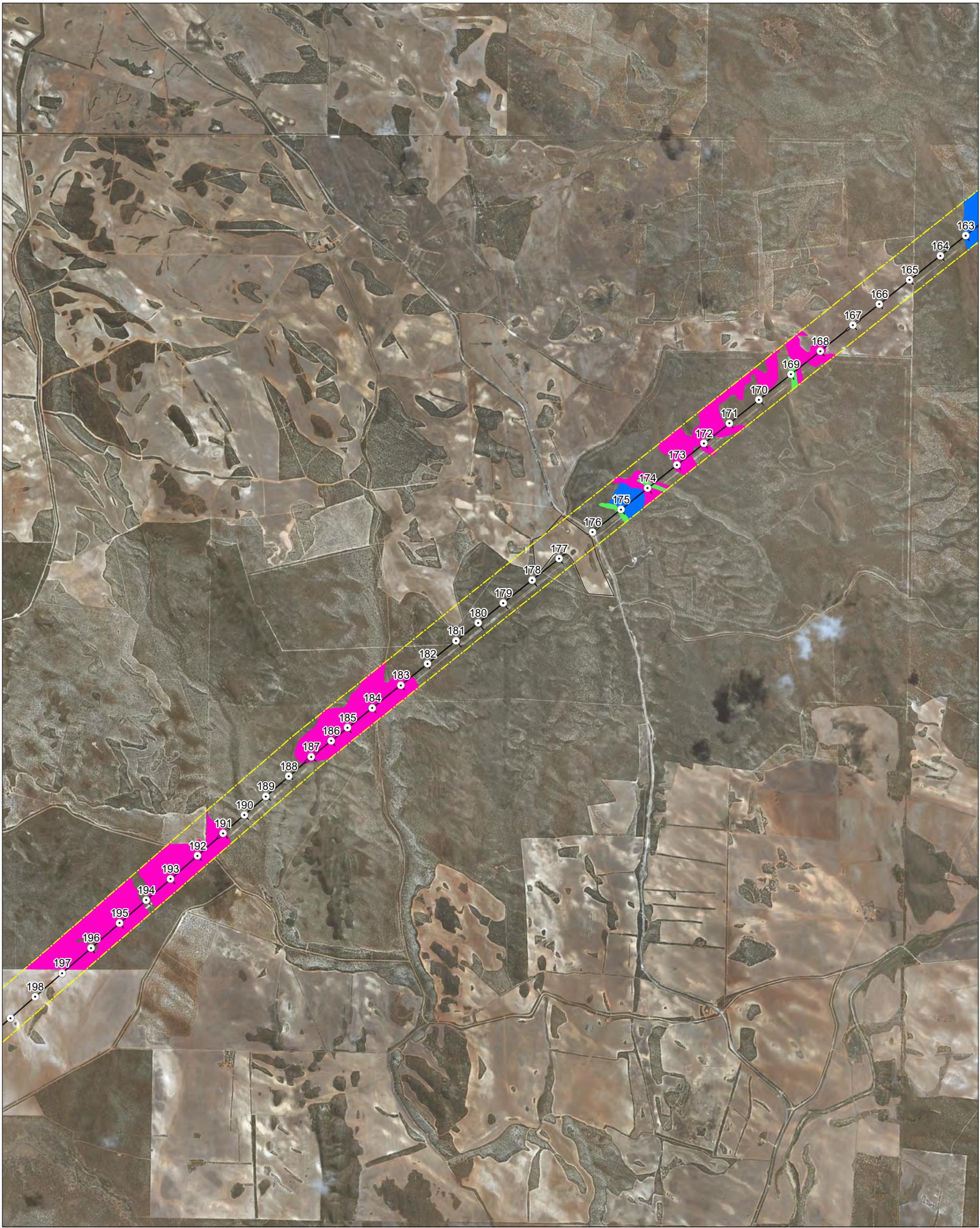
Malleefowl Mounds with 100 m buffer (LiDAR survey)

- Confirmed
- Not confirmed
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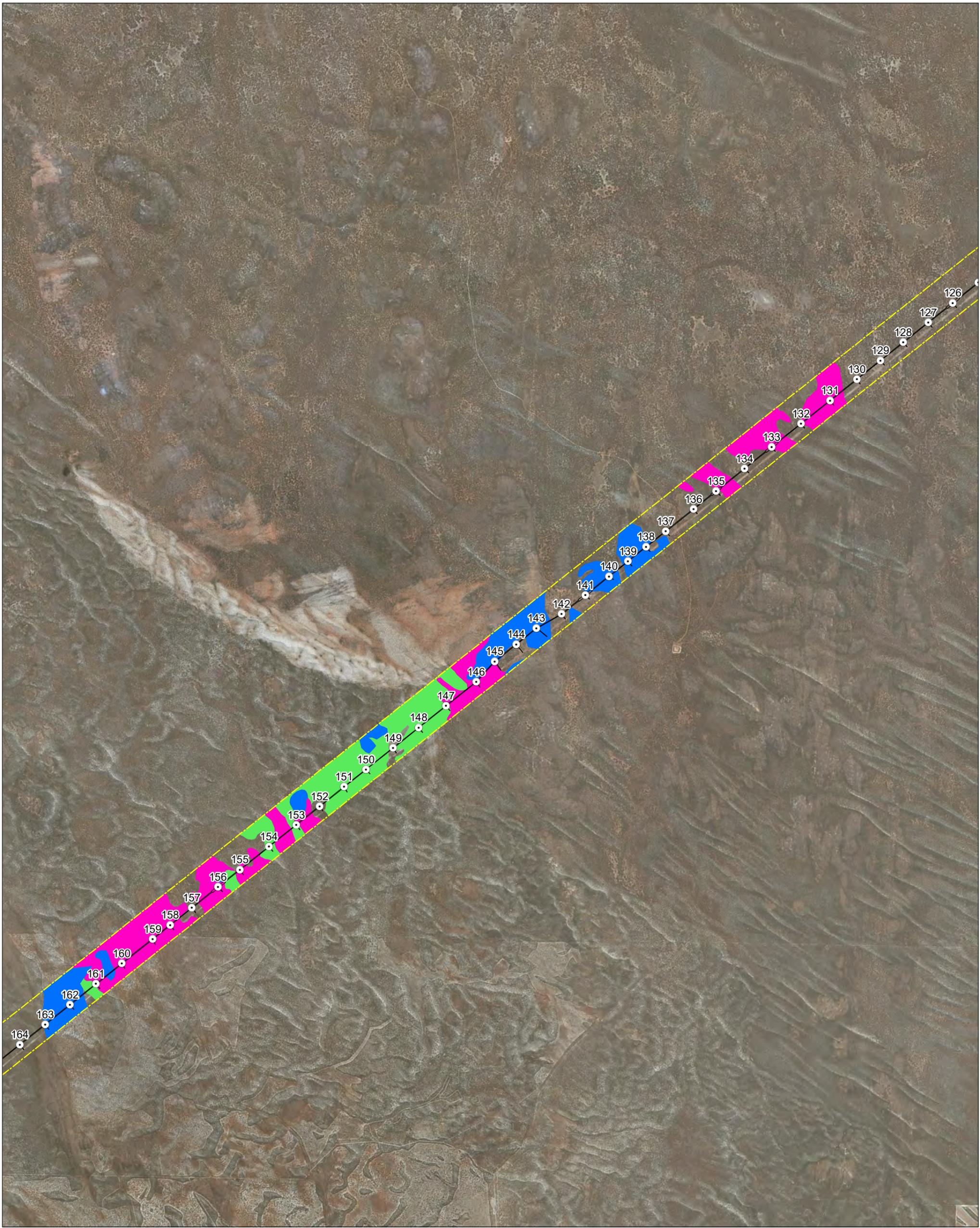
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- Structure location
- Project corridor
- Construction footprint

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*





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- Structure location
- Project corridor
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Vegetation Association

- 17: *Eucalyptus socialis* / *Eucalyptus oleosa* / *Eucalyptus brachycalyx* +/- *Eucalyptus leptophylla* Mallee over *Triodia scariosa* / *Triodia lanatus*
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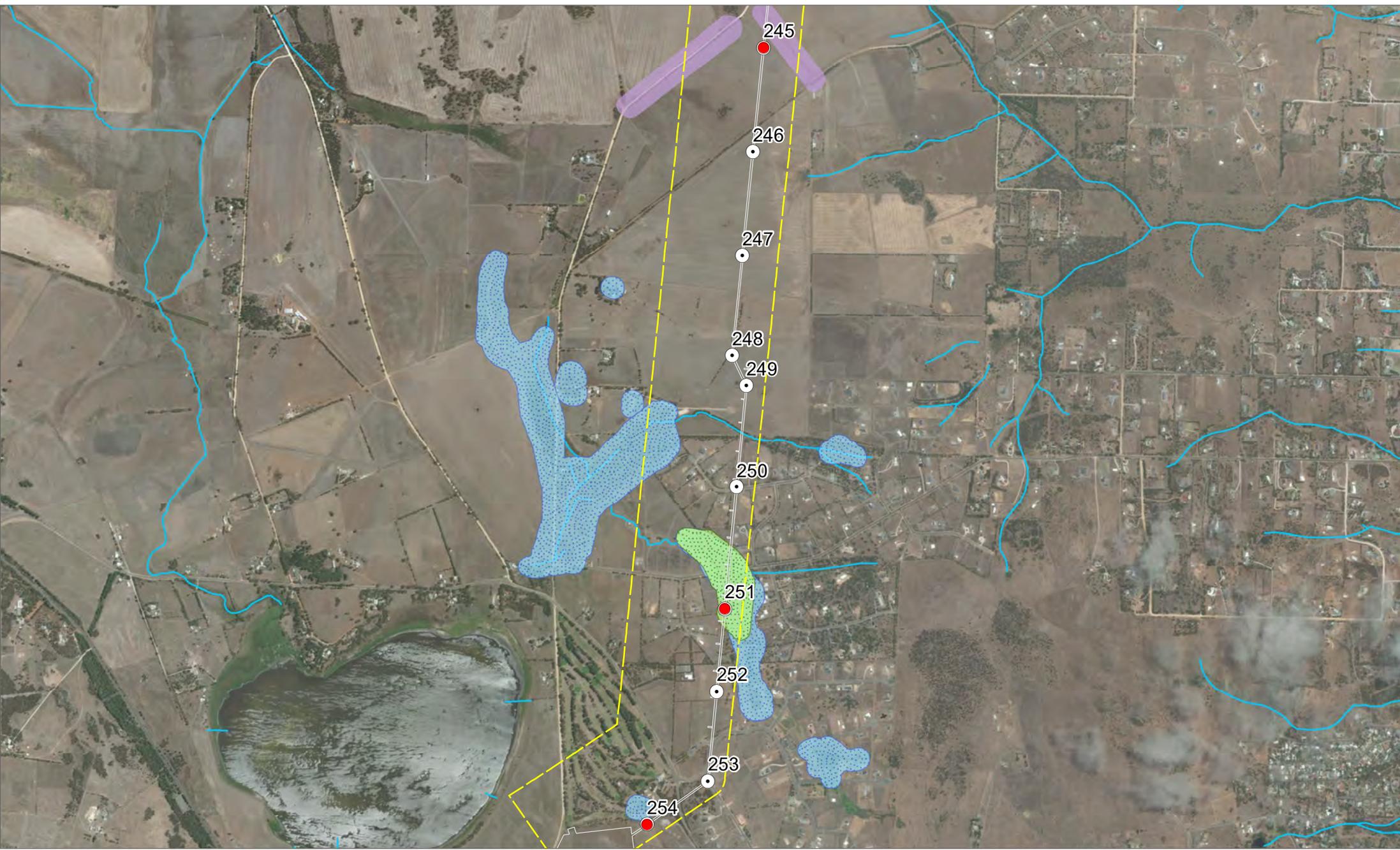
- Structure location
- ▭ Project corridor
- ▭ Construction footprint

Vegetation Association

17: *Eucalyptus socialis* / *Eucalyptus oleosa* / *Eucalyptus brachycalyx* +/- *Eucalyptus leptophylla* Mallee over *Triodia scariosa* / *Triodia lanatus*

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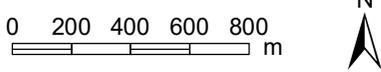


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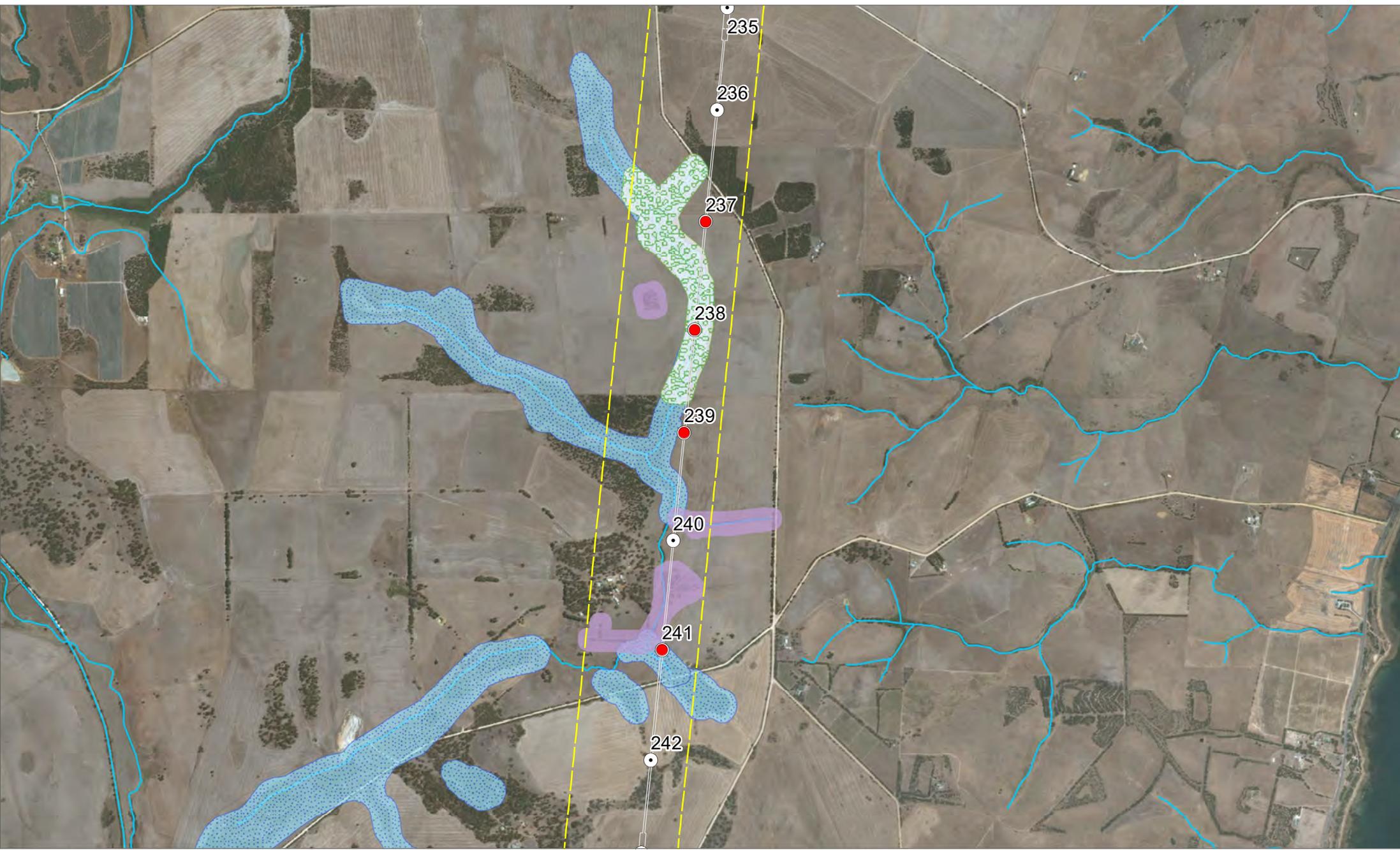
- Structures within/adjacent Southern Emu-wren Habitat
- Structure location
- Construction footprint
- ▭ Project corridor

- Water courses
 - ☁ Water bodies
- Riparian Vegetation**
- ☁ *Gahnia* spp. / *Juncus kraussii* Sedgeland +/- *Eucalyptus petiolaris*
 - ☁ Planted



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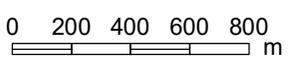


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 Date: 1/11/2019



- Structures within/adjacent Southern Emu-wren Habitat
- Structure location
- Construction footprint
- ▭ Project corridor

- Water courses
- ▭ Water bodies
- Riparian Vegetation**
- ▭ *Juncus acutus* Sedgeland
- ▭ Planted



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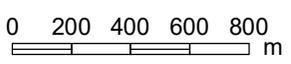
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- Structures within/adjacent Southern Emu-wren Habitat
- Structure location
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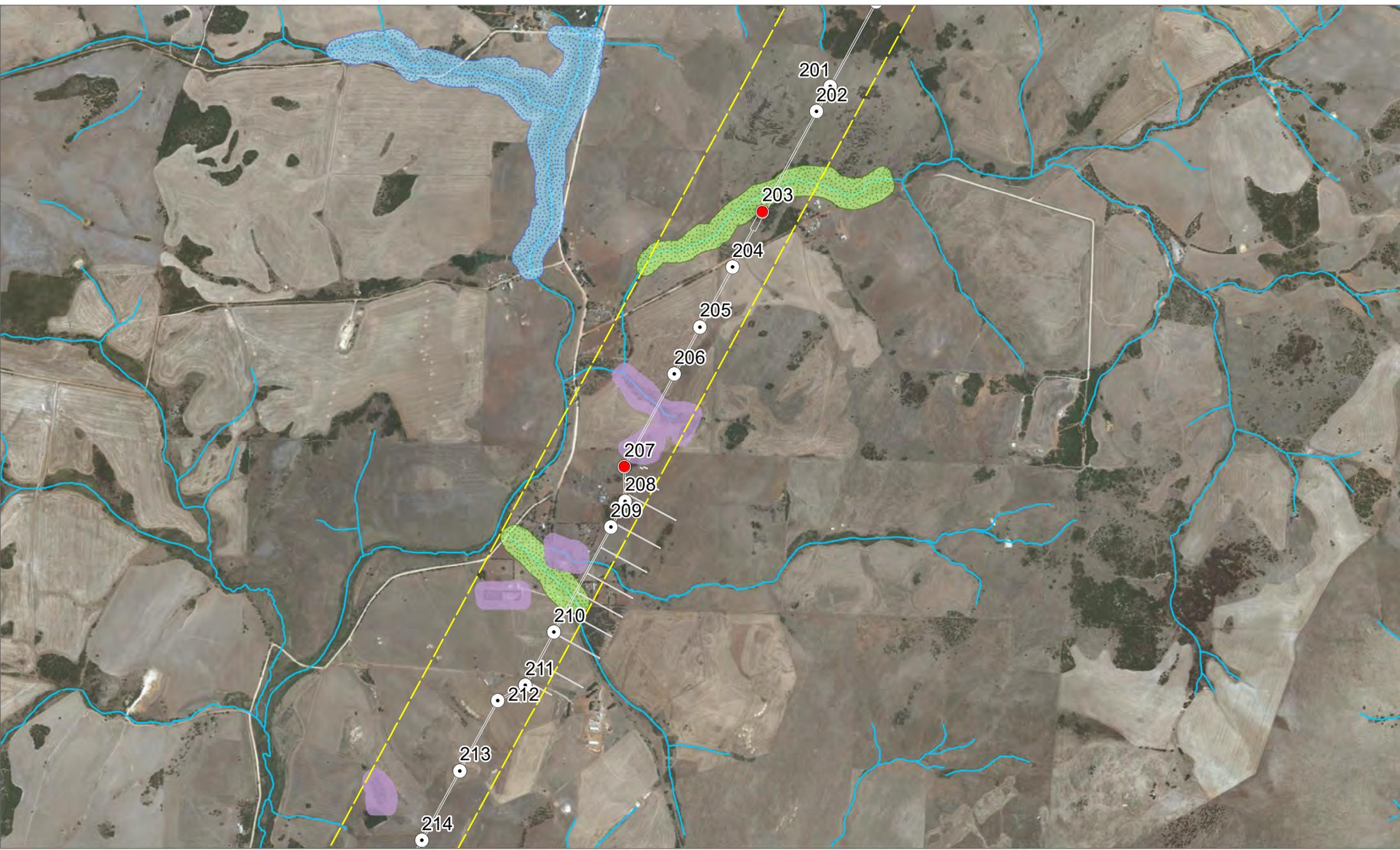
- Water courses
- ☁ Water bodies

- Riparian Vegetation**
- ▨ *Juncus* spp. Sedgeland
 - ▨ Planted



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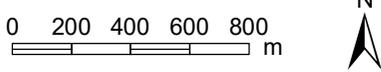


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 Date: 1/11/2019



- Structures within/adjacent Southern Emu-wren Habitat
- Structure location
- Construction footprint
- ▭ Project corridor

- Water courses
 - ☁ Water bodies
- Riparian Vegetation**
- ☘ *Gahnia* spp. / *Juncus kraussii* Sedgeland +/- *Eucalyptus petiolaris*
 - ☘ Planted



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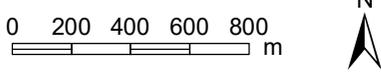


- Structures within/adjacent Southern Emu-wren Habitat
- Structure location
- Construction footprint
- ▭ Project corridor

— Water courses

Riparian Vegetation

 *Gahnia* spp. / *Juncus kraussii* Sedgeland +/- *Eucalyptus petiolaris*



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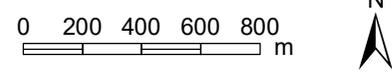


- Structures within/adjacent Southern Emu-wren Habitat
- Structure location
- Construction footprint
- Project corridor

— Water courses

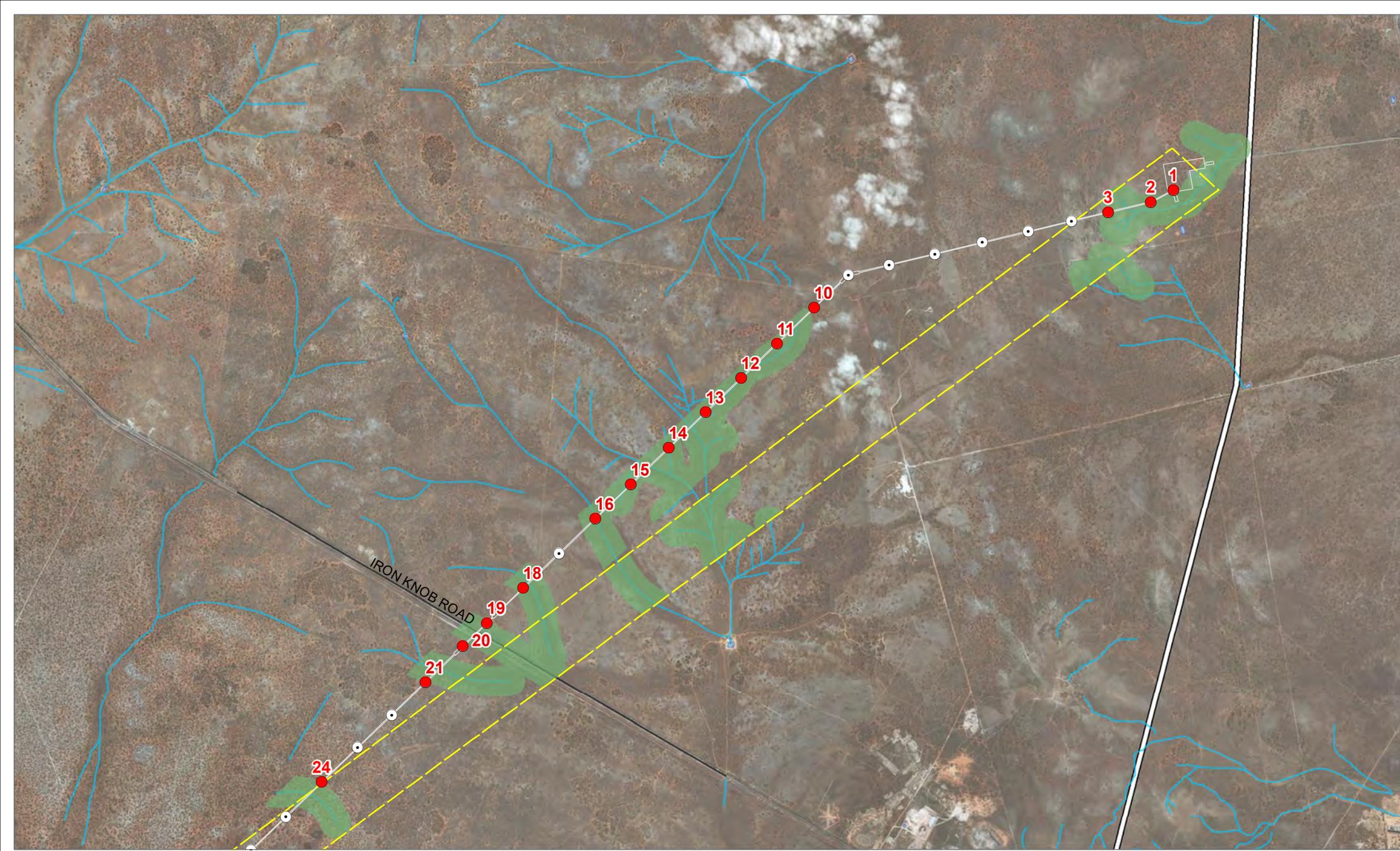
Riparian Vegetation

Gahnia spp. / *Juncus kraussii* Sedgeland +/- *Eucalyptus petiolaris*



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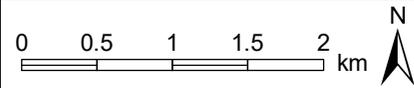




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 Date: 1/11/2019



- Structures within likely WGW habitat
- WGW population extent
- Project corridor
- Structure locations
- Likely WGW Habitat
- Water bodies
- Construction footprint
- Roads
- Water courses

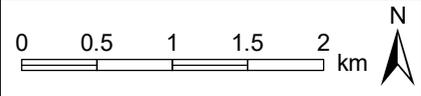


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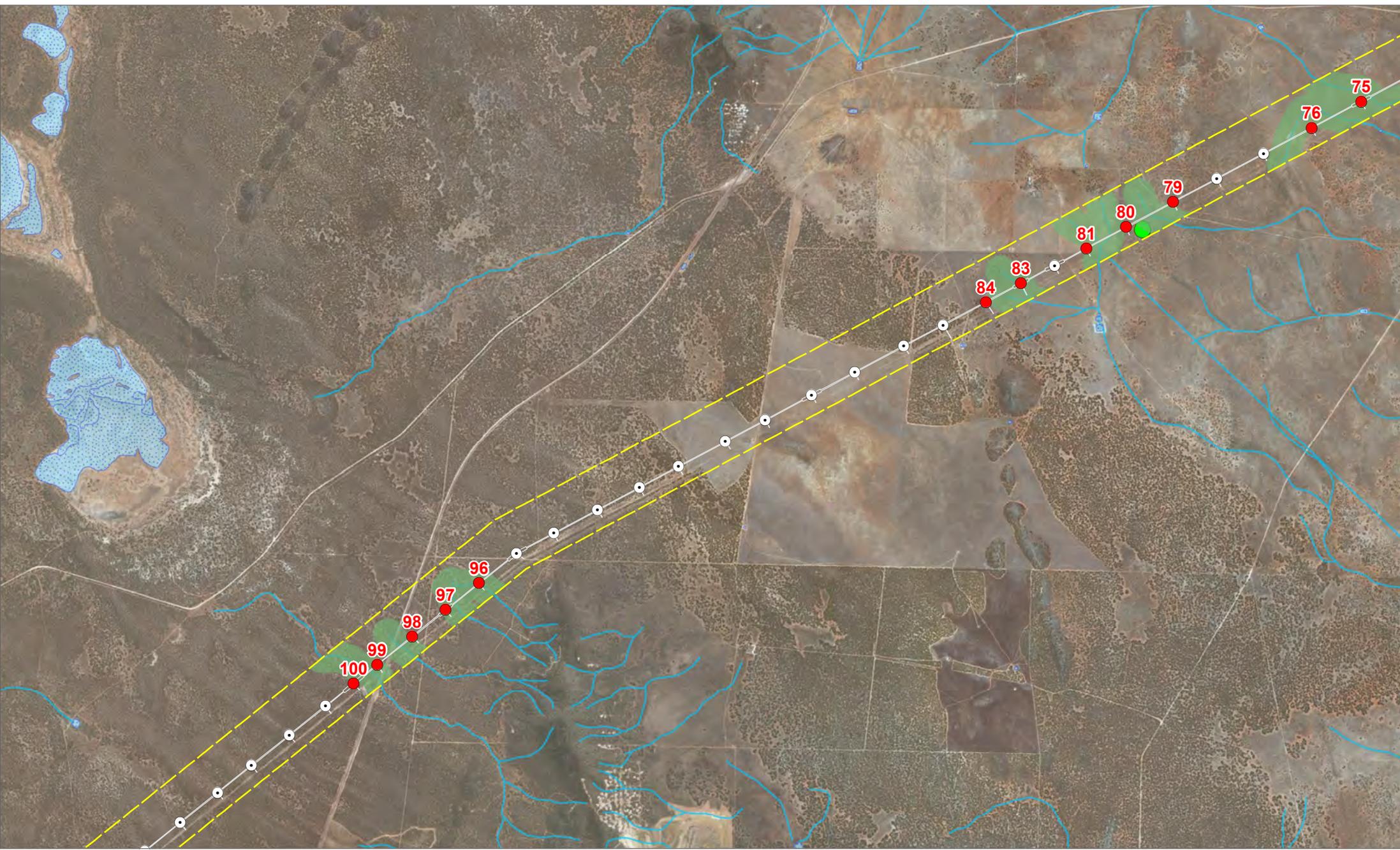
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 Data source: DEW
 Coordinate System:
 GDA 1994 MGA Zone 53
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- Structures within likely WGW habitat
- WGW population extent
- Structure locations
- Likely WGW Habitat
- Construction footprint
- Water bodies
- Project corridor
- Water courses

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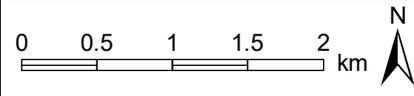




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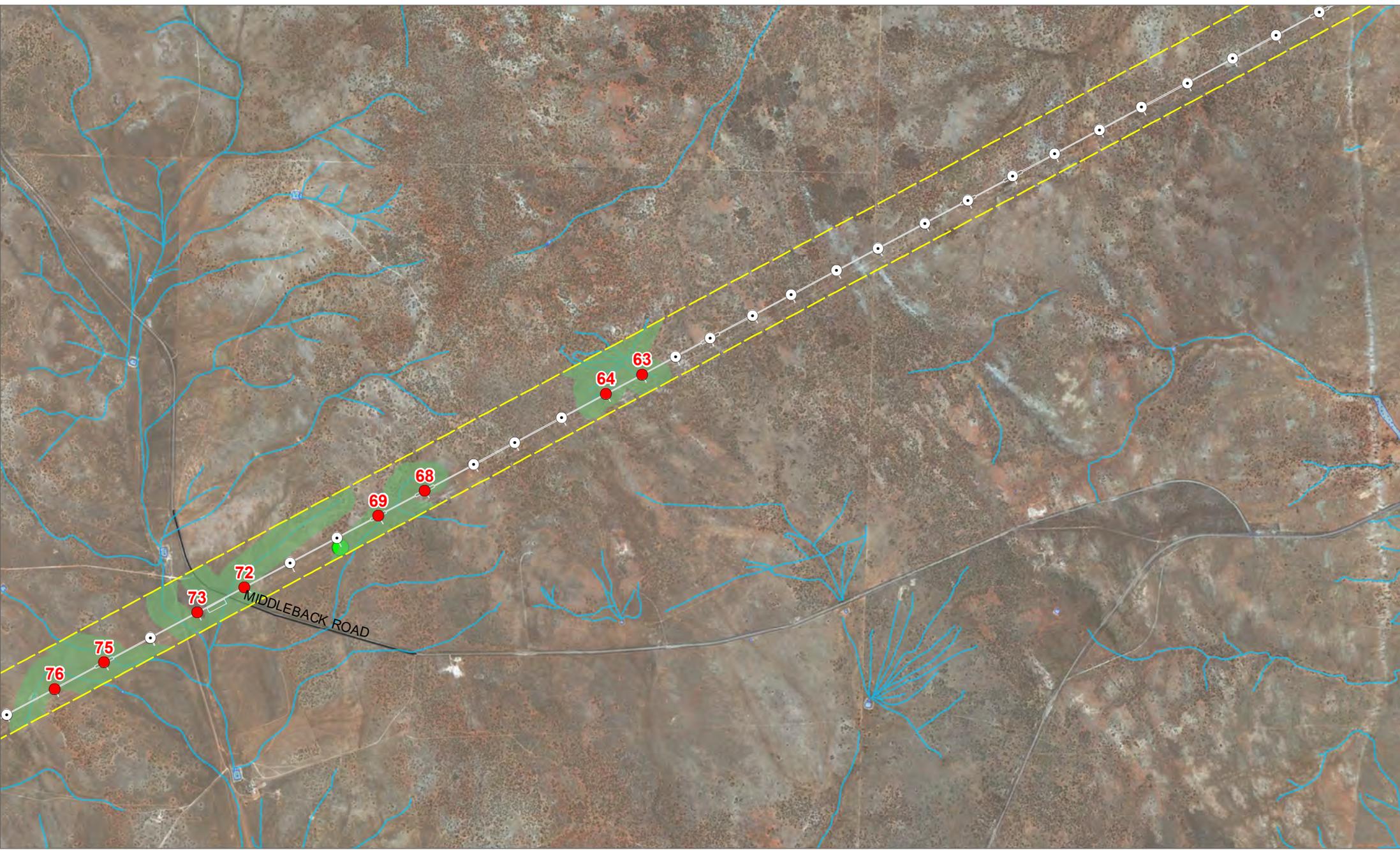


- Structures within likely WGW habitat
- Western Grasswren (*Amytornis textilis*) EBS 2013
- Structure locations
- Construction footprint
- Project corridor
- WGW population extent
- Likely WGW Habitat
- Water bodies
- Water courses

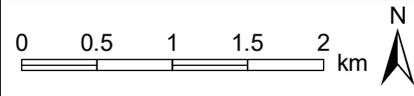


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- Structures within likely WGW habitat
- Western Grasswren (*Amytornis textilis*) EBS 2013
- Structure locations
- ▭ Construction footprint
- ▭ Project corridor
- ▭ WGW population extent
- ▭ Likely WGW Habitat
- ▭ Water bodies
- Roads
- Water courses

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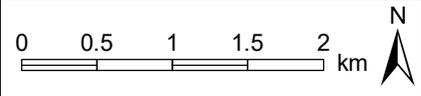




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- Structures within likely WGW habitat
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Council Contacts

Council	Email	Phone Number
District Council of Lower Eyre Peninsula	mail@dclep.sa.gov.au	(08) 8676 0400
District Council of Tumby Bay	dctumby@tumbybay.sa.gov.au	(08) 8688 2101
District Council of Cleve	council@cleve.sa.gov.au	(08) 8628 2004
District Council of Franklin Harbour	council@franklinharbour.sa.gov.au	(08) 8629 2019
Corporation of the City of Whyalla	customer.service@whyalla.sa.gov.au	(08) 8640 3444
Pastoral Unincorporated Area (Outback Communities Authority)	oca@sa.gov.au	(08) 8648 5970

Landholder	Lot Plan (Plan/Allotment or Hundred/Section)	Title ID	Property Address
Ashby, IK, CA, ER & SB	D28423AL1	CL1195/34	24601 LINCOLN HWY MIDDLEBACK RANGE 5600
Ashby, IK, CA, ER & SB	H560100SE10	CL1374/44	MIDDLEBACK RD MIDDLEBACK RANGE 5600
Ashby, IK, CA, ER & SB	H560500SE4	CL1374/45	24601 LINCOLN HWY MIDDLEBACK RANGE 5600
Ashby, IK, CA, ER & SB	H560500SE5	CL1195/45	24601 LINCOLN HWY MIDDLEBACK RANGE 5600
Bammann, GW & SM	H532700SE55	CT5951/701	372 TARAGORO RD RUDALL 5642
Bammann, GW & SM	H532700SE73	CT5951/701	372 TARAGORO RD RUDALL 5642
Bammann, GW & SM	H533400SE1	CT5946/173	737 TARAGORO RD RUDALL 5642
Bammann, GW & SM	H533400SE22	CT5946/173	737 TARAGORO RD RUDALL 5642
Barns & Shapalova, NS & N	H510400SE38	CT5894/892	BAILLA HILL RD KOPPIO 5607
Bascombe, DJ & PM	F130554AL1	CT5253/903	117 MCLEOD LANE WHITES FLAT 5607
Bascombe, DJ & PM	F130554AL5	CT5253/903	117 MCLEOD LANE WHITES FLAT 5607
Bates, KP & SL	H532700SE32	CT5938/853	582 TARAGORO RD RUDALL 5642
Bawden, RL & GM	F178907AL495	CT5547/325	485 WADELLA FALLS RD TUMBY BAY 5605
Bilney, J & C	F208389AL91	CT5549/22	15 MCLEOD LANE WHITES FLAT 5607
Borthwick, CED	F216409AL127	CT5619/639	527 PILLAWORTA RD YALLUNDA FLAT 5607
Borthwick, CED	F216409AL128	CT5619/639	527 PILLAWORTA RD YALLUNDA FLAT 5607
Borthwick, EL	F216604AL354	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
Borthwick, EL	F216604AL355	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
Borthwick, EL	F216604AL357	CT5618/255	239 PILLAWORTA RD YALLUNDA FLAT 5607
Borthwick, EL	F216604QP361	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
Borthwick, EL	F216604QP363	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
Burton, FW & NE	H531400SE27	CT5981/696	4004 COWELL-KIMBA RD MILTALIE 5602
Butler, DJ	F42968AL6	CT5857/555	BRATTEN WAY TUMBY BAY 5605
Butler, DJ	H510300SE125	CT5194/335	BRATTEN WAY YALLUNDA FLAT 5607
Cabot, AJ & KA	F216882AL91	CT5649/880	BRATTEN WAY YALLUNDA FLAT 5607
Calderwood, CJ & IC	H510400SE136	CT6150/547	ROCK VALLEY RD KOPPIO 5607
Calderwood, RJ	H510400SE35	CT6150/545	49 ROCK VALLEY RD KOPPIO 5607
Calderwood, RJ	H510400SE36	CT6150/544	49 ROCK VALLEY RD KOPPIO 5607
Calderwood, RJ	H510400SE37	CT6150/545	49 ROCK VALLEY RD KOPPIO 5607
Calderwood, RJ	H510400SE67	CT6150/546	49 ROCK VALLEY RD KOPPIO 5607

Cameron, MA & AL	F178751AL339	CT5552/927	2024 MOUNT HILL COOMABA RD BUTLER 5605
Carpenter, SW & KL	D72489AL58	CT5977/842	1 CORMORANT DR BOSTON 5607
Carrison, DK & KJ	D93428AL41	CT6138/62	134 CHAPMAN RD BOSTON 5607
Carter, W&S	H510700SE223	CT5446/676	774 WHITE FLAT RD WHITES FLAT 5607
Charlton, CI	D56914AL71	CT5888/274	1584 BROOKER RD BUTLER 5605
Charlton, CI	H530400SE31	CT5282/219	1897 CHILMANS RD BUTLER 5605
Cook, JS & MT	H510700SE163	CT6138/356	447 MURRAY DR NORTH SHIELDS 5607
Cook, JS & MT	H510700SE329	CT6138/358	447 MURRAY DR NORTH SHIELDS 5607
Cook, JS & MT	H510700SE343	CT6138/342	447 MURRAY DR NORTH SHIELDS 5607
Cook, JS & MT	H510700SE376	CT6138/343	447 MURRAY DR NORTH SHIELDS 5607
Cox, MJ, AM & JM	D110446AL15	CT6162/434	29 COCKATOO RD BOSTON 5607
Crosby, BE & KH	D86447AL5		
Crosby, BE & KH	D95003AL5002	CT6151/567	4512 BIRDSEYE HWY CLEVE 5640
Cullen, RW & LA	H510400SE130	CT5547/323	778 PILLAWORTA RD KOPPIO 5607
Cullen, RW & LA	H510400SE134	CT5547/323	778 PILLAWORTA RD KOPPIO 5607
Cutler, T & T	D72489AL59	CT5977/843	13 CORMORANT DR BOSTON 5607
Deer, MP	H531400SE32	CT5673/580	4133 COWELL-KIMBA RD MILTALIE 5602
Deer, MP	H531400SE40	CT5673/580	4133 COWELL-KIMBA RD MILTALIE 5602
Dept. Defence	D85850AL33	CR6140/89	IRON KNOB RD WHYALLA BARSON 0
Dept. Defence	D85850QP32	CL6164/360	1178 EYRE HWY CULTANA 5700
Dept. Defence	D93251AL67	CL6164/360	EYRE HWY CULTANA 5700
Dept. Defence	H835200 B1146		
Docking, PAJ & EL	F1597AL2	CT6058/84	TOD RIVER RD KOPPIO 5607
Docking, PAJ & EL	H510400SE16	CT6058/86	TOD RIVER RD KOPPIO 5607
Docking, PAJ & EL	H510400SE68	CT6058/85	43 TOD RIVER RD KOPPIO 5607
Docking, PAJ & EL	H510700SE144	CT6106/417	WHITE FLAT RD WHITES FLAT 5607
Docking, PAJ & EL	H510700SE145	CT6106/418	WHITE FLAT RD WHITES FLAT 5607
Dorward, CA	H510700SE333	CT5545/496	CHAPMAN RD GREEN PATCH 5607
Dorward, CA	H510700SE334	CT6091/376	CHAPMAN RD GREEN PATCH 5607
Dreckow, LD	H533400SE414	CT6093/50	114 DRECKOW RD CLEVE 5640
Ecological Horizons Pty Ltd	H560700SE3	CL6181/881	MIDDLEBACK RD SECRET ROCKS 5600
Ecological Horizons Pty Ltd	H560700SE4	CL6181/881	MIDDLEBACK RD SECRET ROCKS 5600
ElectraNet	D52791AL501	CT5782/656	4440 BIRDSEYE HWY CLEVE 5640

ElectraNet	D80257AL5051	CT6043/685	POUND LANE BOSTON 5607
ElectraNet	D95003AL5001	CT6151/566	BIRDSEYE HWY CLEVE 5640
ElectraNet	F148263AL23	CT5274/145	CHAPMAN RD TIATUKIA 5607
Fausser, D & S	F178914AL502	CT5390/67	1774 MINE HILL RD UNGARRA 5607
Finch, RD	F6326AL3	CT5115/141	174 CHAPMAN RD BOSTON 5607
Forster, TR & AT	D84960AL178	CT6067/389	32 PETREL CT BOSTON 5607
G K Prime Pty Ltd	D93642AL50	CT6167/159	407 NANTOURA RD WHARMINDA 5603
G K Prime Pty Ltd	F178753AL341	CT5547/716	202 COLEMAN RD BUTLER 5605
G K Prime Pty Ltd	F178754AL342	CT5547/715	202 COLEMAN RD BUTLER 5605
Garra Land Pty Ltd	H530400SE1	CT5949/857	1316 EAST DOG FENCE RD UNGARRA 5607
Gibson, RA	D72491AL2	CT5977/866	137 PANORAMIC DR BOSTON 5607
Grosser, RG	D72489AL76	CT5977/858	15 SEA EAGLE CT BOSTON 5607
Hannemann, GK & ML	H531600SE17	CT5931/542	840 MANGALO-KIELPA RD MANGALO 5602
Hannemann, MR & AC	F178593AL181	CT5940/659	MOUNT DESPERATE RD MANGALO 5602
Hannemann, MR & AC	H530500SE1	CT6076/998	1275 CLEVE RD CAMPOONA 5640
Harris, BM & L	H533400SE64	CT5944/780	BIRDSEYE HWY CLEVE 5640
Harris, BM & L	H533400SE88	CT5944/781	388 SYVERTSEN RD CLEVE 5640
Havendale Nominees Pty Ltd	H530900SE24	CL6182/263	WOOLFORD RD MINBRIE 5602
Havendale Nominees Pty Ltd	H530900SE27	CL6182/263	WOOLFORD RD MINBRIE 5602
HEB Investments Pty Ltd	D23001QP28	CL504/25	1626 MIDDLEBACK RD MIDDLEBACK RANGE 5600
HEB Investments Pty Ltd	D23001QP31	CL513/114	268 ASH RD MIDDLEBACK RANGE 5600
HEB Investments Pty Ltd	H560100SE12	CL587/119	215 ASH RD MIDDLEBACK RANGE 5600
HEB Investments Pty Ltd	H560100SE15	CL512/62	215 ASH RD MIDDLEBACK RANGE 5600
HEB Investments Pty Ltd	H560600SE12	CL1597/16	MIDDLEBACK RD MIDDLEBACK RANGE 5600
Henderson, S & D	H510700SE362	CT5935/172	772 CHAPMAN RD NORTH SHIELDS 5607
Houston, JA & EE	F215905QP92	CT5605/478	1888 BROOKER RD BUTLER 5605
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Houston, JA & EE	H530400SE37	CT5605/479	1888 BROOKER RD BUTLER 5605
Houston, JA & EE	H530400SE67	CT5605/481	1888 BROOKER RD BUTLER 5605
Jillandra Farming Pty Ltd	D32252AL3	CT5419/267	1575 LIPSON-UNGARRA RD UNGARRA 5607
Jillandra Farming Pty Ltd	D32252AL4	CT5420/288	1575 LIPSON-UNGARRA RD UNGARRA 5607
Jillandra Farming Pty Ltd	D32252AL5	CT5419/329	1575 LIPSON-UNGARRA RD UNGARRA 5607

Jones, JM & JK	H533100SE46	CT5942/520	736 PIPE RD VERRAN 5603
K D and W G MacDonald Pty Ltd	F214542AL151	CT5620/114	313 TOD RIVER RD WHITES FLAT 5607
K D and W G MacDonald Pty Ltd	F214542AL153	CT5620/114	313 TOD RIVER RD WHITES FLAT 5607
King, DC	D72492AL6	CT5977/875	29 PETREL CT BOSTON 5607
L S Harris Nominees Pty Ltd	H531400SE10	CT5994/939	683 BROADBENT RD MILTALIE 5602
L S Harris Nominees Pty Ltd	H531400SE46	CT5994/939	683 BROADBENT RD MILTALIE 5602
L S Harris Nominees Pty Ltd	H531400SE5	CT5994/939	683 BROADBENT RD MILTALIE 5602
L S Harris Nominees Pty Ltd	H531400SE6	CT5994/939	683 BROADBENT RD MILTALIE 5602
L S Harris Nominees Pty Ltd	H531400SE9	CT5994/939	683 BROADBENT RD MILTALIE 5602
Lawrie, JN, SA & CJT	D80728AL14	CT6124/37	1742 EAST DOG FENCE RD UNGARRA 5607
Lawrie, JN, SA & CJT	H511600SE365	CT5991/809	1488 LIPSON-UNGARRA RD UNGARRA 5607
Lawrie, JN, SA & CJT	H511600SE433	CT5991/809	1488 LIPSON-UNGARRA RD UNGARRA 5607
Liddicoat, TC & DK	H511000SE99	CT6055/313	49 UNGARRA-STOKES RD UNGARRA 5607
Liddicoat, TC & DK	H511600SE400	CT6055/314	WEST DOG FENCE RD UNGARRA 5607
Lovegrove, MB	F35330QP1	CT6058/985	7646 BALUMBAH-KINNARD RD VERRAN 5603
Lovegrove, MB	H533100SE78	CT6074/876	BAKER RD VERRAN 5603
Low Holdings Pty Ltd	H510700SE373	CT5994/15	380 CLARKES LANE NORTH SHIELDS 5607
Low Holdings Pty Ltd	H510700SE374	CT5994/15	380 CLARKES LANE NORTH SHIELDS 5607
Low, LL & YA	D51226AL32	CT5656/541	GAWLER PONDS RD WHITES FLAT 5607
Low, LL & YA	F199758QP95	CT5955/875	689 WHITE FLAT RD WHITES FLAT 5607
Low, LL & YA	F214991AL93	CT5792/848	WHITE FLAT RD WHITES FLAT 5607
Lower Eyre, District Council of	D72491AE202	CT5977/895	FLINDERS HWY BOSTON 5607
Lower Eyre, District Council of	D84960AE179	CT6067/390	2 COCKATOO RD BOSTON 5607
Malcolm, SW & VB	F178747AL335	CT5565/568	2289 MOUNT HILL COOMABA RD BUTLER 5605
Mallard, RT	D72489AL78	CT5977/860	1 SEA EAGLE CT BOSTON 5607
Masters, GD & GH	H533100SE44	CT5972/350	78 PIPE RD VERRAN 5603
Masters, PG & LM	H533100SE4	CT5937/179	2061 WHARMINDA RD WHARMINDA 5603
Millard, D J	H533100SE13	CT5956/596	208 RANGE RD VERRAN 5603
Millard, D J	H533100SE14	CT5956/596	208 RANGE RD VERRAN 5603
Miller, B & K	D72492AL5	CT5977/874	21 PETREL CT BOSTON 5607
Minister for Primary Industries and Resources	H835200 S374		

Minister for Sustainability, Environment & Conservation	D38006AL100	CR5772/809	COWELL-KIMBA RD MILTALIE 5602
Minister for Sustainability, Environment & Conservation	D83666AL81	CR6059/794	MIDDLEBACK RD MIDDLEBACK RANGE 5600
Minister for Sustainability, Environment & Conservation	D83666AL82	CR6059/795	MIDDLEBACK RD MIDDLEBACK RANGE 5600
Minister for Sustainability, Environment & Conservation	D83666AL84	CR6059/797	MIDDLEBACK RD MIDDLEBACK RANGE 5600
Minister for Sustainability, Environment & Conservation	D83666QP80	CR6059/793	MIDDLEBACK RD MIDDLEBACK RANGE 5600
Minister for Sustainability, Environment & Conservation	H533100SE48	CT5957/792	MASTERS RD WHARMINDA 5603
Minister for Sustainability, Environment & Conservation	H533100SE77	CT5880/963	MASTERS RD WHARMINDA 5603
Minister for Sustainability, Environment & Conservation	H533100SE94	CR5772/879	RANGE RD WHARMINDA 5603
Minister for Sustainability, Environment & Conservation	H560600SE10	CR6072/724	MIDDLEBACK RD MIDDLEBACK RANGE 5600
Minister for Sustainability, Environment & Conservation - Sheoak	H531400SE50	CR5772/867	GARTHS HWY MILTALIE 5602
Minister for Transport	H533100SE55	CT5665/342	BAKER RD VERRAN 5603
Minister for Transport, Infrastructure & Local Government	F217080QP27	CT5680/304	MOUNT HILL COOMABA RD BUTLER 5605
Murray, L&M	H510700SE165	CT5489/756	MURRAY DR NORTH SHIELDS 5607
Murray, L&M	H510700SE365	CT5939/525	CHAPMAN RD GREEN PATCH 5607
Murray, ME	F213007QP92	CT5884/798	CHAPMAN RD CHARLTON GULLY 5607
Neighbour & Brooks, C & S	D110446AL14	CT6162/433	9 COCKATOO RD BOSTON 5607
Nickolai, DS	D72492AL4	CT5977/873	385 RICHARDSON RD BOSTON 5607
Nield, JD & BL	H531600SE11	CT6143/46	BURTON RD MANGALO 5602
Nield, JD & BL	H531600SE12	CT5847/901	353 BURTON RD MANGALO 5602
Nield, K J and E A	H533100SE35	CT6074/875	7282 BALUMBAH-KINNARD RD VERRAN 5603
Norris, PL & KA	F178594AL182	CT5669/119	1741 MANGALO RD MANGALO 5602
Norris, PL & KA	H531600SE37	CT6143/47	45 BURTON RD MANGALO 5602

Nottle, G & K	F6326AL1	CT5534/119	114 CHAPMAN RD BOSTON 5607
Pedler & Swaffer, DT & AM	H530400SE32	CT5233/920	1830 CHILMANS RD BUTLER 5605
Prime, DL	F199822QP91	CT5397/480	240 SOAKS RD WHARMINDA 5603
Prime, DL	F199822QP92	CT5397/480	240 SOAKS RD WHARMINDA 5603
Prime, PG, AJ & CG	F199449QP93	CT5666/49	141 PRIME RD BUTLER 5605
Proude, RD	D52679AL33	CT5733/811	GAWLER PONDS RD CHARLTON GULLY 5607
Pt Lincoln Golf Club	F179979AL757	CT5553/594	495 FLINDERS HWY BOSTON 5607
Quinn, RM & KJ	H533400SE28	CT5939/888	GOVT RD CLEVE 5640
Quinn, W & J	H533400SE103	CT6173/412	500 NORTH SPRIGGS RD CLEVE 5640
Quinn, W & J	H533400SE104	CT6173/414	500 NORTH SPRIGGS RD CLEVE 5640
Quinn, W & J	H533400SE95	CT6173/413	500 NORTH SPRIGGS RD CLEVE 5640
Quinn, W & J	H533400SE96	CT5942/749	96 NORTH SPRIGGS RD CLEVE 5640
R M Cane Nominees Pty Ltd	H530400SE45	CT5542/697	BROOKER RD BUTLER 5605
RBQ Holdings Pty Ltd	H533400SE39	CT5928/337	225 BROADVIEW RD CLEVE 5640
RBQ Holdings Pty Ltd	H533400SE46	CT5940/707	4543 BIRDSEYE HWY CLEVE 5640
RBQ Holdings Pty Ltd	H533400SE55	CT5940/707	4543 BIRDSEYE HWY CLEVE 5640
Reed & Belling, SP & CJ	D84960AL177	CT6067/388	6 FALCON CT BOSTON 5607
Richardson, AG & SJ	F42968AL7	CT5934/51	WADELLA FALLS RD TUMBY BAY 5605
Richardson, AG & SJ	F42968QP9	CT5934/51	WADELLA FALLS RD TUMBY BAY 5605
Richardson, AG & SJ	H510300SE129	CT5549/527	WADELLA FALLS RD TUMBY BAY 5605
Richardson, AG & SJ	H510300SE130	CT5465/916	LOG HUT RD YALLUNDA FLAT 5607
RoeCo Pty Ltd	F6395AL2	CT5536/656	MINE HILL RD UNGARRA 5607
Roediger, KJ & TJ	D66450QP51	CT5941/866	MINE HILL RD UNGARRA 5607
Roediger, KJ & TJ	F6395AL1	CT5941/867	MINE HILL RD UNGARRA 5607
Rogers, GW & HM	H531400SE12	CT6004/865	CLAPP RD MILTALIE 5602
Rosenzweig, TC	H533100SE20	CT5450/559	610 PAHLS HILL RD VERRAN 5603
Rosenzweig, TC	H533100SE42	CT5889/7	MASTERS LANE VERRAN 5603
Ryan, IM	D72489AL62	CT5977/846	26 SEA EAGLE CT BOSTON 5607
Schlink, DT	D110446AL16	CT6162/435	43 COCKATOO RD BOSTON 5607
Seaford Holdings Pty Ltd	F156084AL1	CT5281/628	231 HAIGH DR TIATUKIA 5607
Sheehan, P	F148262AL22	CT5274/146	CHAPMAN RD TIATUKIA 5607
SIMEC Mining	D23001QP19	CT6128/515	MIDDLEBACK RD MIDDLEBACK RANGE 5600
SIMEC Mining	F252366AL62	CL6189/775	0

SIMEC Mining	F252367AL61	CL6189/768	0
SIMEC Mining	F252368QP60	CL6189/768	0
Siviour, GM & TM	H533400SE54	CT5256/872	4231 BIRDSEYE HWY CLEVE 5640
Skinner & Burke, GW & SK	D72489AL77	CT5977/859	7 SEA EAGLE CT BOSTON 5607
Smith, KJ & B	H532700SE29	CT5936/380	1756 CLEVE-VERRAN RD VERRAN 5603
Smits, GM	F130554AL2	CT6122/308	137 MCAVANEY LANE WHITES FLAT 5607
Smits, GM	F130554AL3	CT6122/309	137 MCAVANEY LANE WHITES FLAT 5607
Stephenson, J T & L J	H532700SE33	CT5975/345	TARAGORO RD RUDALL 5642
Stephenson, J T & L J	H533400SE24	CT5975/345	177 TARAGORO RD RUDALL 5642
Stoneleigh Nominees Pty Ltd	F199757QP92	CT5388/607	463 WHITE FLAT RD WHITES FLAT 5607
Story, PJ & LK	F147689AL4	CT5269/41	613 MOUNT DESPERATE RD MANGALO 5602
Story, PJ & LK	H531200SE6	CT5853/934	417 BURTON RD MANGALO 5602
Story, PJ & LK	H531600SE23	CT5269/45	613 MOUNT DESPERATE RD MANGALO 5602
Story, PJ & LK	H531600SE30	CT5853/934	417 BURTON RD MANGALO 5602
Telfer, GK & DH	D69546AL102	CT5957/762	286 DRAY POLE HILL RD YALLUNDA FLAT 5607
Telfer, JK & MK	H511000BL10C	CT5380/595	645 UNGARRA-STOKES RD UNGARRA 5607
Telfer, LC, SJ & IN	D58399AL50	CT5888/648	LIPSON-UNGARRA RD UNGARRA 5607
Tucknott, SI	H510700SE204	CT5546/775	804 WHITE FLAT RD WHITES FLAT 5607
Turner, PS	H533400SE74	CT5975/355	NORTH SPRIGGS RD CLEVE 5640
Turner, PS	H533400SE75	CT5975/355	NORTH SPRIGGS RD CLEVE 5640
Turvey General Supplies Pty Ltd	H510700SE364	CT6109/635	CLARKES LANE GREEN PATCH 5607
Whillas, CA	F6326AL4	CT5411/951	CHAPMAN RD BOSTON 5607
Whillas, CA	F6326AL5	CT5411/949	CHAPMAN RD BOSTON 5607
Whillas, JP	F147915AL7	CT5272/71	265 CHAPMAN RD TOOTENILLA 5607
Whillas, JP	F17131AL33	CT5322/461	HYDE RD TOOTENILLA 5607
Whillas, LG & KL	F216503AL91	CT5802/497	538 HYDE RD TOOTENILLA 5607
Whillas, LG & KL	F216503AL92	CT5802/497	538 HYDE RD TOOTENILLA 5607
Whillas, LG & KL	F216503AL93	CT5802/497	538 HYDE RD TOOTENILLA 5607
Whillas, LG & KL	F216503AL94	CT5802/497	538 HYDE RD TOOTENILLA 5607
Whillas, LG & KL	H510700SE363	CT5698/302	CLARKES LANE NORTH SHIELDS 5607
White Flat Hall	F209442AL256		
Whyalla, City of	D79748AL1000	CT6144/358	101 LINCOLN HWY WHYALLA BARSON 5601
Wishford Nominees Pty Ltd	H531400SE33	CT5979/39	28 CLAPP RD MILTALIE 5602

Wohling, NJ & S	D72489AL61	CT5977/845	32 SEA EAGLE CT BOSTON	5607
Zerk & Zollo, H & B	D80257AL5052	CT6043/686	451 FLINDERS HWY BOSTON	5607



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 19/02/19 12:38:53

[Summary](#)

[Details](#)

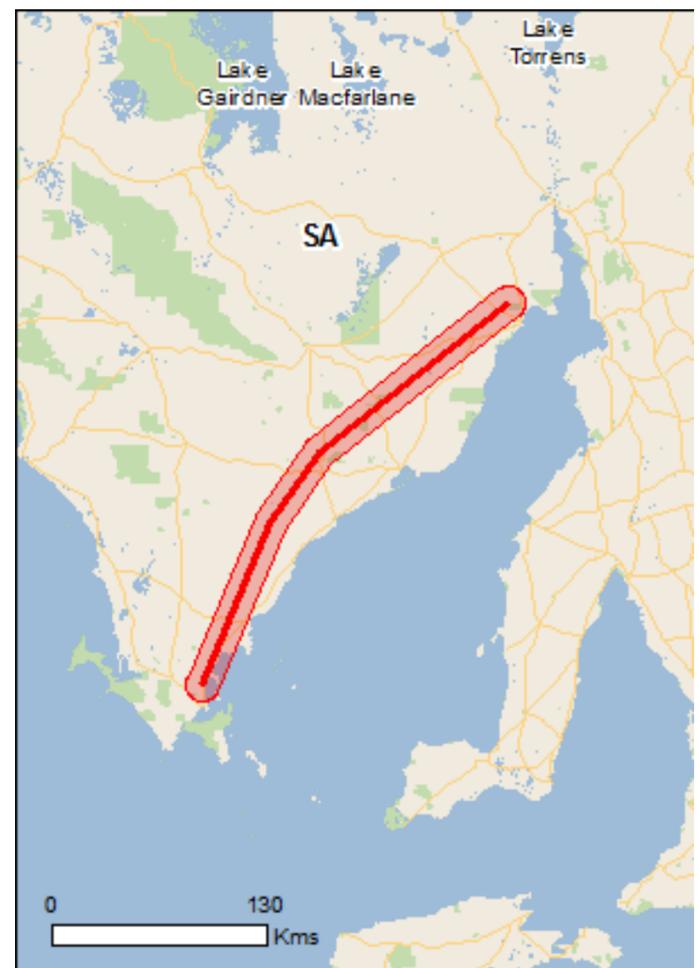
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

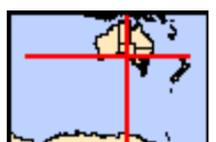
[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	58
Listed Migratory Species:	37

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	73
Whales and Other Cetaceans:	11
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	45
Regional Forest Agreements:	None
Invasive Species:	31
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland	Endangered	Community likely to occur within area
Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Amytornis textilis myall Western Grasswren (Gawler Ranges) [64454]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Psophodes nigrogularis leucogaster Western Whipbird (eastern), Mallee Western Whipbird [64448]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Stipiturus malachurus parimeda Southern Emu-wren (Eyre Peninsula) [26006]	Vulnerable	Species or species habitat known to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area

Mammals

Name	Status	Type of Presence
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Sminthopsis psammophila Sandhill Dunnart [291]	Endangered	Species or species habitat known to occur within area
Plants		
Acacia cretacea Chalky Wattle [10689]	Endangered	Species or species habitat likely to occur within area
Acacia enterocarpa Jumping-jack Wattle [17615]	Endangered	Species or species habitat known to occur within area
Acacia pinguifolia Fat-leaved Wattle [5319]	Endangered	Species or species habitat known to occur within area
Acacia praemorsa Senna Wattle [55363]	Vulnerable	Species or species habitat known to occur within area
Acacia retinocarpa Neat Wattle, Resin Wattle (SA) [11282]	Vulnerable	Species or species habitat known to occur within area
Acacia whibleyana Whibley Wattle [64497]	Endangered	Species or species habitat known to occur within area
Caladenia brumalis Winter Spider-orchid [54993]	Vulnerable	Species or species habitat known to occur within area
Caladenia conferta Coast Spider-orchid [55000]	Endangered	Species or species habitat may occur within area
Caladenia macroclavia Large-club Spider-orchid [55012]	Endangered	Species or species habitat likely to occur within area
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat known to occur within area
Frankenia plicata [4225]	Endangered	Species or species habitat may occur within area
Olearia pannosa subsp. pannosa Silver Daisy-bush, Silver-leaved Daisy, Velvet Daisy-bush [12348]	Vulnerable	Species or species habitat known to occur within area
Prasophyllum goldsackii Goldsack's Leek-orchid [2380]	Endangered	Species or species habitat likely to occur within area
Prasophyllum laxum Lax Leek Orchid [86264]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Prostanthera calycina West Coast Mintbush, Limestone Mintbush, Red Mintbush [9470]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis mirabilis Nodding Rufoushood [86228]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis sp. Hale (R.Bates 21725) Hale Dwarf Greenhood [64539]	Endangered	Species or species habitat likely to occur within area
Ptilotus beckerianus Ironstone Mulla Mulla [3787]	Vulnerable	Species or species habitat known to occur within area
Pultenaea trichophylla Tufted Bush-pea [12715]	Endangered	Species or species habitat known to occur within area
Swainsona pyrophila Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat likely to occur within area
Tecticornia flabelliformis Bead Glasswort [82664]	Vulnerable	Species or species habitat known to occur within area
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land

[[Resource Information](#)]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name

Commonwealth Land -
Commonwealth Land - Australian National Railways Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Minister of Transport
Defence - PORT LINCOLN TRAINING DEPOT

Listed Marine Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Foraging, feeding or related behaviour likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypsognathus horridus Shaggy Pipefish, Prickly Pipefish [66244]		Species or species habitat may occur within area
Hypsognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Vanacampus vercoi Verco's Pipefish [66286]		Species or species habitat may occur within area

Mammals

Name	Threatened	Type of Presence
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Hincks	SA
Ironstone Hill	SA
Moody Tank	SA
Rudall	SA
Sheoak Hill	SA
The Plug Range	SA
Unnamed (No.HA1029)	SA
Unnamed (No.HA1097)	SA
Unnamed (No.HA1111)	SA
Unnamed (No.HA1144)	SA
Unnamed (No.HA1152)	SA
Unnamed (No.HA1206)	SA
Unnamed (No.HA1329)	SA
Unnamed (No.HA137)	SA
Unnamed (No.HA1388)	SA
Unnamed (No.HA1398)	SA
Unnamed (No.HA1409)	SA
Unnamed (No.HA1451)	SA
Unnamed (No.HA1483)	SA
Unnamed (No.HA1486)	SA
Unnamed (No.HA263)	SA
Unnamed (No.HA310)	SA
Unnamed (No.HA318)	SA
Unnamed (No.HA381)	SA
Unnamed (No.HA457)	SA
Unnamed (No.HA516)	SA
Unnamed (No.HA528)	SA
Unnamed (No.HA584)	SA
Unnamed (No.HA589)	SA
Unnamed (No.HA598)	SA
Unnamed (No.HA61)	SA
Unnamed (No.HA63)	SA
Unnamed (No.HA729)	SA
Unnamed (No.HA774)	SA
Unnamed (No.HA787)	SA
Unnamed (No.HA833)	SA
Unnamed (No.HA876)	SA
Unnamed (No.HA881)	SA
Unnamed (No.HA898)	SA
Unnamed (No.HA963)	SA
Unnamed (No.HA981)	SA
Verran Tanks	SA
Wharminda	SA
Whyalla	SA
Yeldulknie	SA

Invasive Species

[[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
<i>Alauda arvensis</i> Skylark [656]		Species or species habitat likely to occur within area
<i>Anas platyrhynchos</i> Mallard [974]		Species or species habitat likely to occur within area
<i>Carduelis carduelis</i> European Goldfinch [403]		Species or species habitat likely to occur within area
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<i>Passer domesticus</i> House Sparrow [405]		Species or species habitat likely to occur within area
<i>Streptopelia chinensis</i> Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
<i>Sturnus vulgaris</i> Common Starling [389]		Species or species habitat likely to occur within area
<i>Turdus merula</i> Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
<i>Bos taurus</i> Domestic Cattle [16]		Species or species habitat likely to occur within area
<i>Canis lupus familiaris</i> Domestic Dog [82654]		Species or species habitat likely to occur within area
<i>Capra hircus</i> Goat [2]		Species or species habitat likely to occur within area
<i>Felis catus</i> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<i>Mus musculus</i> House Mouse [120]		Species or species habitat likely to occur within area
<i>Oryctolagus cuniculus</i> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<i>Rattus rattus</i> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<i>Vulpes vulpes</i> Red Fox, Fox [18]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus declinatus Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands		[Resource Information]
Name	State	
Tod River Wetland System	SA	
Tumby Bay	SA	

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a 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. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.93469 137.50701,-33.61046 136.47908,-33.92455 136.21259,-34.6479 135.84139

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.



Eyre Peninsula Transmission Line
EPBC Assessment

Eyre Peninsula Transmission Line EPBC Assessment

8 November 2019

Version 2 - Final

Prepared by EBS Ecology for ElectraNet

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EBS Ecology
125 Hayward Avenue
Torrensville, South Australia 5031
t: 08 7127 5607
<http://www.ebsecology.com.au>
email: info@ebsecology.com.au



GLOSSARY AND ABBREVIATION OF TERMS

BDBSA	Biological Database of South Australia
DEW	Department for Environment and Water
DotEE	Department of the Environment and Energy (previously known as DSEWPaC)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EBS Ecology	Environmental and Biodiversity Services
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ha	hectare(s)
km	kilometre(s)
kV	kilovolt(s) – unit of electrical potential equal to 1000 volts
LiDAR	Light Detection and Ranging (a remote sensing method that uses the reflectance of a target to develop a three-dimensional map).
m	metre(s)
MNES	Matters of National Environmental Significance (protected by the EPBC Act)
PMR	Protected Matters Report
PMST	Protected Matters Search Tool
Project Area	The 100 m wide and approximately 290 km long transmission line corridor.
TEC	Threatened Ecological Community
the Project	The Eyre Peninsula Transmission Line Project.

EXECUTIVE SUMMARY

EBS Ecology was commissioned by ElectraNet to determine if the proposed Eyre Peninsula Transmission Line Project (the Project) requires referral to the Australian Government Minister for the Environment in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Between 2012 and 2014, EBS Ecology completed an extensive biodiversity assessment for the Project (*Eyre Peninsula Transmission Line – Biodiversity Assessment Report*, EBS Ecology 2014a) which included both desktop assessment and numerous field surveys, and recommended that an EPBC Act referral would be required due to the number of Matters of National Environmental Significance (MNES) protected by the EPBC Act that are located within the Project Area.

To determine if the Project requires EPBC referral, EBS Ecology completed a desktop assessment comprised of the following:

- Review of:
 - previous ecological investigations and draft EPBC referral for the Project;
 - an updated EPBC Act Protected Matters Report (PMR);
 - updated data obtained from the Biological Database of South Australia (BDBSA); and
 - any changes in legislation since 2014 (for example any flora or fauna species or Threatened Ecological Communities (TECs) which have been listed under the EPBC Act since 2014);
- An assessment of the likelihood of all identified EPBC listed flora, fauna and TECs to occur within the Project Area, and whether they are likely to be impacted by the Project; and
- A Significant Impact Assessment for each relevant flora species, fauna species and TEC to determine whether the Project is likely to have a significant impact on a MNES, and whether the Project will require an EPBC referral under the EPBC Act.

The assessment established that an EPBC Referral should be undertaken as there is potential for the Project to have a significant impact on:

- One Threatened Ecological Community (TEC):
 - Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland - Endangered;
- The following six nationally threatened flora species:
 - *Acacia enterocarpa* (Jumping-jack Wattle) – Endangered;
 - *Acacia pinguifolia* (Fat-leaf Wattle) – Endangered;
 - *Caladenia macroclavia* (Large-club Spider-orchid) – Endangered;
 - *Caladenia tensa* (Inland Green-comb Spider-orchid) – Endangered;
 - *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) – Vulnerable; and
 - *Pultenaea trichophylla* (Tufted Bush-pea) – Endangered; and
- The following four nationally threatened fauna species:
 - Malleefowl (*Leipoa ocellata*) – Vulnerable;
 - Sandhill Dunnart (*Sminthopsis psammophila*) – Endangered;

- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) – Vulnerable;
and
- Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*) – Vulnerable.

A number of recommendations are also provided to avoid and/or minimise impacts associated with the Project on MNES and other biodiversity assets within the Project Area, with a specific focus on relocating (where possible) and/or micro-siting proposed infrastructure located within or immediately adjacent to MNES habitat.

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1 INTRODUCTION

EBS Ecology was commissioned by ElectraNet to determine if the proposed Eyre Peninsula Transmission Line Project (the Project) requires referral to the Australian Government Minister for the Environment in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which is administered by the Department of the Environment and Energy (DotEE). As such, this report details the results of a desktop assessment and provides recommendations to minimise the impacts associated with the Project on the biodiversity assets within the region.

Between 2012 and 2014, EBS Ecology completed an extensive biodiversity assessment for the Project (*Eyre Peninsula Transmission Line – Biodiversity Assessment Report*, EBS Ecology 2014a) which included both desktop assessment and numerous field surveys, and recommended that an EPBC Act referral would be required due to the number of Matters of National Environmental Significance (MNES) protected by the EPBC Act that are located within the Project Area. The previous assessment also recommended that extensive consultation with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC; which is now DotEE) would be required. As such, ElectraNet (Scott Haynes) and EBS Ecology (Travis How) met with DSEWPaC to consult with them about the Project and potential impacts to MNES.

It is recommended that this EPBC Assessment is read in conjunction with the *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology 2014).

1.1 Background

The Eyre Peninsula has a single main radial electrical transmission supply of 132 kilovolt (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. Electricity supply to Port Lincoln is supported by three generators located at the Port Lincoln substation and in recent years, demand has steadily increased as a result of agricultural, residential, commercial, mining and industrial development. In addition, forecasted demand has also increased due to proposed spot load mining developments and associated infrastructure projects such as new ports and processing facilities. Therefore, it is anticipated that current electricity network infrastructure will become insufficient to accommodate for future load at Port Lincoln and across the Eyre Peninsula. Furthermore, the age and condition of the existing 132 kV radial line means that replacement of sections of conductor will likely be required from 2019 onwards, with replacement works between Yadnarie and Port Lincoln substations anticipated to take approximately 10 years to complete. As such and after significant investigation of various options to ensure adequate supply, ElectraNet propose to construct a new transmission line from Cultana to Port Lincoln to replace the existing and soon to be insufficient transmission line.

1.2 Objective

The objective of this assessment is to identify any new ecological data that may have emerged since previous ecological assessments were undertaken between 2012 and 2014, and determine if the Project requires referral to the Australian Government Minister for the Environment in accordance with the EPBC Act.

1.3 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the Act as ‘Matters of National Environmental Significance’ (MNES). There are nine matters of national environmental significance protected under the EPBC Act, one of which is of relevance to this project:

- listed threatened species and ecological communities.

An action (for example a project or development) will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- extinct in the wild;
- critically endangered;
- endangered; or
- vulnerable.

An action will also require approval if the action has, will have, or is likely to have a significant impact on an ecological community listed in any of the following categories:

- critically endangered; or
- endangered.

Substantial penalties apply for undertaking an action that has, will have, or is likely to have a significant impact on a MNES without approval.

1.4 Eyre Peninsula Transmission Line Project Specifications

The proposed new transmission line will consist of a 100 m wide corridor from the Cultana substation, just north-west of Whyalla, to Port Lincoln, over an approximate length of 290 km (Figure 1). It will be 275 kV from Cultana to Yadnarie and 132 kV from Yadnarie to Port Lincoln and located immediately west of the existing transmission line easement. Easements on some properties are still to be acquired, so it is possible that the final alignment may still change.

Infrastructure associated with the proposed new transmission line will include permanent components such as transmission line poles/towers, transmission line cables, access tracks and substations as well as temporary components such as stringing areas, construction camps/compounds, materials and equipment laydown areas and temporary transmission lines (Table 1). Based on the concept design information (GIS files) provided by ElectraNet (Alecia Wright) on 4 October 2019 and other general information provided by ElectraNet, the construction footprint has been calculated as 454.35 hectares (ha) and the permanent footprint has been calculated as 37.99 ha. However, the permanent impact area or footprint within native vegetation is only 26.91 ha and impacts are expected to be reduced during the detailed design stage. Areas required temporarily during construction (i.e. non-permanent areas) will be rehabilitated after construction.

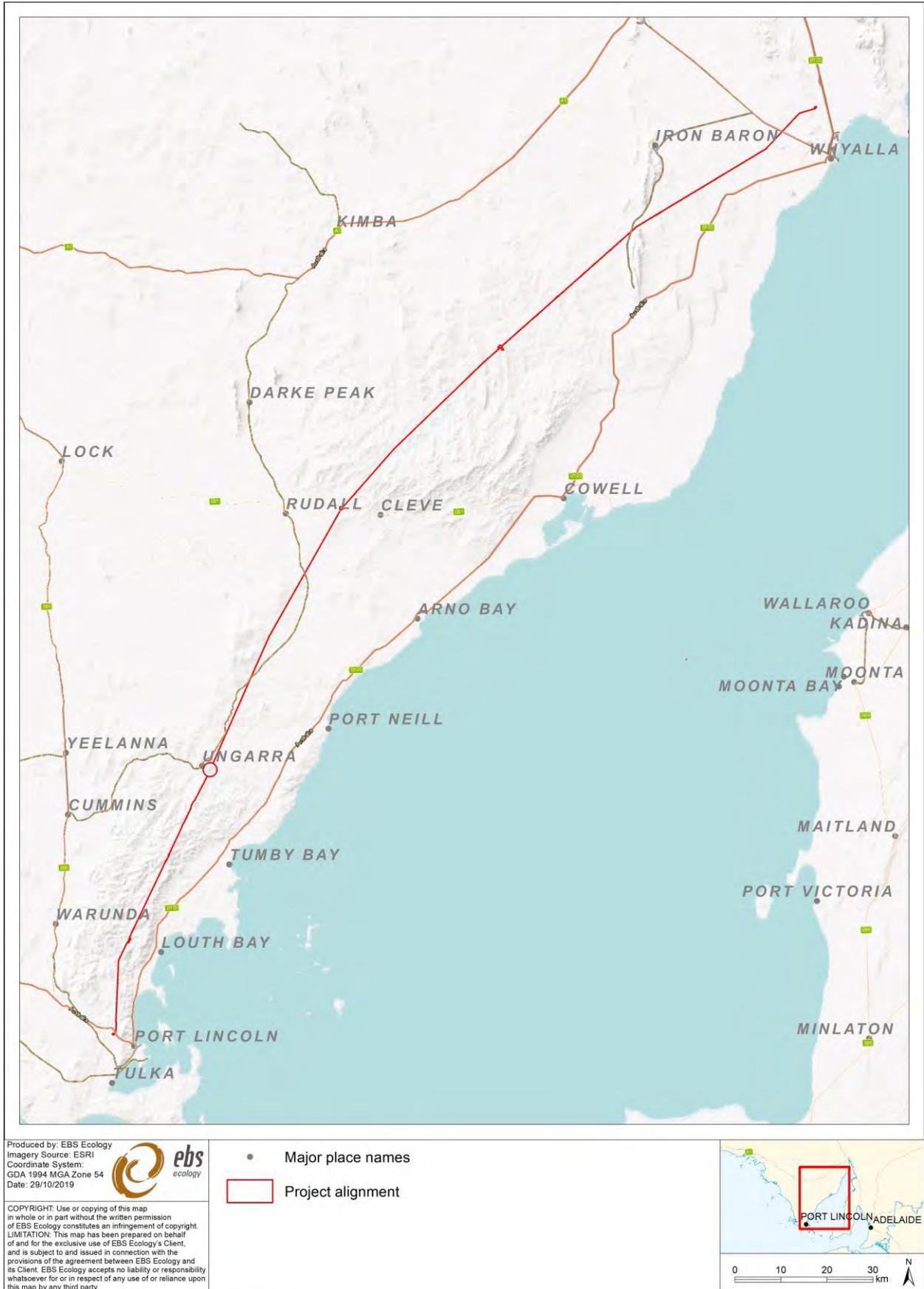


Figure 1. Location of the Eyre Peninsula Transmission Line Project, between Whyalla and Port Lincoln.

Table 1. Permanent and temporary infrastructure impacts associated with the Project.

Component	Description	Construction Impact Area (ha) ¹	Permanent Impact Area (ha) ²	Permanent Impact Area in Native Vegetation (ha) ³
Transmission Line Structures (e.g. poles/towers) Cultana to Yadnarie – approximately 136 km	<ul style="list-style-type: none"> • Poles/towers will be located every 400 – 500 m over approximately 136 km. • Approximately 280 poles/towers will be required. • Each pole/tower will require a 30 m x 40 m (1200 m²) construction footprint (restricted to 30 m x 30 m within native vegetation) and within this, a likely permanent footprint of 15 m x 15 m (225 m²). • Construction footprint: 280 poles/towers x 1200 m² = 33.6 ha • Permanent footprint: 280 poles/towers x 225 m² = 6.30 ha 	33.60	6.30	4.66
Transmission Line Structures (e.g. poles/towers) Yadnarie to Port Lincoln – approximately 126 km	<ul style="list-style-type: none"> • Poles/towers will be located every 400 – 500 m over approximately 126 km. • Approximately 256 poles/towers will be required. • Each pole/tower will require a 30 m x 30 m (900 m²) construction footprint and within this, a likely permanent footprint of 10 m x 10 m (100 m²). • Construction footprint: 256 poles/towers x 900 m² = 23.04 ha • Permanent footprint: 256 poles/towers x 100 m² = 2.56 ha 	23.04	2.56	0.55
Stringing Pads (for stringing of transmission line cables)	<ul style="list-style-type: none"> • Approximately 141 stringing areas will be required. • Each stringing area will require a maximum of 50 m x 50 m (2500 m²). • Construction footprint: 141 stringing areas x 2500 m² = 352,500 m² or 35.25 ha (GIS calculation = 32.11 ha). 	32.11	0	0
Stringing Access Corridor	<ul style="list-style-type: none"> • 10 m wide along the entire 262 km long transmission line. • Construction footprint: 10 m x 262 km = 262 ha (GIS calculation 262.13 ha). • From Cultana to Structure 30, through Department of Defence land, a 5 m wide and 15 km long (75,000 m² or 7.50 ha) access track (within the Stringing Access Corridor impact area) will remain in place to provide maintenance access to structures. • All other Stringing Access Corridor impact areas will be rehabilitated. 	262.13	7.50	6.76
Spur Tracks	<ul style="list-style-type: none"> • Approximately 214 spur tracks from the existing transmission line access track to each new pole/tower will be required during construction and maintenance. • Spur tracks will be 5 m wide and of various lengths (approximately ≤ 100 m), depending on the location of each new pole/tower relative to the existing transmission line access track (approximately 500 m² per spur track). • Construction footprint: 214 x 500 m² = 107,000m² or 10.70 ha (GIS Calculation = 9.71 ha). 	9.71	9.71	7.55

Component	Description	Construction Impact Area (ha) ¹	Permanent Impact Area (ha) ²	Permanent Impact Area in Native Vegetation (ha) ³
Substations	<ul style="list-style-type: none"> Existing substations at Whyalla (Cultana), Yadnarie and Port Lincoln will be upgraded. A new substation (Yadnarie North) will also be constructed adjoining Yadnarie substation on the North side. Substation sites will also serve as major laydown sites during construction. The laydown areas (approximately 5.40 ha) will be rehabilitated. 	17.32	11.92	7.39
Construction Laydown Areas	<ul style="list-style-type: none"> Ten construction laydown areas (approximately 64.70 ha) will be required during construction and will be rehabilitated after. 	64.70	0	0
Construction Camps	<ul style="list-style-type: none"> Two construction camps, approximately 2.00 ha each, (4.00 ha total) will be required during construction and will be rehabilitated after. 	4.00	0	0
Temporary Transmission Lines	<ul style="list-style-type: none"> Approximately 6116 m of transmission line and 52 structures (poles/towers) will be required temporarily. Each pole/tower will require a 30 m x 30 m (900 m²) construction footprint, which will also be used for stringing. Approximately 6116 m of 5 m wide access track (30,580 m²) will be required = 3.06 ha. Construction footprint: (52 structures x 900 m² = 4.68 ha) + 3.06 ha access track = 7.74 ha All temporary transmission line impacts will be rehabilitated. 	7.74	0	0
Total		454.35	37.99	26.91

1: Construction Impact Area (ha) calculations sourced from GIS data provided to EBS Ecology by ElectraNet and/or general information provided by ElectraNet (i.e. outside of GIS data) as the design is still evolving. Construction Impact Areas are expected to be reduced during the detailed design phase.

2: Permanent Impact Area (ha) calculations sourced from GIS data provided to EBS Ecology by ElectraNet and/or general information provided by ElectraNet (i.e. outside of GIS data) as the design is still evolving. Construction Impact Areas are expected to be reduced during the detailed design phase.

3: Permanent Impact Area (ha) in Native Vegetation calculated in GIS system, which has 15 m x 15 m permanent structure footprints for entire transmission line (rather than 10 m x 10 m permanent structure footprints for the Yadnarie to Port Lincoln section), by intersecting with Native Vegetation data (mapped by EBS Ecology). Therefore Permanent Impact Area in Native Vegetation figures are expected to be less than calculated and are also expected to be reduced during the detailed design phase.

2 METHODOLOGY

The methodology used to determine whether the Project will require EPBC referral included a review of previous ecological assessments and reports, new searches of the EPBC Act Protected Matters database and the Biological Database of South Australia (BDBSA), an assessment of the likelihood of occurrence of each threatened flora and fauna species and threatened ecological community and a significant impact assessment as outlined below.

2.1 Review of previous assessments and reports

The following two previous assessments were reviewed:

- *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (draft, version 4) (EBS Ecology 2014a), which includes the 2013 EPBC Act Protected Matters Report and BDBSA search results; and
- *Eyre Peninsula Transmission Line – EPBC Act referral* (draft) (EBS Ecology 2014b).

2.2 EPBC Act Protected Matters Search Tool

The online EPBC Act Protected Matters Search Tool (PMST), maintained by the Department of the Environment and Energy (DotEE), was used to generate an EPBC Act Protected Matters Report (PMR) on 19 February 2019, to identify any flora and fauna species or ecological communities listed as Matters of National Environmental Significance (MNES) and protected by the EPBC Act, that may occur or may have suitable habitat within the Project Area (DotEE 2019). A 10 km buffer was applied to the Project Area for the search.

2.3 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 undertaken on 13 February 2019 to identify flora and fauna species previously recorded within 10 km of the Project Area which are protected by the EPBC Act, particularly species which may not be identified in the EPBC Act PMR (DEW 2019). The BDBSA is comprised of an integrated collection of corporate databases which meet DEW standards for data quality, integrity and maintenance. In addition to the DEW biological data, the BDBSA also includes data from partner organisations.

2.4 Assessment of the likelihood of occurrence

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 of 'Highly Likely', 'Likely', 'Possible' or 'Unlikely' was assigned to each threatened species or ecological community identified in the database 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 2.

Table 2. Likelihood rating and criteria for the presence of threatened species.

Likelihood category	Criteria
Unlikely	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 species does not have highly specific needs, and habitat is largely intact.
Likely	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Records in the last 10 years, the species does not necessarily have highly specific needs, and the habitat is largely intact.

2.5 Significant impact assessment

A significant impact assessment has been undertaken in accordance with the *Matters of National Environmental Significance: Significant impact guidelines 1.1* (DotEE 2013a) to determine whether the Project is likely to have a significant impact on any of the MNES identified for the Project. The significant impact assessment was undertaken for flora and fauna species and ecological communities that have been identified as "Highly likely/Known", "Likely" and "Possible" to occur within the Project Area.

Relevant DotEE Conservation Advice documents and/or Recovery Plans (where available), as well as BDBSA and EBS Ecology records for each MNES, have been reviewed to inform the significant impact assessment process.

2.6 Limitations

Flora and fauna records were sourced from the EPBC Act PMST and the BDBSA. The BDBSA only includes verified flora and fauna records submitted to DEW or partner organisations. It is recognised that knowledge is poorly captured and it is possible that significant species occur that are not reflected by database records. Although much of the BDBSA data has been through a variety of validation processes,

the lists may contain errors and should be used with caution. DEW give no warranty that the data is accurate or fit for any particular purpose of the user or any person to whom the user discloses the information.

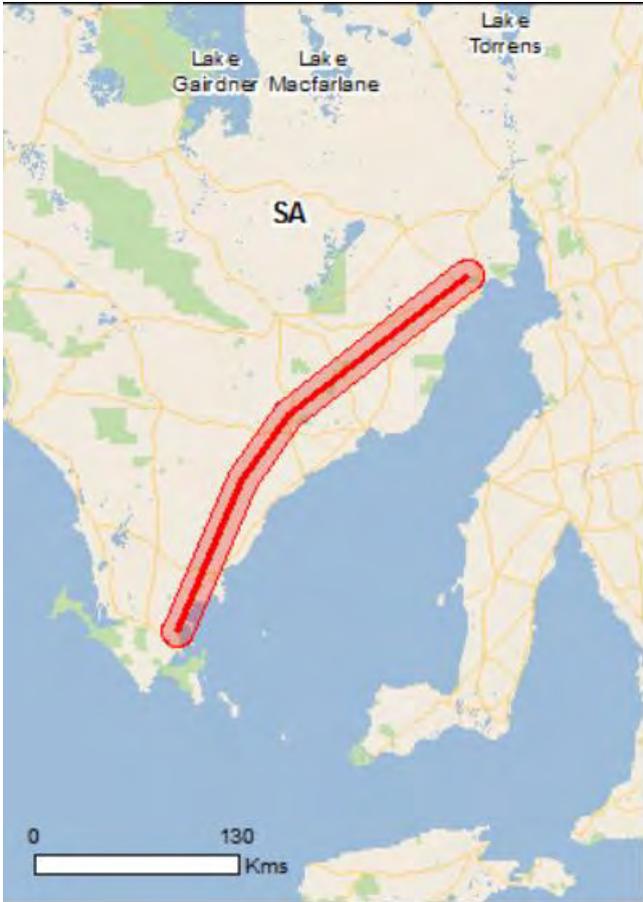
EPBC protected matters records and BDBSA flora and fauna records were limited to a 10 km buffer around the Project Area. The reliability of the BDBSA data ranges from 100 m to over 100 km. Fauna species, in particular birds, also have the ability to traverse distances in excess of 20 km. It is also acknowledged that the presence of species may not be adequately represented by database records. Therefore the EPBC and BDBSA results may not highlight all potential threatened flora and fauna species that may occur in the Project Area, within a 10 km radius. A precautionary approach has therefore been adopted, with reference to existing EPBC and BDBSA records and native vegetation cover.

The significant impact assessment was based on the information available at the time of the assessment from relevant DotEE Conservation Advice documents and/or Recovery Plans (where available), as well as BDBSA and EBS records. Should additional information become available and/or additional MNES are detected during micro-siting surveys, the significant impact assessment and EPBC referral may need to be updated, and appropriate mitigation/management measures may need to be developed and implemented.

3 RESULTS AND DISCUSSION

The results of the EPBC Act PMR generated on 19 February 2019 as well as the EPBC Act PMR generated on 10 April 2013 (within the *Eyre Peninsula Transmission Line – Biodiversity Assessment Report*; EBS Ecology 2014) are summarised in Table 3. The 2019 EPBC Act PMR identified 58 threatened species, 37 migratory species and three threatened ecological communities (TECs) protected under the EPBC Act that may be relevant to the Project Area (DotEE 2019), while the 2013 EPBC Act PMR only identified 50 threatened species, 32 migratory species and one TEC (DotEE 2013b).

Table 3. Summary of the results of the 2013 and 2019 EPBC Act Protected Matters Reports (10 km buffer).

Search Area (10 km buffer around the Project Area*)	Matters of National Environmental Significance under the EPBC Act 1999	2013	2019
	World Heritage Properties	None	None
	National Heritage Properties	None	None
	Wetlands of International Significance	None	None
	Great Barrier Reef Marine Park	None	None
	Commonwealth Marine Areas	None	None
	Threatened Ecological Communities	1	3
	Threatened Species	50	58
	Migratory Species	32	37
	Marine Species	57	73
	Whales and other Cetaceans	12	11
	Other Matters Protected by the EPBC Act		
	Commonwealth Lands	5	5
	Commonwealth Heritage Places	None	None
	Critical Habitats	None	None
	Commonwealth Reserves Terrestrial	None	None
	Commonwealth Reserves Marine	None	None
	Extra Information		
	State and Territory Reserves	48	45
	Regional Forest Agreements	None	None
Invasive Species	31	31	
Nationally Important Wetlands	2	2	
Key Ecological Features (Marine)	None	None	

*Project Area based on GIS data provided by ElectraNet prior to generation of EPBC Act PMR on 19/02/2019.

Marine species, which are not also listed as threatened or migratory, only require EPBC Referral if they are likely to be significantly impacted within a Commonwealth Marine Area. As Commonwealth Marine Areas commence three nautical miles from shore, marine species are not relevant to this Project and have been excluded from further assessment. Furthermore, fauna that complete their life cycle in marine habitats, such as sharks and whales, have also been excluded from further assessment due to their irrelevance to the Project, which is located on terrestrial land.

3.1 Threatened ecological communities

The 2019 EPBC Act PMR identified three Threatened Ecological Communities (TECs), while only one TEC was identified by the 2013 EPBC Act PMR, as summarised in Table 4.

Table 4. Threatened Ecological Communities potentially occurring within the Project Area identified by the EPBC Act Protected Matters Search Tool in 2013 and 2019 (10 km buffer).

Threatened Ecological Community	EPBC Act status		Likelihood of occurrence within Project Area
	2013	2019	
Eyre Peninsula Blue Gum (<i>Eucalyptus petiolaris</i>) Woodland	N/A	EN	Known
Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland of South Australia	CE	CE	Unlikely
Subtropical and Temperate Coastal Saltmarsh	N/A	VU	Unlikely

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

Eyre Peninsula (EP) Blue Gum (*Eucalyptus petiolaris*) Woodland was not listed under the EPBC Act at the time of the 2013 EPBC Act PMR, but was listed shortly after in August 2013 and subsequently included in the *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology 2014).

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.

It is estimated that the current infrastructure layout will impact upon approximately 1.44 ha of EP Blue Gum Woodland. Refer to Attachment A1 for the location of EP Blue Gum Woodland within the Project Area.

3.1.2 Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia

Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia was identified in both the 2013 and 2019 EPBC Act PMRs. 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.

3.1.3 Subtropical and Temperate Coastal Saltmarsh

Subtropical and Temperate Coastal Saltmarsh was not identified by the 2013 EPBC Act PMR as it was not listed under the EPBC Act at the time. Although it has been identified by the 2019 EPBC Act PMR, 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. Furthermore, as this TEC is only listed as Vulnerable, any impact to it does not require EPBC Referral (refer to section 1.3).

3.2 Nationally threatened flora species

Both the 2019 and 2013 EPBC Act PMRs identified 22 nationally threatened flora species (Table 5). The following two nationally threatened flora species were identified in the 2019 EPBC Act PMR, but not in the 2013 EPBC Act PMR:

- *Prasophyllum laxum* (Lax Leek Orchid); and
- *Pterostylis sp. Hale* (R. Bates 21725) (Hale Dwarf Greenhood).

Another nationally threatened flora species, *Veronica parnkalliana* (Port Lincoln Speedwell), which was not identified previously by the 2013 EPBC Act PMR or the BDBSA, has been identified by the 2019 BDBSA search. Furthermore, *Limosella granitica* (Granite Mudwort) was not identified by the 2013 or 2019 EPBC Act PMRs, but was identified on both occasions by the BDBSA search.

The following two nationally threatened flora species that were identified in the 2013 EPBC Act PMR, were not identified in the 2019 EPBC Act PMR:

- *Dodonaea procumbens* (Trailing Hop-bush); and
- *Haloragis eyreana* (Prickly Raspwort).

Although *Dodonaea procumbens* and *Haloragis eyreana* were not identified in the 2019 EPBC Act PMR, they are still listed as nationally threatened under the EPBC Act as well as the NPW Act.

Five nationally threatened flora species have undergone name changes since the *Eyre Peninsula Transmission Line – Biodiversity Assessment Report* (EBS Ecology 2014), but their conservation status and listing under the EPBC Act has remained the same:

- *Caladenia brumalis* (Winter Spider-orchid) (previously *Arachnorchis brumalis*);
- *Caladenia conferta* (Coast Spider-orchid) (previously *Arachnorchis conferta*);
- *Caladenia macroclavia* (Large-club Spider-orchid) (previously *Arachnorchis macroclavia*);
- *Caladenia tensa* (Greencomb Spider-orchid/Rigid Spider-orchid) (previously *Arachnorchis tensa*); and
- *Pterostylis mirabilis* (Nodding Rufoushood) (previously *Pterostylis sp. Eyre Peninsula* (R. Bates 19474)).

Table 5: Differences in the nationally threatened flora species listed under the EPBC Act identified from the desktop assessments (EPBC PMR and BDBSA) in 2013 and 2019.

Scientific name	Common name	2013		2019	
		Conservation status	Data Source	Conservation status	Data Source
		Aus		Aus	
<i>Acacia cretacea</i>	Chalky Wattle	EN	1, 2	EN	1, 2
<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	1, 2	EN	1, 2
<i>Acacia pinguifolia</i>	Fat-leaved Wattle	EN	1, 2	EN	1, 2
<i>Acacia praemorsa</i>	Senna Wattle	VU	1, 2	VU	1, 2
<i>Acacia rhetinocarpa</i>	Neat Wattle, Resin Wattle (SA)	VU	1, 2	VU	1, 2
<i>Acacia whibleyana</i>	Whibley Wattle	EN	1, 2	EN	1, 2
<i>Arachnorchis brumalis</i> (2013) <i>Caladenia brumalis</i> (2019)	Winter Spider-orchid	VU	1, 2	VU	1, 2
<i>Arachnorchis conferta</i> (2013) <i>Caladenia conferta</i> (2019)	Coast Spider-orchid	EN	1, 2	EN	1
<i>Arachnorchis macroclavia</i> (2013) <i>Caladenia macroclavia</i> (2019)	Large-club Spider-orchid	EN	1, 2	EN	1, 2
<i>Arachnorchis tensa</i> (2013) <i>Caladenia tensa</i> (2019)	Greencomb Spider-orchid, Rigid Spider-orchid	EN	1, 2	EN	1, 2
<i>Dodonaea procumbens</i>	Trailing Hop-bush	VU	1, 2	VU	-
<i>Frankenia plicata</i>		EN	1	EN	1
<i>Haloragis eyreana</i>	Prickly Raspwort	EN	1, 2	EN	2
<i>Limosella granitica</i>	Granite Mudwort	VU	2	VU	2
<i>Olearia pannosa</i> subsp. <i>pannosa</i>	Silver Daisy-bush	VU	1, 2	VU	2
<i>Prasophyllum goldsackii</i>	Goldsack's Leek-orchid	EN	1, 2	EN	1, 2
<i>Prasophyllum laxum</i>	Lax Leek Orchid	N/A	N/A	CE	1, 2
<i>Prostanthera calycina</i>	West Coast Mintbush, Limestone Mintbush, Red Mintbush	VU	1, 2	VU	1, 2
<i>Pterostylis mirabilis</i> (2019) <i>Pterostylis</i> sp. Eyre Peninsula (R. Bates 19474) (2013)	Nodding Rufoushood	VU	1	VU	1
<i>Pterostylis</i> sp. <i>Hale</i> (R. Bates 21725)	Hale Dwarf Greenhood	N/A	N/A	EN	1
<i>Pterostylis xerophila</i>	Desert Greenhood	VU	2	VU	2
<i>Ptilotus beckerianus</i>	(Ironstone Mulla Mulla)	VU	1, 2	VU	1, 2
<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	1, 2	EN	1, 2
<i>Swainsona pyrophila</i>	Yellow Swainson-pea	VU	1, 2	VU	1, 2
<i>Tecticornia flabelliformis</i>	Bead Glasswort, Bead Samphire	VU	1, 2	VU	1, 2
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	1, 2	EN	1, 2
<i>Veronica parnkalliana</i>	Port Lincoln Speedwell	N/A	N/A	EN	2

Data Source: 1: PMST, 2: BDBSA

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.

The results of the assessment of the likelihood of occurrence and significant impact assessment are provided in Table 6. Six nationally threatened flora species are known to be present in the Project Area from previous field surveys:

- *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).

Three nationally threatened flora species are considered to be highly likely to occur within the Project Area:

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

A further 12 nationally threatened flora species are considered likely or possible to occur within the Project Area, while six are considered unlikely to occur, as outlined in Table 6.

3.2.1 Nationally threatened flora species potentially subject to a significant impact

The Project has potential to have a significant impact upon the following six nationally threatened flora species:

- *Acacia enterocarpa* (Jumping-jack Wattle) – Endangered;
- *Acacia pinguifolia* (Fat-leaf Wattle) – Endangered;
- *Caladenia macroclavia* (Large-club Spider-orchid) – Endangered;
- *Caladenia tensa* (Inland Green-comb Spider-orchid) – Endangered;
- *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) – Vulnerable; and
- *Pultenaea trichophylla* (Tufted Bush-pea) – Endangered.

Refer to Table 6 for the likelihood and rationale associated with the significant impact assessment undertaken for each nationally threatened flora species and Attachment A2 for maps showing the location of each of nationally threatened flora species within the Project Area.

Table 6: Likelihood of occurrence of nationally threatened flora species identified by the desktop assessment and rationale associated with their significant impact assessment.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Acacia cretacea</i>	Chalky Wattle	EN	1, 2	2005	Highly Likely	EP endemic species. Grows in low shrubland and mallee scrub dominated by <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>Melaleuca uncinata</i> (Broombush), <i>Triodia irritans</i> (Spinifex), <i>Phebalium bullatum</i> (Silvery Phebalium), on deep red sand in gently undulating country, with low sand ridges.	No	Not likely. Not detected during targeted surveys in 2013. The extremely restricted area where it occurs is approx. 10 km SE of the Project Area. Can easily be targeted during micro-siting surveys during the detailed design phase. If detected, significant impact to be reassessed.
<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	1, 2	2013	Known	The species occurs as a disjunct population on EP, with other populations occurring on YP, SE and in western Victoria. Recorded from <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. socialis</i> (Beaked Red Mallee) Mallee woodland; <i>Eucalyptus calycogona</i> (Square-fruit Mallee), +/- <i>E. phenax</i> ssp. <i>phenax</i> (White Mallee) Mallee woodland; <i>Eucalyptus gracilis</i> (Yorrell) +/- <i>E. dumosa</i> (White Mallee) +/- <i>E. brachycalyx</i> (Gilja), +/- <i>E. oleosa</i> (Red Mallee) Mallee.	Yes	Likely. Twenty-eight individuals detected across three sub-populations during targeted surveys in 2013. The current layout can avoid impact to these sub-populations if structure 96 and the construction compound are micro-sited. However, 1.68 ha of suitable habitat (100 m buffer from records) will be impacted.
<i>Acacia pinguifolia</i>	Fat-leaf Wattle	EN	1, 2	2004	Known	Known from disjunct sub-populations on EP, where it grows in undulating terrain with a westerly aspect in association with a range of Mallee species including <i>Eucalyptus odorata</i> (Peppermint Box) and <i>E. incrassata</i> (Ridge-fruited Mallee), <i>E. dumosa</i> (White Mallee), <i>E. foecundum</i> (Hooked Mallee), <i>E. calycogona</i> (Square-fruited Mallee), <i>E. cooperiana</i> (Coopers Mallee), <i>E. flocktoniae</i> (Merrit) and <i>E. pileata</i> (Capped Mallee) and occurs in <i>Melaleuca uncinata</i> (Broombush) shrubland. Sub-populations are known to occur near Cockaleechee, Ungarra and Butler, with many located on roadsides and rail reserves.	Yes	Likely. Five individuals detected in one sub-population during targeted surveys in 2013. The current layout can avoid impact to this sub-population if the laydown area adjacent to structure 189 is micro-sited to avoid the patch of roadside vegetation. However, 0.04 ha of suitable habitat (100 m buffer from records) will be impacted.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Acacia praemorsa</i>	Senna Wattle	VU	1, 2	2014	Likely	Endemic to EP 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 <i>Melaleuca uncinata</i> (Broombush), <i>Acacia calamifolia</i> (Wallowa), <i>Eucalyptus odorata</i> (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.	No	Not likely. Not detected during targeted surveys in 2013. Almost entirely restricted to Yeldulknie CP and two unnamed heritage agreements approx. 10 km SE of the Project Area. Can easily be targeted during micro-siting surveys during the detailed design phase. If detected, significant impact to be reassessed.
<i>Acacia rheticocarpa</i>	Resin Wattle	VU	1, 2	2006	Highly Likely	Grows in disjunct sub-populations on EP (also YP southern MLR) 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 <i>Eucalyptus dumosa</i> (White Mallee), <i>E. foecunda</i> (Hooked Mallee), <i>E. calycogona</i> (Square-fruited Mallee), <i>E. incrassata</i> (Ridge-fruited Mallee) and <i>E. brachycalyx</i> (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.	No	Not likely. Not detected during targeted surveys in 2013. Closest subpopulation approx. 10 km north of Project Area in road reserve of Cleve Road. Can easily be targeted during micro-siting surveys during the detailed design phase. If detected, significant impact to be reassessed.
<i>Acacia whibleyana</i>	Whibley's Wattle	EN	1, 2	2018	Possible	Endemic to EP 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 of occurrence is southeast of Project Area, towards Tumby Bay.	No	Not likely. Not detected during targeted surveys in 2013. Restricted to near-coastal areas near Tumby Bay, with the closest records approx. 5 km SE of the Project Area. Can easily be targeted during micro-siting surveys during the detailed design phase. If detected, significant impact to be reassessed.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Caladenia brumalis</i>	Winter Spider-orchid	VU	1, 2	1985	Possible	Endemic to SA. Found in association with Mallee-Broombush associations, <i>Allocasuarina verticillata</i> (Drooping Sheoak) woodland, <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) mallee woodland and <i>Eucalyptus cladocalyx</i> (Sugar Gum) woodlands.	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
<i>Caladenia conferta</i>	Coast Spider-orchid	EN	1		Unlikely	Endemic to SA. Currently known from two distinct localities in the upper south-east of SA and on YP. There is one record from 1968 from Hincks WA, but this sub-population is now considered extinct. Another collection, from Carrappee Hill, may not be <i>Caladenia conferta</i> and is possibly a subspecies of <i>C. toxochila</i> .	No	N/A.
<i>Caladenia macroclavia</i>	Large-club Spider-orchid	EN	1, 2	1960	Known	Endemic to SA and rare on EP now. Also occurs on YP 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.	Yes	Likely. Three individuals detected in one sub-population during targeted surveys in 2013. The current layout can avoid impact to this sub-population if structure 194 is micro-sited. However, 0.40 ha of suitable habitat (100 m buffer from records) will be impacted.
<i>Caladenia tensa</i>	Inland Green-comb Spider-orchid/Rigid Spider-orchid	EN	1, 2	2003	Known	Widespread in SA from the west coast, throughout EP and adjacent pastoral zone, the FR, 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 location during targeted survey approximately 20 m from the western boundary of assessment corridor along the Ungarra – Yeelana Road reserve.	Yes	Likely. Twenty-five individuals detected in one sub-population during targeted surveys in 2013. Although current layout avoids this sub-population, 0.07 ha of suitable habitat (100 m buffer from records) will be impacted.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Dodonea procumbens</i>	Trailing Hop-bush	VU	1, 2	1986	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 EP. Grows in low-lying, often winter-wet areas in woodland, low open forests, heathland and grasslands, on sands and clays.	No	N/A
<i>Frankenia plicata</i>	Braided Sea-heath	EN	1		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 <i>Frankenia</i> spp. No records in Eyre Hills or Eyre Mallee subregions (Gillam and Urban 2009). 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.	No	Not likely. 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.
<i>Haloragis eyreana</i>	Prickly Raspwort	EN	2	1970	Possible	Endemic to EP. 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 <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. dumosa</i> (Dumosa Mallee) or <i>Melaleuca decussata</i> (Totem-poles).	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in appropriate flowering times. Occurs in roadside and rail reserves NW of the Project Area around Cummins and Yeelanna. Two records close to Project Area approx. 7 km NE of Ungarra are not recent (1969).
<i>Limosella granitica</i>	Granite Mudwort	VU	2	2006	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.	No	N/A

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Olearia pannosa ssp. pannosa</i>	Silver Daisy-bush	VU	2	2011	Known	A widespread but rare species occurring also on the Fleurieu Peninsula, SE, YP, MN and KI. Two main sub-populations on EP 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 <i>Eucalyptus cladocalyx</i> (Sugar Gum), <i>Allocasuarina verticillata</i> (Drooping Sheoak), <i>Melaleuca uncinata</i> (Broombush), and less often with <i>Callitris</i> sp. (Native Pine). Northern population associated with <i>Allocasuarina verticillata</i> (Drooping Sheoak), low woodland <i>Eucalyptus odorata</i> (Peppermint Box), +/- <i>E. phenax ssp. phenax</i> (White Mallee) mid Mallee woodland, <i>Eucalyptus porosa</i> (Mallee Box) mid open Mallee woodland, <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) mid Mallee woodland, <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. socialis</i> (Beaked Red Mallee) mid Mallee woodland.	Yes	Likely. One individual detected during targeted surveys in 2013 and one individual detected during 2019 native vegetation clearance assessment. Although current layout avoids these individuals, 0.38 ha of suitable habitat (100 m buffer from records) will be impacted and micro-siting of stringing is important.
<i>Prasophyllum goldsackii</i>	Goldsack's Leek-orchid	EN	1, 2	2004	Possible	Endemic to SA. Found from 14 small populations on EP and YP not exceeding 500-1000 individuals. Occurs largely on limestone, in shallow soil pockets but also in calcareous sands. Found in <i>Eucalyptus cladocalyx</i> (Sugar Gum) forests, as well as <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodlands and <i>Melaleuca uncinata</i> (Broombush) tall open shrublands.	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Prasophyllum laxum</i>	Lax Leek Orchid	CE	1, 2	2004	Possible	The Lax Leek Orchid is only known from one location in private property (Cockatoo Hill) near Koppio (DoE 2015) 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.	N/A	Not likely. 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).
<i>Prostanthera calycina</i>	West Coast Mintbush	VU	1, 2	1900	Possible	Endemic to EP 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 <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) mid Mallee woodland over <i>Melaleuca uncinata</i> (Broombush) and <i>Leptospermum coriaceum</i> (Dune Tea-tree) and <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee), +/- <i>Allocasuarina verticillata</i> (Drooping Sheoak) mid Mallee woodland over <i>Melaleuca lanceolata</i> (Dryland Tea-tree).	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
<i>Pterostylis mirabilis</i> (was <i>Pterostylis</i> sp. Eyre Peninsula (R. Bates 1947)).	Nodding Rufoushood	VU	1	2013	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 <i>Melaleuca uncinata</i> (Broombush) scrub, but it is also known to occur in <i>Callitris</i> 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.	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Pterostylis sp. Hale</i> (R. Bates 21725)	Hale Dwarf Greenhood	EN	1	1993 from EP	Unlikely	This species occurs in Mallee scrub, Broombush and <i>Callitris</i> 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.	N/A	N/A
<i>Pterostylis xerophila</i>	Desert Greenhood	VU	2	1998	Possible	Currently known from only eight populations containing about 150 plants from EP and two locations in Victoria. The closest records to the Project Area are north of Cowell and Coolanie. Found in areas containing <i>Melaleuca uncinata</i> (Broombush), <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>Eucalyptus socialis</i> (Beaked Red Mallee) and/or <i>Eucalyptus leptophylla</i> (Narrow-leaf Mallee).	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
<i>Ptilotus beckerianus</i>	Ironstone Mulla Mulla	VU	1, 2	2007	Possible	Endemic to SA. Disjunct populations on EP as well as Kangaroo Island. Found in association with <i>Eucalyptus cladocalyx</i> (Sugar Gum) forests, as well as <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodlands and <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) +/- <i>E. incrassata</i> (Ridge-fruited Mallee) +/- <i>E. leptophylla</i> (Narrow-leaf Mallee), +/- <i>Eucalyptus peninsularis</i> (Cummins Mallee) Mallee woodland.	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	1, 2	2013	Known	Endemic to EP. Numerous 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 <i>Eucalyptus cladocalyx</i> (Sugar Gum) Woodlands, <i>Eucalyptus peninsularis</i> (Cummins Mallee) Low Woodland/Mallee, <i>Allocasuarina verticillata</i> (Drooping Sheoak) Low Open Woodland over <i>E. odorata</i> (Peppermint Box) and <i>E. angulosa</i> (Coast Ridge-fruited Mallee) and <i>E. foecundum</i> (Hooked Mallee), mostly over <i>Melaleuca uncinata</i> (Broombush) understories. Also occurs in tall shrublands dominated by <i>Melaleuca uncinata</i> (Broombush) and <i>Acacia</i> spp.	Yes	Likely. Several individuals detected across several sub-populations during targeted surveys in 2013. Although the current layout largely avoids these sub-populations, 1.55 ha of suitable habitat (100 m buffer from records) will be impacted and micro-siting of structure 154 and stringing is important.
<i>Swainsona pyrophila</i>	Yellow Swainson-pea	VU	1, 2	2010	Highly Likely	Occurs across the EP and also in YP and Murraylands, NSW and VIC. It is known to occur on sandy or loamy soil in Mallee scrub and is usually found after fire.	No	Not likely. 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.
<i>Tecticornia flabelliformis</i>	Bead Samphire	VU	1, 2	1969	Unlikely	Mainly confined to coastal habitats. Records from Arno Bay and historically from Todd Reservoir.	No	N/A

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Broad habitat requirements and general commentary/rationale associated with likelihood of occurrence	Identified during 2012/13 field surveys	Significant impact assessment likelihood and rationale
		Aus						
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	1, 2	1980	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. Habitat is mainly confined to <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodland, <i>Eucalyptus cladocalyx</i> (Sugar Gum) mid woodland, <i>Eucalyptus angulosa</i> (Coast Ridge-fruited Mallee), <i>E. diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) mid Mallee woodland, +/- <i>Melaleuca lanceolata</i> (Dryland Tea-tree), +/- <i>Melaleuca uncinata</i> (Broombush) tall shrubs and <i>Melaleuca uncinata</i> (Broombush) tall open shrubland.	No	Not likely. Not detected during targeted surveys in 2013, which were undertaken in known flowering times in known suitable habitat.
<i>Veronica parnkalliana</i>	Port Lincoln Speedwell	EN	2	1909 from EP	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.	No	N/A

Data Source: 1: PMST, 2: BDBSA

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.

3.3 Nationally threatened fauna species

The 2019 EPBC Act PMR identified 36 nationally threatened fauna species, while the 2013 EPBC Act PMR identified 28 nationally threatened species, as summarised in Table 7.

The differences are likely to be due to the following reasons:

- Some species that have been identified in the 2019 EPBC Act PMR were not identified in the 2013 EPBC Act PMR, as they were either not listed under the EPBC Act or they did not apply to the search area at the time that the 2013 EPBC Act PMR was generated;
- Some species listed in the 2013 EPBC Act PMR have since been delisted from the EPBC Act and therefore not identified or applicable to the 2019 EPBC Act PMR; and
- Potential data changes in species distribution.

Of note, there are nine nationally threatened fauna species listed in the 2019 EPBC Act PMR that have been listed under the EPBC Act since the 2013 EPBC Act PMR was generated, as summarised in Table 8.

A number of species were not identified by EPBC Act PMR, but were identified by the BDBSA search.

Table 7. Differences in the nationally threatened fauna species and migratory fauna species listed under the EPBC Act identified in the desktop assessments (EPBC Act PMR and BDBSA) in 2013 and 2019.

Scientific name	Common name	2013		2019	
		Conservation status	Data Source	Conservation status	Data Source
		Aus		Aus	
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi	2	Mi	1, 2
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (Western)	VU	1, 2	Delisted	N/A
<i>Amytornis textilis myall</i>	Western Grasswren (Gawler Ranges)	Not identified	2	VU	1, 2
<i>Apus pacificus</i>	Fork-tailed Swift	Mi	1, 2	Mi	1, 2
<i>Ardenna carneipes</i> (<i>Puffinus carneipes</i> 2013)	Flesh-footed Shearwater	Mi	1	Mi	1
<i>Ardea alba</i>	Great Egret	Mi	1, 2	Delisted	
<i>Ardea ibis</i>	Cattle Egret	Mi	1, 2	Delisted	
<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	Not identified		Mi	2
<i>Arenaria interpres</i>	Ruddy Turnstone	Not identified		Mi	2
<i>Botaurus poiciloptilus</i>	Australasian Bittern	VU	2	EN	2
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Not identified		Mi	1, 2
<i>Calidris alba</i>	Sanderling	Not identified		Mi	2
<i>Calidris canutus</i>	Red Knot	Not identified		EN, Mi	1, 2
<i>Calidris cinereus</i>	Terek Sandpiper	Not identified		Mi	2
<i>Calidris ferruginea</i>	Curlew Sandpiper	Not identified		CE, Mi	1, 2
<i>Calidris melanotos</i>	Pectoral Sandpiper	Not identified		Mi	1
<i>Calidris pugnax</i>	Ruff	Not identified		Mi	2

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Scientific name	Common name	2013		2019	
		Conservation status	Data Source	Conservation status	Data Source
		Aus		Aus	
<i>Calidris ruficollis</i>	Red-necked Stint	Mi	2	Mi	2
<i>Calidris subminuta</i>	Long-toed Stint	Not identified		Mi	2
<i>Calidris tenuirostris</i>	Great Knot	Not identified		CE	2
<i>Charadrius bicinctus</i>	Double-banded Plover	Not identified		Mi	2
<i>Charadrius mongolus</i>	Lesser Sand Plover	Not identified		EN	2
<i>Charadrius veredus</i>	Oriental Plover	Mi	1	Mi	1
<i>Diomedea antipodensis</i>	Antipodean Albatross	Not identified		VU	1
<i>Diomedea epomophora</i>	Southern Royal Albatross	Not identified		VU	1
<i>Diomedea exulans</i>	Wandering Albatross	VU, Mi	1	VU, Mi	1
<i>Diomedea exulans amsterdamensis</i>	Amsterdam Albatross	EN, Mi	1	Not identified	
<i>Diomedea exulans exulans</i>	Tristan Albatross	EN, Mi	1	Not identified	
<i>Diomedea exulans gibsoni</i>	Gibson's Albatross	VU, Mi	1	Not identified	
<i>Diomedea sanfordi</i>	Northern Royal Albatross	Not identified		EN, Mi	1
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi	1	Mi	1
<i>Halobaena caerulea</i>	Blue Petrel	VU	1	VU	1
<i>Hirundapus caudacutus</i>	White-throated Needletail	Not identified		Mi	2
<i>Hydroprogne caspia</i>	Caspian Tern	Not identified		Mi	2
<i>Leipoa ocellata</i>	Malleefowl	VU, Mi	1, 2	VU, delisted Mi	1, 2
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit (baueri)	Not identified		VU, Mi	1
<i>Limosa lapponica menzbieri</i>	Bar-tailed Godwit (menzbieri)	Not identified		CE, MI	1
<i>Limosa limosa</i>	Black-tailed Godwit	Not identified		Mi	2
<i>Macronectes giganteus</i>	Southern Giant Petrel	EN, Mi	1	EN, Mi	1
<i>Macronectes halli</i>	Northern Giant Petrel	VU, Mi	1	VU, Mi	1
<i>Macropus eugenii</i>	Tammar Wallaby	Not identified		EX	2
<i>Motacilla cinerea</i>	Grey Wagtail	Not identified		Mi	1
<i>Motacilla flava</i>	Yellow Wagtail	Not identified		Mi	1
<i>Neophoca cinerea</i>	Australian Sea Lion	Not identified		VU	1, 2
<i>Numenius madagascariensis</i>	Far Eastern Curlew	Not identified		CE, Mi	1, 2
<i>Numenius phaeopus</i>	Whimbrel	Not identified		Mi	2
<i>Pachyptila turtur subantarctica</i>	Fairy Prion (Southern)	Not identified		VU	1
<i>Pachycephala rufogularis</i>	Red-lored Whistler	VU	1, 2	Not identified	
<i>Pandion haliaetus</i>	Osprey	Not identified		Mi	1, 2
<i>Pedionomus torquatus</i>	Plains-wanderer	Not identified		CE	1
<i>Pezoporus occidentalis</i>	Night Parrot	Not identified		EN	1

Eyre Peninsula Transmission Line EPBC Assessment

Scientific name	Common name	2013		2019	
		Conservation status	Data Source	Conservation status	Data Source
		Aus		Aus	
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	Not identified		Mi	2
<i>Phalaropus lobatus</i>	Red-necked Phalarope	Not identified		Mi	2
<i>Phoebastria fusca</i>	Sooty Albatross	Not identified		VU, Mi	1
<i>Pluvialis fulva</i>	Pacific Golden Plover	Not identified		Mi	2
<i>Pluvialis squatarola</i>	Grey Plover	Not identified		Mi	2
<i>Psophodes nigrogularis leucogaster</i>	Western Whipbird (Eastern)	VU	1, 2	VU	1, 2
<i>Pterodroma mollis</i>	Soft-plumaged Petrel	VU	1	VU	1
<i>Rostratula australis</i>	Australian Painted Snipe	VU, Mi	1	EN, delisted Mi	1
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	1	EN	1, 2
<i>Sterna hirundo</i>	Common Tern	Not identified		Mi	2
<i>Sternula nereis nereis</i>	Australian Fairy Tern	VU	1	VU	1, 2
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula)	VU	1, 2	VU	1, 2
<i>Thalassarche bulleri</i>	Buller's Albatross	VU, Mi	1	Not identified	
<i>Thalassarche cauta cauta</i>	Shy Albatross	VU, Mi	1	VU, Mi	1
<i>Thalassarche cauta steadi</i>	White-capped Albatross	Not identified		VU, Mi	1
<i>Thalassarche impavida</i>	Campbell Albatross	VU, Mi	1	VU, Mi	1
<i>Thalassarche melanophris</i>	Black-browed Albatross	VU, Mi	1	VU, Mi	1
<i>Thinornis rubricollis rubricollis</i>	Hooded Plover (Hooded Dotterel)	Not identified		VU	1, 2
<i>Tringa brevipes</i>	Grey-tailed Tattler	Not identified		Mi	2
<i>Tringa nebularia</i>	Common Greenshank	Not identified		Mi	1, 2
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Not identified		Mi	2
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	Mi	1	Delisted	
<i>Merops ornatus</i>	Rainbow Bee-eater	Mi	1	Delisted	

Data Source: 1: PMST, 2: BDBSA

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.

Table 8. Nationally threatened fauna listed under the EPBC Act since 2013.

Common name	Scientific name	Conservation status	Date listed
Bar-tailed Godwit	<i>Limosa lapponica baueri</i>	Vulnerable	05/05/2016
Bar-tailed Godwit	<i>Limosa lapponica menzbieri</i>	Critically Endangered	05/05/2016
Curlew Sandpiper	<i>Calidris ferruginea</i>	Critically Endangered	26/05/2015
Far Eastern Curlew	<i>Numenius madagascariensis</i>	Critically Endangered	26/05/2015
Great Knot	<i>Calidris tenuirostris</i>	Critically Endangered	05/05/2016
Hooded Plover	<i>Thinornis rubricollis rubricollis</i>	Vulnerable	06/11/2014
Lesser Sand Plover	<i>Charadrius mongolus</i>	Endangered	05/05/2016
Red Knot	<i>Calidris canutus</i>	Endangered	05/11/2016
Western Grasswren (Gawler Ranges)	<i>Amytornis textilis myall</i>	Vulnerable	06/11/2014

The results of the assessment of the likelihood of occurrence are provided in Table 9. Four nationally threatened fauna species are known to occur in the Project Area:

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

Two nationally threatened fauna species are considered likely to occur (as fly-over) in the Project Area:

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

One nationally threatened fauna species, the Hooded Plover (Hooded Dotterel) (*Thinornis rubricollis rubricollis*) is considered to possibly occur (as fly-over) in the Project Area during irregular inland movements to salt lakes. Twenty-nine nationally threatened fauna species are considered to possibly occur (as fly-over) in the Project Area during migration. All other nationally threatened fauna species listed in Table 9 are considered unlikely to occur within the Project Area as:

- The Project is located outside the species distribution area;
- There is no suitable habitat for the species;
- They are either marine pelagic or coastal species;
- They are a very rare vagrant to South Australia; or
- They are extinct in the region.

Table 9. Likelihood of occurrence of nationally threatened fauna species identified by the desktop assessment as potentially occurring within the Project Area.

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Rationale
		Aus				
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi	1, 2	2002	Possible (Fly-over)	fly-over during migration
<i>Amytornis textilis myall</i>	Western Grasswren (Gawler Ranges)	VU	1, 2	2003	Known	Recorded within the Project Area
<i>Apus pacificus</i>	Fork-tailed Swift	Mi	1, 2	1996	Likely (Fly-over)	Aerial species, suitable habitat.
<i>Ardenna carneipes</i>	Flesh-footed Shearwater	Mi	1		Unlikely	Marine pelagic species
<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	Mi	2	2010	Unlikely	Marine pelagic species
<i>Arenaria interpres</i>	Ruddy Turnstone	Mi	2	2014	Possible (Fly-over)	fly-over during migration
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	2	1965	Unlikely	Unsuitable habitat
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi	1, 2	2016	Possible (Fly-over)	fly-over during migration
<i>Calidris alba</i>	Sanderling	Mi	2	2016	Possible (Fly-over)	fly-over during migration
<i>Calidris canutus</i>	Red Knot	EN, Mi	1, 2	2016	Possible (Fly-over)	fly-over during migration
<i>Calidris cinereus</i>	Terek Sandpiper	Mi	2	1981	Possible (Fly-over)	fly-over during migration
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE, Mi	1, 2	2017	Possible (Fly-over)	fly-over during migration
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	1		Possible (Fly-over)	fly-over during migration
<i>Calidris pugnax</i>	Ruff	Mi	2	1981	Possible (Fly-over)	fly-over during migration
<i>Calidris ruficollis</i>	Red-necked Stint	Mi	2	2017	Possible (Fly-over)	fly-over during migration
<i>Calidris subminuta</i>	Long-toed Stint	Mi	2	2015	Possible (Fly-over)	fly-over during migration
<i>Calidris tenuirostris</i>	Great Knot	CE	2	2016	Possible (Fly-over)	fly-over during migration
<i>Charadrius bicinctus</i>	Double-banded Plover	Mi	2	2012	Possible (Fly-over)	fly-over during migration
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	2	1973	Possible (Fly-over)	fly-over during migration
<i>Charadrius veredus</i>	Oriental Plover	Mi	1		Possible (Fly-over)	fly-over during migration
<i>Diomedea antipodensis</i>	Antipodean Albatross	VU	1		Unlikely	Marine pelagic species
<i>Diomedea epomophora</i>	Southern Royal Albatross	VU	1		Unlikely	Marine pelagic species
<i>Diomedea exulans</i>	Wandering Albatross	VU, Mi	1		Unlikely	Marine pelagic species

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Rationale
		Aus				
<i>Diomedea sanfordi</i>	Northern Royal Albatross	EN, Mi	1		Unlikely	Marine pelagic species
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi	1		Possible (Fly-over)	fly-over during migration
<i>Halobaena caerulea</i>	Blue Petrel	VU	1		Unlikely	Marine pelagic species
<i>Hirundapus caudacutus</i>	White-throated Needletail	Mi	2	1990	Likely (Fly-over)	Aerial species, suitable habitat.
<i>Hydroprogne caspia</i>	Caspian Tern	Mi	2	2017	Possible (Fly-over)	fly-over during migration
<i>Leipoa ocellata</i>	Malleefowl	VU	1, 2	2017	Known	Mounds recorded throughout mallee associations within the Project Area.
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit (baueri)	VU, Mi	1	2015	Possible (Fly-over)	fly-over during migration
<i>Limosa lapponica menzbieri</i>	Bar-tailed Godwit (menzbieri)	CE, MI	1		Unlikely	Outside distribution
<i>Limosa limosa</i>	Black-tailed Godwit	Mi	2	1999	Possible (Fly-over)	fly-over during migration
<i>Macronectes giganteus</i>	Southern Giant Petrel	EN, Mi	1		Unlikely	Marine pelagic species
<i>Macronectes halli</i>	Northern Giant Petrel	VU, Mi	1		Unlikely	Marine pelagic species
<i>Macropus eugenii</i>	Tammar Wallaby	EX	2	1922	Unlikely	Extinct in region
<i>Motacilla cinerea</i>	Grey Wagtail	Mi	1		Unlikely	Very rare vagrant to South Australia
<i>Motacilla flava</i>	Yellow Wagtail	Mi	1		Unlikely	Very rare vagrant to South Australia
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CE, Mi	1, 2	1985	Possible (Fly-over)	fly-over during migration
<i>Numenius phaeopus</i>	Whimbrel	Mi	2	1973	Possible (Fly-over)	fly-over during migration
<i>Pachyptila turtur subantarctica</i>	Fairy Prion (Southern)	VU	1		Unlikely	Marine pelagic species
<i>Pandion haliaetus</i>	Osprey	Mi	1, 2	2004	Possible (Fly-over)	fly-over during migration
<i>Pedionomus torquatus</i>	Plains-wanderer	CE	1		Unlikely	Unsuitable habitat
<i>Pezoporus occidentalis</i>	Night Parrot	EN	1		Unlikely	Unsuitable habitat
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	Mi	2	1919	Unlikely	Coastal species, outside distribution
<i>Phalaropus lobatus</i>	Red-necked Phalarope	Mi	2	1973	Possible (Fly-over)	fly-over during migration

Scientific name	Common name	Conservation status	Data Source	Last record	Likelihood of occurrence within Project Area	Rationale
		Aus				
<i>Phoebastria fusca</i>	Sooty Albatross	VU, Mi	1		Unlikely	Marine pelagic species
<i>Pluvialis fulva</i>	Pacific Golden Plover	Mi	2	2016	Possible (Fly-over)	fly-over during migration
<i>Pluvialis squatarola</i>	Grey Plover	Mi	2	2016	Possible (Fly-over)	fly-over during migration
<i>Psophodes nigrogularis leucogaster</i>	Western Whipbird (Eastern)	VU	1, 2	1966	Unlikely	Unsuitable habitat
<i>Pterodroma mollis</i>	Soft-plumaged Petrel	VU	1		Unlikely	Marine pelagic species
<i>Rostratula australis</i>	Australian Painted Snipe	EN	1		Unlikely	Unsuitable habitat
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	1, 2	2012	Known	Recorded within Project Area
<i>Sterna hirundo</i>	Common Tern	Mi	2	2000	Possible (Fly-over)	fly-over during migration
<i>Sternula nereis nereis</i>	Australian Fairy Tern	VU	1, 2	2017	Unlikely	Coastal species
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula)	VU	1, 2	2004	Possible	Potential habitat present inland from Louth Bay
<i>Thalassarche cauta cauta</i>	Shy Albatross	VU, Mi	1		Unlikely	Marine pelagic species
<i>Thalassarche cauta steadi</i>	Campbell Albatross	VU, Mi	1		Unlikely	Marine pelagic species
<i>Thalassarche melanophris</i>	Black-browed Albatross	VU, Mi	1		Unlikely	Marine pelagic species
<i>Thinornis rubricollis rubricollis</i>	Hooded Plover (Hooded Dotterel)	VU	1, 2	2016	Possible (Fly-over)	Fly-over during irregular inland movements to salt lakes
<i>Tringa brevipes</i>	Grey-tailed Tattler	Mi	2	2015	Possible (Fly-over)	fly-over during migration
<i>Tringa nebularia</i>	Common Greenshank	Mi	1, 2	2017	Possible (Fly-over)	fly-over during migration
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Mi	2	2000	Possible (Fly-over)	fly-over during migration

Data Source: 1: PMST, 2: BDBSA

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.

3.3.1 Nationally threatened fauna species potentially subject to a significant impact

The Project has potential to have a significant impact upon the following four nationally threatened fauna species, which are known to occur within the Project Area:

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

Refer to Table 10 for the rationale associated with the significant impact assessment undertaken for these four nationally threatened flora species. More detailed information about each of these four species is also provided individually on the following pages.

All other nationally threatened fauna species which are considered likely or possible to occur in the Project Area would only fly-over and therefore, would not use the habitats within the Project Area. As such, the potential impact of the Project on all other nationally threatened fauna species identified for Project Area (Table 9) would be non-existent or negligible and therefore, no significant impact assessment has been undertaken.

Table 10. Summary of rationale associated with the significant impact assessment undertaken for each EPBC Act Fauna species.

Species	Significant impact assessment likelihood and rationale (based on current design*)
Malleefowl (<i>Leipoa ocellata</i>)	<p>Likely. 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 within the Project Area with several mounds recorded throughout Mallee associations in the northern extent of the Project Area by EBS in 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).</p> <p>It is estimated that the current infrastructure design will impact upon approximately 72.63 ha of Malleefowl habitat, of which approximately 6.08 ha will be permanently impacted and the remaining 66.55 ha will be rehabilitated after construction. The level of impact can be reduced (where possible) by:</p> <ul style="list-style-type: none"> - Using poles (instead of lattice style towers) to support transmission lines within Malleefowl habitat; - Using spur tracks from the existing transmission line access track to each new pole/tower (instead of a new longitudinal access track along the new transmission line) to minimise clearance of native vegetation and creation of predator highways (i.e. easy access for foxes and feral cats); and - Micro-siting infrastructure to avoid Malleefowl mounds, where practicable (refer to Table 14 for more detail).
Sandhill Dunnart (<i>Sminthopsis psammophila</i>)	<p>Likely. 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). Suitable habitat exists in the Project Area in Mallee over <i>Triodia</i> associations. The species is known to occur within the Project Area, which transects through a key population located near Whyalla in the Middleback Ranges.</p> <p>It is estimated that the current infrastructure design will impact upon approximately 39.08 ha of habitat suitable for Sandhill Dunnart, of which approximately 3.55 ha will be permanently impacted and the remaining 35.53 ha will be rehabilitated after construction. As Sandhill Dunnart habitat is widespread within the Project Area, any micro-siting of infrastructure would have a negligible reduction in overall impacts on the species. However, minimise stringing and access track impacts within habitat suitable for Sandhill Dunnart, where practicable (refer to Table 14 for more detail).</p>
Southern Emu-wren (Eyre Peninsula) (<i>Stipiturus malachurus parimeda</i>)	<p>Likely. The range of this species overlaps with poor quality vegetation within the Project Area (low native species and structural diversity, and high weed cover). Potentially suitable habitat exists in the southern extent of the Project Area around Charlton Gully in shrubland, heathland, mallee and sedgeland, which have one or two low dense layers. The most recent BDBSA record in this area is from 2004, prior to the 2005 Wangary bushfire. The habitat has since recovered and could sustain the species. However, it is unknown whether the species will/has recolonise/d this area, particularly given the highly fragmented habitat between patches and the species' poor long distance movements.</p> <p>It is estimated that the current infrastructure design will impact upon approximately 7.71 ha of habitat potentially suitable for Southern Emu-wren, of which approximately 0.24 ha will be permanently impacted and the remaining 7.47 ha will be rehabilitated after construction. The amount of habitat impacted could be reduced by relocating and/or micro-siting structures outside of habitat suitable for Southern Emu-wren and minimising stringing and access track impacts within habitat suitable for Southern Emu-wren, where practicable (refer to Table 14 for more detail).</p>
Western Grasswren (Gawler Ranges) (<i>Amytornis textilis myall</i>)	<p>Likely. 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). Suitable habitat exists in watercourses and waterbodies, which could retain connectivity to additional suitable habitat (important as the species is highly fragmented). Suitable habitat was observed within the Project Area by EBS in September 2019. The species is known to occur within Project Area with five individuals observed at three sites by EBS in December 2012. One individual was observed <1 km west of the Project Area adjacent to Iron Knob Road by EBS in October 2019.</p> <p>It is estimated that the current infrastructure design will impact upon approximately 18.05 ha of habitat suitable for Western Grasswren (Gawler Ranges), of which approximately 1.76 ha will be permanently impacted and the remaining 16.29 ha will be rehabilitated after construction. The amount of habitat impacted can be reduced by relocating and/or micro-siting structures outside of habitat suitable for Western Grasswren (Gawler Ranges) and minimising stringing and access track impacts within habitat suitable for Western Grasswren (Gawler Ranges) (refer to Table 14 for more detail).</p>

*current design = design information (GIS files) provided by ElectraNet (Alecia Wright) on 4 October 2019.

Malleefowl (Leipoa ocellata)

A targeted study which determined the number and extent of Malleefowl mounds over 35 km of the Project Area from Iron Duchess to the southern end of She-oak Conservation Park was conducted in 2013/14 (EBS 2014). The Study Area for the Malleefowl mound survey followed three transects, (1) the existing transmission line, (2) the proposed transmission line and (3) a transect 2.5 km west of the other transects, located within suitable habitat.

The study used LiDAR, which is a remote sensing method that uses the reflectance of a target to develop a three-dimensional map. An algorithm was developed to distinguish Malleefowl mounds from other elevations above the surrounding plain, which include the size, shape and height of earth rises. Ground-truthing was conducted for 80% of the potential mounds.

A total of 253 objects were identified using the airborne LiDAR survey. However, many of these were proven to be either mounds of dirt, large elevated lignotubers or other object rather than mounds. As such, 80 objects were removed simply from analysis by their height, shape and cross checking with the orthophotos. This resulted in 173 potential mounds being identified and was either 'confirmed' mounds (81) with a concave shape or 'possible' mounds (92) which were flat or domed. Of these 137 mounds (80% of the total) were ground-truthed, consisting of 67 of the 81 'confirmed' (representing 83%) and 70 of the 92 'possible' (representing 76%). This was to confirm the mounds as being Malleefowl nest as well as establishing if the mound was either current or historical in its use. Of these ground truthed mounds, 95% (64 of 67) of the 'confirmed' objects identified by LiDAR were found to be Malleefowl and only 8.5% (6 of 70) 'possible' objects were confirmed to be Malleefowl mounds. If the same percentage accuracy is assumed for the 14 'confirmed' objects and for the 22 'possible' which were not visited on the ground, we can assume another 13 'confirmed' and 2 'possible' objects would be mounds within the Study Area.

A total of 38 mounds were confirmed on the 24.1 km of transmission line transect ground-truthed, compared with 37 on the 16.6 km of the control transect (2.5 km further west). This data suggests that Malleefowl mound density along the transmission line was 73% of that in areas remote from the transmission line.

Refer to Attachment A3 for maps showing the location of Malleefowl mounds within Malleefowl habitat in the Project Area based on the 2013/2014 mound Malleefowl data. It is understood that ElectraNet are currently in the process of obtaining new LiDAR data, which will also be ground-truthed to confirm the location of Malleefowl mounds within the Project Area, in order to further inform the detailed design process to avoid and/or minimise impacts to Malleefowl mounds and the species in general.

Sandhill Dunnart (Sminthopsis psammophila)

Sandhill Dunnarts have been confirmed to occur within the Project Area (EBS 2014). The species has been captured at long-term fauna monitoring sites in the Project Area (EBS 2014). To determine the potential area of occupancy of Sandhill Dunnarts in the Project Area a habitat suitability assessment was conducted in 2014.

Vegetation mapping within the transmission line corridor revealed a total of 1236.4 hectares of native vegetation contained *Triodia* habitat (EBS 2014). EBS (2014) determined that of areas which contained *Triodia* habitat, 1213.3 hectares were suitable habitat for Sandhill Dunnarts. This equates to nearly 17%

of the total native vegetation along the assessed portion of the corridor and includes four of the five *Triodia* vegetation associations identified (Table 11). The small isolated patch of the vegetation association “*Triodia* spp. Hummock Grassland over *Austrostipa* spp., *Aristida contorta*, *Sida petrophila*” located near Whyalla was not considered suitable for Sandhill Dunnarts due to the absence of mallee species and isolated location within chenopod clay swales. The main area of Sandhill Dunnart habitat was located between the Middleback Range and Sheoak Hill Conservation Park in Ironstone Hill CP, Sheoak Hill CP, Secret Rocks Nature Reserve and adjacent heritage agreements. Patches of suitable *Triodia* habitat were interspersed with other habitat types which would likely be used by Sandhill Dunnarts for dispersal and feeding. Refer to Attachment A4 for maps showing the location of Sandhill Dunnart habitat within the Project Area.

Table 11. Flora composition of *Triodia* vegetation associations within the proposed corridor.

Detailed flora species composition of <i>Triodia</i> vegetation associations	ha	%*	SHD sites	Suitable habitat
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> / <i>Eucalyptus leptophylla</i> Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>	892.4	12.17%	7	Yes
<i>Eucalyptus incrassate</i> , <i>Callitris verrucosa</i> Mallee over <i>Leptospermum coriaceum</i> , <i>Phebalium bullatum</i> , <i>Triodia</i> spp. and <i>Calytrix tetragona</i>	186.7	2.55%	1	Yes
<i>Acacia wilhelmiana</i> , <i>Senna artemisioides</i> ssp. <i>coriacea</i> , <i>Eucalyptus gracilis</i> , <i>Melaleuca uncinata</i> Tall Shrubland over <i>Triodia</i> spp.	125.0	1.70%		Yes
<i>Triodia</i> spp. Hummock Grassland over <i>Austrostipa</i> spp., <i>Aristida contorta</i>, <i>Sida petrophila</i>	22.7	0.31%		No
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> / <i>Eucalyptus leptophylla</i> Mallee over <i>Acacia</i> spp., <i>Leptospermum coriaceum</i> , <i>Triodia</i> spp. , <i>Austrostipa</i> spp. and <i>Rytidosperma caespitosa</i>	9.6	0.13%		Yes

*Note: percentage calculation is based on total area of native vegetation. Vegetation association in bold is not considered suitable for Sandhill Dunnarts.

Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*)

A targeted survey which aimed to determine the presence of Southern Emu-wrens within the Project Area was conducted in 2013, however, failed to record the species (EBS 2014). This survey was conducted by two surveyors over two morning periods, whom used call play-back and active search methods to target the Southern Emu-wrens within their historic range and in suitable habitat.

The area targeted was within the Charlton Gully where the most recent South Emu-wren record occurred in 2004 (ALA 2019). No records of Southern Emu-wrens have occurred within the Charlton Gully area since the 2005 Wangary bushfire (DESWP 2011).

Suitable habitat for Southern Emu-wrens was recorded within the Project Area. Habitats that are used by Southern Emu-wrens include shrubland, heathland, mallee and sedgeland, which have one or two low dense layers (Pickett 2002; Garnett *et al.* 2011). The habitat within the Project Area has recovered following the 2005 fire, and could sustain the species (*B Backhouse, Pers Obs* 2013), however, it is unknown whether this species will re-habituate this area, particularly given the highly fragmented habitat between the sites and the species' poor long distance movements (Garnett *et al.* 2011).

Refer to Attachment A5 for maps showing the location of Southern Emu-wren habitat within the Project Area.

Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*)

The Western Grasswren is distributed over the north-eastern Eyre Peninsula (Black *et al.* 2009). The core range for the Western Grasswren occurs in the southern area of their distribution, especially along Myall Creek and Pine Creek (Black *et al.* 2009). The Project Area bisects the core distribution of the Western Grasswren, overlapping with Pine Creek and the Whyalla-Iron Knob Road, where the distribution of Western Grasswrens is almost continuous (Black *et al.* 2009). The Western Grasswren was recorded at three sites, totalling 5 individuals, within the Project Area in December 2012 by EBS (2014).

The Western Grasswren inhabits chenopod shrublands that have dense structure. Black *et al.* (2009) conducted an analysis of habitats used by Western Grasswrens and described suitable habitat as “*low-lying areas of Blackbush and spiny shrubs, particularly Australian Boxthorn, either as a shrubland or as an understorey of Western Myall low open woodland*”. Furthermore, the “*presence of grasswrens could largely be predicted by the total cover of Blackbush, Australian Boxthorn, spiny shrubs, Ruby Saltbush and taller shrubs (over 0.75 m)*”. Preferred habitats are expected to be restricted in their area of occurrence, however, widespread in their extent within the northern most 20 km of the Project Area.

Refer to Attachment A6 for maps showing the location of Western Grasswren habitat within the Project Area.

3.4 Commonwealth Land

Five areas of Commonwealth Land were identified by the 2019 EPBC Act PMR:

- Commonwealth Land – (no details);
- Commonwealth Land – Australian National Railways Commission;
- Commonwealth Land – Defence Housing Authority;
- Commonwealth Land – Minister of Transport; and
- Defence – Port Lincoln Training Depot.

The Project alignment passes through land owned by the Commonwealth which is used for the Department of Defence Cultana Training Range (refer to Table 12 for property details).

Table 12. Department of Defence Cultana Training Range property details.

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

The Department of Defence Cultana Training Range 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 Project is not expected to be any worse than that of the current land use.

3.5 State Reserves

The EPBC PMR identified 45 State Reserves, including one Wilderness Protection Area (WPA) and nine Conservation Parks (CP) (Table 13), as well as 35 Heritage Agreements (section 3.5.1) (Figure 2 and Figure 3). The Project alignment passes through Ironstone Hill CP, Sheoak Hill CP and Wharminda CP (Figure 2 and Figure 3).

Table 13. Wilderness Protection Area and Conservation Parks identified by the 2019 EPBC Act PMR.

Name	Within project alignment
Hincks WA	No
Ironstone Hill CP	Yes
Moody Tank CP	No
Rudall CP	No
Sheoak Hill CP	Yes
The Plug Range CP	No
Verran Tanks CP	No
Wharminda CP	Yes
Whyalla CP	No
Yeldulknie CP	No

WA: Wilderness Protection Area; CP: Conservation Park

3.5.1 Heritage Agreements

A Heritage Agreement is a conservation area on private land, which is established by agreement (or contract) between a landholder and the South Australian Minister for Environment and Water. 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*. 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.

The following 35 Heritage Agreements were identified by the 2019 EPBC Act PMR, including seven (highlighted in bold text) that are located within or across the Project Area (Figure 2 and Figure 3):

- HA1029
- HA1097
- HA1111
- HA1144
- HA1152
- HA1206
- HA1329
- **HA137**
- HA1388
- **HA1398**
- HA1409
- HA1451
- HA1483
- HA1486
- HA263
- HA310
- HA318
- **HA381**
- HA457
- HA516
- **HA528**
- HA584
- HA589
- HA598
- HA61
- HA63
- **HA729**
- **HA774**
- HA787
- **HA833**
- HA876
- HA881
- HA898
- HA963
- HA981

Note that the above list may not include all Heritage Agreements located within the Project Area. As such it is recommended that the Native Vegetation Council within DEW is consulted to identify all Heritage Agreements within the Project Area.

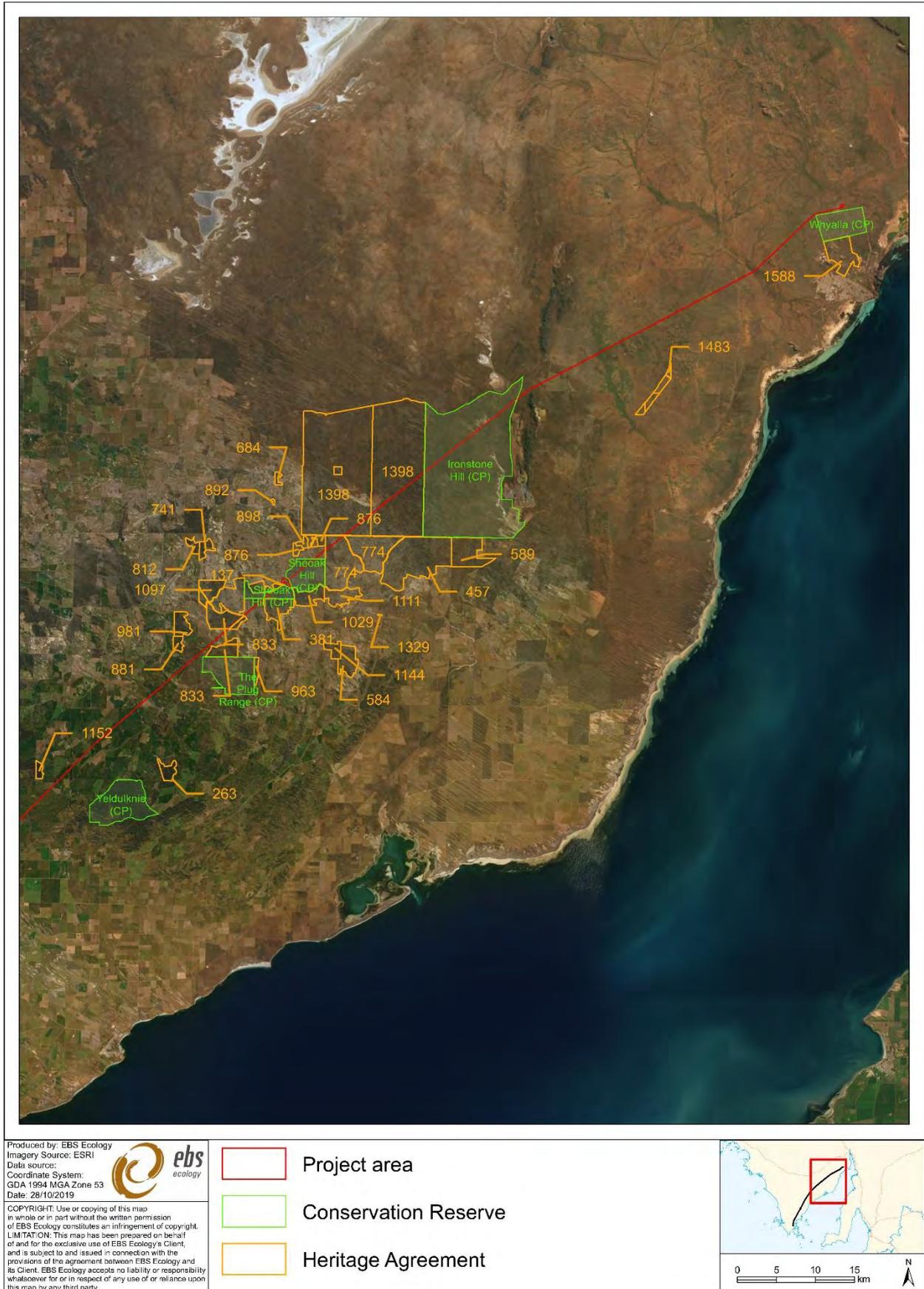


Figure 2. State Reserves identified by the EPBC PMR (map 1 of 2).



4 CONCLUSION AND RECOMMENDATIONS

An EPBC referral is recommended for the Eyre Peninsula Transmission Line Project due to the potential for the Project to have a significant impact on the following Matters of National Environmental Significance (MNES):

- One Threatened Ecological Community (TEC):
 - Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland - Endangered;
- The following six nationally threatened flora species:
 - *Acacia enterocarpa* (Jumping-jack Wattle) – Endangered;
 - *Acacia pinguifolia* (Fat-leaf Wattle) – Endangered;
 - *Caladenia macroclavia* (Large-club Spider-orchid) – Endangered;
 - *Caladenia tensa* (Inland Green-comb Spider-orchid) – Endangered;
 - *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) – Vulnerable; and
 - *Pultenaea trichophylla* (Tufted Bush-pea) – Endangered; and
- The following four nationally threatened fauna species:
 - Malleefowl (*Leipoa ocellata*) – Vulnerable;
 - Sandhill Dunnart (*Sminthopsis psammophila*) – Endangered;
 - Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) – Vulnerable; and
 - Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*) – Vulnerable.

The following additional recommendations are provided to avoid and/or minimise impacts associated with the Project on MNES and other biodiversity assets within the Project Area:

- Contact the Native Vegetation Council within DEW to identify all Heritage Agreements within the Project Area;
- Seek approval from the Minister for Environment and Water for impacts within State Reserves (Wilderness Protection Areas, Conservation Parks and Heritage Agreements);
- Implement a mitigation hierarchy, such as that outlined by the *Native Vegetation Regulations 2017* (Avoid, Minimise, Rehabilitate or Restore, and Offset) to minimise the potential impacts of the Project on native vegetation (including important habitats);
- Where possible, relocate and/or micro-site the final location of specific infrastructure as outlined in Table 14 (on the following page) to avoid and/or minimise impacts to the MNES identified for the Project, or any other EPBC listed species detected during micro-siting surveys, which the project has potential to have a significant impact on.
 - All EPBC listed flora species potentially occurring within the Project Area should be targeted during micro-siting surveys, which should focus on remnant patches over 10 ha within the distribution of each species (remnant patches less than 10 ha were thoroughly searched by EBS (2014) during targeted surveys in 2013).

- Should an additional EPBC listed species be detected during micro-siting surveys, the significant impact to this species will need to be re-assessed. Based on the results of the re-assessment, the EPBC referral may need to be updated and appropriate mitigation/management measures may need to be developed and implemented.
- Micro-siting surveys should be undertaken by a suitably qualified ecological consultant at the most appropriate time of year for each MNES (particularly flora species) (EBS 2014).

Table 14. Recommendations to avoid and/or minimise impacts to MNES associated with the Project.

MNES	Impact from current design*	Recommendations to avoid and/or minimise impact
Eyre Peninsula Blue Gum (<i>Eucalyptus petiolaris</i>) Woodland TEC	1.44 ha of the TEC.	<ul style="list-style-type: none"> • Where possible, relocate and/or micro-site structures 144, 148 and 179 outside of Eyre Peninsula Blue Gum (<i>Eucalyptus petiolaris</i>) Woodland; and • Minimise stringing and access track impacts between structures 143-144, 148-149, 171-172, 177-178, 179-180 and 182-183 (refer to Attachment A1).
<i>Acacia enterocarpa</i> (Jumping-jack Wattle)	1.68 ha of suitable habitat (100 m buffer from records).	<ul style="list-style-type: none"> • Micro-site and/or minimise impacts of access track and stringing at structures 96 and 122, as well as the construction compound proposed to be located in the vicinity of structures 119-124 (refer to Attachment A2).
<i>Acacia pinguifolia</i> (Fat-leaf Wattle)	0.04 ha of suitable habitat (100 m buffer from records).	<ul style="list-style-type: none"> • Micro-site and/or minimise impacts of access track and stringing between structure 188-189 and the laydown area adjacent to structure 189 to avoid the patch of roadside vegetation (refer to Attachment A2).
<i>Caladenia macroclavia</i> (Large-club Spider-orchid)	0.40 ha of suitable habitat (100 m buffer from records).	<ul style="list-style-type: none"> • Micro-site and/or minimise impacts of structure 194 and adjacent access track and stringing (refer to Attachment A2).
<i>Caladenia tensa</i> (Inland Green-comb Spider-orchid/Rigid Spider-orchid)	0.07 ha of suitable habitat (100 m buffer from records).	<ul style="list-style-type: none"> • Although the current infrastructure layout avoids the known sub-population of this species, micro-site and/or minimise impacts of access track and stringing between structures 118-119 (refer to Attachment A2).
<i>Olearia pannosa ssp. pannosa</i> (Silver Daisy-bush)	0.38 ha of suitable habitat (100 m buffer from records).	<ul style="list-style-type: none"> • Micro-site and/or minimise impacts of access track and stringing between structures 185-186 and 168-169 (refer to Attachment A2).
<i>Pultenaea trichophylla</i> (Tufted Bush-pea)	1.55 ha of suitable habitat (100 m buffer from records).	<ul style="list-style-type: none"> • Where possible, relocate and/or micro-site structures (poles/towers) 154, 158 and 159; and • Minimise impacts of access track and stringing between structures 133-134, 138-139 and 153-159 (refer to Attachment A2).

MNES	Impact from current design*	Recommendations to avoid and/or minimise impact
Malleefowl (<i>Leipoa ocellata</i>)	72.63 ha of suitable habitat (permanent impact of 6.08 ha)	<ul style="list-style-type: none"> Where possible, use poles (instead of lattice style towers) to support transmission lines within Malleefowl habitat (Mallee vegetation associations) between structures 93-197, to minimise creation of roosts for birds of prey; Where possible, use spur tracks from the existing transmission line access track to each new pole/tower (instead of a new longitudinal access track along the new transmission line) to minimise clearance of native vegetation and creation of predator highways (i.e. easy access for foxes and feral cats); Review new LiDAR data and ground-truthing data (once available) to identify the location of Malleefowl mounds. Where possible, relocate and/or micro-site structures (poles/towers) outside of the 100 m buffer zone around Malleefowl mounds or as far away as possible; and Minimise stringing impacts as much as possible within Malleefowl habitat (Mallee vegetation associations and other native vegetation associations) between structures 93-197 (refer to Attachment A3).
Sandhill Dunnart (<i>Sminthopsis psammophila</i>)	39.08 ha of suitable habitat (permanent impact of 3.55 ha)	<ul style="list-style-type: none"> As Sandhill Dunnart habitat is widespread within the Project Area, any micro-siting of infrastructure would have a negligible reduction in overall impacts on the species. However, minimise stringing and access track impacts within habitat suitable for Sandhill Dunnart between structures 92-114, 130-163, 168-175, 183-187 and 191-197 (refer to Attachment A4).
Southern Emu-wren (Eyre Peninsula) (<i>Stipiturus malachurus parimeda</i>)	7.71 ha of suitable habitat (permanent impact of 0.24 ha)	<ul style="list-style-type: none"> Where possible, relocate and/or micro-site structures (poles/towers) 177, 184, 190, 203, 207, 222, 225, 238, 239, 241, 245, 251 and 254 outside of habitat suitable for Southern Emu-wren; and Minimise stringing and access track impacts within habitat suitable for Southern Emu-wren (refer to Attachment A5).
Western Grasswren (Gawler Ranges) (<i>Amytornis textilis myall</i>)	18.05 ha of suitable habitat (permanent impact of 1.76 ha)	<ul style="list-style-type: none"> Where possible, relocate structures (poles/towers) 1-3, 10-16, 18-21, 24, 29, 44-46, 63, 64, 68-69, 72, 73, 75, 76, 79-81, 83, 84, 96-100, 113 and 114 outside of habitat suitable for Western Grasswren (Gawler Ranges). Minimise stringing and access track impacts within habitat suitable for Western Grasswren (refer to Attachment A6).

*current design = design information (GIS files) provided by ElectraNet (Alecia Wright) on 4 October 2019.

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Threatened Species Scientific Committee (TSSC) (2007) Commonwealth Listing Advice on Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia [Listing Advice].

6 APPENDICES

Appendix 1. List of Attachments

A1 – EP Blue Gum Woodland Maps

A2 – EPBC Flora Species Maps

A3 – Malleefowl Habitat and Mound Maps

A4 – Sandhill Dunnart Habitat Maps

A5 – Southern Emu-wren Habitat Maps

A6 – Western Grasswren Habitat Maps



EBS Ecology
125 Hayward Avenue
Torrensville, SA 5031
www.ebsecology.com.au
t. 08 7127 5607





**Eyre Peninsula Transmission Line -
Biodiversity Assessment Report**

Eyre Peninsula Transmission Line - Biodiversity Assessment Report

9 July 2014

Final Version

Prepared by EBS Ecology for ElectraNet

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EBS Ecology
3/119 Hayward Avenue
Torrensville, South Australia 5031
t: 08 7127 5607
<http://www.ebsecology.com.au>
email: info@ebsecology.com.au



GLOSSARY AND ABBREVIATION OF TERMS

BDBSA	Biological Database of South Australia
CP	Conservation Park
CR	Conservation Reserve
DEWNR	Department of Environment, Water and Natural Resources
DPTI	Department of Planning, Transport and Infrastructure
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EBS	EBS Ecology
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EP	Eyre Peninsula
EPNRMB	Eyre Peninsula Natural Resources Management Board
EYB	Eyre Yorke Block (IBRA Bioregion)
IBRA	Interim Biogeographical Regionalisation of Australia
NP	National Park
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NRM Act	<i>Natural Resources Management Act 2004</i>
NSW	New South Wales
NV Act	<i>Native Vegetation Act 1991</i>
NVC	Native Vegetation Council
SE	South East
SEB	Significant Environmental Benefit
spp.	species (plural)
ssp.	subspecies (fauna)
subsp.	subspecies (flora)
WA	Wilderness Area
YP	Yorke Peninsula

EXECUTIVE SUMMARY

EBS Ecology assessed the potential terrestrial flora and fauna constraints for Eyre Peninsula Reinforcement Project, from Cultana Substation near Whyalla to the outskirts of Pt. Lincoln, South Australia.

The assessment involved desktop research and field survey to identify:

- the vegetation type and condition
- flora and fauna species present
- value of habitats present
- threatened species occurring or expected to occur at the site
- identification of knowledge gaps and further survey required.

The proposed transmission line corridor (project area) was approximately 290 km long, and covered an area of approximately 15,741.5 hectares.

Three baseline flora surveys (December 2012, January 2013 and February 2013) were aimed at ground truthing DEH floristic data and recording the condition of the vegetation within the assessment corridor. Opportunistic threatened species records were also collected as well as species lists for each vegetation association. These were followed by four threatened species targeted surveys undertaken in August, October and early November 2013.

Three bird surveys were (December 2012, January 2013 and February 2013) undertaken, where opportune sightings of other fauna species were recorded.

A number of protected areas were intersected by the proposed transmission line corridor: Six NPW reserves (Conservation Parks, Conservation reserves and Wilderness Areas), 18 Heritage Agreement and two Significant Environmental Benefit (SEB) offset areas. The project area also intersects two known Threatened Habitat Areas identified on the Eyre Peninsula; Cleve Hills and Koppio Hills. These areas are identified based on a number of factors including State and regionally threatened ecosystems, low remnancy and highly fragmented and isolated vegetation blocks, low representation within the reserve system and large numbers of threatened species, many at a national level.

Flora

Approximately 45% of the project area consisted of remnant native vegetation, in the form of large continuous tracts of mallee and Western Myall / chenopod low woodlands, fragmented patches, roadside and rail reserves, and scattered trees. The dominant native vegetation communities were mallee which covered 20% of the project area, followed by woodlands (13%), chenopod shrublands (6.5%), tall shrublands (4%) and native grasslands and sedgeland (0.7%). The remainder of the area was cleared for predominantly agricultural purposes and was not considered to contain significant flora and fauna implications.

Seventy-five vegetation associations were described throughout the project area. The condition of the vegetation communities ranged from very poor (SEB 1:1) to excellent (SEB 10:1). 32.7% ranged from good to very good, and most of this vegetation was located in the northern half of the project area. 32% was in

moderate condition and 34.4% was in poor to very poor condition. Most of the poorest quality vegetation was located in the southern section.

One threatened ecological community (TEC) was highlighted in the EPBC Protected Matters Search as potentially occurring within the vicinity of the project area; Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia. Although areas were mapped as *Eucalyptus odorata* Woodland, the EPBC listing advice excludes occurrences of Peppermint Box that are a part of 'mallee' Eucalyptus woodlands with a shrubby understorey. An additional TEC, Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland, was listed under the EPBC Act, 2003 as Endangered, on 13 Aug 2013. There are a number of remnants mapped as *Eucalyptus petiolaris* Woodland along the alignment, however most are in moderate to poor condition and therefore some of these may not qualify as the TEC under the Approved Conservation Advice.

Six State listed Threatened Ecological Communities were recorded in the project area:

- *Allocasuarina verticillata* Low Woodland - State Vulnerable
- *Alectryon oleifolius ssp. canescens* Low Woodland over *Atriplex vesicaria* / *Maireana sedifolia* - State Vulnerable
- *Eucalyptus peninsularis* , *E. dumosa* complex Woodland – State Endangered
- *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland – State Endangered
- *Gahnia trifida* (Cutting Grass) Sedgeland – State Endangered
- *Austrodanthonia spp.* / *Austrostipa spp.* +/- *Themeda triandra* Tussock Grassland – State Endangered

There were twenty-two nationally threatened flora species identified during the EPBC Protected Matters Search. Nine of these are endemic to Eyre Peninsula and 16 were recorded within 10kms of the project area from the BDBSA search and considered either possible or likely to occur on site. A total of 97 State threatened flora species were recorded through database searches and advice from local experts, with 65 of those considered either likely or possible to occur within the alignment. These species were targeted during 2013 spring surveys to help determine presence / absence and area of occupancy. Based on existing records, all patches of intact vegetation with good quality understorey and limited weed invasion were considered potential threatened habitat. The following nationally threatened species were targeted:

- *Acacia cretacea* (Chalky Wattle), EPBC Endangered, State Endangered
- *Acacia praemorsa* (Senna Wattle), EPBC Vulnerable, State Endangered
- *Acacia retinocarpa* (Resin Wattle), EPBC Vulnerable, State Vulnerable
- *Acacia whibleyana* (Whibley Wattle), EPBC Endangered, State Endangered
- *Arachnorchis brumalis* (Winter Spider-orchid), EPBC Vulnerable, State Vulnerable
- *Arachnorchis tensa* (Rigid Spider-orchid), EPBC Endangered
- *Frankenia plicata*, EPBC Endangered, State Vulnerable
- *Haloragis eyreana* (Prickly Raspwort), EPBC Endangered, State Endangered
- *Olearia pannosa subsp. pannosa* (Silver Daisy-bush), EPBC Vulnerable, State Vulnerable
- *Prasophyllum goldsackii* (Goldsack's Leek-orchid), EPBC Endangered, State Endangered

- *Prostanthera calycina* (West Coast Mintbush), EPBC Vulnerable, State Vulnerable
- *Pterostylis* sp. Eyre Peninsula (R.Bates 19474), EPBC Vulnerable, State Vulnerable
- *Ptilotus beckerianus*, (Ironstone Mulla Mulla), EPBC Vulnerable, State Vulnerable
- *Pultenaea trichophylla* (Tufted Bush-pea), EPBC Endangered, State Rare
- *Swainsona pyrophila* (Yellow Swainson-pea), EPBC Vulnerable, State Rare
- *Thelymitra epipactoides* (Metallic Sun-orchid), EPBC Endangered, State Endangered

Over 350 flora species were recorded during the baseline and targeted field surveys, including five flora species of national conservation significance and 19 of State conservation significance. Most occurrences were found in intact vegetation or on roadside reserves. The species include:

- *Acacia enterocarpa* (Jumping-jack Wattle) – nationally Endangered, State Endangered
- *Acacia pinguifolia* (Fat-leaf Wattle) - nationally Endangered, State Endangered
- *Arachnorchis tensa* (Inland Green-comb Spider-orchid) - nationally Endangered
- *Pultenaea trichophylla* (Tufted Bush-pea) - nationally Endangered, State Rare
- *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) - nationally Vulnerable, State Vulnerable
- *Santalum spicatum* (Sandalwood) - State Vulnerable
- *Acacia dodonaeifolia* (Hop-bush Wattle) - State Rare
- *Acacia hexaneura* (Six-nerve Spine-bush) - State Rare
- *Acacia imbricata* (Feathery Wattle) - State Rare
- *Acacia rhigiophylla* (Dagger-leaf Wattle) - State Rare
- *Austrostipa tenuifolia* - State Rare
- *Austrostipa breviglumis* (Cane Spear-grass) - State Rare
- *Daviesia benthamii* ssp. *humilis* (Mallee Bitter-pea) - State Rare
- *Daviesia pectinata* (Zig-zag Bitter-pea) - State Rare
- *Eremophila gibbifolia* (Coccid Emubush) - State Rare
- *Eucalyptus cretata* (Darke Peak Mallee) - State Rare
- *Goodenia benthamiana* (Bentham's Goodenia) - State Rare
- *Maireana suaedifolia* (Lax Bluebush) - State Rare
- *Microtis* sp. Nash (R. Bates 44740) (Nash's Onion Orchid) - State Rare
- *Olearia adenolasia* (Musk Daisy-bush) - State Rare
- *Philotheca angustifolia* ssp. *angustifolia* (Narrow-leaf Wax-flower) - State Rare
- *Prostanthera chlorantha* (Green Mintbush) - State Rare
- *Spyridium leucopogon* (Silvery Spyridium) - State Rare
- *Spyridium spathulatum* (Spoon-leaf Spyridium) - State Rare

Twenty-four weed species were recorded during the surveys, with five of those declared under the *Natural Resources Management Act 2004* (NRM Act), in addition to eleven environmental weed species.

Fauna

A total of seven nationally listed fauna species were highlighted in the Protected Matters Search of which four were considered 'Likely' to occur within the project area. All of these except the Fairy Tern were recorded in the BDBSA search.

- Sandhill Dunnart (*Sminthopsis psammophila*), EPBC Endangered, State Vulnerable
- Malleefowl (*Leipoa ocellata*), EPBC Vulnerable, State Vulnerable
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*), EPBC Vulnerable, State Endangered
- Fairy Tern (Australian) (*Strenua nereis nereis*), EPBC Vulnerable, State Endangered

Both Malleefowl (*Leipoa ocellata*) and Sandhill Dunnart (*Sminthopsis psammophila*), were targeted in 2014, whilst the Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) was targeted in spring 2013.

Sandhill Dunnarts are currently only recorded from large, intact areas of mallee *Triodia* vegetation and the large area of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park contains the majority of Sandhill Dunnart habitat within the proposed corridor and there are numerous current records of the species from this area. The potential impacted posed by the development area considered to be direct removal, degradation or further fragmentation of suitable *Triodia* habitat and connective non-*Triodia* habitat used for dispersal and feeding, direct removal of individuals and increased predation of the species via further accessibility of suitable habitat to exotic species such as Cats and Foxes.

Critical habitat for the Malleefowl was found along approximately 35 km within the northern section, from between Iron Duchess to the southern end of She-oak Conservation Park. The clearing and fragmentation of Malleefowl habitats is highlighted as a key threat to the species, in addition to increased predation resulting from a greater access to feral Cats and Foxes.

In addition the data suggests that proximity to the transmission line may negatively influence nest site selection and possibly nesting success in Malleefowl. Confirmed mound densities along the transmission line were 28% lower than densities on the remote transect, suggesting recently active Malleefowl mound density and hence possibly nesting success, is reduced by approximately one third in the vicinity of the existing ElectraNet transmission line.

The Southern Emu-wren (Eyre Peninsula) sub-species is restricted to the extreme south of the Eyre Peninsula in numerous small disjointed populations. Preferred habitat includes shrubland or heathland, mallee and sedgeland, of which some suitable areas occur within the Transmission Line corridor. Surveys were therefore undertaken in areas historically known to have Southern Emu-wrens, however none were observed, although the species can be very cryptic and shy making confirmed detection very difficult. The known population within the Koppio Hills has been decimated by the 2005 'Black Tuesday' fires and the historical population within Charlton Gully has not been observed since 2005. Suitable habitat has recovered and could sustain this species, but it is unknown if this species will re-habituate this area, particularly given the highly fragmented habitat between the sites and the species' poor long distance

movements. Any potential impacts to the species can be minimised by sensitive micro-siting of infrastructure.

The Fairy Tern (*Strenua nereis nereis*) population has dramatically declined over the past ten years. Results from the November 2010 State-wide census recorded a range between 650 and 750 Fairy Tern across South Australia. This species, if occurring on site, would likely to be as a fly-over species with impact from the proposed easement being difficult to predict but assumed as unlikely.

There were 323 native fauna species (excluding marine species) from the BDBSA search (10km buffer), of which five were nationally listed, 10 migratory and 44 State listed. The nationally listed species include two bird species, considered unlikely to occur within the project area and the three species listed previously in the EPBC search.

Ten nationally listed migratory species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area. Eight of these are considered as possible or likely visitors to the project area:

- Fork-tailed Swift (*Apus pacificus*)
- Great Egret (*Ardea alba*)
- Cattle Egret (*Ardea ibis*)
- Red-necked Stint (*Calidris ruficollis*)
- Latham's Snipe (*Gallinago hardwickii*)
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
- Malleefowl (*Leipoa ocellata*)
- Rainbow Bee-eater (*Merops ornatus*)

A total of 85 individual point count surveys were undertaken for avian species along the current easement during the bird surveys. Surveys were placed at 2 km intervals along the line in large tracts of remnant vegetation, or where largely cleared, in any substantial vegetation patches. Opportunistic observations were also recorded, generally when moving between survey sites. This resulted in 94 species of bird being identified. These included ten State listed and three introduced.

Biodiversity Hot spots

Six 'hot spots' have been highlighted along the project area that identify key constraints associated with areas possessing a high concentration of nationally and State threatened species records, TECs, protected areas, remnant native vegetation or associated with recognised threatened habitat areas, Koppio Hills and Cleve Hills.

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1 INTRODUCTION

Electrical demand on the Eyre Peninsula has grown steadily over the years as a result of agricultural, residential, commercial and light-industrial development. Population is projected to increase by 33% over the next 30 years and combined with an increase in commercial and agricultural activity, load growth on the lower part of the Peninsula is expected to vary between 3.3% and 4.9% per annum. The Eyre Peninsula Region also has significant mineral and renewable energy and resources and over the next few decades mining investment and outputs are expected to grow substantially.

ElectraNet are proposing to upgrade the existing 132 kV transmission line from Cultana to Port Lincoln (Figure 1) to address the growing power demands and provide sufficient infrastructure to meet Electricity Transmission Code (ETC) reliability standards. EBS Ecology (EBS) was contracted by ElectraNet to assist with the ecological considerations. This report presents findings from an initial baseline flora and fauna assessment, followed by a series of targeted flora and fauna surveys. It also provides more specific information in relation to key areas to consider during the planning process.

1.1 Objectives

The objectives of the project were to:

- summarise relevant legislation and regulations
- identify areas that represent key fauna habitats and faunal or floral assemblages
- identify flora and fauna species (including pest plants and animals) that are known to occur
- identify any matters of national, State or local conservation significance
- assess the likelihood of the presence of species of conservation significance
- identify any 'no-go' zones
- identify potential management actions for mitigation of project impacts
- present findings from targeted flora and fauna surveys

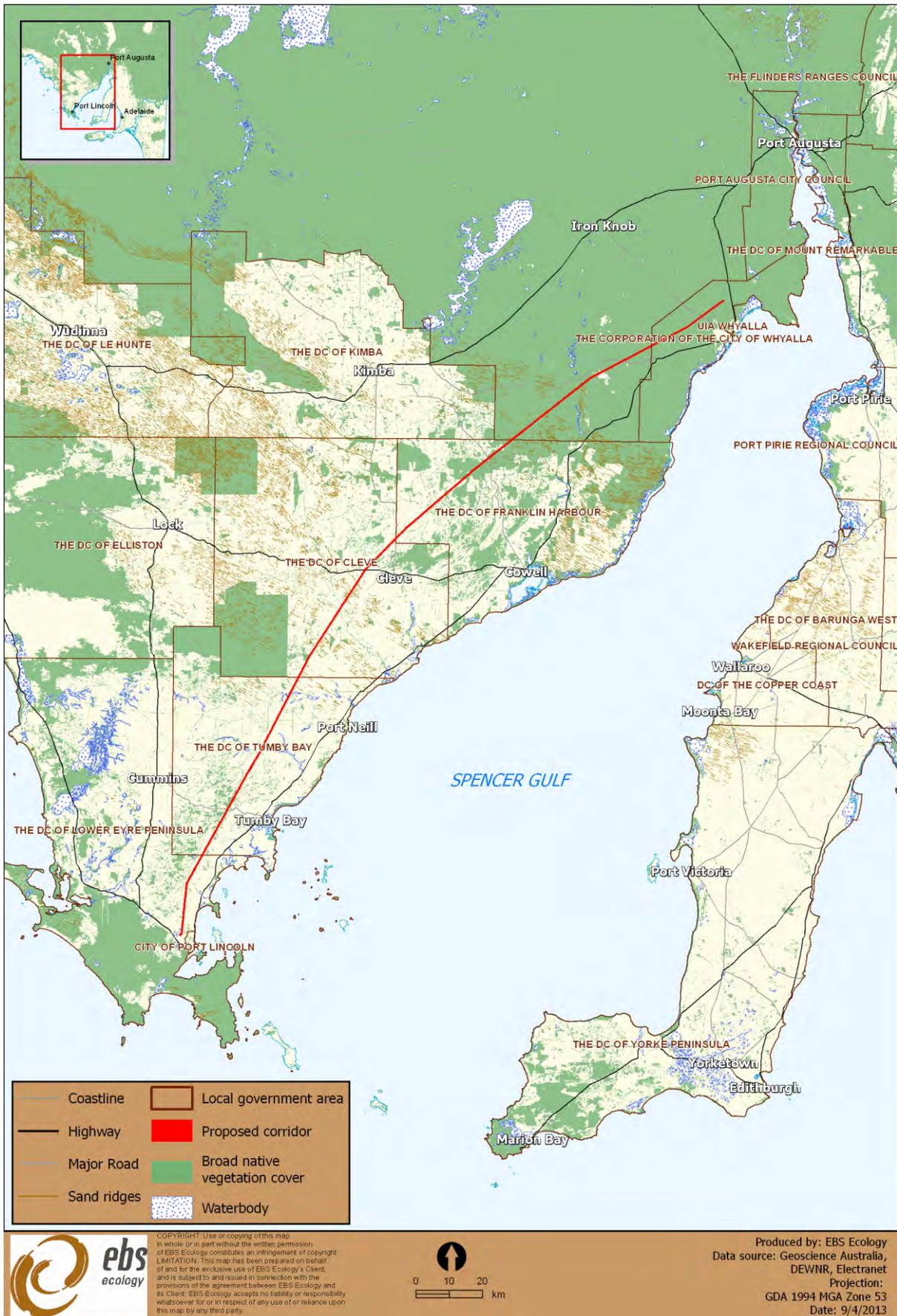


Figure 1. Location of the proposed transmission line development.

2 COMPLIANCE AND LEGISLATIVE SUMMARY

A summary of key legislation relating to flora and fauna consideration and their relevance to the proposed project is provided in Table 1.

2.1 Native Vegetation Act 1991

All native vegetation in South Australia is protected under the provisions of the *Native Vegetation Act 1991*. Clearance of vegetation is prohibited unless approved by the Native Vegetation Council (NVC) or the activity requiring the clearance is exempt by the regulations under the Act. In most circumstances, including exemptions, approval to clear vegetation is contingent upon the proponent providing a management plan that creates a Significant Environmental Benefit (SEB) (set aside of land for the management of native vegetation that results in a net gain for the environment).

Heritage Agreements

The Heritage Agreement Scheme is a program that encourages landowners to conserve native vegetation on their properties forming an important network of 'off park' areas that are managed for biodiversity conservation. When a Heritage Agreement is entered into, it formally protects the indigenous flora and fauna within the area in perpetuity, and the Agreement is listed on the Certificate of Title. The Scheme is administered by Department of Environment, Water and Natural Resources (DEWNR) on behalf of the NVC. When ownership of the property is transferred, so is the responsibility for the care of the Heritage Agreement area.

Any alterations to Heritage Agreements (for the purposes of creating easements and undertaking clearance) are not normally favoured by the NVC. The NVC would initially discourage any alterations to a Heritage Agreement and require other alternatives to be investigated and considered as a priority (P. Farmer, NVC, pers. comm. 2012). Should an easement through or clearance within a Heritage Agreement be proposed, an application to the NVC would be required. The application should outline the proposed action, and the reason for clearance. Support from the NVC would then be required in relation to the concept and design of the project, and management measures to be implemented to reduce or mitigate impacts relating to the clearance. The application would be reviewed by the NVC and, if approval is granted, the Minister is required to sign off on the proposal.

2.2 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides protection for matters of national environmental significance. Any action that has, will have or is likely to have a significant impact on matters of national environmental significance requires referral under the EPBC Act.

2.3 National Parks and Wildlife Act 1972

The South Australian *National Parks and Wildlife Act 1972* covers the protection of native plants within reserves and native animals throughout the State. Threatened plant and animal species are listed in Schedules 7 (endangered species), 8 (vulnerable species) and 9 (rare species).

2.4 Natural Resources Management Act 2004

Under the *Natural Resources Management Act 2004* (NRM Act), landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation. The majority of the project area falls within the jurisdiction of the Eyre Peninsula Natural Resources Management Board (EPNRMB). Some sections of the northern alignment fall under the jurisdiction of the South Australian Arid Lands Natural Resources Management Board (SAALNRMB).

Table 1. Summary of relevant State and Commonwealth legislation.

Legislation	Summary	Relevance
Commonwealth		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>To protect 'matters of national environmental significance':</p> <ul style="list-style-type: none"> World Heritage properties National Heritage properties wetlands of international importance (Ramsar wetlands) listed threatened species and ecological communities migratory species Commonwealth marine areas the Great Barrier Reef Marine Park nuclear actions (including uranium mining). <p>To determine whether an action is likely to have a significant impact on a matter of national environmental significance, refer to the <i>Significant Impact Guidelines (Commonwealth of Australia 2009)</i> at: http://www.environment.gov.au/epbc/publication/s/pubs/nes-guidelines.pdf.</p>	<p>Where an activity may trigger requirements of the EPBC Act, this legislation must be taken into account.</p> <p>Any action that has, will have, or is likely to have a significant impact on a matter of national environmental significance requires referral and approval. Significant penalties apply.</p>
South Australian		
<i>Native Vegetation Act 1991</i>	<p>To preserve, enhance and manage the State's native vegetation; provide a regulatory framework to control clearance of vegetation; and provide incentives and assistance to landowners to encourage them to preserve and enhance native vegetation.</p> <p>The Act protects all native vegetation that naturally occurs, i.e. vegetation which has not been planted. This includes all naturally occurring local native plants, from small ground covers and native grasses to mallee scrub and tall trees. It does not cover planted trees.</p> <p>Under the Act, clearance is defined as:</p> <ul style="list-style-type: none"> the killing or destruction of native vegetation the removal of native vegetation the severing of branches, limbs, stems or trunks of native vegetation the burning, poisoning and slashing of native vegetation any other substantial damage to native vegetation including activities such as the 	<p>Approval is required under the Act for the clearance of native vegetation.</p> <p>Persons wanting to clear native vegetation must apply for a permit from the Native Vegetation Council (NVC) (ss.7, 14), unless exempt under the regulations. The NVC will take into account the impacts of the proposed clearance and may grant consent, refuse consent or grant consent subject to certain conditions (s.29). A net environment benefit is generally conditional on an approval being granted.</p> <p>Significant penalties apply if a person clears native vegetation without the permission of the NVC (s.26). The NVC can also take civil enforcement proceedings in the District Court for an order that the native vegetation be reinstated (s.31).</p> <p>The Act also provides the opportunity for landholders to enter into voluntary "Heritage Agreement(s)" to ensure vegetation on private land is protected for perpetuity (s.23).</p> <p>The propose clearance associated with the upgrade of the transmission line is likely to be considered to comply with Exemption 5 (1)(d) Building or provision of infrastructure including infrastructure in the public interest. However, for</p>

	<p><i>draining for the reclamation of wetlands or flooding of land</i></p> <ul style="list-style-type: none"> • <i>grazing land where stock have been excluded for more than ten years.</i> 	<p>this exemption to apply, the criteria within the regulation (detailed below) must be satisfied.</p> <p>Pursuant to Section 27(1)(b) of the Act, native vegetation may, subject to any other Act or law to the contrary, be cleared if—</p> <p>(i) —</p> <p>(A) <i>the clearance is incidental to the construction or expansion of a building or infrastructure and the Minister has, by instrument in writing, declared that he or she is satisfied that the clearance is in the public interest; or</i></p> <p>(B) <i>the clearance is required in connection with the provision of infrastructure or services to a building or proposed building, or to any place; and</i></p> <p>(ii) <i>any development authorisation required by or under the Development Act 1993 has been obtained; and</i></p> <p>(iii) <i>the Council is satisfied (on the basis of information provided to the Council by the person seeking the benefit of this paragraph and such other information as the Council thinks fit) that, after taking into account the need to preserve biological diversity and the nature and purposes of any proposed building or infrastructure that is yet to be constructed, the proposed site of the building or infrastructure is the most suitable that is available; and</i></p> <p>(iv) <i>the Council is satisfied (on the basis of information provided to the Council by the person seeking the benefit of this paragraph and such other information as the Council thinks fit) that, there is no other practicable alternative that would involve no clearance or the clearance of less vegetation or the clearance of vegetation that is less significant or (if relevant) the clearance of vegetation that has been degraded to a greater extent than the vegetation proposed to be cleared; and</i></p> <p>(v) <i>the clearance is undertaken in accordance with a standard operating procedure determined or approved by the Council for the purposes of this provision or a management plan that has been approved by the Council, and either—</i></p> <p>(A) <i>there will be a significant environmental benefit on the property where the clearance is being undertaken or within the same region of the State; or</i></p> <p>(B) <i>either—</i></p> <p><i>the owner of the land (or a person acting on his or her behalf); or</i></p> <p><i>a person connected with the construction or expansion of the building or infrastructure, or the provision of the infrastructure or services (as the case requires), has, on application to the Council to proceed with clearing the vegetation in accordance with this provision, made a payment into the Fund of an amount considered by the Council to be sufficient to achieve a significant environmental benefit in the manner contemplated by section 21(6) of the Act.</i></p>
<p><i>National Parks and Wildlife Act 1972</i></p>	<p><i>Allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters); provides for the protection of native flora and fauna; identifies flora and fauna species considered to be of conservation significance (under Schedules 7, 8, and 9 of the Act); and provides for the use of approved wildlife through a system of permits allowing certain actions, i.e. keeping and selling (s.58), harvesting (s.60G), farming (s.60C), hunting (s.68A), releasing (s.55) and undertaking scientific research (s.53) on/of native fauna species, and for the taking of plants (s.49).</i></p>	<p><i>A person must not “take” a native plant, protected animal or the eggs of a protected animal without approval (s.48A). Maximum penalties of \$10 000 apply (\$100,000 in the case of a marine mammal). The most serious penalties apply where the plant or animal is of an endangered species.</i></p> <p><i>To take a native plant means to remove the plant or part of the plant, from the place in which it is growing; or to damage the plant. To take a protected animal means to remove, hunt, catch, restrain, kill or injure an animal, or attempt to do so.</i></p> <p><i>A person may take non-prescribed plant species from private land with the consent of the owner; however these species may also be covered under the Native Vegetation Act 1991.</i></p> <p><i>There are a number of non-complying activities in parks and reserves that result in penalty (parts 4-6).</i></p>

<p><i>Natural Resources Management Act 2004</i></p>	<p><i>To promote and facilitate integrated and sustainable management of all natural resources (water, soil, biodiversity etc); and to provide for arrangements to involve the community in the development and implementation of regional initiatives to improve the management of the natural resources.</i></p> <p><i>Key components include the establishment of regional Natural Resource Management (NRM) Boards and development of regional NRM Plans; the ability to control water use through prescription, allocations and restrictions; requirement to control pest plants and animals, and activities that might result in land degradation.</i></p> <p><i>A 'duty of care' is a fundamental component of this Act, i.e. ensuring one's environmental and civil obligation by taking reasonable steps to prevent land and water degradation. Persons can be prosecuted if they are considered negligent in meeting their obligations.</i></p> <p><i>Section 188(5) of the Act requires that the NRM Board must take into account any relevant provision of the regional NRM plan.</i></p>	<p><i>The NRM Board may appoint authorised officers to administer and enforce the Act. Authorised officers possess powers of entry, powers to give directions, powers to collect evidence and seize and remove animals and plants. An authorised officer may issue a protection order for the purpose of securing compliance with specified provisions of the Act:</i></p> <ul style="list-style-type: none"> <i>- breach of the general statutory duty;</i> <i>- breach of the duty not to damage watercourses or lakes;</i> <i>- failure to take action to destroy or control certain animals or plants;</i> <i>- failure to comply with the terms of a management agreement entered into under the Act; and</i> <i>- any other requirement imposed by the NRM Act or a repealed Act and which has been specified in the NRM Regulations.</i> <p><i>An owner of land who is, or is likely to be, in breach of the general statutory duty under the Act resulting or likely to result in land degradation may be required to prepare an action plan. Failure to comply with a notice requiring preparation of an action plan is an offence. An NRM authority or a State authorised officer may issue a reparation order in certain circumstances where a person has caused harm to a natural resource and repair is necessary. Enforcement action in the ERD Court can be taken if necessary.</i></p>
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Note: this summary is not intended to be a substitute for particular legal advice. It should be recognised that in the case of particular environmental issues precise legal opinion may be required. This summary does not address the legal implications of every set of circumstances and situations that may arise in the course of activities.

3 BACKGROUND INFORMATION

3.1 Project area

The proposed new transmission line is planned to broadly follow a similar alignment to the existing 132 kV line, as shown in Figure 1. The transmission line will be approximately 290 km long, with the final route alignment and distance dependent on any route constraints. The line runs from the Cultana substation just north-west of Whyalla, south to Port Lincoln, Eyre Peninsula. The preliminary plans require new 275/132 kV substations at Yadnarie and a location north of Port Lincoln. The assessment area covers approximately 15,741.5 hectares.

3.1.1 Region

The site is located on Eyre Peninsula, South Australia covering approximately five million hectares. The landforms spanning the site are dominated by undulating limestone plains overlain by longitudinal dune systems (Brandle, 2010) 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.

The region supports some extremely sensitive environmental areas, including large tracks of remnant vegetation, conservation parks and reserves, which include a number that are located within the project area (Sheoak Hill Conservation Park and Whyalla Conservation Park, the Middleback Ranges, Cleve Hills, Koppio Hills and the Tod River Wetland System), 18 Heritage agreements and two SEB offset areas managed for conservation.

3.1.2 Existing Land Use

Land use in the northern section of the proposed transmission alignment is mainly confined to pastoral activities and conservation, whilst in the southern sections, land is utilised for cropping, grazing and residential purposes and small areas devoted to revegetation and conservation.

3.2 Environmental setting

3.2.1 Landscape position

Interim Biogeographical Regionalisation of Australia (IBRA) is a landscape based approach to classifying the land surface across a range of environmental attributes, which is used to assess and plan for the protection of biodiversity (DSEWPaC 2013). In this system, Eyre Peninsula forms part of the Eyre Yorke Bioregion and the Gawler Bioregions, which are large regions, separated into numerous IBRA subregions and Environmental Associations based on landforms, climate and vegetation associations (Laut et al. 1977) (Table 2). A map showing the IBRA Sub-regions present across the project area is shown in Figure 3 and Environmental Associations in Figure 4.

Table 2. IBRA Bioregions, Sub-regions and environmental associations present across the project area.

Gawler IBRA Bioregion	
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 Gillies 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 <i>Native Vegetation Act 1991</i>). This is 10% of the mapped native vegetation.
Red Rock Environmental Association (4.4.7)	
Landform	Hills on conglomerate with long dissected footslopes.
Geology	Conglomerate, colluvium and alluvium.
Soil	Dense brown loams, hard pedal red duplex soils and crusty red duplex soils.
Vegetation	Low open woodland of Western Myall and Black Oak/ Western Myall.
Remnant vegetation	100% (45,230ha) of the association is mapped as remnant native vegetation, where 3% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,172ha).
Whyalla Environmental Association (4.4.6)	
Landform	Easterly sloping calcreted plain with occasional hills on outcropping conglomerate, and with mangrove flats along the coastal margin.
Geology	Calcrete, conglomerate, silts, metasediments and sands.
Soil	Red calcareous earths, dense brown loams, grey calcareous loams and whitish calcareous sands.
Vegetation	Low open woodland of Black Oak and Western Myall sometimes with False Sandalwood, low woodland of Mangrove and chenopod shrubland of Samphire.
Remnant vegetation	95% (69,604ha) of the association is mapped as remnant native vegetation, where 3% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (2,418ha).
Buckleboo Environmental Association (4.4.2)	
Landform	Gently undulating calcrete plains and occasional quartzite or granite hills.
Geology	Calcrete, quartzite, granite and alluvium.
Soil	Grey-brown calcareous earths, hard pedal red duplex soils, dense brown loams and black calcareous loams.
Vegetation	Low woodland of Western Myall and Black Oak, open scrub of Beaked Red Mallee and Yorrell, low open woodland of Western Myall and chenopod shrubland of Samphire.
Remnant vegetation	99% (492,213ha) of the association is mapped as remnant native vegetation, where 12% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (57,040).

Middleback Range Environmental Association (4.4.5)	
Landform	Steep strike ridges with long footslopes.
Geology	Metasediments, colluvium, sand and calcrete.
Soil	Dense brown loams and red calcareous earths.
Vegetation	Open scrub of Ridge-fruited Mallee and Broombush, low woodland of Drooping Sheoak and low open woodland of Western Myall.
Remnant vegetation	96% (34007ha) of the association is mapped as remnant native vegetation, where 5% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,747ha).
Eyre and Yorke Block IBRA Bioregion	
<p>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.</p>	
Eyre Hills IBRA Subregion (EYB3)	
<p>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 200m and 400m 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 <i>Eucalyptus cladocalyx</i>, <i>E. odorata</i> and <i>E. leucoxydon</i>. 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 <i>E. incrassata</i> / <i>Melaleuca uncinata</i> mallee on the plains or <i>Melaleuca lanceolata</i> woodland along the coastal fringe. Lincoln National Park occupies the south eastern tip of the subregion and consists of 15 971ha of coastal mallee. The majority of this subregion is cleared for winter cereal cultivation and grazing livestock.</p>	
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% (350,795ha) of the subregion is mapped as remnant native vegetation.
Protected Areas	11% of the subregion is protected (124,693ha in formal reserves and conserved in private Heritage Agreements under the <i>Native Vegetation Act 1991</i>). This is 36% of the mapped native vegetation.
Ironstone Hill Environmental Association (4.3.14)	
Landform	Undulating plain with low hills of outcropping bedrock and occasional dunes.
Geology	Sand, calcrete, conglomerate and alluvium.
Soil	Brown calcareous earths, dense brown loams, brownish sands and crusty red duplex soils.
Vegetation	Open scrub of Ridge-fruited Mallee, Narrow-leaved Mallee and Broombush, sometimes with Beaked Red Mallee and Yorrell and a low chenopod shrubland of Samphire and Nitrebush.
Remnant vegetation	99% (26,659ha) of the association is mapped as remnant native vegetation, where 4% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,034ha).
Midgee Environmental Association (4.3.12)	
Landform	Sandy plain with frequent short dunes, sloping to the east, and locally interrupted by low fault scarps or granite inselbergs. Low cliffs and tidal flats alternate along the coastline.
Geology	Sand, calcrete, metasediments, granite and silts.
Soil	Reddish calcareous earths, brown sands, brown calcareous earths and grey calcareous loams.
Vegetation	Open scrub of Ridge-fruited Mallee and Broombush sometimes with Beaked Red Mallee and Yorrell and low woodland of mangroves.
Remnant vegetation	65% (73,526ha) of the association is mapped as remnant native vegetation, where 40% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (29,624ha).

Yalarna Environmental Association (4.3.13)	
Landform	Calcreted plain and occasional low hills, mainly overlain by parabolic dunes.
Geology	Sand, calcrete and quartzite.
Soil	Whitish sands and brown calcareous earths.
Vegetation	Open scrub of Ridge-fruited Mallee, Narrow-leaved Mallee and Broombush.
Remnant vegetation	72% (16,908ha) of the association is mapped as remnant native vegetation, where 37% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (6,311).
Messenger Environmental Association (4.3.17)	
Landform	Undulating plain with isolated dunes, and narrow strike ranges on outcropping quartzite.
Geology	Sand, metasediments, quartzite and alluvium.
Soil	Hard pedal red duplex soils, dense brown loams, hard pedal mottled-yellow duplex soils and yellow-brown sands.
Vegetation	Open scrub of Beaked Red Mallee and Yorrell, Ridge-fruited Mallee and Broombush sometimes with a low woodland of Drooping Sheoak.
Remnant vegetation	34% (64,642ha) of the association is mapped as remnant native vegetation, where 47% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (30,247ha).
Mt Desperate Environmental Association (4.3.10)	
Landform	Hills on metasediments with short footslopes and fans.
Geology	Metasediments, colluvium and alluvium.
Soil	Dense brown loams, hard pedal red duplex soils and hard pedal mottled-yellow duplex soils.
Vegetation	Open scrub of Beaked Red Mallee, Yorrell, Ridge-fruited Mallee and Broombush and low woodland of Drooping Sheoak.
Remnant vegetation	38% (33,553ha) of the association is mapped as remnant native vegetation, where 17% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (5,622ha).
Cleve Environmental Association (4.3.9)	
Landform	Gently sloping sandy plains and footslopes with some dunes and low cliffs along the coastline.
Geology	Sand and metasediments.
Soil	Red calcareous earths, hard pedal red duplex soils, brownish sands and whitish calcareous sands.
Vegetation	Open scrub of Beaked Red Mallee and Yorrell, sometimes with Ridge-fruited Mallee and Broombush, open heath of Coast Daisy Bush, Coast Beard Heath and Coastal Wattle.
Remnant vegetation	18% (17,456ha) of the association is mapped as remnant native vegetation, where 18% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (3,125ha).
Eyre Mallee IBRA Subregion (EYB5)	
<p>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 <i>Eucalyptus socialis</i> and <i>E. gracilis</i> occurs on the shallow calcareous earths or deeper duplex soils of the plains with <i>E. incrassata/Melaleuca uncinata</i> 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.</p>	
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% (811,497ha) of the subregion is mapped as remnant native vegetation.

Protected Areas	20% of the subregion is protected (437,121ha in formal reserves and conserved in private Heritage Agreements under the <i>Native Vegetation Act 1991</i>). This is 54% of the mapped native vegetation.
Hambidge Environmental Association (4.3.7)	
Landform	Extensive undulating plain with parallel dunes and occasional low inselbergs and with tidal flats and sand dunes on the coastal margin.
Geology	Sand, calcrete, inselberg, alluvium and metamorphics.
Soil	Sandy pedal mottled-yellow duplex soils, brownish sands, dense brown loams, grey calcareous loams and whitish calcareous sands.
Vegetation	Open scrub of Ridge-fruited Mallee, Narrow Leaved Mallee and Broombush, low woodland of mangroves, low chenopod shrubland of samphire and low shrubland of Coastal Wattle and Coast Beard Heath.
Remnant vegetation	28% (99,967ha) of the association is mapped as remnant native vegetation, where 73% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (73,287ha).
Wharminda Environmental Association (4.3.5)	
Landform	Undulating plain with sand sheets and dunes, and isolated hills.
Geology	Sand, calcrete, quartzite, alluvium and calcarenite.
Soil	Sandy pedal mottled-yellow duplex soils, brownish sands, dense brown loams, crusty red duplex soils and whitish calcareous sands.
Vegetation	Chenopod shrubland of samphire and Nitrebush.
Remnant vegetation	9% (6,179ha) of the association is mapped as remnant native vegetation, where 3% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (156ha).
Hincks Environmental Association (4.3.2)	
Landform	Plain with a thick sand cover forming high parabolic dunes.
Geology	Sand.
Soil	Brownish sands.
Vegetation	Open scrub of Coastal Mallee and open scrub of Coastal Mallee, Ridge-fruited Mallee, Narrow Leaved Mallee and Broombush.
Remnant vegetation	83% (23,953ha) of the association is mapped as remnant native vegetation, where 91% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (21,795ha).
Butler Environmental Association (4.1.18)	
Landform	Undulating plain on partly calcreted alluvium with isolated quartzite hills, ending in low cliffs along the coastline.
Geology	Alluvium, calcrete, quartzite and metasediments.
Soil	Hard pedal mottled-yellow duplex soils, red friable loams and crusty red duplex soils.
Vegetation	Open scrub of Ridge-fruited Mallee and Broombush and chenopod shrubland of samphire and Nitrebush.
Remnant vegetation	7% (5,127ha) of the association is mapped as remnant native vegetation, where 0% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves.
Yalunda Environmental Association (4.1.9)	
Landform	Low hills derived from the dissection of a former lateritic plateau.
Geology	Laterite and alluvium.
Soil	Hard pedal mottled-yellow duplex soils and grey calcareous loams.
Vegetation	Woodland of SA Blue Gum and Sugar Gum and low open forest of Sugar Gum.
Remnant vegetation	20% (21,661ha) of the association is mapped as remnant native vegetation, where 9% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,984ha).
Mt Gawler Environmental Association (4.1.8)	
Landform	Rounded hills and low ranges on metasediments.
Geology	Metasediments and alluvium.

Soil	Hard pedal mottled-yellow duplex soils and brown weakly structured sandy soils.
Vegetation	Grasslands and open parkland of Peppermint Box.
Remnant vegetation	9% (1,660ha) of the association is mapped as remnant native vegetation, where 0% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves.

Source: DEH 2007; DSEWPaC 2013.

Since European settlement, approximately 55% (2,783,000 ha) of the original native vegetation on Eyre Peninsula has been cleared primarily for agricultural purposes (Matthews et al, 2001). 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 32% (DEH 2007). Likewise with both IBRA Subregions, Eyre Hills and Eyre Mallee, where approximately 80% of the proposed alignment is located, contain 30% and 35% native vegetation 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 (Matthews et al, 2001). Further south where rainfall is higher and land is better suited to agriculture, the lower the remnancy figures. A number of the more southern IBRA Environmental Associations exhibit remnancy figures of less than 10%.

3.2.2 Protected Areas

NPW Reserves

A number of reserves dedicated under the *National Parks and Wildlife Act 1972* (NPW Act) are within the transmission line corridor (Table 3 and Figure 5) (DEWNR (2013b)). The proposed alignment traverses four reserves; Whyalla Conservation Park, Ironstone Hill Conservation Park and Sheoak Hill Conservation Park and Sheoak Hill Conservation Reserve, all of which are located approximately halfway along the alignment between Whyalla and Cleve, and Wharminda Conservation Park which is located approximately 5 kilometres east of Hincks Wilderness Area.

Table 3. NPW Act Reserves within the project area.

NPW Act Reserve	Size (ha)
Hincks Wilderness Area	66,934
Ironstone Hill Conservation Park	13,968
Sheoak Hill Conservation Park	747
Sheoak Hill Conservation Reserve	1,680
Wharminda Conservation Park	269
Whyalla Conservation Park	1,980

Heritage Agreements

There are 18 Heritage Agreements intersected by the proposed transmission corridor (Figure 5). Location details for the Heritage Agreements have been obtained from the Native Vegetation Council (NVC) Secretariat.

SEB offset Areas

There are two SEB offset areas intersected by the proposed transmission corridor. Location details have been obtained from the Native Vegetation Council (NVC) Secretariat.

3.2.3 Existing conservation initiatives

The project area falls within the DEWNR 'East meets West' Naturelinks. 'East meets West' is one of five Naturelinks corridors identified by DEWNR for the conservation of wildlife. The aim is to conserve the biological diversity of northern Eyre Peninsula and the Far West, protect dynamic and broad-scale ecosystem processes and lessen the impacts of changing climatic conditions. This is to be achieved by connecting habitats through a comprehensive system of parks and reserves buffered and linked by lands with complementary land management objectives. The approach of Naturelinks is characterised by a shift away from managing patches of land and discrete wildlife populations towards holistic land and wildlife management where connectedness and functioning ecosystems are of prime concern (Government of South Australia, 2012).

In addition to Naturelinks, DEWNR, in partnership with the EPNRMB, and other conservation bodies is involved in recovery efforts for priority threatened flora and fauna on Eyre Peninsula. Figure 2 shows the location of priority focus work areas for threatened flora. Within the vicinity of the proposed transmission line routes, priority work areas include Barwell Conservation Park (CP), the large heritage agreement adjacent to Barwell CP (north of Lock), Hambridge Wilderness Area (WA), Hincks WA, and coastal areas near Sheep Hill. Numerous other smaller priority areas are scattered throughout the project area as shown.

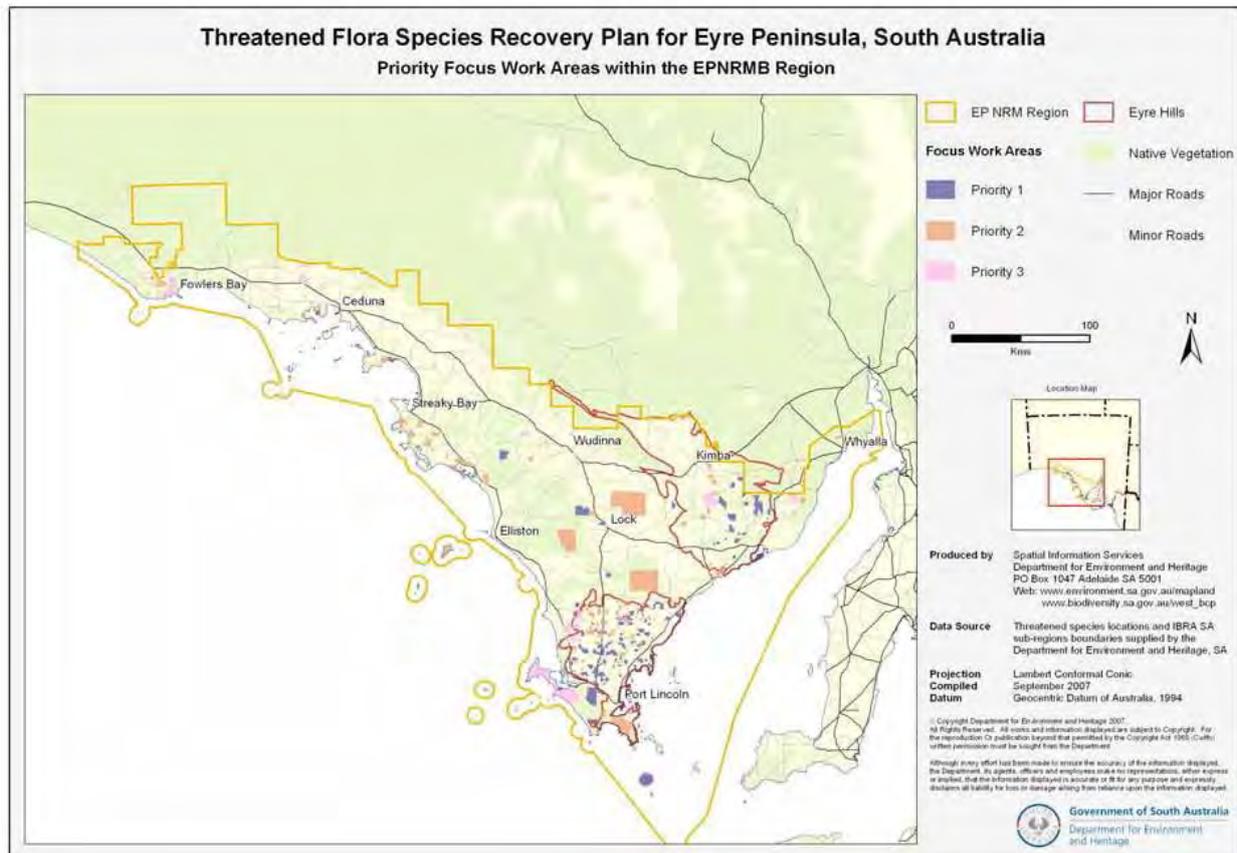


Figure 2. Priority focus areas for threatened species recovery efforts on Eyre Peninsula (Pobke 2007).

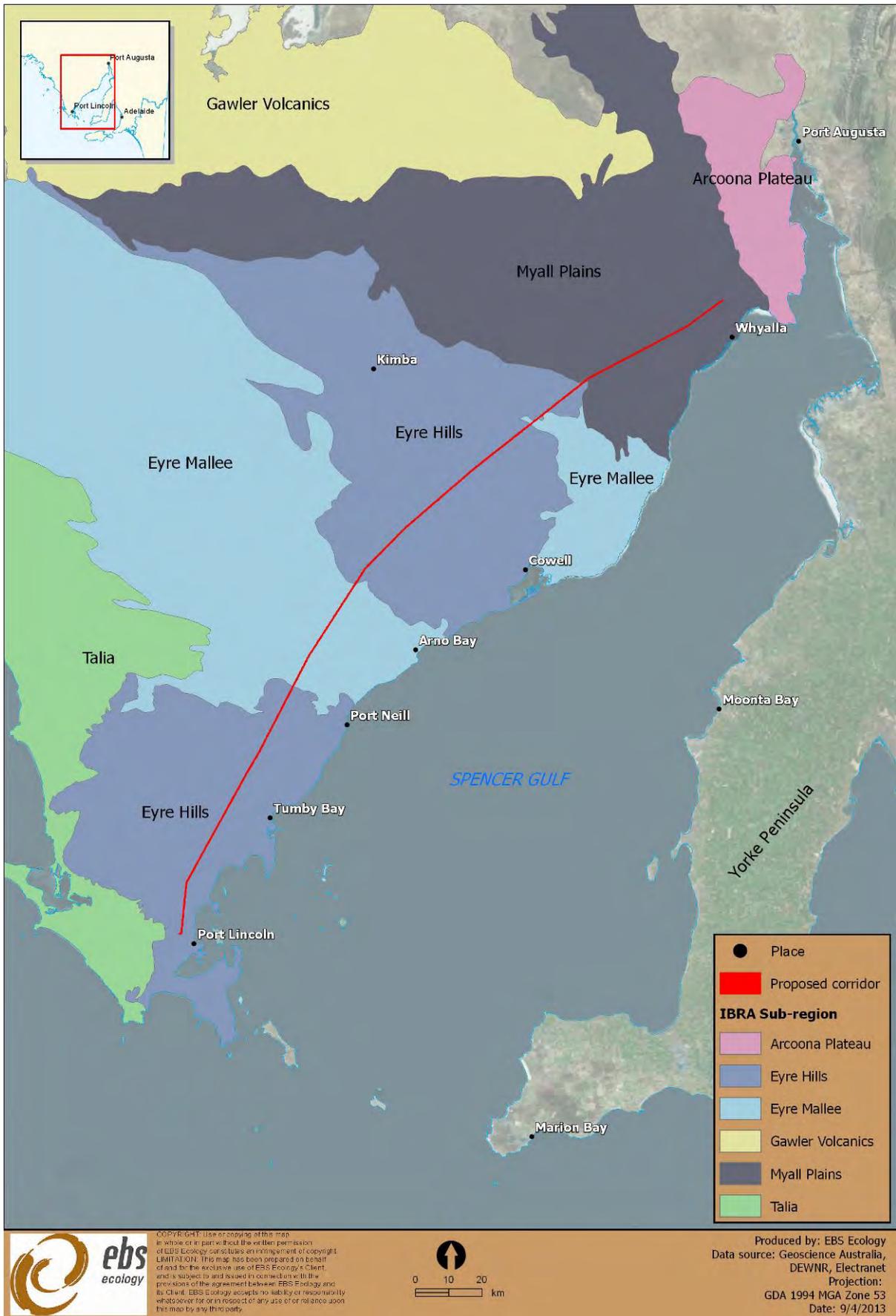


Figure 3. IBRA Sub-regions present across the project area.

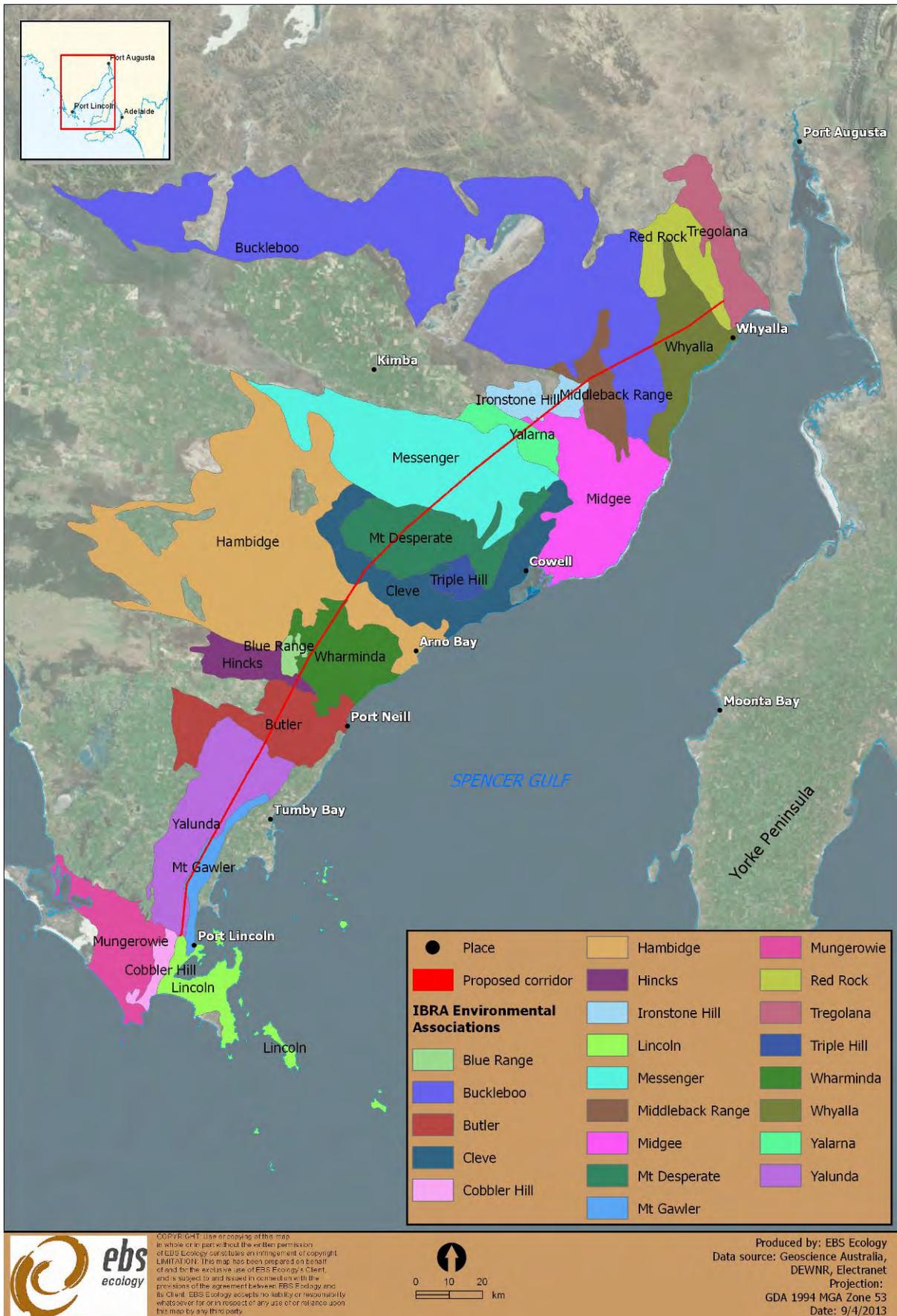


Figure 4. IBRA Environmental Associations present across the project area.



Figure 5. Protected areas located within the project area.

3.2.4 Previous surveys conducted

A biological survey of the Eyre Peninsula was undertaken in 1999 (Brandle 2010). In total, 433 previous DENR flora survey sites and 72 previous DEWNR fauna survey sites are located within 10 km of the proposed alignments (DENR 2013b). Brandle (2010) summarises a range of previous vegetation and fauna studies undertaken on Eyre Peninsula.

The following roadside vegetation surveys have previously been undertaken by Transport SA (now Department of Planning, Transport and Infrastructure (DPTI)) along main transport corridors (road and rail) in proximity to the proposed transmission corridor:

- Pt Lincoln-Thevenard (Cummins- Buckleboo) Railway Corridor Survey, 2000
- Far West Eyre Peninsula Standard Roadside Survey, Kimba – Cleve Road 1999
- North Eastern Eyre Peninsula Standard Roadside Survey, Lincoln Road, 2002
- North Western Eyre Peninsula Standard Roadside Survey, Iron Knob – Puddle Holes Dam Road, and Kimba – Lincoln Highway (Whyalla Road)
- Eyre Highway Standard Roadside Survey, Eyre Highway, Ceduna – Kimba, 2001
- Lower Eyre Peninsula Standard Roadside Survey, Lock – Cowell Road, Mount Hope – Tumbly Bay Road, and Lincoln Road, 1998
- Southern Eyre Aleppo Pine Management Group Standard Roadside Survey, Koppio – Tod Reservoir Road, 1999.

3.2.5 Climate

Eyre Peninsula is characterised by a Mediterranean climate, having predominantly winter rains and hot dry summers (Table 4, Table 5, and Table 6). The northern and central sections of the alignment are subject to the warm drier inland climates of the north and northeast of the region, whilst the southerly portion experiences relatively mild moist coastal climates that define the south and southwest. The mean annual rainfall is about 500 mm in the south of the region, and exhibits a general decrease to approximately 250 mm in the northeast. Cleve can receive a rise to over 400 mm due to a slight increase in elevation (Matthews et al, 2001) (Figure 6, Figure 7 and Figure 8).

Table 4. Average monthly rainfall and temperature figures for Whyalla Aero weather station.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	14.5	25.2	20.4	19.5	24.6	25.2	23.8	22.1	27.1	25	21	24
Mean max temp (°C)	30.1	29.5	27.2	23.9	20.5	17.2	16.9	18.5	21.6	23.8	26.6	28.2

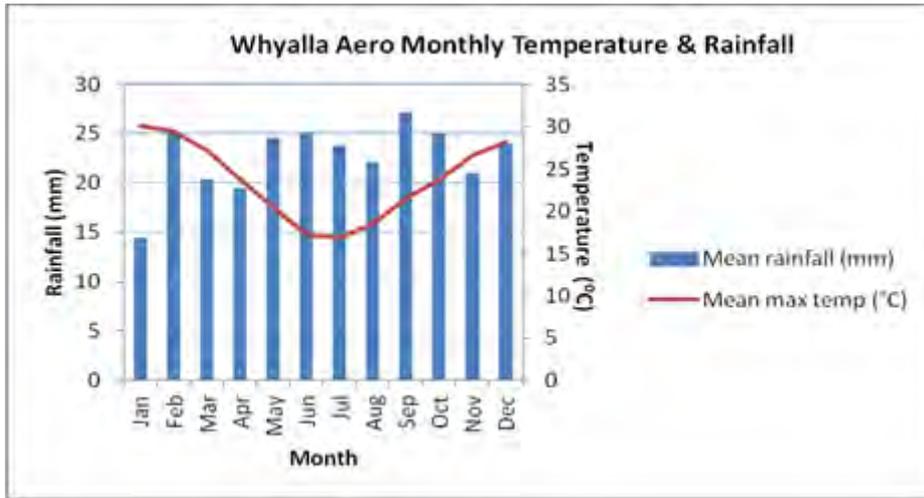


Figure 6. Average monthly rainfall and temperature data for Whyalla Aero weather station (Lat: 33.05° S; Lon: 137.52° E from 2002 to 2012) – northerly section.

Table 5. Average monthly rainfall and temperature figures for Cleve weather station.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	15.4	22.4	21.9	28.4	40.8	46.6	46.1	48	42.4	36.6	27.2	26
Mean max temp (°C)	28.3	27.7	25.9	22.7	18.9	16	15.3	16.6	19.4	22.3	24.9	26.8

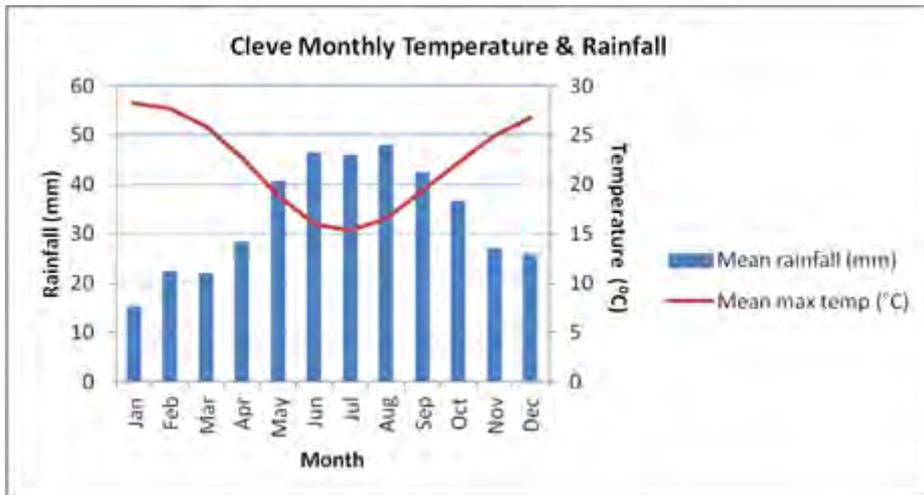


Figure 7. Average monthly rainfall and temperature data for Cleve weather station (Lat: 33.70° S; Lon: 136.49° E from 2002 to 2012) – central section.

Table 6. Average monthly rainfall and temperature figures for North Shields weather station.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	10.2	12.4	18.6	28.3	45.1	58.8	70.6	60.7	43.7	30.3	20.1	20.3
Mean max temp (°C)	26	25.9	24	22.1	19.4	16.8	16.1	16.8	18.6	20.5	23	24.4

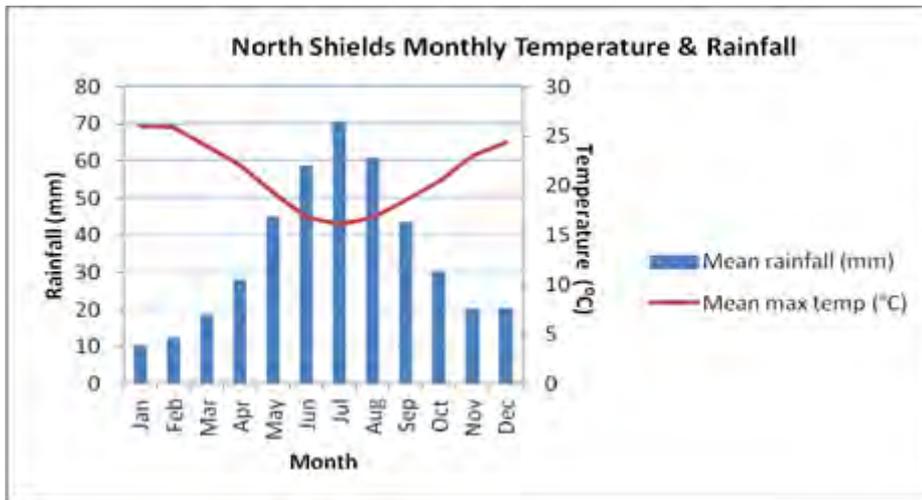


Figure 8. Average monthly rainfall and temperature data for North Shields (Pt Lincoln AWS) weather station (Lat: 34.60 S; Lon: 135.88° E from 2002 to 2012) – southern section.

Source: Australian Government – Bureau of Meteorology, (2013)

4 METHODS

4.1 Database searches

The online Protected Matters Search Tool was used to determine matters of national environmental significance under the Commonwealth EPBC Act that may occur or may have suitable habitat occurring within the project area (DSEWPac 2013b).

A search of the Biological Databases of South Australia (BDBSA) was originally obtained from the Department of Environment, Water and Natural Resources (DEWNR) in March 2012, to identify flora and fauna species previously recorded within a 50 kilometre buffer around the project area (DEWNR 2012a). Data used in this report was subsequently clipped to a 10 kilometre buffer along the proposed transmission corridor from Cultana to Pt Lincoln. The BDBSA is comprised of an integrated collection of corporate databases which meet DEWNR standards for data quality, integrity and maintenance. In addition to DEWNR biological data the BDBSA also includes data from partner organisations (Birds Australia, Birds SA, Australasian Wader Study Group, SA Museum, and other State Government Agencies). This data is included under agreement with the partner organisation for ease of distribution but they remain owners of the data and should be contacted directly for further information.

Marine species have been excluded from the database search results as the project area is entirely inland.

4.2 Desktop review

A broad preliminary desktop assessment was undertaken in 2012 by EBS Ecology to collate existing biological data for the wider project area which included several other alignments within the region. Existing information relevant to the project area was reviewed, including:

- aerial imagery
- spatial datasets: DEWNR biological survey sites, vegetation cover, protected areas, National Vegetation Information System (NVIS) floristic mapping, TSA roadside vegetation survey
- online database and literature searches including EPBC Protected Matters Search, Birdlife Australia and Atlas of Living Australia (ALA) website
- reports and plans, including:
 - Biodiversity Plan for Eyre Peninsula (DEH 2002)
 - West region species status assessment (Gillam and Urban 2009)
 - Eyre Peninsula Natural Resources Management Plan (EPNRMB 2004)
 - A Biological Survey of the Eyre Peninsula, South Australia (Brandle 2010).

Some of this information has been used to create lists of species known to occur in the area, whilst vegetation association data has been ground truthed during recent field surveys.

4.3 Field Surveys

4.3.1 General vegetation survey

The general vegetation survey focused on obtaining a greater understanding of the vegetation communities and vegetation condition within the project area. This involved surveying all accessible areas of native vegetation within the 600m wide easement and recording the following:

- Location of vegetation associations,
- Species list for each vegetation association,
- Vegetation condition, determined using criteria adopted by the Native Vegetation Council to calculate significant environmental benefit (SEB) offset requirements for native vegetation clearance. Using these criteria, vegetation is assigned an SEB condition ratio based on factors such as the percentage of native and exotic species in the understorey, disturbance, and intactness of vegetation stratum (Table 10),
- Flora species of conservation significance,
- Threatened Ecological Communities.

4.3.2 Threatened flora

Native vegetation within the project area was broadly surveyed for nationally and State threatened flora species that possibly occurred within the area. The locations of historic BDBSA threatened flora records within the project area were visited. The survey was undertaken mainly from the vehicle along the existing access tracks, with regular survey on foot within representative areas and those considered potential habitat for threatened species. The survey was also undertaken on foot in larger patches of native vegetation considered to be in good to excellent condition. A ramble survey method was adopted (i.e. randomly walking through areas of vegetation, attempting to cover different topography and habitats) to ensure best coverage of the patches of vegetation within the time available.

Opportunistically observed threatened species were marked during the baseline surveys and this information fed directly into the dataset collated during the targeted surveys. Areas of native vegetation considered of a suitable quality to support threatened orchid species were also recorded and assisted during the planning for targeted surveys.

Prior to the targeted surveys, an assessment of the likelihood of each threatened species occurring in the project area was undertaken (Table 7). A likelihood of occurrence rating was assigned to each threatened species identified in the Protected Matters Search and BDBSA database searches. This rating, 'Highly Likely', 'Likely', 'Possible' and 'Unlikely' takes the following criteria into consideration:

- 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)

- knowledge of the species habitat preferences, causes of its decline, and local population trends.

Table 7. Likelihood of occurrence criteria.

Likelihood category	Criteria
Unlikely	<ul style="list-style-type: none"> • No BDBSA records despite survey effort considered adequate, or • No BDBSA records and survey effort is considered not adequate, and no suitable habitat is known to occur in the area, or • No BDBSA 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	<ul style="list-style-type: none"> • No BDBSA 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 • BDBSA records within the last 40 years, and the area is not largely intact, or • BDBSA records in the last 10 years, the species does not have highly specific needs, and habitat is largely intact.
Likely	<ul style="list-style-type: none"> • BDBSA records in the last 10 years, the species does not have highly specific habitat needs and the habitat is largely intact, or • BDBSA records in the last 10 years, the species does have highly specific habitat needs and these needs occur in the area.
Highly likely	<ul style="list-style-type: none"> • BDBSA records in the last 10 years, the species does not have highly specific needs, and the habitat is largely intact.

4.3.3 Targeted surveys

Some of the flora and fauna species of conservation significance which were recorded within or in close proximity to the project area have been targeted to gather more information regarding presence / absence and area of occupancy within the transmission line corridor. A series of targeted surveys were undertaken in the spring of 2013 to gather this information which will aim to assist with State and Commonwealth legislative approvals such as EPBC Act 1999, and Native Vegetation Act, 1991. The EBS Ecology surveys were conducted in:

- 12th – 16th August 2013
- 27th – 29th August 2013
- 30th September – 2nd October 2013
- 5th – 7th November 2013

A 120m wide corridor on the western side of the existing transmission line was identified by ElectraNet as the preferred alignment.

The Malleefowl targeted survey which included the field data capture and data analysis and modelling was undertaken between 30 November 2013 and 26 February 2014 by Ecological Horizons Pty. Ltd.

The Sandhill Dunnart targeted surveys occurred between April 2009 and May 2013.

FLORA

During the targeted flora surveys, remnants were selected based on previously mapped condition ratings of over 4:1 (Moderate condition) and habitat suitability for threatened species. Smaller remnants (<10ha) were thoroughly searched on foot. All threatened species were marked with a GPS coordinate and some samples were collected for later identification. A number of other attributes were recorded including size of the population, vegetation association, date of collection and a photograph record. Larger remnants (>10ha) were also partially traversed on foot, whereby the vehicle was used to move to each change of vegetation association and representative areas were thoroughly searched. It will be important to incorporate spring micro-siting surveys prior to construction to finalise the layout design, given that it was not practical to thoroughly search every area within the assessment corridor. Table 8 lists the national and State threatened flora species which were targeted.

Table 8. Broad Targeted Survey Planning 2013.

Species	Status	Flowering Time (annuals)	Targeted Survey timing
<i>Acacia cretacea</i> (Chalky Wattle)	EPBC Endangered, State Endangered		July - August
<i>Acacia enterocarpa</i> (Jumping-jack Wattle)	EPBC Endangered, State Endangered		July - August
<i>Acacia pinguifolia</i> (Fat-leaved Wattle)	EPBC Endangered, State Endangered		July - August
<i>Acacia praemorsa</i> (Senna Wattle)	EPBC Vulnerable, State Endangered		July - August
<i>Acacia rheticocarpa</i> (Resin Wattle)	EPBC Vulnerable, State Vulnerable		July - August
<i>Acacia whibleyana</i> (Whibley Wattle)	EPBC Endangered, State Endangered		July - August
<i>Arachnorchis brumalis</i> (Winter Spider-orchid)	EPBC Vulnerable, State Vulnerable	Late June-July-August-September	Late August
<i>Arachnorchis macroclavia</i> (Large-club Spider-orchid)	EPBC Endangered, State Endangered	Between September - October	Late September
<i>Arachnorchis tensa</i> (Rigid Spider-orchid)	EPBC Endangered	late August-October	Late August
<i>Frankenia plicata</i>	EPBC Endangered, State Vulnerable		July - August
<i>Haloragis eyreana</i> (Prickly Raspwort)	EPBC Endangered, State Endangered		July - August
<i>Olearia pannosa subsp. pannosa</i> (Silver Daisy-bush)	EPBC Vulnerable, State Vulnerable		July - August
<i>Prasophyllum goldsackii</i> (Goldsack's Leek-orchid)	EPBC Endangered, State Endangered	late September-October	Late September
<i>Prostanthera calycina</i> (West Coast Mintbush)	EPBC Vulnerable, State Vulnerable		July - August
<i>Pterostylis sp. Eyre Peninsula</i> (R.Bates 19474)	EPBC Vulnerable, State Vulnerable	late October-early January	late October
<i>Ptilotus beckerianus</i> (Ironstone Mulla Mulla)	EPBC Vulnerable, State Vulnerable		July - August

Species	Status	Flowering Time (annuals)	Targeted Survey timing
<i>Pultenaea trichophylla</i> (Tufted Bush-pea)	EPBC Endangered, State Rare		July - August
<i>Swainsona pyrophila</i> (Yellow Swainson-pea)	EPBC Vulnerable, State Rare		July - August
<i>Thelymitra epipactoides</i> (Metallic Sun-orchid)	EPBC Endangered, State Endangered	August-December	Late September

SOUTHERN EMU-WREN

An initial desktop analysis of the Southern Emu-wren, review of current knowledge and records in the project region was undertaken as well as a review of vegetation mapping to identify all potential habitat areas. Suitable habitat for the species was then targeted within known historically ranges. The use of call play back and active searching of the areas were employed for 20 minutes by two observers, during two morning periods.

The areas where data was collected were then targeted specifically for potential sightings of the species. The following data was recorded for any sightings:

- Number of individuals
- Distance from observer (m)
- Behaviour:
 - Flying in a single direction – FLM
 - Flying (hovering or circling) over or around a single point (FLH)
 - Foraging (feeding) on ground – FOG
 - Foraging (feeding) on Tree/Shrub- FOT/FOS
 - Perching/resting/walking on ground – ROG
 - Perching/resting/climbing on trees or shrubs – ROT
- Advertising (any loud, breeding territorial/breeding/alarm call) - ADV.

SANDHILL DUNNART

(Information sourced from *Sandhill Dunnart Habitat Assessment Proposed ElectraNet Transmission Line Corridor - Eastern Eyre Peninsula, Ecological Horizons Pty. Ltd., 2014* (Appendix 3))

A desktop habitat assessment was conducted for the likelihood of Sandhill Dunnart occurrence along the proposed transmission line based on fire and vegetation characteristics. Information collected from more than 70 previous Sandhill Dunnart survey sites were also analysed to provide underlying models to predict likely habitat utilisation by the Sandhill Dunnart. The assessment of likely habitat suitability was considered more valuable than trapping for Sandhill Dunnarts for a number of reasons (see Appendix 3) including the changing nature of its suitable habitat and the elusiveness of the species.

Habitat modelling

Previous site surveys

Data were taken from 77 survey sites trapped between April 2009 and May 2013 within the extent of occurrence of the Sandhill Dunnart in South Australia. Survey sites also included previously known capture locations of the species recorded between 1980 and 2007. All sites were in suitable habitat and were in sand plain or sand dune habitat in *Triodia* vegetation associations with mallee overstorey. Each survey site was trapped for a standard four nights, however the methodology used at the survey sites varied, including pitfall trapping (deep and short pits) and Elliot trapping (further details in Appendix 3). Some of the dataset was omitted from the analysis due to the inconsistency of methods.

Habitat and Site Variables

At each site the following measurements were taken; *Triodia* height, separation, cover and length. For details of methods see Ward (2009). Fire history data was derived from the DEWNR 2014 Fire History Dataset (GDA 1994) containing fire history data from 1956 until present. A number of site and habitat variables were compared with Sandhill Dunnart presence and abundance using generalised linear models. These included seral age, distance from edge of burn, *Triodia* height, *Triodia* cover, 90th percentile *Triodia* height, *Triodia* separation and *Triodia* length.

Data Analysis

Sandhill Dunnart trapping parameters were compared with habitat and site variables using generalised linear models. The dependent variables included Sandhill Dunnart presence/absence, adult presence/absence, total pitfall trap success and adult pitfall trap success. For each response variable, ten models were compared (refer to Appendix 3 for details) in relation to the habitat's fire age and *Triodia* characteristics (e.g. *Triodia* height, cover, separation).

The relationship between the important non-fire habitat variables (as determined from the analyses above) and fire age were also investigated. As it was not possible to determine the fire age for sites that were greater than 50 years post fire, these sites were excluded from these analyses. As with the analyses above, generalised linear models were used to determine the relationships between fire age and habitat variables.

Transmission Line

Sandhill Dunnart habitat was identified by only selecting native vegetation associations from the survey which included *Triodia* species. Previous Sandhill Dunnart trapping locations were overlaid with the identified Sandhill Dunnart habitat.

To identify currently optimal Sandhill Dunnart habitat, all *Triodia* spp. vegetation associations and areas of 10 – 50 years post fire (1974 – 2004) were selected and then classified as optimum Sandhill Dunnart habitat. Future optimal Sandhill Dunnart habitat was classified based on areas including *Triodia* spp. vegetation associations and less than 10 year post fire history (<2004 until present). Areas with no known fire history were classified as Sandhill Dunnart habitat but would require ground-truthing to determine if the *Triodia* characteristics are currently suitable for Sandhill Dunnarts.

Ground-truthing

Twenty four sites in the five *Triodia* vegetation associations were randomly selected and recommended for ground-truthing. Although ground-truthing was outside of the scope of the brief, an additional five sites were visited in Sheoak Hill Conservation Park where targeted surveys for Sandhill Dunnarts have not

occurred. At these sites, the maximum height of 30 random *Triodia* hummocks was measured using a range pole. The average height and 90th percentile height were calculated.

MALLEEFOWL

(Information sourced from *Malleefowl Targeted Survey Report, Ecological Horizons Pty. Ltd., 2014* (Appendix 4).

The proposed transmission line traverses various areas of intact mallee habitat, with much of this being suitable for the Malleefowl. The species has been monitored in these sections since 2008, with mounds being identified throughout the area by opportunistic surveys, strategic surveys and in 2013 a grid search undertaken by helicopter. These surveys successfully located over 100 Malleefowl mounds, however many of these are located away from the proposed transmission line. Further survey work was undertaken in late 2013 and early 2014 focusing primarily on the current and proposed transmission line, as well as a control line approximately 2500 m west of the other transect. This survey utilised LiDAR technology which allowed for a uniform survey approach across the desired study. The LiDAR assessed ground features, isolating anomalies that could be Malleefowl mounds with most of these anomalies being subsequently ground truthed after the search in an attempt to confirm the mounds. This technique also allowed for analysis of Malleefowl mounds in close proximity to the line as well as further away in a less disturbed area of Mallee, allowing a comparison of densities to be established.

Previous site surveys

Surveys across the study area have focused primarily on opportunistic discovery of mounds, or by strategic ground based surveys and smaller 1 km² helicopter grid searches. These have been undertaken for approximately six years and resulted in over 100 mounds being identified on Ironstone Hill CP and Secret Rocks Nature Reserve. All sites were in suitable habitat and were in sand plain or sand dune habitat in mallee overstorey with dense middle storey of various vegetation types.

2013 LiDAR surveys

The use of LiDAR is a relatively new technique of remote sensing and provides the opportunity to cover large tracts of ground with relative ease and provide very fine details of certain desired ground aspects. LiDAR is acronym of both light and radar, both of which are used in the technique to measure distances by illuminating a target with a laser and analysing the reflected light. This can then be transferred to visualisation programs and a detailed three dimensional map can be created.

The LiDAR was deployed by AAM, Geospatial Services company who used a helicopter (Bell Longranger L3 (C30 Turbine) flown at a height of 400 m AGL and at a speed of 60 knots. Two separate transects were undertaken, a 60 km transect along the proposed / current transmission line, as well as a 30 km transect located 2500 m west of the proposed / current transmission line to act as a control line for further analysis. Both transects had a buffer of 500 m.

The equipment used was ALTM 3100 LiDAR Sensor which utilizes a DiMAC 51 mm image sensor, using nominal point density of 20+ points / m² provided a resolution of 10 cm pixel size with relative system accuracy of 2 cm on both horizontal and vertical scales.

Data analysis was then undertaken by exaggerating the vertical scale of the surface created by the LiDAR ground points. This then enabled most mounds to become clearly visible and a 3D point manually placed

by operators in the centre of objects of similar size and shape to Malleefowl mounds. Cross-checking with orthorectified photos then allowed for a percentage of these objects identified to be excluded as Malleefowl mounds due to shape or size. To assist in eliminating most of these false positives an algorithm was created to reduce all objects with an arbitrary height lower than 25 cm above the surrounding plain, which eliminated a number of the identified objects.

Ground-truthing of mounds identified by LiDAR

Ground truthing of potential mounds was then undertaken for approximately 80% of all mounds identified on both transects. Dimensions and characteristics of the mounds were scored using standard national Malleefowl mound monitoring sheets. Distance from current transmission was then determined via Google Earth image that was generated by AAM. 'Historic' mounds were distinguished from more recently active mounds by the presence of moss or lichen growing on the mounds or depressions.

4.3.4 Bird survey

Dedicated bird surveys were undertaken along the entirety of the easement from Cultana sub-station to Port Lincoln across three survey periods: December 2012, January 2013 and March 2013. This involved replicated point count surveys spaced at 2 kilometre intervals along the easement in remnant vegetation, or within remnant patches of vegetation, when the existing line traversed cleared cropping lands in central/south Eyre Peninsula. Each point count was undertaken by a single observer, however two vehicles were present and would 'leap frog' along due to the large distance involved. Each point count was of a twenty minute duration, commencing after a five minute acclimatisation period. Surveys were undertaken during the morning and late afternoon period. These periods were chosen as birds tend to be more active, and as such easier to detect. During the middle of the day (between 12-3pm) no counts were undertaken if temperatures were extreme. Point count sites were only surveyed once. Data collected for each point count observation were as follows:

- Species observed
- Number of individuals
- Distance from observer (m)
- Behaviour:
 - Flying in a single direction – FLM
 - Flying (hovering or circling) over or around a single point (FLH)
 - Foraging (feeding) on ground – FOG
 - Foraging (feeding) on Tree/Shrub- FOT/FOS
 - Perching/resting/walking on ground – ROG
 - Perching/resting/climbing on trees or shrubs – ROT
- Advertising (any loud, breeding territorial/breeding/alarm call) - ADV.

Southern Emu-wren habitat was targeted within known historically ranges, as well as areas that exhibited preferred habitat types that were within 1 km of the line. The use of call play back and active searching of the areas were employed for 20 minutes by two observes, during one morning period.

4.3.5 Bat survey

AnaBat detectors were set up within four main habitat types (over 6 nights) along the transmission line corridor to determine the diversity of species. At each location, the AnaBat recorded bat calls from late afternoon until early the following morning to determine bat species present within the area. For best results, the AnaBats were placed in areas thought to be of suitable habitat for bats or that bats may frequent when feeding. Woodland areas seen to contain hollows for roosting and 'fly-way' tunnels through the canopy were targeted for bat call activity. Bat calls recorded on the AnaBat detectors were analysed and interpreted by Dennis Matthews in line with the reporting standards for echolocation call analysis developed by the Australasian Bat Society. The bat identifications made were based on a combination of manual and automated methods using either reference calls from the region or from species calls recorded outside the region that are likely to represent the calls from species in the survey region. A species inventory was tabulated for each detector night and the number of calls for each species was recorded. Species identifications were only made if certain of the call identification.

Details of bat density and diversity on the Eyre Peninsula were also obtained by accessing previous studies, with numerous records existing throughout the study area. Brandle (2010) undertook a large scale biodiversity survey of the Eyre Peninsula during 2001 to 2005 that contained 37 dedicated bat surveys, with both Harp traps and AnaBats used. The method of utilising both techniques allows greater accuracy in identifying species, due to AnaBats being an imprecise technique due to similarities in vocalization between species making identifying calls very difficult to positively identify. These records combined with the spring 2013 AnaBat records were deemed as adequate to provide a snapshot of the species present. See Table 32 in Results. Table 9 shows the locations where AnaBats were established during the targeted surveys.

Table 9. AnaBat site details.

AnaBat Unit	Date/Time Start	Date/Time Stop	General Habitat	Weather	Regional location
4	27/8/2013 1745hrs	28/9/2013 0800hrs	<i>Eucalyptus cladocalyx</i> Woodland	Cool	Draypole Road
2	27/8/2013 1800hrs	28/9/2013 0815hrs	<i>Eucalyptus cladocalyx</i> Woodland	Cool	The Bratten Way
2	30/09/2013	1/10/2013	<i>Eucalyptus incrassata</i> Mallee patch	Windy Stormy	Approx 16kms east of Hincks CP
4	30/09/2013	1/10/2013	<i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside	Windy Stormy	Approx 16kms east of Hincks CP amongst cleared cropping land
2	1/10/2013	2/10/2013	<i>Eucalyptus calycogona</i> / <i>E. dumosa</i> Mallee patch on roadside	Clear / cool	Directly north-west of the Plug Range CP
4	1/10/2013	2/10/2013	<i>Melaleuca uncinata</i> / Mallee association	Clear / cool	Approximate 8km north-west of Cleve
1	5/11/13 1733hrs	6/11/13 0615hrs	Dense mallee vegetation	Sunny warm and mildly windy	Sheoak Hill CP
4	5/11/13 1750hrs	6/11/13 0620hrs	Dense mallee vegetation	Sunny warm and mildly windy	North of Sheoak Hill CP southern boundary of Ecological Horizons Heritage Agreement
1	6/11/13 1733hrs	7/11/13 0615hrs	Dense mallee vegetation	Sunny warm and mildly windy, rained overnight	North of Sheoak Hill CP
4	6/11/13 1750hrs	7/11/13 0620hrs	Dense mallee vegetation	Sunny warm and mildly windy, rained overnight	North of Sheoak Hill CP

4.4 Limitations

Flora and fauna records were sourced from the BDBSA (DENR 2012) for a 10 kilometres buffer search area along the proposed transmission line corridor. The BDBSA only includes verified flora and fauna records submitted to DEWNR or partner organisations. It is recognised that knowledge is poorly captured and it is possible that significant species occur that are not reflected by database records. The reliability of the BDBSA data ranges from 100 metres to over 100 kilometres. Fauna species, in particular birds, have the ability to traverse distances in excess of 10 kilometres. Hence the BDBSA records provided may not adequately highlight all threatened flora and fauna species that may occur in the area. Similarly, without carrying out intensive trapping or spot lighting, it is not possible to detect all terrestrial animals that may use the site. However, the assessment of habitats together with the site observations made and the database records are considered adequate to make a reasonable assessment of potential impacts of the proposed project on the site's fauna.

AnaBat recordings alone may only represent a proportion of species that are actually present onsite or visiting the area. The recording of calls on any one night may be influenced by many factors including temperature, humidity, insect activity, wind and associated vegetation movement.

Some bat species are readily identified via AnaBat recordings, but many are not able to be distinguished to species level by a call recording alone because there is not enough information available on bat reference calls to make definitive identifications. AnaBat call analysis is affected by many factors, these include the suite of species present, the quality of calls recorded (equipment settings, microphone quality, background noise from wind, insects, echoes), the quality of the reference call database for the region and the experience of the analyst. The time taken to identify calls depends on the above and the needs of the client. Deriving an inventory of species for each detector night is much quicker than attempting to identify every call for each detector night. Often only a low proportion of all calls recorded may be of sufficient quality to allow identification.

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.

The findings and conclusions expressed by EBS Ecology are based solely upon information in existence at the time of the assessment. Field data collected during the December 2012, January and February 2013 and spring 2013 targeted surveys, combined with database records and background research, is considered to provide an adequately detailed assessment of the flora and fauna that occur and are likely to occur within the project area.

Table 10. Vegetation condition ratios used to assess the condition of vegetation communities.

Condition	SEB Ratio	% total indigenous cover	Native Vegetation Council SEB Ratio Interim Policy	Understorey condition description	Indicators
Very Poor	0:1	<10%	Any potential clearance consists of lopping of overhanging limbs only &/or no indigenous understorey present.	Complete or almost complete destruction of understorey (by grazing &/or introduced plants). The understorey* consists mainly of alien species.	Vegetation structure no longer intact (e.g. removal of one or more vegetation strata). Scope for regeneration, but not to a State approaching good condition without intensive management. Dominated by very aggressive weeds. Partial or extensive clearing (> 50% of area). Evidence of heavy grazing (tracks, browse lines, species changes, no evidence of soil surface crust).
	1:1	10-19%	Areas are dominated by introduced species. Native vegetation is largely reduced to scattered trees, indigenous understorey flora reduced to scattered clumps and individual plants.		
	2:1	20-29%	Weeds dominate, scattered trees with indigenous understorey reduced to scattered clumps and individual plants.		
Poor	3:1	30-39%	Mostly intact overstorey vegetation but there is still considerable weed infestation amongst the understorey flora.	Heavy loss of plant species. The understorey* consists predominately of alien species, although a small number of natives persist.	Vegetation structure substantially altered (e.g. one or more vegetation strata depleted). Retains basic vegetation structure or the ability to regenerate it. Very obvious signs of long-term or severe disturbance. Weed dominated with some very aggressive weeds. Partial clearing (10 – 50% of area). Evidence of moderate grazing (tracks, browse lines, soil surface crust extensively broken).
	4:1	40-49%	Mostly intact overstorey vegetation but there is still considerable weed infestation amongst the understorey flora.		
Moderate	5:1	50-59%	Mostly intact, weed-free areas small, indigenous vegetation dominant.	Moderate loss of plant species. Substantial invasion of aliens resulting in significant competition, but native understorey* persists; for example, may be a low proportion of native species and a high native cover, or a high proportion of native species and low native cover.	Vegetation structure altered (e.g. one or more vegetation strata depleted). Most seed sources available to regenerate original structure. Obvious signs of disturbance (e.g. tracks, bare ground). Minor clearing (<10% of area). Considerable weed infestation with some aggressive weeds. Evidence of some grazing (tracks, soil surface crust patchy).
	6:1	60-69%	Mostly intact overstorey vegetation with moderate but not severe weed infestation amongst the understorey flora.		
Good	7:1	70-79%	Mostly intact overstorey and understorey vegetation, weed infestation is moderate to low, but the original vegetation is still dominant.	Understorey only slightly modified. High proportion of native species and native cover in the understorey*; reasonable representation of probable pre-European vegetation.	Vegetation structure intact (e.g. all strata intact). Disturbance minor, only affecting individual species. Only non-aggressive weeds present. Some litter build-up.
	8:1	80-89%			
Excellent	9:1	> 89%	Diverse vegetation with very little weed infestation.	Understorey largely undisturbed, minimal loss of plant species diversity. Very little or no sign of alien vegetation in the understorey*; resembles probable pre-European condition.	All strata intact and botanical composition close to original. Little or no signs of disturbance. Little or no weed infestation. Soil surface crust intact. Substantial litter cover.
	10:1		Diverse vegetation with no weed infestation.		

*Or all strata if the upper and lower strata are difficult to distinguish.

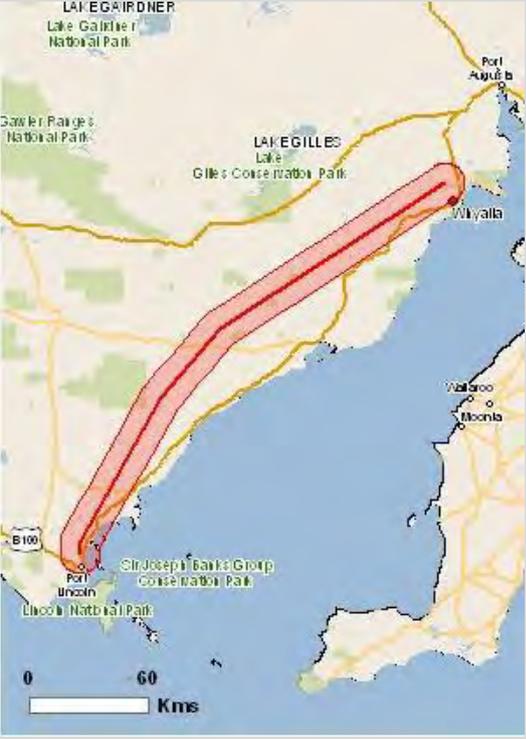
Adapted from *Guide to Roadside Vegetation Survey Methodology for South Australia* (Stokes et al. 1998) and *Guidelines for a Native Vegetation Significant Environmental Benefit Interim Policy* (DWLBC 2005)

5 RESULTS

5.1 Matters of national environmental significance protected under the EPBC Act

The EPBC Act Protected Matters Search highlighted a number matters of national environmental significance protected under the EPBC Act that may be relevant for the project area (Table 11). One threatened ecological community, 50 threatened species and 32 migratory species were highlighted in the report, and these are discussed below. It should be noted that marine species were excluded from the discussion.

Table 11. Summary of the results of the EPBC Protected Matters search.

Search area (10 km buffer)	Matters of National significance under the EPBC Act 1999	Identified within the search area
	World Heritage Properties	None
	National Heritage Properties	None
	Wetlands of International Significance	None
	Great Barrier Reef Marine Park	None
	Commonwealth Marine Areas	None
	Threatened Ecological Communities	1
	Threatened Species	50
	Migratory Species	32
	Commonwealth Lands	5
	Commonwealth Heritage Places	None
	Listed Marine Species	57
	Whales and other Cetaceans	12
	Critical Habitats	None
	Commonwealth Reserves	None
	Places on the Register of the National Estate	22
	State and Territory Reserves	48
	Regional Forest Agreements	None
Invasive Species	31	
Nationally Important Wetlands	2	

5.1.1 Wetlands and watercourses

Wetlands are identified as ‘special habitats’ on *Eyre Peninsula in the Biodiversity Plan for Eyre Peninsula* (DEH 2002), due to such areas having not been cleared or being remnants of the pre-existing vegetation. No wetlands on Eyre Peninsula have been identified as international importance under the Ramsar Convention. There are two wetlands within the Protected Matters Search area that have been identified as

of national importance by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). Those that are in close proximity to the project area are the Tod River Wetland System and Tumby Bay.

The Tod River itself is the only permanent flowing drainage line on Eyre Peninsula, and is therefore an important habitat and refuge for many wetland organisms (Lloyd and Balla 1986, as cited in DEH 2002). The Tod River and Tod River Reservoir are the terminal water bodies of the catchment, which is fed by rainfall and water runoff. This reservoir supplies most of the reticulated water for the whole of the Eyre Peninsula. Tod Reservoir is under the control of SA Water.

Tumby Bay is recognised as a wetland of National Significance in the Directory of Important Wetlands in Australia. The wetlands cover an area of approximately 1,000 ha around the Tumby Bay Township (DEH 2002). They consist of marine waters, seagrass meadows, sandbars, estuarine waters, intertidal mud and sand flats, intertidal marshes and mangrove swamps. The Tumby Bay CP has been identified an area of international importance for shorebirds (Watkins 1993, as cited in DEH 2002).

5.1.2 Nationally threatened flora species

Twenty-two nationally listed flora species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area (Table 12). Twenty of these species were recorded within the BDBSA search area, however sixteen were considered either possible or likely to occur on site (Figure 9, Figure 10 and Figure 11). The two species not included in the BDBSA search were *Frankenia plicata*, Nationally Endangered and considered possible and *Pterostylis sp.* Eyre Peninsula (R.Bates 19474), Nationally Vulnerable and considered as likely to occur within the project area. An additional two nationally vulnerable flora species not highlighted in the EPBC Protected Matters Search were highlighted in the BDBSA search; *Limosella granitica* (Granite Mudwort) which is considered unlikely to occur within the project area and *Pterostylis xerophila* (Desert Greenhood), considered possible.

Following targeted survey, some of these species were detected within the 120m wide assessment corridor. The final column in Table 12 indicates whether the species was recorded during the surveys.

Table 12. Nationally threatened flora species identified by EPBC Protected Matters Search Tool as possibly occurring within the project area.

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Acacia cretacea</i>	Chalky Wattle	EN	E	6/12/2005	Highly likely	A spindly, straggly, single-stemmed shrub or tree, growing 4-5 m high with lemon yellow to golden yellow, very fragrant flower heads. Flowers are born July-February. Occurs in an extremely restricted area about 30 km north to north-west of Cowell and north-east of Coolanie on the north-eastern EP. Total population consists of between a few hundred and 5000 plants. Found along roadsides and in adjacent leasehold farming land. Occurs in low shrubland and mallee scrub, on deep red sand in gently undulating country, with low sand ridges.	N
<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E	7/12/2004	Highly likely	A dense, rounded, sprawling, prickly shrub to 1.5 m high. Flowering occurs May-October. Occupies disjunct sub-populations on EP. Sub-populations known from roadsides and rail reserves and amongst vegetation corridors along SA Water pipelines. Grows in association with a wide range of vegetation communities. Known to grow in association with various Mallee species in northern EP (Pobke 2007).	Y
<i>Acacia pinguifolia</i>	Fat-leaved Wattle	EN	E	7/12/2004	Highly likely	A dense spreading shrub, to 2 m high and 3 m across, with globular golden yellow flower heads. Flowers are mostly borne August-September. Considered endangered and declining in Eyre Hills IBRA subregion (Gillam and Urban 2009). Known from disjunct sub-populations on EP, where it grows in association with a range of Mallee species and <i>Melaleuca uncinata</i> shrubland. On northern EP, sub-populations are known to occur near Cockaleechee, Ungarra and Bulter. Many sub-populations are located on roadsides managed by the District Council of Tumby Bay. The species is also known from rail reserves. Flowering usually occurs between July and October.	Y

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Acacia praemorsa</i>	Senna Wattle	VU	E	22/11/2007	Likely	An erect, suckering, hairless shrub, 1–3 m high with smooth, green, angled branchlets and long, linear, soft phyllodes. Endemic to South Australia. Confined 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. 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.	N
<i>Acacia retinocarpa</i>	Neat Wattle, Resin Wattle (SA)	VU	V	6/09/2006	Highly likely	An erect, perennial, compact, rounded, resinous, spreading shrub that grows 0.5-1.5 m tall. Flowers are mainly borne August-October. Grows in association with <i>Eucalyptus</i> mallee, in areas often classified as dune crest and dunes/hills, plains and swales. It is also known to survive in degraded sites largely devoid of remnant vegetation. Grows in disjunct sub-populations on EP, encompassing an area from Kimba to just north of Arno Bay, Cleve and Lock. Sub-populations are known to survive within roadside vegetation. Considered vulnerable and declining in Eyre Hills and Eyre Mallee subregions (Gillam and Urban 2009).	N
<i>Acacia whibleyana</i>	Whibley Wattle	EN	E	5/09/2004	Highly likely	A dense shrub growing to 2.5 m high and spreading to 4 m in diameter, with globular flower heads. Flowers are borne August-October. Endemic to EP, the species is restricted to near-coastal areas near Tumby Bay on the EP. Grows on limestone and loam, sometimes near salt swamps.	N
<i>Arachnorchis brumalis</i>	Winter Spider-orchid	VU	V	07/09/1985	Possible	A creamy coloured spider-orchid to 20 cm tall. Leaf to 8 cm long, soft green, red based, with dense short hairs. Flower stem is tall, rigid, with close short hairs. Flower single, rarely two, to 70 mm across, creamy with darker markings on many flowers. Flowering: Late June-July-August-September. Endemic to South Australia, mostly on Yorke Peninsula but likely to occur in the southern Eyre Peninsula, however the 4 BDBSA records are all post 1985. Found mostly on terra rossa soils or fertile sands over limestone, in mallee broom-bush associations, light woodland or sedge dominated grasslands.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Arachnorchis conferta</i>	Coast Spider-orchid	EN	E	7/10/1968	Unlikely	A small terrestrial orchid. During the growth period, a single dull-green, hairy leaf occurs at the base of the plant. Flowers usually solitary or pairs, greenish and crimson, to 3 cm across. Flowering occurs July-September. Endemic to SA. 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 WA, but this sub-population is now considered extinct. Another collection, from Carrappee Hill, may not be <i>Caladenia conferta</i> and is possibly a subspecies of <i>C. toxochila</i> (R. Bates 2005, pers. comm., cited in DSEWPAC (2012c).	N
<i>Arachnorchis macroclavia</i>	Large-club Spider-orchid	EN	E	26/11/2008	Possible	Spider-orchid to 30 cm high flowering: in September to October. Stem reddish and slightly hairy. Leaf to 10 cm long, rigid, shortly hairy, red based. Flower usually single about 5 cm across, yellow-green and maroon with brown osmophores. Endemic to South Australia. Rare on central Eyre Peninsula with few records from Stamford Hill in Pt Lincoln. Also known from about 5 locations on Yorke Peninsula and one location at Telowie Gorge, SA. Favours fertile shallow loams in mallee broom-bush associations, usually where other orchids are numerous.	N
<i>Arachnorchis tensa</i>	Greencomb Spider-orchid, Rigid Spider-orchid	EN		1/10/2005	Likely	Flowers usually single, green, white and red, to 50 mm across. Flowering occurs late August-October. Not evaluated for EP regions as there are taxonomic issues (some are <i>C. interanea</i>) (Gillam and Urban 2009). Distribution unsure in SA, probably not on EP (Bates 2009). Generally found in Heathy Woodland or Mallee on sands and sandy loams. Broadly considered secure but some forms may prove to be distinct species.	N
<i>Dodonaea procumbens</i>	Trailing Hop-bush	VU	V	31/08/1986	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 EP. Grows in low-lying, often winter-wet areas in woodland, low open forests, heathland and grasslands, on sands and clays.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Frankenia plicata</i>		EN	V	None	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 Marree. Likely that the species has been under reported due to difficulty of identification of <i>Frankenia</i> spp. No records in Eyre Hills or Eyre Mallee subregions (Gillam and Urban 2009). 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.	N
<i>Haloragis eyreana</i>	Prickly Raspwort	EN	E	25/01/1969	Possible	Prickly Raspwort is a perennial, herb growing to 10-30 cm tall. Flowering occurs between October and November. The species is endemic to Lower Eyre Peninsula, found in the district councils of Lower Eyre Peninsula, Tumby Bay and Franklin Harbour on predominantly poorly drained mottled-yellow duplex soils and hard pedal red-duplex soils in historically grassland areas that have been cleared for agriculture. Now only exists in roadsides and rail reserves.	N
<i>Olearia pannosa</i> subsp. <i>pannosa</i>	Silver Daisy-bush	VU	V	22/11/2007	Highly likely	<ul style="list-style-type: none"> A perennial, low spreading shrub, which can grow up to 1.5 m tall. Mature leaves are shiny on the top and have a distinct white/cream/pale rusty-brown coloured, soft, velvet texture on the underside of leaves. Flowers are typically white and have a typical daisy appearance. Flowering occurs from August-October. Occurs in the understorey of mallee, woodland and forest communities. 	• Y
<i>Prasophyllum goldsackii</i>	Goldsack's Leek-orchid	EN	E	26/11/2008	Possible	A small, slender terrestrial orchid that grows 10-30 cm high. Flowers are green with dark purple edges and tips, and arranged in loose groups of 5-12 flowers. Flowering occurs late September-October. Endemic to SA, found only on Yorke Peninsula and lower EP. Two of the four known general locations are on the EP; in the south-western to central area, and within 50 km of Port Lincoln. Considered endangered and probably declining in Eyre Hills subregion (Gillam and Urban 2009). Occurs largely on limestone, in shallow soil pockets but also in calcareous sands. Found in mallee and scrub.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Prostanthera calycina</i>	West Coast Mintbush, Limestone Mintbush, Red Mintbush	VU	V	28/10/2002	Possible	A perennial shrub that grows to half a metre tall and spreads across the ground. The leaves smell like mint when crushed. Flowers are red and tube shaped. Flowering occurs from September-December. Endemic to the EP. Sub-populations are distributed from Buckleboo to Coorabie. Commonly associated with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. oleosa</i> (Red Mallee), <i>E. socialis</i> (Beaked Red Mallee) and <i>Santalum acuminatum</i> (Quandong), along with <i>Melaleuca</i> , <i>Pittosporum</i> , <i>Grevillea</i> , <i>Hakea</i> and <i>Spyridium</i> sp.	N
<i>Pterostylis</i> sp. Eyre Peninsula (R.Bates 19474)		VU	V		Likely	A small herb with 5-12 overlapping leaves forming a basal rosette. Flowers are greenish-white and number from 1-7 (sometimes 10), produced on pedicles bent at right angles to the stem. Flowers late October-early January. Endemic to the EP, where it is known from about 12 localities. Grows mostly in scrublands of <i>Melaleuca uncinata</i> , but also in woodland of <i>Callitris</i> spp. (Native Pine) and <i>Eucalyptus</i> spp., particularly in stony brown loams.	N
<i>Ptilotus beckerianus</i>		VU	V	29/09/2007	Possible	A small, perennial herb growing 10-25 cm tall. Flowers are hairy, with 20-40 spiky looking flowers per stem. Flowering occurs between August-January. Endemic to SA, and grows in disjunct populations on Kangaroo Island and the EP. Grows on roadside verges and private property within the District Council of Lower EP. Often grows in association with <i>Eucalyptus cladocalyx</i> (Sugar Gum) and <i>Xanthorrhoea</i> sp. (Yacca) in low open forest or low open woodland along roadsides.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R	11/01/2005	Highly Likely	<p>Endemic to southern EP. Only occurs in Eyre Hills IBRA subregion, where it is considered rare but stable (Gillam and Urban 2009, Pobke 2007). In relation to the project area, records only exist from in the southern half of Tumby Bay District Council near the coast.</p> <p>Recorded growing in a range of soil types including acidic, sandy or clay loam over ironstone in gullies, hillcrests and undulating plains, lateritic soils on hill slopes with outcropping quartzite. Grows in association with Open Woodland scrub on loam with ironstone gravel, overlaying yellow clay. Associated vegetation includes <i>Eucalyptus cladocalyx</i> (Sugar Gum), <i>Xanthorrhoea semiplana ssp. tateana</i> (Tate's grass-tree), and <i>Melaleuca uncinata</i> (Broombush) and <i>Homoranthus homoranthoides</i> (Port Lincoln Ground-myrtle). Sub-populations grow within roadside vegetation managed by the District Council of Tumby Bay (Pobke 2007).</p>	Y
<i>Swainsona pyrophila</i>	Yellow Swainson-pea	VU	R	25/11/2010	Likely	<p>Considered vulnerable and probably declining in Eyre Hills and Eyre Mallee subregions. Populations fluctuate (Gillam and Urban 2009). Known from SA, NSW and Vic. On EP, Southern extent is Hambidge CP, where it has been recorded growing in claypans and ashes. Sub-populations grow in the district councils of Ceduna, Elliston and Franklin Harbour (Pobke 2007). Found in Mallee vegetation communities on a variety of soil types including well-drained sands, sandy loams and heavier clay loams. It is usually found after fire.</p> <p>Associated vegetation communities on EP include <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. socialis</i> (Beaked Red Mallee), <i>E. brachycalyx</i> (Gilja), <i>E. gracilis</i> (Yorrell), and <i>E. oleosa</i> (Red Mallee) mid mallee woodland over <i>Melaleuca uncinata</i> (Broombush) tall shrubland.</p> <p><i>Swainsona pyrophila</i> has been found growing amongst young vegetation structures with open canopy post fire. Was recorded growing 2 years post-fire in low mallee (less than 3 m tall) in Munyeroo CP with a range of low shrubs and ground covers (Pobke 2007).</p>	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Tecticornia flabelliformis</i>	Bead Glasswort	VU	V	11/04/2007	Unlikely	Considered vulnerable and probably declining in Eyre Mallee subregion (Gillam and Urban 2009). <i>Tecticornia flabelliformis</i> (Bead Glasswort) is found in SA, WA and Vic, with the majority of known sub-populations in SA. On EP, it is known from the district councils of Cleve, Streaky Bay, Elliston, Ceduna, Tumby Bay and Lower Eyre Peninsula. It grows in low lying areas on the margins of salt lakes and coastal salt marshes over gypsum deposits, and is often associated with other <i>Tecticornia</i> species and salt tolerant vegetation communities (Pobke 2007).	N
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	E	26/11/2008	Possible	Robust herb, 6-60 cm high. Has 5-20 flowers per flower cluster, and each flower is 20-25 mm in diameter. Flower colour is highly variable with brown, copper, blue and green the main colour groups, with infusions of red, blue or green, giving a bronzy or metallic appearance. The extent of occurrence on EP is approximately 900 km ² , growing within Edillilie in the north, and Mikkira in the south.	N

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

* Most recent record sourced from BDBSA search (DENR 2012).

Habitat information sourced and adapted from DSEWPAC (2012), Bates (2009), Pobke (2007), (Laut et al. 1977), Jessop et al (2006), DEH (2002), DEH (undated).

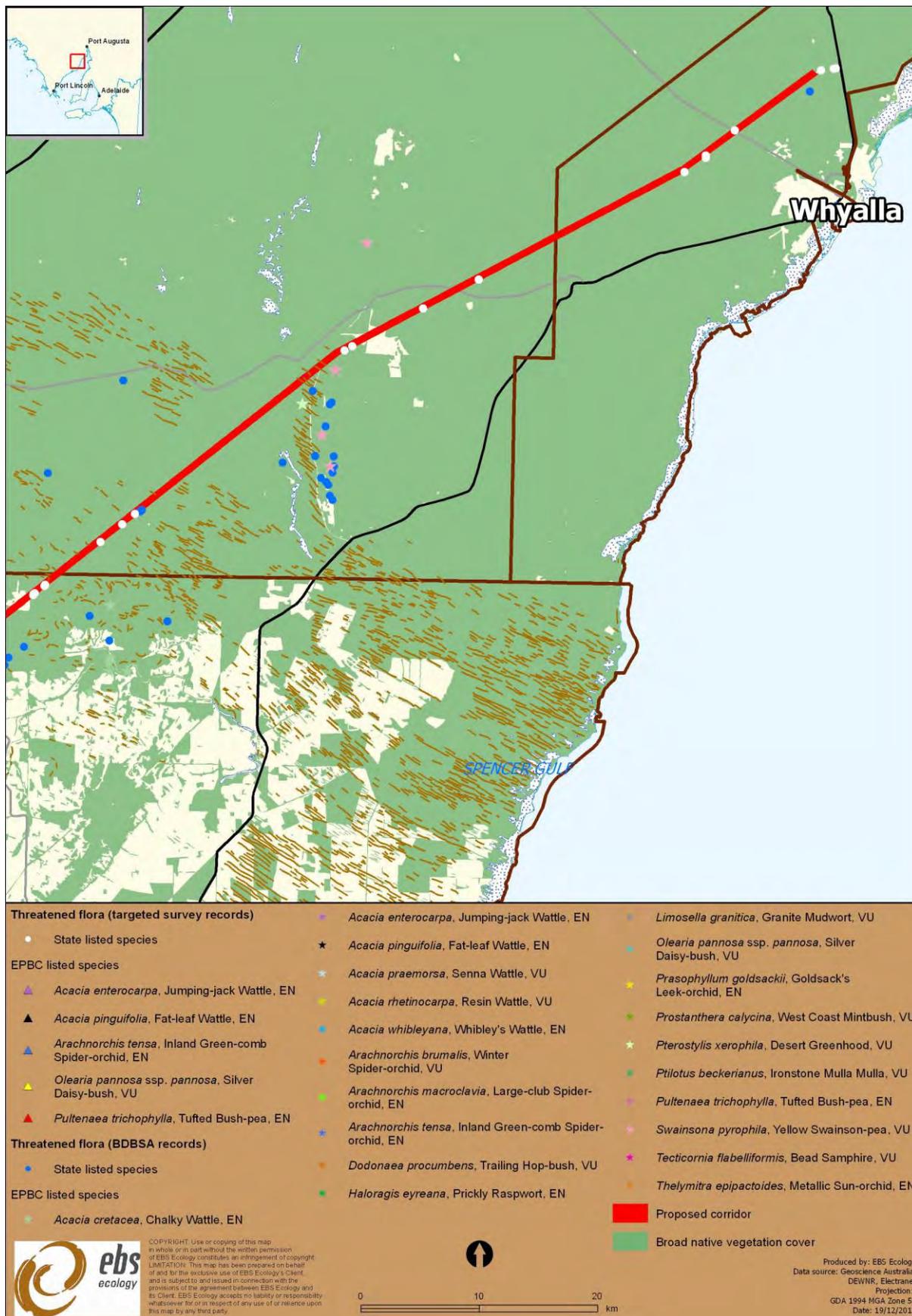


Figure 9. Location threatened flora species in relation to the northern section of the project area (based on BDBSA records – 10km buffer and spring targeted survey records).

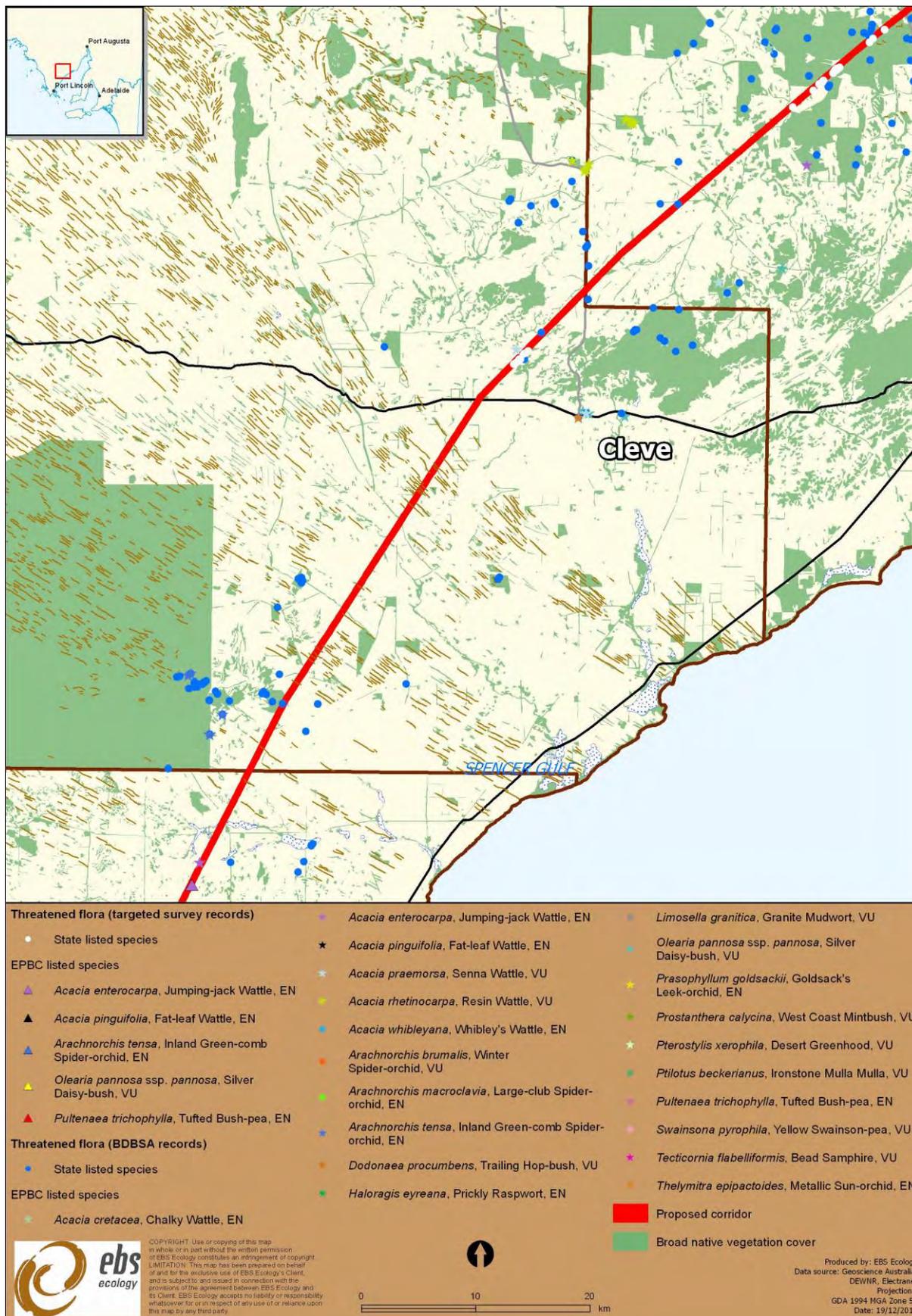


Figure 10. Location of threatened flora species in relation to the central section of the project area (based on BDBSA records – 10km buffer and spring targeted survey records).

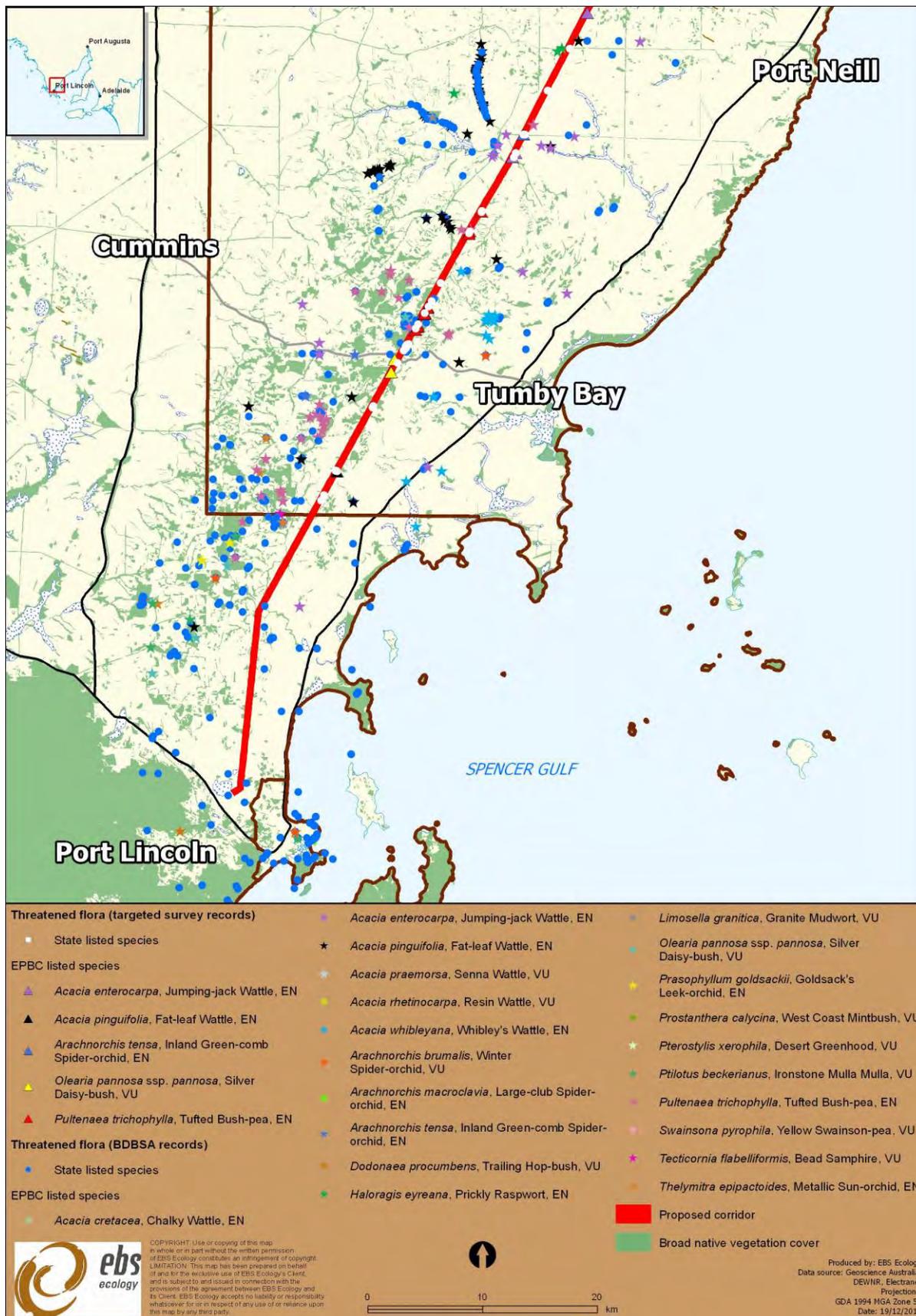


Figure 11. Location of threatened flora species in relation to the southern section of the project area (based on BDBSA records – 10km buffer and spring targeted survey records).

5.1.3 Nationally threatened fauna species

Eight fauna species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area (Table 13). Five of these species were highlighted in the BDBSA search and have been mapped with an additional three nationally threatened fauna species not highlighted in the EPBC Protected Matters Search (Figure 12, Figure 13 and Figure 14). One species, Slender-billed Thornbill (*Acanthiza iredalei iredalei*) (western), has since been delisted on 13 December 2013.

Many marine species have been excluded from the report that were identified during database searches. These were captured by the searches due to the transmission line's proximity to the Spencers Gulf, with the buffer extending into a marine environment in some areas. Species excluded were strict coastal and oceanic species, including true oceanic seabirds such as Albatross, Giant Petrel and Shearwaters. Many of the species identified are very rare vagrant visitors to the waters in South Australia and the Eyre Peninsula. These species also rarely cross or utilise land and as such have been excluded from this report. Along with these avian species, migratory whales and other cetaceans, sharks and marine reptiles have also been excluded.

Table 13. Nationally threatened fauna species identified by EPBC Protected Matters Search Tool as possibly occurring within the project area.

Species name	Common name	Conservation status		Most recent record	Likelihood of occurrence within survey area	Description
		Aus	SA			
Birds						
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill	Delisted from EPBC Act	V	18/09/2006	Likely	Distributed across arid and semi-arid southern WA, and western SA. In SA they occur near Port Pirie, Gawler Ranges and upper EP with a stronghold across the Nullarbor. Generally inhabits treeless chenopod shrublands dominated by <i>Maireana</i> spp. (Bluebush) and <i>Atriplex</i> spp. (Saltbush), and saline flats associated with salt lakes, particularly where there is <i>Halosarcia</i> (glasswort). Forages in low shrubs and on the ground seeking insects and other small prey from the foliage of samphire and saltbush shrubs, and from the surrounding ground. Although likely to be present within the project area, this species is unlikely to be greatly affected by the proposed project; given most of the chenopod shrublands (i.e. critical habitat) should be avoided.
<i>Leipoa ocellata</i>	Malleefowl	VU	V	26/03/2008	Likely	The Murray Mallee is the stronghold for the Malleefowl, but it has severely declined throughout its range. It is now found in scattered locations through semi-arid rangelands and dry-land cropping zones in the south east of South Australia, and the Eyre Peninsula. Principally found in mallee eucalypt woodland and scrub as well as dry forest dominated by other eucalypts, Mulga, and other <i>Acacia</i> sp. They feed on seeds and herbage, and build nest mounds in sandy substrates with leaf litter.
<i>Pachycephala rufogularis</i>	Red-lored Whistler	VU	V	9/02/1993	Unlikely	Occurs in the Murray Mallee east of the Mount Lofty Ranges, and more recently a small population on northern EP. Prefer habitat dominated by mallee-heath, and mallee-Broombush. Tend to be sparsely dispersed throughout the mallee and are capable of long distance movements. Spends a lot of time on the ground or in low shrubs foraging for beetles, grubs and other insects, as well as plant material such as berries.
<i>Psophodes nigrogularis leucogaster</i>	Western Whipbird	VU	V	13/10/2004	Unlikely	The Western Whipbird (eastern) occurs in three isolated regional populations in southern South Australia: the first on the southern Eyre Peninsula; the second on the south-western Yorke Peninsula; and the third in the Murray-Mallee region of south-eastern South Australia (perhaps extending across the border to western Victoria). It inhabits

Species name	Common name	Conservation status		Most recent record	Likelihood of occurrence within survey area	Description
		Aus	SA			
						mallee and thicket vegetation in coastal and inland areas of southern South Australia, on sand flats, dunes and limestone country.
<i>Rostratula australis</i>	Australian Painted Snipe	VU	R	None	Unlikely	<p>Compared with the Greater Painted Snipe, this species has a longer wing, shorter bill and shorter tarsus; has a chocolate brown, rather than rufous, head and neck in the female; has round, rather than flat and visually barred, spots on the tail (female) and upper wing-coverts (male); and, apparently lacks a call.</p> <p>Is endemic to Australia, though its distribution is patchy and its presence in any particular area is unpredictable. Although they have occurred at many sites, no site can be identified in which they are resident or regular in occurrence. Usually found in shallow inland wetlands, either freshwater or brackish, that is either permanently or temporarily filled. Prefer sites with a thick cover of low vegetation, and feed on wetland invertebrates such as worms, molluscs, insects and crustaceans; also seeds and other vegetation. During breeding, prefers temporary but recently flooded wetlands, with low cover for shelter, shallow water and exposed mud for feeding, and small islands on which to nest. Nests in ground scrapes or on mounds in water, lined with grass, leaves and twigs.</p>
<i>Strenua nereis nereis</i>	Fairy Tern (Australian)	VU	E	25/01/2011	Likely	<p>Found on isolated sandy inlets and along the coast from Dampier Archipelago, WA, southward to Tasmania and Victoria, and is only vagrant to the east coast. It is most common in WA and rare in New South Wales, Northern Territory and Queensland. It is also found in New Zealand and New Caledonia.</p> <p>Found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons. It favours both fresh and saline wetlands and near-coastal terrestrial wetlands, including lakes and salt-ponds.</p> <p>Movements are poorly known and the species appears partly migratory and partly non-migratory. In South Australia Fairy Terns appear not to move regularly and are numerous at all times in some areas.</p>

Species name	Common name	Conservation status		Most recent record	Likelihood of occurrence within survey area	Description
		Aus	SA			
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula)	VU	E	23/10/2009	Likely	Small bird that has an overall length of 17–19 cm. Only occurs in SA where it is confined to the extreme south of the EP. The extent of occurrence is estimated at 2545 km ² . The total population is estimated to be less than 1000 birds. Occurs in three types of habitat: shrubland or heathland, mallee and sedgeland. These habitats are characterised by one or two layers of dense vegetation up to 3 m in height.
Mammals						
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V	19/10/2010	Likely	<p>The largest of Australia's 19 dunnart species. Despite extensive survey efforts across western SA and WP, has been recorded in only a few locations. On EP, they occur in semi-arid mallee habitats in the central, east and north west regions. Has recently been recorded in Pinkawillinie and Hincks CPs and west of the Middleback Ranges. Further survey work is required to determine the species' distribution on EP.</p> <p>On EP, prefer habitats characterised by parallel sand dunes with associations of open mallee with a diverse shrub layer and Spinifex (<i>Triodia spp</i>). Mallee associations usually include Yorrell (<i>Eucalyptus gracilis</i>), Ridge-fruited Mallee (<i>E. incrassata</i>), Red Mallee (<i>E. oleosa</i>) and Beaked Red Mallee (<i>E. socialis</i>) with Scrub Cypress Pine (<i>Callitris verrucosa</i>).</p> <p>Spinifex is a key habitat component, as Sandhill Dunnarts build a nest within the centre of the plant, which is both protected and insulated by the needles of the tussock. The species' preference for large domed Spinifex highlights the potential role of fire in creating suitable habitat.</p>

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.

* Most recent record sourced from BDBSA search (DENR 2012a).

Habitat information sourced and adapted from DSEWPAC (2012c) and various other sources

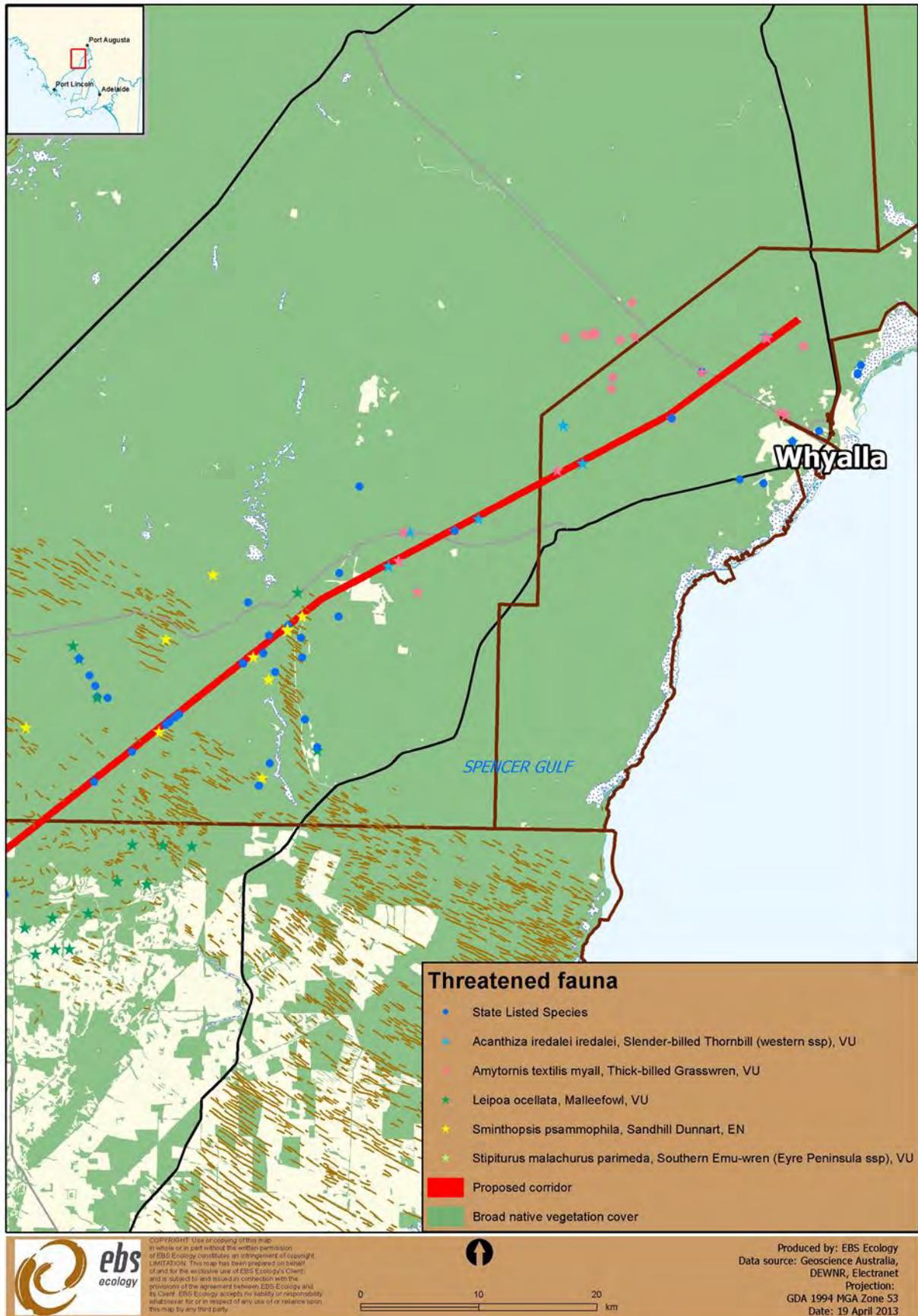


Figure 12. Location of threatened fauna species in relation to the northern section of the project area (based on BDBSA records – 10km buffer).

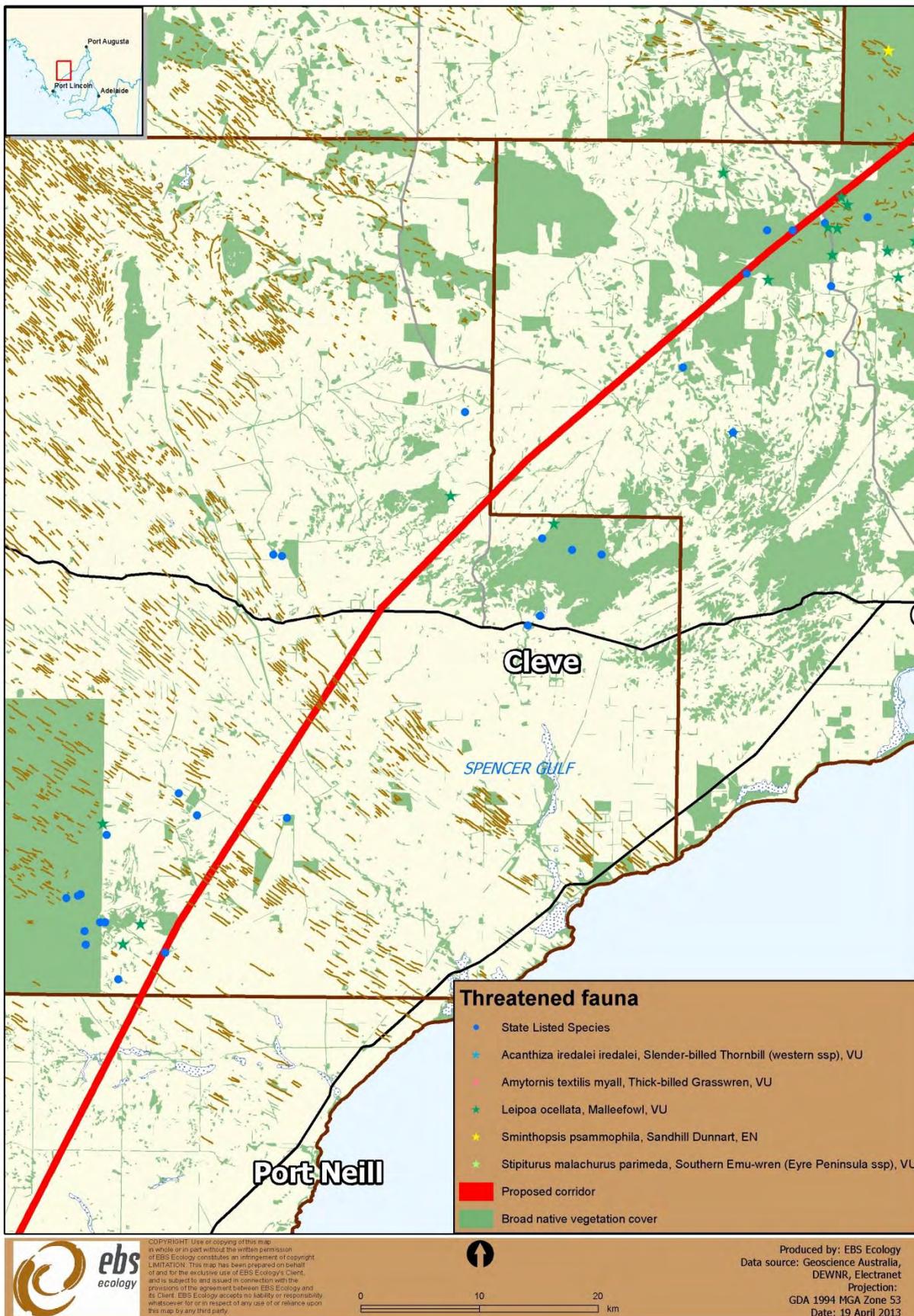


Figure 13. Location of threatened fauna species in relation to the central section of the project area (based on BDBSA records – 10km buffer).

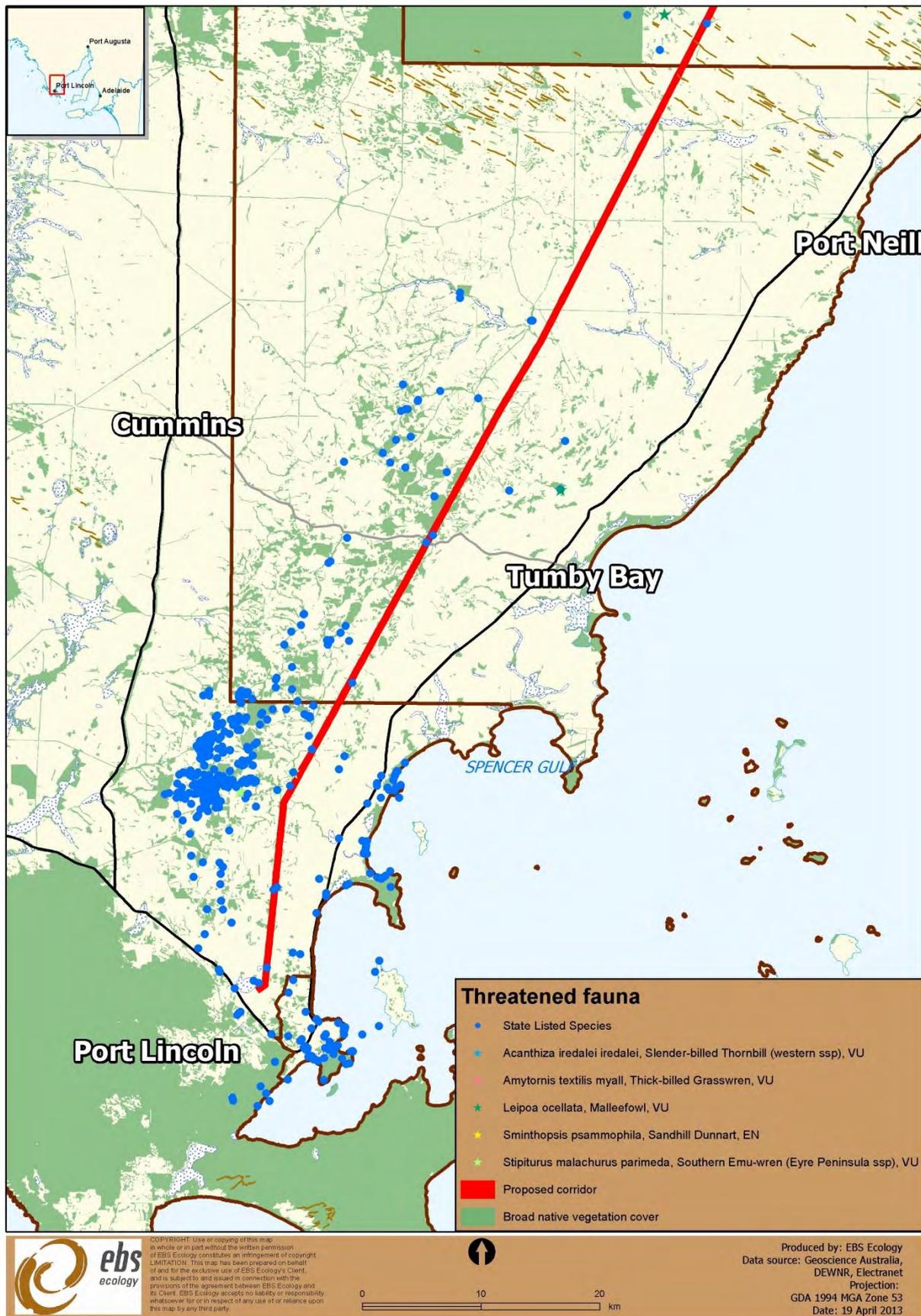


Figure 14. Location of threatened fauna species in relation to the southern section of the project area (based on BDBSA records – 10km buffer).

5.1.4 *Nationally threatened ecological communities*

One threatened ecological community (TEC) was highlighted in the EPBC Protected Matters Search as potentially occurring within the vicinity of the project area:

- Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia.

This threatened ecological community extends from the southern Flinders Ranges to Lake Alexandrina. It is mostly found in the Flinders–Lofty Block Bioregion but patches also extend into the Murray–Darling Depression, Kanmantoo, Eyre–Yorke Block and Gawler Bioregions (DEWR 2007). Remaining patches of this ecological community typically occur on gentle to moderate slopes, hilltops and adjacent plains. The soil types range from sandy-loam to clay-loam.

Eucalyptus odorata (Peppermint Box) is the dominant overstorey species within this community. Other tree species that may be present in the overstorey but are not as abundant as *E. odorata* include *E. microcarpa* (Grey Box), *E. leucoxylon* (South Australian Blue Gum), *E. cladocalyx* (Sugar Gum), *E. porosa* (Mallee Box), *Allocasuarina verticillata* (Drooping Sheoak); *Callitris glaucophylla* (White Cypress-pine) and *C. preissii* (Southern Cypress-pine). The ground layer mainly comprises grasses and herbs which can vary from a relatively dense and diverse layer, in more open sites, to a sparse layer under more densely wooded sites.

The key threats to the survival of this ecological community include clearing, grazing and weed invasion. Other threats include road and rail maintenance activities and the effects of fragmentation and edge effects.

Although areas were mapped along the southern portions of the proposed transmission corridor as *Eucalyptus odorata* Woodland, 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, notably *Eucalyptus leucoxylon* (SA Blue Gum), in which Peppermint Box 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).

Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland has recently been listed as Endangered at a national level. This vegetation association was not listed at the time of the EPBC Protected Matters Search. See Section 5.3.5 *Threatened Ecological Communities* for description of community.

5.1.5 *Nationally listed migratory species*

Nine nationally listed migratory species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area (Table 14). Many marine species have been excluded from the report that was identified during database searches. These were captured by the searches due to the lines proximity to the Spencers Gulf, with the buffer extending into a marine environment in some areas. Species excluded were strict coastal and oceanic species, including true oceanic seabirds such as Albatross, Giant Petrel and Shearwaters. Many of the species identified are very rare vagrant visitors to the waters in South Australia and the Eyre Peninsula. These species also rarely cross or utilise land and as such have been excluded from this report. Along with these avian species, migratory whales and other cetaceans, sharks and marine reptiles have also been excluded.

Table 14. Migratory species identified by EPBC Protected Matters Search Tool as possibly utilising or flying over the project area.

Species name	Common name	Conservation status		Likelihood of occurrence within survey area
		Aus	SA	
<i>Apus pacificus</i>	Fork-tailed Swift	MiM		Possible
<i>Ardea alba</i>	Great Egret	MiM/MiW		Possible
<i>Ardea ibis</i>	Cattle Egret	MiM/MiW	R	Possible
<i>Calidris ruficollis</i>	Red-necked Stint	MiW		Possible
<i>Charadrius veredus</i>	Oriental Plover	MiW		Unlikely
<i>Gallinago hardwickii</i>	Latham's Snipe	MiW	R	Possible
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	MiT	E	Possible
<i>Leipoa ocellata</i>	Malleefowl	VU/MiT	V	Highly Likely
<i>Merops ornatus</i>	Rainbow Bee-eater	MiT		Highly Likely
<i>Rostratula benghalensis s. lat.</i>	Painted Snipe	VU/MiW		Unlikely

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare. **MiM:** Migratory Marine, **MiW:** Migratory Wetland, **MiT:** Migratory Terrestrial.

5.2 Biological Databases of South Australia (BDBSA)

5.2.1 Flora results

A total of 1606 flora species (1260 native species and 346 exotic species) have previously been recorded within 10 km of the project area, based on the BDBSA search (DENR 2012a). A full list of species is available from EBS Ecology upon request.

5.2.2 State threatened flora species

DEWNR is currently developing an updated regional conservation assessment process based on IBRA subregions which will then be used to provide rated species lists and endemics for the larger biogeographic regions. The West Region has been completed (Gillam and Urban 2009). For the Eyre Hills subregion only 57% of 1060 taxa were considered of least concern with 14% in the vulnerable to endangered categories. Eyre Mallee subregion was 55% and 10% in the vulnerable to endangered categories (Brandle, 2010). The region also contains a high level of endemic flora species (40 species) (DEH, undated).

A total of 119 species are listed as threatened under the NPW Act of which 22 are listed under the EPBC Act, 2003 (Table 12). Following targeted survey, some of these species were detected within the 120m wide assessment corridor and the final column in Table 15 indicates whether the species was recorded during the surveys.

The distribution of threatened species records within 10km of the proposed transmission line corridor is displayed in Figure 9, Figure 10 and Figure 11. Due to the large number of species recorded, no delineation between species is shown. Records have been displayed for a more broad scale representation of key constraint areas or hot spots; for example, where clusters of threatened flora species are present.

Table 15. Threatened flora species identified by the BDBSA search.

Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
LEGUMINOSAE	<i>Acacia alcockii</i>	Alcock's Wattle		R	2005	Unlikely	Found in <i>Eucalyptus gracilis</i> (Yorrell), <i>Melaleuca lanceolata</i> (Dryland Teatree) and <i>M. uncinata</i> (Broombush) scrub defined mainly by sand over limestone. Known populations too far south of project area.	N
LEGUMINOSAE	<i>Acacia cretacea</i>	Chalky Wattle	EN	E	1980	Highly Likely	EP endemic species. Grows in low shrubland and mallee scrub dominated by <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>Melaleuca uncinata</i> (Broombush), <i>Triodia irritans</i> (Spinifex), <i>Phebalium bullatum</i> (Silvery Phebalium), on deep red sand in gently undulating country, with low sand ridges.	N
LEGUMINOSAE	<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R	2008	Highly Likely	Usually grows on undulating hills on clay loams or sandy clay loams, in eucalypt woodland and open forest (not in Mallee communities according to P. Lang, pers. comm.). It is tolerant of calcareous soils.	Y
LEGUMINOSAE	<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E	2004	Highly Likely	The species occurs as a disjunct population on EP, with other populations occurring on YP, SE and in western Victoria. Recorded from <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. socialis</i> (Beaked Red Mallee) mallee woodland; <i>Eucalyptus calycogona</i> (Square-fruit Mallee), +/- <i>E. phenax</i> ssp. <i>phenax</i> (White Mallee) mallee woodland; <i>Eucalyptus gracilis</i> (Yorrell) +/- <i>E. dumosa</i> (White Mallee) +/- <i>E. brachycalyx</i> (Gilja), +/- <i>E. oleosa</i> (Red Mallee) mallee.	Y
LEGUMINOSAE	<i>Acacia hexaneura</i>	Six-nerve Spine-bush		R	2007	Highly Likely	EP endemic species. Restricted to area between Cowell and Kimba. Grows in gravelly loam and sandy soils dominated by <i>E. dumosa</i> (White Mallee) / <i>Eucalyptus gracilis</i> (Yorrell), <i>M. uncinata</i> (Broombush) over a sclerophyllous shrub understorey.	Y
LEGUMINOSAE	<i>Acacia imbricata</i>	Feathery Wattle		R	2007	Highly Likely	EP endemic species. Restricted to areas between Ungarra, Cummins and Wanilla extending southeast into the Koppio Hills. Grows usually in sand in open forest, woodland or open scrub.	Y
LEGUMINOSAE	<i>Acacia lineata</i>	Streaked Wattle		R	1984	Possible	Population located from Qld, through NSW, Vic and through the Upper SE, Murray Mallee, Yorke Peninsula with few records on EP representing the far western extent of its range. Preferred habitat is mainly in eucalypt	N

Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							woodlands, mallee or scrubland on low nutrient and high drainage sandy red earths and gravelly loams.	
LEGUMINOSAE	<i>Acacia montana</i>	Mallee Wattle		R	2010	Likely	North-east EP, as well as Mid-north and Fleurieu Peninsula and the eastern States. Grows in a variety of soils, often in <i>Eucalyptus gracilis</i> (Yorrell) and <i>E. socialis</i> (Beaked Red Mallee) open forests or tall shrublands.	N
LEGUMINOSAE	<i>Acacia pinguifolia</i>	Fat-leaf Wattle	EN	E	2004	Highly Likely	Known from disjunct sub-populations on EP, where it grows in undulating terrain with a westerly aspect in association with a range of Mallee species including <i>Eucalyptus odorata</i> (Peppermint Box) and <i>E. incrassata</i> (Ridge-fruited Mallee), <i>E. dumosa</i> (White Mallee), <i>E. foecunda</i> (Hooked Mallee), <i>E. calycogona</i> (Square-fruited Mallee), <i>E. cooperiana</i> (Coopers Mallee), <i>E. flocktoniae</i> (Merrit) and <i>E. pileata</i> (Capped Mallee) and occurs in <i>Melaleuca uncinata</i> (Broombush) shrubland. Sub-populations are known to occur near Cockaleechee, Ungarra and Butler, with many located on roadsides and rail reserves.	Y
LEGUMINOSAE	<i>Acacia praemorsa</i>	Senna Wattle	VU	E	1992	Likely	Endemic to EP 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 <i>Melaleuca uncinata</i> (Broombush), <i>Acacia calamifolia</i> (Wallowa), <i>Eucalyptus odorata</i> (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.	N
LEGUMINOSAE	<i>Acacia rheticocarpa</i>	Resin Wattle	VU	V	2006	Highly Likely	Grows in disjunct sub-populations on EP (also YP southern MLR) 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 <i>Eucalyptus dumosa</i> (White Mallee), <i>E. foecunda</i> (Hooked Mallee), <i>E. calycogona</i> (Square-fruited Mallee), <i>E. incrassata</i> (Ridge-fruited Mallee) and <i>E. brachycalyx</i> (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.	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
LEGUMINOSAE	<i>Acacia rhigiophylla</i>	Dagger-leaf Wattle		R	2002	Highly Likely	Small occurrences on EP (and Murray region) in open scrub associated with <i>Eucalyptus gracilis</i> (Yorrell) and <i>E. socialis</i> (Beaked Red Mallee) open scrub.	Y
LEGUMINOSAE	<i>Acacia whibleyana</i>	Whibley's Wattle	EN	E	2004	Highly Likely	Endemic to EP where it is restricted to near-coastal areas near Tumby Bay. Grows on limestone and loam, sometimes near salt swamps.	N
GRAMINEAE	<i>Amphibromus archeri</i>	Pointed Swamp Wallaby-grass		R	1989	Unlikely	Known from one record north of Cleve and east of Mt Desperate. Grows in temporarily or permanently wet sites in open woodland communities.	N
GRAMINEAE	<i>Amphibromus macrorhinus</i>	Long-nosed Swamp Wallaby-grass		R	1990	Unlikely	Grows in temporarily or permanently wet sites in open woodland communities. Two records from North of Sheoak CP (1990) and east of Hincks WA (1969).	N
ADIANTACEAE	<i>Anogramma leptophylla</i>	Annual Fern		R	1990	Possible	East of Wharminda CP near alignment and around Dark Peake. Found in rocky habitats.	N
ORCHIDACEAE	<i>Arachnorchis bicalliata</i> ssp. <i>bicalliata</i>	Western Daddy-long-legs		R	2008	Possible	Generally coastal although recorded from over 100 km inland on Eyre Peninsula in scrub and mallee woodlands on well-drained sand or loam; in inland areas of SA grows.	N
ORCHIDACEAE	<i>Arachnorchis brumalis</i>	Winter Spider-orchid	VU	V	1985	Possible	Endemic to SA. Found in association with Mallee-Broombush associations, <i>Allocasuarina verticillata</i> (Drooping Sheoak) woodland, <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) mallee woodland and <i>Eucalyptus cladocalyx</i> (Sugar Gum) woodlands.	N
ORCHIDACEAE	<i>Arachnorchis conferta</i>	Coast Spider-orchid	EN	E	1968	Unlikely	Endemic to SA. Currently known from two distinct localities in the upper south-east of SA and on YP. There is one record from 1968 from Hincks WA, but this sub-population is now considered extinct. Another collection, from Carrapee Hill, may not be <i>Caladenia conferta</i> and is possibly a subspecies of <i>C. toxochila</i> .	N
ORCHIDACEAE	<i>Arachnorchis dilatata</i>	Late Spider-orchid		E	2001	Unlikely	Most record from Bascombe Well CP.	N
ORCHIDACEAE	<i>Arachnorchis macroclavia</i>	Large-club Spider-orchid	EN	E	2008	Possible	Endemic to SA and rare on EP now. Also occurs on YP 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.	N
ORCHIDACEAE	<i>Arachnorchis tensa</i>	Inland Green-comb Spider-orchid	EN		2003	Possible	Widespread in SA from the west coast, throughout EP and adjacent pastoral zone, the FR, rare in the MLR, more common in the Murray and upper South-east. In dry	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							woodland, mallee-heath, low scrub and about rock outcrops in a variety of soil types.	
ASPLENIACEAE	<i>Asplenium trichomanes</i>	Common Spleenwort		R	1970	Unlikely	A widespread species found in a variety of rocky habitats. All records located south of project area.	N
GRAMINEAE	<i>Austrostipa tenuifolia</i>			R	1954	Possible	Widespread mainly in sandy soils dominated by grassland or associated with <i>Callitris</i> or <i>Allocasuarina</i> low woodlands. Also on coastal limestone.	Y
PITTOSPORACEAE	<i>Billardiera</i> sp. Yorke Peninsula (P.C.Heyligers 80164)	Lehmann's Apple-berry		E	1995	Unlikely	One record in coastal scrub near Point Boston.	N
RUTACEAE	<i>Boronia pilosa</i> ssp. <i>torquata</i>	Hairy Boronia		R	1927	Unlikely	One historic record from Pt Lincoln.	N
LEGUMINOSAE	<i>Bossiaea ensata</i>	Sword Bossiaea		V	2008	Possible	Mainly along coast of eastern states with disjunct population on Lower EP north of Cummins. Found on sandy plain with <i>Callitris gracilis</i> (Southern-cypress Pine), <i>Eucalyptus diversifolia</i> (Coastal White Mallee) Low Woodland and growing along roadside with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee and <i>Melaleuca uncinata</i> (Broombush). Also found growing on sandy rises around edge of <i>Melaleuca brevifolia</i> (Mallee Honey-myrtle) and <i>Gahnia</i> (Sword Sedge) brackish (saline) swamp.	N
GRAMINEAE	<i>Bothriochloa macra</i>	Red-leg Grass		R	1997	Possible	Scattered recent records within southern EP. Mainly found in open grassy woodland communities and is often found in disturbed sites.	N
ORCHIDACEAE	<i>Calochilus campestris</i>	Plains Beard-orchid		R	2003	Possible	Several records from Hincks WA. Prefers white sandhills with broombush cover, flowering mostly after fires but never common.	N
ORCHIDACEAE	<i>Calochilus pruinosus</i>	Plains Beard-orchid		R	2003	Possible	Several more recent records within and close to Hincks WA. Prior to settlement the species was widespread across the WA wheat belt and adjacent pastoral country wherever there were white sandhills with broombush cover, flowering mostly after fires but never common. Now more common in SA than WA.	N
CENTROLEPIDACEAE	<i>Centrolepis cephaloformis</i> ssp. <i>cephaloformis</i>	Cushion Centrolepis		R	1968	Possible	Records are widespread from Dark Peak to Louth Bay, however most are historic with more recent records collected from Dark Peak. Species also occurs in southern WA and Victoria. Found in variety of habitats ranging from	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							Swampy area dominated by <i>Acacia sclerophylla</i> var. <i>sclerophylla</i> Tall Shrubland, low hills with <i>Allocasuarina verticillata</i> , <i>Eucalyptus odorata</i> Low Open Woodland and Limestone plains dominated by <i>Eucalyptus diversifolia</i> Mallee.	
CENTROLEPIDACEAE	<i>Centrolepis glabra</i>	Smooth Centrolepis		R	1990	Possible	Three records from within the 1990's, near Wanilla Forest, Edillilie and toward Wangary. Also occurs in, NL, MU, YP, SL, KI and SE regions. The species requires muddy conditions within ephemerally damp and swampy habitats around temporary freshwater pools and stream margins.	N
COMPOSITAE	<i>Ceratogyne obionoides</i>	Wingwort		R	1998	Possible	Numerous records throughout the Cleve Hills from Coolanie to Dark Peak. Populations also in WA, VIC and NSW. Occur in hilly area amongst granite outcropping dominated by <i>Melaleuca uncinata</i> Tall Open Shrubland and also found in <i>Sandy</i> flats supporting <i>Callitris</i> Woodland.	N
SANTALACEAE	<i>Choretrum glomeratum</i> var. <i>chrysanthum</i>	Yellow-flower Sour-bush		R	1993	Likely	Records widespread Cluster around Hincks WA. Preferred habitat <i>Eucalyptus odorata</i> Woodlands on stony ground and other mallee associations.	N
STERCULIACEAE	<i>Commersonia multiloba</i>	<i>Trailing Commersonia</i>		E	2007	Possible	Endemic to EP. Several records from north and south of Cowell. Found on rocky ridge slopes associated with <i>Melaleuca uncinata</i> (Broombush) and in fire regrowth areas with regenerating <i>Acacia</i> sp. (Wattle) and <i>Dodonaea</i> sp. (Hopbush), also hill slopes and crests with red clayey sand and laterite at base of sheet granite with <i>Melaleuca uncinata</i> (Broombush).	N
CRASSULACEAE	<i>Crassula exserta</i>	Large-fruit Crassula		R	1998	Likely	Widespread across Eyre Peninsula throughout variety of habitats including swales in dunefield system supporting <i>Eucalyptus socialis</i> / <i>E. dumosa</i> , <i>E. incrassata</i> Low Mallee, Swamps in alluvial plain systems supporting <i>Acacia sclerophylla</i> var. <i>sclerophylla</i> (hard-leaved wattle) Tall Shrubland and hill crests supporting <i>Melaleuca uncinata</i> (Broombush) Tall Open Shrubland. Also common in granite outcropping and dense granite boulders. Also occurs in Kangaroo Island, South-east, Fleurieu Peninsula, WA and Vic.	N
LEGUMINOSAE	<i>Daviesia benthamii</i> ssp. <i>humilis</i>	Mallee Bitter-pea		R	2006	Highly Likely	Numerous recent records from Hincks WA to The Plug Range CR. Also occurs across Victoria and much of southern SA. Habitat preferences include Mallee	Y

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							associations with <i>Eucalyptus phenax</i> ssp. <i>phenax</i> (White Mallee) Low Mallee over <i>Melaleuca uncinata</i> (Broombush), <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), Low Mallee and <i>Eucalyptus oleosa</i> (Red Mallee) / <i>Eucalyptus brachycalyx</i> (Gilja) Mallee.	
LEGUMINOSAE	<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R	2007	Highly Likely	Numerous recent records widespread from Pt Lincoln to Heggaton CR. Also occurs across south-eastern Australia near Horsham and on the Fleurieu Peninsula. Habitat includes a variety of Eucalypt communities such as <i>Eucalyptus dumosa</i> (White Mallee), <i>Eucalyptus calycogona</i> (Square-fruited Mallee), low woodland, <i>Eucalyptus dumosa</i> (White Mallee), <i>E. calycogona</i> (Square-fruited Mallee), low woodland over <i>Melaleuca uncinata</i> (Broombush) shrubland, <i>Melaleuca uncinata</i> / <i>Ozothamnus retusus</i> (Notched-bush Everlasting) Shrubland and <i>E. incrassata</i> (Ridge-fruited Mallee), <i>E. calycogona</i> , <i>Melaleuca lanceolata</i> (Dryland Teatree) low woodland.	Y
RESTIONACEAE	<i>Desmocladius diacolpicus</i>	Bundled Cord-rush		V	2001	Possible	Disjunct populations near Albany in Western Australia, EP and KI. EP populations from Wanilla, Edillilie, north of Cummins to Hincks WA. Preferred habitat includes deep sandy soils supporting <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) and <i>E. leptophylla</i> (Narrow-leaf Mallee) open scrub, dunes with <i>Callitris verrucosa</i> (Scrubby Pine) and <i>Melaleuca uncinata</i> (Broombush) tall closed shrublands.	N
SAPINDACEAE	<i>Dodonea procumbens</i>	Trailing Hop-bush	VU	V	1986	Unlikely	Two records on EP from 1986 just west of Pt Lincoln. The species is widely but patchily distributed across south-eastern Australia, where it also occurs in NSW and Victoria. SA populations have been recorded in open <i>Eucalyptus camaldulensis</i> var. <i>camaldulensis</i> (Red Gum), <i>Eucalyptus fasciculosa</i> (Pink Gum) and <i>Eucalyptus leucoxylon</i> (Blue gum) woodlands in low-lying areas.	N
DROSERACEAE	<i>Drosera striaticaulis</i>	Erect Sundew		V	2006	Possible	Records mainly confined to around the southern portion of the project area, with one recent outlying record from Dark Range CP. Also occurs in WA. Occurs within <i>Eucalyptus cretata</i> (Darke Peak Mallee), <i>Eucalyptus odorata</i> (Peppermint Box) Mallee, Granite rock run-off area, In damp clay/sand in water retentive soils, drainage lines in <i>Eucalyptus camaldulensis</i> (River Red Gum) woodlands.	N

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			Aus	SA				
BORAGINACEAE	<i>Embadium johnstonii</i>	Johnston's Slipper-plant		R	1958	Unlikely	Single record from 1958 near Ironstone Hill CP.	N
MYOPORACEAE	<i>Eremophila barbata</i>	Blue Range Emubush		R	2006	Possible	EP endemic species. Populations located around Ungarra and north and east of Hincks WA. Found with <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee), <i>Eucalyptus socialis</i> (Beaked Red Mallee) tall shrubland over <i>Melaleuca uncinata</i> (Broombush) shrubland, Growing on rocky slopes and alongside creeklines.	N
MYOPORACEAE	<i>Eremophila gibbifolia</i>	Coccid Emubush		R	2002	Possible	Populations from SA and Vic. SA populations occur in SE, Fleurieu Peninsula and two disjunct populations on EP, in the Koppio and Cleve Hills. Normally associated with mallee associations on stony hills.	Y
MYRTACEAE	<i>Eucalyptus behriana</i>	Broad-leaf Box		R	1923	Possible	Known from three disjunct populations in SA, near Cummins on lower EP, associated with <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee), <i>E. peninsularis</i> (Cummins Mallee) and <i>E. odorata</i> (Peppermint Box). Other populations in Vic and NSW.	N
MYRTACEAE	<i>Eucalyptus calycogona</i> ssp. <i>spaffordii</i>	Spafford's Square-fruit Mallee		R	1956	Possible	Restricted to lower central EP from around Yeelanna and south of Cummins. Also occurs in southern WA and scattered along the River Murray. Prefers loamy soils in mallee associations, with species such as <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee), <i>E. peninsularis</i> (Cummins Mallee), <i>E. leptophylla</i> (Narrow-leaf Mallee) and <i>E. diversifolia</i> (Coastal White-mallee).	N
MYRTACEAE	<i>Eucalyptus conglobata</i> ssp. <i>conglobata</i>	Port Lincoln Mallee		R	2008	Unlikely	Occurs in dense mallee scrub on the southern tip of EP and on adjacent Taylor and Boston Islands. Also occurs on the southern coast of WA, KI and the scattered occurrences on the southern Fleurieu Peninsula.	N
MYRTACEAE	<i>Eucalyptus cretata</i>	Darke Peak Mallee		R	1988	Highly Likely	EP endemic species. Numerous records across upper EP from Caralue Bluff to Lock and Cowell in the south, but particularly common in Darke Peak and Carapee Hill. Mainly associated with <i>Eucalyptus calycogona</i> (Square-fruited Mallee), <i>E. porosa</i> and also with <i>Eucalyptus brachycalyx</i> (Gilja) Low Mallee over <i>Melaleuca uncinata</i> (Broombush), <i>Melaleuca lanceolata</i> (Dryland Teatree)	Y
MYRTACEAE	<i>Eucalyptus gillienii</i>	Mount Lindsay Mallee		R	1953	Unlikely	Historical records only from near Pt Lincoln.	N

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			Aus	SA				
MYRTACEAE	<i>Eucalyptus viridis</i> ssp. <i>viridis</i>	Green Mallee		R	1996	Possible	Small disjunct populations also in Mid North, Flinders Ranges, western Victoria, NSW and Qld. EP sub-population located in the southern Middleback Ranges near Iron Duchess, on rocky hill slopes and ridges with <i>Eucalyptus oleosa</i> (Red Mallee) and <i>E. gracilis</i> (Yorrell).	N
GOODENIACEAE	<i>Goodenia benthamiana</i>	Bentham's Goodenia		R	2002	Highly Likely	Located north of Cowell and Cleve and additional subpopulations north of Kimba and also in VIC. Associated with Associated with <i>Eucalyptus calycogona</i> (Square-fruited Mallee) / <i>Eucalyptus oleosa</i> (Red Mallee) open scrub. Also found on limestone outcropping and growing near <i>Melaleuca uncinata</i> (Broombush) shrubland and in <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) / <i>Melaleuca uncinata</i> (Broombush) shrubland - <i>Leptospermum coriaceum</i> (Dune Teatree) Mallee.	Y
PROTEACEAE	<i>Grevillea halmaturina</i> ssp. <i>halmaturina</i>	Prickly Grevillea		R	1883	Unlikely	Most records from Kangaroo Island. One historic record from Pt Lincoln.	N
PROTEACEAE	<i>Grevillea halmaturina</i> ssp. <i>laevis</i>	Prickly Grevillea		R	1909	Unlikely	Mainly confined to Lower Eyre Peninsula. Mostly historic records with more recent ones along the Tod Highway between Edillilie and Wanilla.	N
COMPOSITAE	<i>Haeckeria cassiniiformis</i>	Dogwood Haeckeria		R	2008	Possible	Populations scattered across EP. Small sub-populations near Gladstone and north of Dutchman's Stern CP. Associated with sandy mallee associations.	N
HALORAGACEAE	<i>Haloragis eyreana</i>	Prickly Raspwort	EN	E	1970	Possible	Endemic to EP. 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 <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. dumosa</i> (Dumosa Mallee) or <i>Melaleuca decussata</i> (Totem-poles).	N
CAMPANULACEAE	<i>Isotoma scapigera</i>	Salt Isotome		R	1883	Unlikely	Historical records mainly associated with coastal areas along the west coast of EP, south-west WA and YP.	N
JUNCACEAE	<i>Juncus radula</i>	Hoary Rush		V	1960	Unlikely	Historical record from along the Tod River	N
MALVACEAE	<i>Lawrencia berthae</i>	Showy Lawrencia		R	2000	Possible	Populations from southern WA, NT, Yorke Peninsula, Eyre Peninsula and the Murray Mallee. EP sub-population located across Upper EP from Minnipa along both sides of the Eyre Highway to north of Pt Augusta. Preferred habitat confined to limestone-rich and clay-loam soils, and disturbances such as fire or mechanical clearances.	N

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			Aus	SA				
CYPERACEAE	<i>Lepidosperma gahnioides</i>			R	1998	Possible	Small sub-population growing in Verran Tanks CP. Other population in WA. Known from red clay loam with ironstone gravel growing near <i>Melaleuca uncinata</i> (Broombush), <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee) and <i>Lepidosperma viscidum</i> (Sticky Sword-sedge)	N
COMPOSITAE	<i>Leptorhynchos elongatus</i>	Lanky Buttons		R	1989	Possible	Single record from EP very close to project area (1989) west of Mangalo. Found in Steep rich soil slope not grazed along the roadside associated with mallee-broombush associations.	N
EPACRIDACEAE	<i>Leucopogon clelandii</i>	Cleland's Beard-heath		R	2007	Likely	Populations found in the southern parts of SA and western Victoria. EP sub-populations located near Wanilla and south of and in Hincks WA. Found growing in sandy soil associated with mallee communities.	N
STYLIDIACEAE	<i>Levenhookia stipitata</i>			R	2007	Likely	Main population in southern WA. The only other sub-population located on EP from east of Hincks WA to north-east of Darke Peak and Wanilla in the south. Prefers sandy loam soils with <i>Melaleuca uncinata</i> (Broombush) Tall Shrubland and rocky mallee hillsides associated Broombush.	N
SCROPHULARIACEAE	<i>Limosella granitica</i>	Granite Mudwort	VU	V	2006	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.	N
CAMPANULACEAE	<i>Lobelia heterophylla</i>	Wing-seeded Lobelia		R	1998	Highly Likely	One recent record from within the project area west of Ironstone Hill CP. Widespread species across NT and WA. SA population confined to northern parts of the State and EP. Habitat includes drainage depressions defined by light clay soils with <i>Eucalyptus oleosa</i> (Red Mallee), <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee) Open Mallee, <i>Melaleuca uncinata</i> (Broombush) Tall Open Shrubland, <i>Melaleuca</i> sp., <i>Acacia</i> and <i>Geijera</i> Shrublands.	N
CHENOPODIACEAE	<i>Maireana rohrlachii</i>	Rohrlach's Bluebush		R	1998	Possible	Species occurs from few locations on EP, but mainly YP, Mid North, Fleurieu Peninsula, Murraylands and western Victoria. Preferred habitat includes Heavy clay and calcareous loams with <i>Geijera linearifolia</i> (Sheep Bush) Very Open Shrubland, <i>Eremophila scoparia</i> (Silvery Emubush) low open shrubland.	N

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			Aus	SA				
CHENOPODIACEAE	<i>Maireana suaedifolia</i>	Lax Bluebush		R	2010	Highly Likely	Subpopulation located between Cowell – Kimba and Whyalla. Also throughout WA and the Murray Mallee and the Far West. Associated with Mallee with low shrubs, <i>Senna</i> , <i>Olearia</i> and <i>Lomandra effusa</i> on coarse red sands. Also mallee-chenopod low open woodland and in seasonally damp alluvial heavy clay over calcrete with <i>Eucalyptus gracilis</i> , <i>Disphyma crassifolium</i> and <i>Zygophyllum eremaeum</i> .	Y
MYRTACEAE	<i>Melaleuca armillaris ssp. akineta</i>	Needle-leaf Honey-myrtle		R	1991	Unlikely	Main population located north east of Cleve across upper EP, with two records from Fleurieu Peninsula.	
MYRTACEAE	<i>Melaleuca oxyphylla</i>	Pointed-leaf Honey-myrtle		R	1989	Possible	EP endemic species. Numerous records across upper EP from Sheoak Hill CP to Gawler Ranges NP. Mainly associated with rocky skeletal loams with <i>Melaleuca uncinata</i> (Broombush) Shrubland, <i>Eucalyptus brachycalyx</i> (Gilja), <i>Eucalyptus phenax ssp. phenax</i> (White Mallee) <i>Eucalyptus calycogona</i> (Square-fruited mallee) Open Mallee over <i>Melaleuca uncinata</i> (Broombush).	N
LABIATAE	<i>Mentha satureioides</i>	Native Pennyroyal		R	1936	Unlikely	Historic records from north of Wangary and in Pt Lincoln.	N
CRUCIFERAE	<i>Microlepidium pilosulum</i>	Hairy Shepherd's-purse		R	1996	Unlikely	Scattered records slightly inland along the west coast on EP. Also along Nullarbor Plain, KI, Murraylands. Found in mainly sandy and loamy soils on plains and consolidated dune field systems. <i>Eucalyptus yalataensis</i> (Yalata Mallee), <i>Callitris verrucosa</i> (Scrubby Pine), <i>Eucalyptus phenax ssp. phenax</i> (White Mallee) Low Mallee.	N
ORCHIDACEAE	<i>Microtis atrata</i>	Yellow Onion-orchid		R	1990	Possible	Two records on EP west of White Flat. Other populations scattered across southern Australia (WA, SA and Vic). Prefers boggy areas and swamps.	N
ORCHIDACEAE	<i>Microtis orbicularis</i>	Swamp Onion-orchid		V	1990	Unlikely	Occurs in areas which are inundated for up to six months of the year, such as waterholes, lake margins and shallow lagoons where very large populations may form. Known only from 5 locations in this State. Also occurs in WA and VIC.	N
MYOPORACEAE	<i>Myoporum parvifolium</i>	Creeping Boobialla		R	1995	Possible	Subpopulations scattered throughout the EP and also throughout southern SA and Vic. Occurs in sandy coastal areas, Red Gum woodlands, <i>Melaleuca halmaturorum</i>	N

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			Aus	SA				
							(Swamp Teatree) Very Low Open Forests and dune swales.	
HALORAGACEAE	<i>Myriophyllum integrifolium</i>	Tiny Milfoil		R	1969	Unlikely	Associated with damp clay flats and wet swampy areas near Edillilie Springs and west of Wanilla.	N
OLACACEAE	<i>Olax obcordata</i>			R	1986	Possible	Several scattered records pre 1986 north of Cleve and around Pt. Lincoln. Has been found in roadside vegetation regenerating after fire. Growing with <i>Acacia rigens</i> (Nealie), <i>Grevillea ilicifolia</i> (Holly-leaf Grevillea), <i>Scaevola</i> sp.(Fan-flower), <i>Melaleuca decussata</i> (Totem Poles), <i>Acacia rupicola</i> (Rock Wattle) in sandy loam.	
COMPOSITAE	<i>Olearia adenolasia</i>	Musk Daisy-bush		R	2002	Highly Likely	Few individuals recorded along the project areas. Sub-population located from between Cowell and Kimba. Other examples in WA. Found in sandy soil. Associated with <i>Melaleuca acuminata</i> (Mallee Honey-myrtle), <i>Eucalyptus socialis</i> (Beaked Red Mallee) - <i>E. dumosa</i> (White Mallee) open scrub.	Y
COMPOSITAE	<i>Olearia pannosa ssp. cardiophylla</i>	Velvet Daisy-bush		R	1999	Possible	Several recent records from south of Yalunda Flat, Cummins, south of White Flat and a cluster of records from the 1980s around Cowell. Occurs across YP, Mid North, Fleurieu Peninsula, the SE and Victoria. <i>Eucalyptus cladocalyx</i> (Sugar Gum) open forest with rocky outcropping.	N
COMPOSITAE	<i>Olearia pannosa ssp. pannosa</i>	Silver Daisy-bush	VU	V	2005	Highly Likely	A widespread but rare species occurring also on the Fleurieu Peninsula, SE, YP, MN and KI. Two main sub-populations on EP 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 <i>Eucalyptus cladocalyx</i> (Sugar Gum), <i>Allocasuarina verticillata</i> (Drooping Sheoak), <i>Melaleuca uncinata</i> (Broombush), and less often with <i>Callitris</i> sp.(Native Pine). Northern population associated with <i>Allocasuarina verticillata</i> (Drooping Sheoak), low woodland <i>Eucalyptus odorata</i> (Peppermint Box), +/- <i>E. phenax</i> ssp. <i>phenax</i> (White Mallee) mid mallee woodland, <i>Eucalyptus porosa</i> (Mallee Box) mid open mallee woodland, <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) mid mallee woodland, <i>Eucalyptus incrassata</i> (Ridge-fruited	Y

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			Aus	SA				
							Mallee), <i>E. socialis</i> (Beaked Red Mallee) mid mallee woodland.	
COMPOSITAE	<i>Olearia picridifolia</i>	Rasp Daisy-bush		R	2003	Unlikely	Historic records mainly except for 2003 record in Hincks WA. Mainly associated with limestone.	N
OROBANCHACEAE	<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape		R	1995	Unlikely	Widespread across SA, EP records from Port Kenny and Pt Lincoln NP.	N
ORCHIDACEAE	<i>Petalochilus pusillus</i>	Pigmy Caladenia		R	2007	Possible	Mostly in hard clay soils in open patches of woodland and scrub. More frequently seen when bushfires open up the vegetation. Also found in heath and open forest, in sandy soils in the eastern States.	N
RUTACEAE	<i>Philotheca angustifolia</i> ssp. <i>angustifolia</i>	Narrow-leaf Wax-flower		R	2007	Highly Likely	Associated with the Cleve Hills and the Koppio Hills Woodland environments.	Y
EUPHORBIACEAE	<i>Phyllanthus calycinus</i>	Snowdrop Spurge		R	1995	Unlikely	Mainly associated with coastal environs from Pt Lincoln almost to Streaky Bay. One record north of Pt Neill.	N
LYCOPODIACEAE	<i>Phylloglossum drummondii</i>	Pigmy Clubmoss		R	2007	Unlikely	One record from Wanilla CP.	N
MARSILEACEAE	<i>Pilularia novae-hollandiae</i>	Austral Pillwort		R	1996	Unlikely	Widespread across southern Western Australia to Victoria with scattered populations across SA. One record from EP located on boggy clay flats north-east of Glen-Forest Tourist Park.	N
THYMELAEACEAE	<i>Pimelea williamsonii</i>	Williamson's Riceflower		R	1998	Possible	Scattered records from Hincks WA and Hambridge WA and Heggaton CR and within Murraylands across the border into Victoria. Prefers recently burnt areas associated with sandy Eucalyptus woodlands and heathlands.	N
GRAMINEAE	<i>Poa drummondiana</i>	Knotted Poa		R	1989	Unlikely	Widespread across southern Australia from Western Australia to Victoria. Scattered records across EP, from north of Lock and north of Cleve to south of Arno Bay and several historic records around Hincks WA, and south from Coffin Bay NP and around Pt Lincoln. Prefers sandy locations with Mallee and/or Triodia communities.	N
GRAMINEAE	<i>Poa fax</i>	Scaly Poa		R	1996	Unlikely	Mainly confined to coastal areas in SA except in NSW and Vic where it is found inland. EP populations mainly associated with the coast preferring sandy environments.	N
ORCHIDACEAE	<i>Prasophyllum constrictum</i>	Tawny Leek-orchid		R	1998	Possible	Records scattered across Victoria and SA with a historic record from WA. On EP found in scattered locations within Hincks WA and Darke Peak CP and Verran Tanks CP.	N

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			Aus	SA				
							Found in <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) Open Low Mallee over <i>Melaleuca uncinata</i> (Broombush) and <i>Eucalyptus diversifolia</i> (Coastal White Mallee), <i>Eucalyptus leptophylla</i> (Narrow-leaf Mallee) Open Mallee over <i>Triodia irritans</i> (Spinifex)	
ORCHIDACEAE	<i>Prasophyllum fecundum</i>	Self-pollinating Leek-orchid		R	2007	Possible	Endemic to South Australia where scattered across southern Eyre Peninsula, the leg of Yorke Peninsula and in the Barossa Valley. In mallee heathland and Callitris/ Pink gum woodland or on rock outcrops in the wheat belt in sandy or loamy soils.	N
ORCHIDACEAE	<i>Prasophyllum goldsackii</i>	Goldsack's Leek-orchid	EN	E	2008	Possible	Endemic to SA. Found from 14 small populations on EP and YP not exceeding 500-1000 individuals. Occurs largely on limestone, in shallow soil pockets but also in calcareous sands. Found in <i>Eucalyptus cladocalyx</i> (Sugar Gum) forests, as well as <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodlands and <i>Melaleuca uncinata</i> (Broombush) tall open shrublands.	N
ORCHIDACEAE	<i>Prasophyllum occultans</i>	Hidden Leek-orchid		R	2001	Possible	Endemic to South Australia where scattered from central Eyre Peninsula, across Yorke Peninsula into the upper South East, very rare on Kangaroo Island and on Fleurieu Peninsula. Especially in shallow soils over rock, including limestone, and usually with other Leek-orchids.	N
LABIATAE	<i>Prostanthera calycina</i>	West Coast Mintbush	VU	V	1984	Possible	Endemic to EP 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 <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) mid mallee woodland over <i>Melaleuca uncinata</i> (Broombush) and <i>Leptospermum coriaceum</i> (Dune Tea-tree) and <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee), +/- <i>Allocasuarina verticillata</i> (Drooping Sheoak) mid mallee woodland over Dryland Tea-tree (<i>Melaleuca lanceolata</i>)	N
LABIATAE	<i>Prostanthera chlorantha</i>	Green Mintbush		R	2008	Possible	Main populations from KI and southern Lofty Ranges. records from EP mainly around Pt Lincoln and one record from east of Cockaleechee. Found in <i>Melaleuca uncinata</i> heath.	Y
ORCHIDACEAE	<i>Pterostylis</i> sp. <i>Triloba</i> (pl. 191,			E	1970	Unlikely	1 record from 1970	N

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			Aus	SA				
	<i>Bates & Weber 1990)</i>							
ORCHIDACEAE	<i>Pterostylis xerophila</i>	Desert Greenhood	VU	V	1980	Possible	Currently known from only eight populations containing about 150 plants from EP and two locations in Victoria. The closest records to the project area are north of Cowell and Coolanie. Found in areas containing <i>Melaleuca uncinata</i> (Broombush), <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>Eucalyptus socialis</i> (Beaked Red Mallee) and/or <i>Eucalyptus leptophylla</i> (Narrow-leaf Mallee).	N
AMARANTHACEAE	<i>Ptilotus beckerianus</i>	Ironstone Mulla Mulla	VU	V	2007	Possible	Endemic to SA. Disjunct populations on EP as well as Kangaroo Island. Found in association with <i>Eucalyptus cladocalyx</i> (Sugar Gum) forests, as well as <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodlands and <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) +/- <i>E. incrassata</i> (Ridge-fruited Mallee) +/- <i>E. leptophylla</i> (Narrow-leaf Mallee), +/- <i>Eucalyptus peninsularis</i> (Cummins Mallee) mallee woodland.	N
LEGUMINOSAE	<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R	2005	Highly Likely	Endemic to EP. Numerous recent records 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 species is commonly associated with <i>Eucalyptus cladocalyx</i> (Sugar Gum) woodlands, <i>Eucalyptus peninsularis</i> (Cummins Mallee) low woodland/mallee, Drooping Sheoak (<i>Allocasuarina verticillata</i>) low open woodland over <i>E. odorata</i> (Peppermint Box) and <i>E. angulosa</i> (Coast Ridge-fruited Mallee) and <i>E. foecunda</i> (Hooked Mallee), mostly over <i>Melaleuca uncinata</i> (Broombush) understories. Also occurs in tall shrublands dominated by <i>Melaleuca uncinata</i> (Broombush) and <i>Acacia</i> spp.	Y
POLYGONACEAE	<i>Rumex dumosus</i>	Wiry Dock		R	1964	Unlikely	Widespread species from Brisbane south through NSW and Victoria, southern and northern Lofty Ranges, EP and south-western WA. disjunct EP populations located at Iron Knob, north of Tumby Bay and near Ungarra.	N
SANTALACEAE	<i>Santalum spicatum</i>	Sandalwood		V	2004	Highly Likely	Found along the project area within the semi-arid pastoral areas. Occurs in tall acacia woodlands and shrublands over chenopods, <i>Callitris gracilis</i> low woodlands and semi-arid mallee communities.	Y

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			Aus	SA				
GOODENIACEAE	<i>Scaevola myrtifolia</i>	Myrtle Fanflower		R	1991	Possible	Population confined to southern edge of WA from Albany across the Nullarbor to the EP. Sub-population from south of Cowell to north of Tumbly Bay. Preferred habitat is mallee communities.	N
CYPERACEAE	<i>Schoenus sculptus</i>	Gimlet Bog-rush		R	2007	Possible	Scattered along south-western WA, EP, KI, SE and western Victoria. EP records scattered across upper EP and concentrated around Edillilie and Wanilla on lower EP. Mainly associated with stream channels, granite outcropping, Clay loam and sandy soils with <i>Melaleuca armillaris</i> ssp. <i>akineta</i> (Needle-leaf Honey-myrtle) Low Closed Forest and <i>Melaleuca brevifolia</i> (Mallee Honey-myrtle), <i>Melaleuca decussata</i> (Totem Poles), <i>Melaleuca uncinata</i> (Broombush) shrublands sometimes with <i>Gahnia trifida</i> (Rough Cutting-Grass).	N
LEGUMINOSAE	<i>Sphaerolobium minus</i>	Leafless Globe-pea		R	1995	Possible	EP population represents far western extent of the species range. Also occurs on KI, southern Lofty Ranges, SE and sweeps across Tasmania, southern Victoria, coastal NSW and south-western QLD. Several recent records associated with <i>Eucalyptus cladocalyx</i> (Sugar Gum) Very Low Woodland	N
RHAMNACEAE	<i>Spyridium bifidum</i> var. <i>integrifolium</i>			R	1909	Unlikely	Small disjunct populations located on KI and EP, at Kulliparu CP and around Wanilla.	N
RHAMNACEAE	<i>Spyridium bifidum</i> var. <i>Wanilla</i> (K.Clipstone 88)	Wanilla Spyridium		V	1994	Possible	Endemic to EP. Several records from the 1990's but locate along the coast south of the project area. On record east of Darke Peak located in mallee vegetation.	N
RHAMNACEAE	<i>Spyridium erymnocladum</i>	Cloaked Spyridium		V	2006	Possible	Endemic to EP. Occurs in mallee / Broombush associations, with some populations occurring within roadside vegetation around and within Hincks WA.	Y
RHAMNACEAE	<i>Spyridium leucopogon</i>	Silvery Spyridium		R	2009	Likely	Endemic to EP. Confined to the Lower EP where it is associated with mallee associations including <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) Mallee, <i>Eucalyptus odorata</i> (Peppermint Box) Very Open Mallee over <i>Melaleuca uncinata</i> (Broombush), and <i>Eucalyptus dumosa</i> (White Mallee) and <i>E. foecunda</i> (Hooked Mallee).	Y
RHAMNACEAE	<i>Spyridium spathulatum</i>	Spoon-leaf Spyridium		R	2004	Possible	Scattered across southern Australia with sub-population located in central Australia. EP population mainly from lower EP, with small sub-populations located north-west of Pt Kenny, Cowell and north-east of Cleve. Associated with	Y

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			Aus	SA				
							clayey sands dominated by <i>Melaleuca uncinata</i> (Broombush) Tall Shrubland with emergent mallee species.	
LEGUMINOSAE	<i>Swainsona pyrophila</i>	Yellow Swainson-pea	VU	R	2010	Highly Likely	Occurs across the EP and also in YP and Murraylands, NSW and VIC. It is known to occur on sandy or loamy soil in mallee scrub and is usually found after fire.	N
CHENOPODIACEAE	<i>Tecticornia flabelliformis</i>	Bead Samphire	VU	V	1969	Unlikely	Mainly confined to coastal habitats. Records from Arno Bay and historically from Todd Reservoir.	N
ORCHIDACEAE	<i>Thelymitra carnea</i>	Small Pink Sun-orchid		R	1990	Possible	Widespread but rare in southern coastal districts, from southern Eyre Peninsula, Kangaroo Island, Mount Lofty Ranges from south of Adelaide and in the lower South-east. More common in the Eastern states and New Zealand and rare in Western Australia. Grows in bare soil around seepage areas on the edge of roads, quarries, or land slips, less often in low scrubs and woodland and often in the company of numerous other <i>Thelymitra</i> spp.	N
ORCHIDACEAE	<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	E	2008	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. Habitat is mainly confined to <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodland, <i>Eucalyptus cladocalyx</i> (Sugar Gum) mid woodland, <i>Eucalyptus angulosa</i> (Coast Ridge-fruited Mallee), <i>E. diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) mid mallee woodland, +/- <i>Melaleuca lanceolata</i> (Dryland Tea-tree), +/- <i>Melaleuca uncinata</i> (Broombush) tall shrubs and <i>Melaleuca uncinata</i> (Broombush) tall open shrubland.	N
ORCHIDACEAE	<i>Thelymitra flexuosa</i>	Twisted Sun-orchid		R	2008	Possible	Widespread but uncommon across the southern, coastal, higher rainfall districts, EP, MU (Kaiser Stuhl only) SL, KI, SE and also in Western Australia and the Eastern states. Mostly in nitrogen deficient soils which are boggy in winter, in low heath and scrub, forest clearings and swamp margins where more obvious after fire or disturbance.	N
LILIACEAE	<i>Thysanotus nudicaulis</i>			E	1967	Unlikely	All historic records south of project area	N
LILIACEAE	<i>Thysanotus wangariensis</i>	Eyre Peninsula Fringe-lily		R	2008	Possible	Mainly confined to the coastal areas of southern Australia, from eastern Victorian border with NSW, Tas, SA and	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							south-western WA. On EP found on Dunes/consolidated dune with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) Low Mallee and other open mallee shrublands.	
SCROPHULARIACEAE	<i>Veronica gracilis</i>	Slender Speedwell		V	1983	Unlikely	One record from 1980's south of the project area	N
LILIACEAE	<i>Wurmbea decumbens</i>	Trailing Nancy		R	2007	Possible	While endemic to South Australia, it is widespread and locally common on Eyre Peninsula but rare on Kangaroo Island. Mainly associated with rocky hills on central Eyre Peninsula, mostly on sheltered southern slopes at the base of rocks.	N
LILIACEAE	<i>Wurmbea latifolia</i> ssp. <i>vanessae</i>	Broad-leaf Nancy		R	1994	Possible	Widespread along the coast and offshore islands from Eyre Peninsula, Fleurieu Peninsula, Kangaroo Island, and the South-East of South Australia, extending into Victoria. Occurs in low scrub on exposed sites such as headlands, stabilised sandhills, windswept islands and cliff faces, more rarely up to 20 km inland. EP Records located south of Yalunda Flat associated with <i>Eucalyptus cladocalyx</i> (Sugar Gum), <i>Acacia mearnsii</i> (Black Wattle) woodland in fertile soils.	N
LILIACEAE	<i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i>	Tate's Grass-tree		R	2008	Unlikely	Endemic to SA, records range from the upper SE, KI, Fleurieu Peninsula, YP and EP. EP sub-population confined to southern EP near Wangary and at the entrance to Pt Lincoln NP. Habitat preference is <i>Eucalyptus diversifolia</i> (Coastal White Mallee), <i>Acacia paradoxa</i> (Kangaroo Thorn) on limestone.	N

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.

Sources of information: Pobke (2007); Whibley and Simon (1992); World Wide Wattle (2013); Jessop, Dashorst & James (2006); Willson and Bignall (2008); Native Orchid Society of South Australia (2008); DSEWPAC (2013); DEWNR (2013); Carter (2010), DEH (undated); (Jusaitis et al. 2000, as cited in Pobke, 2007); Duncan (2010); (Government of SA (2013); D. Duvall pers. comm.

5.2.3 State threatened fauna species

A total of 339 fauna species (323 native species and 15 exotic species) have previously been recorded within 10 km of the project area, based on the BDBSA search (DENR 2012a). This excludes Marine species such as Albatross and Petrels, whales and other cetaceans, sharks and marine reptiles.

Of the 339 fauna species that have been recorded within the BDBSA, 51 species are listed as threatened under the NPW Act and 9 are listed under the EPBC Act. It should be noted that this does not include any species classified as strictly marine, as they will not be affected by the easement change. BDBSA species that have been identified are listed in Table 16, with all species identified being shown in Appendix 2.

The distribution of threatened species records (from the last 20 years) in the vicinity of the proposed transmission line is displayed in Figure 12, Figure 13 and Figure 14. Due to the large number of species recorded, no delineation between species is shown. Records have been displayed for a more broad scale representation of key constraint area; for example, where clusters of threatened flora species are present. Below, is a list of nationally listed species that have been previously recorded within 10km of the project area by the BDBSA search and therefore potentially occur:

Nationally threatened (EPBC Act)

- Sandhill Dunnart (*Sminthopsis psammophila*) – nationally endangered, vulnerable in South Australia
- Australasian Bittern (*Botaurus poiciloptilus*) – nationally endangered, vulnerable in South Australia
- Malleefowl (*Leipoa ocellata*) – nationally vulnerable, vulnerable in South Australia
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) – nationally vulnerable, endangered in South Australia
- Fairy Tern (*Sternula nereis*) – nationally vulnerable, endangered in South Australia

Migratory (EPBC Act)

The list of migratory species established under section 209 of the EPBC Act comprises:

- migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II);
- migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA); and
- native migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Seven of the bird species observed have a migratory rating under the EPBC Act, all of which were recorded along the coast, outside of the project area:

- Fork-tailed Swift (*Apus pacificus*) - listed as migratory under JAMBA, CAMBA and ROKAMBA
- Great Egret (*Ardea alba*) - listed as migratory under JAMBA, CAMBA

- Cattle Egret (*Ardea ibis*) - listed as migratory under JAMBA, CAMBA
- Red-necked Stint (*Calidris ruficollis*) - listed as migratory under JAMBA, CAMBA and ROKAMBA
- Oriental Plover (*Charadrius veredus*) - listed as migratory under JAMBA, Bonn and ROKAMBA
- Latham's Snipe (*Gallinago hardwickii*) - listed as migratory under JAMBA, CAMBA, ROKAMBA and Bonn
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)- listed as migratory under CAMBA
- Rainbow Bee-eater (*Merops ornatus*)- listed as migratory under JAMBA
- Painted Snipe (*Rostratula benghalensis s. lat.*) - listed as migratory under JAMBA, CAMBA.

State threatened

The following 43 fauna species recorded within the BDBSA search have a State conservation rating, with their likelihood of occurrence within the project area described in Table 16:

- | | |
|--|--|
| • Common Brushtail Possum (<i>Trichosurus vulpecula</i>) | • Glossy Ibis (<i>Plegadis falcinellus</i>) |
| • Bardick (<i>Echiopsis curta</i>) | • Great Crested Grebe (<i>Podiceps cristatus</i>) |
| • Carpet Python (<i>Morelia spilota</i>) | • Lesser Sand Plover (<i>Charadrius mongolus</i>) |
| • Dwarf Four-toed Slider (<i>Lerista distinguenda</i>) | • Little Egret (<i>Egretta garzetta</i>) |
| • Heath Goanna (<i>Varanus rosenbergi</i>) | • Musk Duck (<i>Biziura lobata</i>) |
| • Macquarie Tortoise (<i>Emydura macquarii</i>) | • Painted Button-quail (<i>Turnix varius</i>) |
| • Western Three-lined Skink (<i>Bassiana trilineata</i>) | • Peregrine Falcon (<i>Falco peregrinus</i>) |
| • Australasian Shoveler (<i>Anas rhynchotis</i>) | • Restless Flycatcher (<i>Myiagra inquieta</i>) |
| • Australian Bustard (<i>Ardeotis australis</i>) | • Rock Parrot (<i>Neophema petrophila</i>) |
| • Banded Stilt (<i>Cladorhynchus leucocephalus</i>) | • Ruddy Turnstone (<i>Arenaria interpres</i>) |
| • Bar-tailed Godwit (<i>Limosa lapponica</i>) | • Ruff (<i>Philomachus pugnax</i>) |
| • Black-tailed Godwit (<i>Limosa limosa</i>) | • Sanderling (<i>Calidris alba</i>) |
| • Blue-billed Duck (<i>Oxyura australis</i>) | • Shy Heathwren (<i>Calamanthus cautus</i>) |
| • Cape Barren Goose (<i>Cereopsis novaehollandiae</i>) | • Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) (western) |
| • Common Sandpiper (<i>Actitis hypoleucos</i>) | • Square-tailed Kite (<i>Lophoictinia isura</i>) |
| • Common Tern (<i>Sterna hirundo</i>) | • Striated Grasswren (<i>Amytornis striatus</i>) |
| • Diamond Firetail (<i>Stagonopleura guttata</i>) | • Terek Sandpiper (<i>Xenus cinereus</i>) |
| • Eastern Curlew (<i>Numenius madagascariensis</i>) | • Western Gerygone (<i>Gerygone fusca</i>) |
| • Eastern Osprey (<i>Pandion cristatus</i>) | • Whimbrel (<i>Numenius phaeopus</i>) |
| • Elegant Parrot (<i>Neophema elegans</i>) | • White-winged Chough (<i>Corcorax melanorhamphos</i>) |
| • Freckled Duck (<i>Stictonetta naevosa</i>) | • Wood Sandpiper (<i>Tringa glareola</i>) |
| • Gilbert's Whistler (<i>Pachycephala inornata</i>) | • Yellow-tailed Black-Cockatoo (<i>Calyptorhynchus funereus</i>) |

Table 16. Threatened fauna species identified by the BDBSA search.

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
Birds							
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)	-	R	1/08/2006	Highly Likely	Y	Bluebush plains with sparse trees. Found from Whyalla west into Gawler ranges and then into Nullarbor region. Can inhabit pastoral properties
<i>Actitis hypoleucos</i>	Common Sandpiper	-	R	10/01/2003	Possible	N	Found in a variety of habitats from coastal areas to inland wetlands. Tends to avoid wide open mudflats, but spends time on narrow edges of dams and billabongs
<i>Amytornis striatus</i>	Striated Grasswren	-	R	15/05/2008	Highly Likely	Y	Small Grasswren found in mallee woodlands with well established Spinifex grasses. Most wide spread Grasswren in Australia, with numerous small fragmented populations known in SA. EP population in Middleback ranges and into Pinkawillinie CP
<i>Anas rhynchos</i>	Australasian Shoveler	-	R	4/02/2006	Possible	N	Prefers large permanent lakes or waterholes over wetlands that have suitable cover of <i>Melaleuca sp.</i>
<i>Ardea ibis</i>	Cattle Egret	-	R	22/06/1998	Unlikely	N	Pastures with tall grass being actively used by stock, which it associates with. This is to assist with feeding. Possibly expanding in the south, however is rare throughout this region
<i>Ardeotis australis</i>	Australian Bustard	-	V	26/03/2005	Possible	N	Grasslands, namely tussocky grasslands such as spear grasses etc. Can also be found in open dry woodlands such as mulga or mallee. Wide distribution in Australia however has reduced in numbers in the south and tends to be rare in and around heavily settle areas.
<i>Arenaria interpres</i>	Ruddy Turnstone	-	R	21/02/1981	Unlikely	N	Coastal species that migrate to far northern destinations during Australian winter. As such, may pass through project area, but would not reside there

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Biziura lobata</i>	Musk Duck	-	R	4/02/2006	Possible	N	Deep permanent lakes with dense reedbeds on the fridges, with large open water spaces
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	V	1/02/1965	Unlikely	N	Freshwater estuaries, with heavily vegetation of shrubs and reeds. Spends practically all time in cover. More common in SE South Australia, with only a handful of records from the EP
<i>Calamanthus cautus</i>	Shy Heathwren	-	R	15/05/2008	Highly Likely	Y	Found in heathy areas, and generally dense thickets. Uncommon throughout its range, however has been noted in good numbers by Brandle (2010) on southern Eyre Peninsula, possibly indicating the importance of the area for this species.
<i>Calidris alba</i>	Sanderling	-	R	2/10/2000	Unlikely	N	Beach dweller however may move through the project zone during summer
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	-	V	27/02/2008	Likely	N	Diverse woodland species. Eyre Peninsula sub-species have distinct migratory pattern, spending summer breeding in Sugar Gums in the Koppio Hills before heading north to Wudinna area. Feeds on variety of seeds and insects. Unfortunately, small population affected by stochastic event, and now few individuals remain
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	-	R	19/01/2010	Highly Likely	Y	Breeds on offshore islands such as the Sir Joseph Banks Group of EP, however frequent visitor to the mainland, and will be observed in close proximity with livestock and in pastures
<i>Charadrius mongolus</i>	Lesser Sand Plover	-	R	17/02/1973	Unlikely	N	Inter-tidal mudflats and estuaries- migrates to Australia during summer, but is rare in south
<i>Cladorhynchus leucocephalus</i>	Banded Stilt	-	V	26/04/2006	Likely	N	Salt lakes along the coast as well as inland areas. Congregates in large flocks, and will breed on many usual

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
							dry large inland lakes such as Lake Torrens or Lake Eyre. Very dispersive species.
<i>Corcorax melanorhamphos</i>	White-winged Chough	-	R	15/05/2008	Highly Likely	Y	Found in open Eucalyptus woodlands, this species lives in small closely bonded family groups of up to 20 individuals. One of only a number of mud nest builders. Tend to be locally common, but rather fragmented.
<i>Egretta garzetta</i>	Little Egret	-	R	26/01/2000	Possible	N	Wetlands, both fresh and saline, usually foraging within the shallows of these areas. Widespread, and can be classed as nomadic or migratory
<i>Falco peregrinus</i>	Peregrine Falcon	-	R	23/11/2006	Likely	Y	Found throughout a wide variety of habitat types across Australia, however are never classed as common. Nests on cliffs, and has adapted to utilise human structures such as communication towers, mines or buildings. As such, can be found in areas that once were unfavourable.
<i>Gerygone fusca</i>	Western Gerygone	-	R	13/12/2007	Likely	N	Woodland species with a strong musical call. Usually restricted to central arid Australia and areas of Western Australia and Queensland. A small fragmented population persist in and around the Southern Eyre Peninsula, particularly the Tod Reservoir.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Mi	E	26/01/2000	Possible	N	Usually coastal, however can head inland, and may follow rivers or visit flooded lagoons or lakes.
<i>Leipoa ocellata</i>	Malleefowl	VU	V	13/11/2007	Highly Likely	N	Widespread Southern Australian species that needs dense mallee thickets that produce suitable leaf litter, as well as a sandy substrate for nest construction. Have suffered greatly throughout their historical range due to changes in farming practices, and inappropriate fire regimes.
<i>Limosa lapponica</i>	Bar-tailed Godwit	-	R	4/06/2004	Likely	N	Sheltered bays and lagoons, however will also visit sewerage ponds,

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Limosa limosa</i>	Black-tailed Godwit	-	R	5/01/1999	Unlikely	N	Sheltered bays and lagoons, however will also visit sewerage ponds, More common in Northern Australia
<i>Lophoictinia isura</i>	Square-tailed Kite	-	E	20/12/1972	Unlikely	N	Eucalyptus woodlands and heath, Found throughout the East coast, as well as distinct populations in the Perth Hills, they are practically absent from much of South Australia. As such, they are rare.
<i>Myiagra inquieta</i>	Restless Flycatcher	-	R	13/05/2008	Likely	N	Open woodlands, including farms. Can be classed as sedentary throughout its range.
<i>Neophema elegans</i>	Elegant Parrot	-	R	2/08/2006	Highly Likely	N	Woodlands from dry regions though to more heavily woodland and wetter regions. Can be slightly migratory, moving throughout its range during the year
<i>Neophema petrophila</i>	Rock Parrot	-	R	22/10/2008	Possible	N	Coastal species breeding mainly on off-shore islands under limestone ledges. Spends some time on the mainland, however rarely heads far inland
<i>Numenius madagascariensis</i>	Eastern Curlew	-	V	10/02/1985	Unlikely	N	Large wader with exceptionally long bill. Found along tidal mudflats and estuaries or mangroves, rare inland visitor. May migrate through the project, but will not reside,
<i>Numenius phaeopus</i>	Whimbrel	-	R	2/01/1973	Unlikely	N	Mudflats and estuaries, occasionally on inland salt lakes. Migratory species, common in northern Australia, however rare along southern areas
<i>Oxyura australis</i>	Blue-billed Duck	-	R	15/05/2008	Possible	N	Breeds in deep permanently vegetated lakes and dams. Spends winters on more open waters
<i>Pachycephala inornata</i>	Gilbert's Whistler	-	R	15/05/2008	Highly Likely	Y	Found in mallee habitats, as well as mulga, with a dense understorey. Loud, repetitive call. Can be nomadic in movements, and uncommon throughout their range.

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Pandion cristatus</i>	Eastern Osprey	-	E	10/02/2008	Possible	N	Usual coastal, however will follow rivers many kilometres inland to well established pools and water courses. More common in Northern Australia.
<i>Philomachus pugnax</i>	Ruff	-	R	21/02/1981	Unlikely	N	Mudflats and estuaries however can be found in inland saline lakes and pools. A rare visitor to Australia, however a number of inland records exist for this species.
<i>Plegadis falcinellus</i>	Glossy Ibis	-	R	21/11/1987	Unlikely	N	Swamps, sewage ponds, flooded or irrigated pastures and sheltered marine habitats. Common in Northern Australia, less common in the south and west of the continent.
<i>Podiceps cristatus</i>	Great Crested Grebe	VU	R	16/12/2004	Unlikely	N	Prefers well vegetated margins and reedbeds channels near open waters. These tend to lakes or reservoirs. Strong hold of the species is the far SE of Australia, but can disperse during non-breeding. Rarely seen on small farm stock dams or lakes.
<i>Stagonopleura guttata</i>	Diamond Firetail	-	V	17/11/2008	Highly Likely	Y	Striking Australian finch, habituating open forests with grass understoreys; commonly along the sides of watercourses or roadways. Can be found in pastoral areas or cropping land. Patchy occurrence, including on the Eyre Peninsula.
<i>Stictonetta naevosa</i>	Freckled Duck	-	V	10/01/2003	Possible	N	A large darkly coloured duck found on large freshwater lakes and rivers, however needs dense vegetation consisting of Melaleuca, Casuarina or grasses. Nomadic in movements, following water flows and availability of food
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula)	VU	E	1/07/2004	Likely	N	Small wren with very large tail consisting of few feathers that resemble emu feathers. Three populations in South Australia all fragmented and isolated. EP Southern Emu-wrens are found in heathy areas, especially along

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
							creeklines. Population in Koppio Hills decimated by fire in 2005 and may exist along easement.
<i>Tringa glareola</i>	Wood Sandpiper	-	R	16/12/2004	Possible	N	Freshwater lakes, flooded pastures and dams, and less common in saline or brackish areas. Is an uncommon visitor to Australia, spending the summer before departing from northern destination in winter
<i>Turnix varius</i>	Painted Button-quail	-	R	14/12/2004	Possible	N	Open forest that may contain Banksia or Brigalow. Have been found on stony ridges with abundant leaf litter but limited grass. More common east of the Eyre Peninsula.
<i>Xenus cinereus</i>	Terek Sandpiper	-	R	6/12/1981	Unlikely	N	Sheltered bays and lagoons, however will also visit sewerage ponds and salt fields. Common in northern areas, rare in the south. Migrates to Australia during summer, leaves over winter.
Mammals							
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V	19/10/2010	Highly Likely	N	The largest of Australia's 19 dunnart species. On EP, prefer habitats characterised by parallel sand dunes with associations of open mallee with a diverse shrub layer and Spinifex (<i>Triodia irritans</i>). Mallee Cypress Pine (<i>Callitris verrucosa</i>). Spinifex is a key habitat component, as Sandhill Dunnarts build a nest within the centre of the plant, which is both protected and insulated by the needles of the tussock. Numerous records from Middleback ranges and Hincks Conservation Park
<i>Trichosurus vulpecula</i>	Common Brush-tailed Possum		R	12/12/2007	Possible	N	The Common Brushtail Possum is a solitary, nocturnal and arboreal marsupial, endemic to Australia. In Australia, they are found in five disjunct groups: northern, eastern, central, and south western mainland

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
							<p>Australia, as well as Tasmania. Brushtail Possums prefer to make a nest in a tree-hole, but in their absence will make a nest in hollow logs, abandoned burrows and roof spaces. Most young are born in Autumn.</p> <p>Although named 'common' they are rare in South Australia, having disappeared from most regions apart from urban centres.</p> <p>Small population exists on Eyre Peninsula, including the Koppio Hills.</p>
Reptiles							
<i>Bassiana trilineata</i>	Western Three-lined Skink		R	11/12/1985	Unlikely	N	This species is found in dense vegetation in the edge of wetland margins. They are confined to the southern tips of the Eyre Peninsula, mainly in Port Lincoln National Park or Coffin Bay National Park..
<i>Echiopsis curta</i>	Bardick		R	2/12/2002	Possible	N	Tending to habitats in mallee or heath with Spinifex understoreys, this species is found in numerous locations across the Eyre Peninsula. Records exist from both the Middleback Ranges and Hincks CP, with the easement passing through or close to both. As such, Bardick maybe encountered along the current and proposed easement
<i>Emydura macquarii</i>	Macquarie Tortoise		V	1/01/1950	Unlikely	N	Possible introduction from pet stock (Brandle 2010). Unlikely, however populations may establish in permanent water sources
<i>Lerista distinguenda</i>	Dwarf Four-toed Slider		R	6/12/2003	Possible	N	Found within Sandy mallee margins in the central and northern areas of Eyre Peninsula. This species has numerous records from in and around the study area, and is a possible species within the easement.

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Morelia spilota</i>	Carpet Python		R	1/09/2000	Possible	N	Found throughout Australia in a variety of habitats, this species is found on the Northern Eyre Peninsula mainly within unburnt mallee vegetation, with a number of records from in and around the Middleback Ranges and Ironstone Hill CP
<i>Varanus rosenbergi</i>	Heath Goanna		R	1/01/1950	Unlikely	N	The Heath Goanna is the most southerly distributed of the Varanus genus, being found in southern Western Australia, and South Australia. They are moderately common on Kangaroo Island, however are rare on the mainland; including Eyre Peninsula. Majority of records exists within Port Lincoln National Park, and as such this species is unlikely to be encountered by this project
Amphibians							
<i>Pseudophryne bibronii</i>	Brown Toadlet	-	R	17/09/2001	Likely	N	Found in damp areas containing logs and pebbles, common in East coast States and Kangaroo Island and SE SA, rare in Mount Lofty ranges. Few records exist on Eyre Peninsula, one 15 km NNW of Port Lincoln, and one potential call recorded in Koppio Hills (Brandle 2010)

Source: Atlas of Living Australia 2012; Debus 1998; DSEWPac 2011b; Geering et al. 2008; Graham et al. 2001; Maguire 2008; Reader's Digest 1997; Simpson and Day 2009; Brandle (2010) and Morecombe (2000).

5.3 Field survey

5.3.1 Weather

During the baseline surveys, weather conditions were generally warm to hot, with extreme heat experienced in all survey months (Table 17 to Table 20). These conditions tended to cause birds to be very active in the early mornings or late afternoons, as they tend to shelter and attempt to avoid the heat during the middle parts of the day. The only rainfall recorded was in December, with a steady rain falling throughout the morning. March was dominated by extreme humidity and large storms across much of the Eyre Peninsula.

Table 17. Weather data Whyalla Aero in December 2012.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
10/12/2012	14.8	25.8	0	9am	19.6	48	ESE	19
				3pm	25.0	30	SSW	35
11/12/2012	15.6	32.8	0	9am	21.4	49	SSE	20
				3pm	31.5	20	S	30
12/12/2012	19.6	38.7	0	9am	25.9	50	S	15
				3pm	37.5	25	SE	20
13/12/2012	24.6	40.7	0	9am	34.6	26	N	26
				3pm	25.2	27.4	S	33
14/12/2012	21.6	27.3	0.4	9am	24.3	68	SSE	9
				3pm	22.6	88	NE	13

Table 18. Weather data Cleve Aero in January 2013.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
22/01/2013	13.9	26.0	0	9am	19.6	64	ESE	22
				3pm	25.6	36	SE	28
23/01/2013	15.6	32.8	0	9am	19.8	66	ESE	26
				3pm	25.4	43	SE	22
24/01/2013	19.6	38.7	0	9am	27.6	26	NNE	24
				3pm	38.2	9	N	28

Table 19. Weather data Cummins in February 2013.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
20/02/2013	15.2	25.7	0	9am	19.4	62	SE	35
				3pm	25.1	44	SSE	22
21/02/2013	12.9	28.0	0	9am	18.1	72	SSW	13
				3pm	26.5	39	SSE	19
22/02/2013	17.5	34.2	0	9am	21.7	75	E	17
				3pm	33.1	29	SE	6

Table 20. Weather data from Cummins March 2013.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
06/03/2013	17.5	36.2	0	9am	26.5	51	NNE	7
				3pm	33.3	30	ESE	15
11/12/2013	23.0	35.7	0	9am	27.5	56	NNE	15
				3pm	30.1	54	SSW	26

During the targeted surveys, weather conditions were generally cool to mild with extreme heat experienced on a single day November which was categorised as 'Catastrophic' on Eyre Peninsula (Table 21 to Table 24). The cooler conditions during the spring provided ideal temperatures for annual flowering plants, many of which were visible. Rainfall was recorded during all surveys with associated large storms which affected much of the Eyre Peninsula. The cooler conditions also favoured birds which enable foraging during the day, as opposed to only early morning and evening.

Table 21. Weather data from Cummins August 12th 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
12/08/2013	2.6	15.9	0.2	9am	10.7	93	NNW	7
				3pm	15.1	62	WNW	39
13/08/2013	5.2	17.9	8.0	9am	-	-	NNW	20
				3pm	17.7	48	NW	30
14/08/2013	0.4	14.6	2.8	9am	12.0	77	WSW	24
				3pm	13.8	62	WSW	28
15/08/2013	1.1	16.2	0	9am	7.5	100	NNE	13
				3pm	15.9	58	N	24
16/08/2013	6.9	12.9	0	9am	12.8	58	N	33
				3pm	10.5	100	W	33

Table 22. Weather data from Cummins August 27th 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
27/08/2013	9.5	21.7	0	9am	14.3	68	NNE	19
				3pm	19.4	65		W
28/08/2013	7.6	21.3	0	9am	-	-	N	9
				3pm	21.2	62		N
29/08/2013	11.7	16.6	18.2	9am	12.6	100	NW	22
				3pm	16.3	89		W

Table 23. Weather data Cleve Aero in September 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
30/09/2013	15.3	29.4	0	9am	27.2	24	NNW	39
				3pm	28.8	29		NNW
01/10/2013	7.8	17.1	1.0	9am	13.3	52	WSW	31
				3pm	15.6	43		W
02/10/2013	9.7	19.6	0	9am	14.9	64	WNW	39
				3pm	16.7	49		WSW

Table 24. Weather data from Cleve Aero in November 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
05/11/2013	8.1	32.7	0	9am			Calm	
				3pm	30.6	8		N
06/11/2013	21.0	37.5	0	9am	28.0	11	N	37
				3pm	35.8	7		NNW
07/11/2013	15.4	17.3	0	9am	16.2	81	SE	26
				3pm	16.2	79		S

5.3.2 Flora

A total of 352 native species and 24 exotic flora species were recorded for the project area across numerous vegetation associations and landforms. It is expected that additional species are present within inaccessible areas as well as some annual species which were inconspicuous at the time of the survey. Refer to Appendix 1 for the list of those species recorded during the 2012 -13 field surveys.

5.3.3 Threatened flora

Five nationally threatened species were recorded within the 120m wide transmission line corridor. An additional 19 state threatened flora species were also recorded. Table 25 lists the species and conservation ratings. Most of these individuals were found in moderate to high value large vegetation blocks, whilst others were contained within reasonable roadside remnants. Figure 27 to Figure 32 show records within the identified biodiversity hot spot areas discussed in Section 6.3 Biodiversity hot spots.

Table 25 Threatened flora species recorded during 2013 targeted surveys

Family	Species name	Common name	Cons. status	
			AUS	SA
LEGUMINOSAE	<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E
LEGUMINOSAE	<i>Acacia pinguifolia</i>	Fat-leaf Wattle	EN	E
ORCHIDACEAE	<i>Arachnorchis tensa</i>	Inland Green-comb Spider-orchid	EN	
LEGUMINOSAE	<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R
COMPOSITAE	<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V
SANTALACEAE	<i>Santalum spicatum</i>	Sandalwood		V
LEGUMINOSAE	<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R
LEGUMINOSAE	<i>Acacia hexaneura</i>	Six-nerve Spine-bush		R
LEGUMINOSAE	<i>Acacia imbricata</i>	Feathery Wattle		R
LEGUMINOSAE	<i>Acacia rhigiophylla</i>	Dagger-leaf Wattle		R
GRAMINEAE	<i>Austrostipa breviglumis</i>	Cane Spear-grass		R
GRAMINEAE	<i>Austrostipa tenuifolia</i>			R
LEGUMINOSAE	<i>Daviesia benthamii</i> ssp. <i>humilis</i>	Mallee Bitter-pea		R
LEGUMINOSAE	<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R
MYOPORACEAE	<i>Eremophila gibbifolia</i>	Coccid Emubush		R
MYRTACEAE	<i>Eucalyptus cretata</i>	Darke Peak Mallee		R
GOODENIACEAE	<i>Goodenia benthamiana</i>	Bentham's Goodenia		R
CHENOPODIACEAE	<i>Maireana suaedifolia</i>	Lax Bluebush		R
ORCHIDACEAE	<i>Microtis</i> sp. <i>Nash</i> (R. Bates 44740)	Nash's onion orchid		R
COMPOSITAE	<i>Olearia adenolasia</i>	Musk Daisy-bush		R
RUTACEAE	<i>Philotheca angustifolia</i> ssp. <i>angustifolia</i>	Narrow-leaf Wax-flower		R
LABIATAE	<i>Prostanthera chlorantha</i>	Green Mintbush		R
RHAMNACEAE	<i>Spyridium leucopogon</i>	Silvery Spyridium		R
RHAMNACEAE	<i>Spyridium spathulatum</i>	Spoon-leaf Spyridium		R

5.3.4 Vegetation associations

The Eyre Peninsula has significant areas of remnant native vegetation and contains important habitats dominated by mallee and woodland communities, with shrublands, grasslands and sedgeland. The vegetation communities across the project area varied greatly given the distance from the northern extremity near Whyalla to the southern extent at Pt Lincoln. The northern semi-arid regions were largely dominated by *Acacia* and *Casuarina* woodlands with scattered patches of Bullock Bush low woodlands and chenopod shrublands grading into tall shrublands dominating the rocky hills associated with the Middleback range. On the lower slopes of the ranges mallee and chenopod communities became more prominent. These areas were frequently interspersed with large dune complexes characterized by mixed mallee communities over Spinifex understories, *Melaleuca uncinata* (Broombush), *Senna* spp. (Cassia) and *Dodonaea* spp. (Hopbush) tall shrublands. The southern sections of the corridor were much more fragmented with remnant patches dominated by stands of mature *Eucalyptus cladocalyx* (Sugar Gum), the mallee form *Eucalyptus odorata* (Peppermint Box) woodlands and scattered patches of *Acacia* tall shrubland. Creeklines were frequently dominated by the nationally Endangered *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Woodlands and *Melaleuca* tall shrublands, sometimes over *Gahnia* spp. (Cutting

Grass) Sedgeland. A total of seventy-five vegetation associations have been described and mapped across the project area (Table 26). Some associations have been broadly grouped together where dominant overstories were similar but where understorey assemblages differ. Each association has been assigned a condition rating (or range of conditions) which primarily reflects indigenous cover and weed invasion levels in the understorey. See Table 10 for description of ratings. See attachment for mapped vegetation associations across the project area.

Table 26. Vegetation Association Descriptions.

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
Woodlands						
<i>Acacia papyrocarpa</i> Woodland	Two vegetation associations typified by the presence of <i>Acacia papyrocarpa</i> (Western Myall). These range from the stereotypical large procumbent trees over a dense ground layer of bluebush and saltbush widespread in the area west of Whyalla and continuing south to the Middleback Range. The level of dominance of this species defines the associations where it will form co-dominance with species such as <i>Myoporum platycarpum</i> (Sugarwood).	1	<i>Acacia papyrocarpa</i> Low Open Woodland over <i>Maireana sedifolia</i> / <i>Atriplex vesicaria</i> / <i>Maireana pyramidata</i>			9:1
		7	<i>Acacia papyrocarpa</i> +/- <i>Alectryon oleifolius</i> ssp. <i>canescens</i> +/- <i>Myoporum platycarpum</i> mixed Low Open Woodland over <i>Atriplex vesicaria</i> / <i>Austrostipa</i> spp.			9:1
<i>Alectryon oleifolius</i> ssp. <i>canescens</i> Low Woodland	Exclusively recorded north of the Middleback Range where this association forms relatively large tracts on the alluvial soils and plains where soil depth and ephemeral runoff enable this species to outcompete other larger tree species. Threatened due to lack of regeneration as this species is preferentially grazed as juveniles by domestic and native herbivores.	4	<i>Alectryon oleifolius</i> ssp. <i>canescens</i> Low Woodland over <i>Atriplex vesicaria</i> / <i>Maireana sedifolia</i>		V	9:1
<i>Allocasuarina verticillata</i> Woodland	Primarily recorded on stony outcropping country and rises where exposure to the elements is highest. Can often contain a high diversity of understorey species and provide valuable food and nesting habitat for bird species.	40	<i>Allocasuarina verticillata</i> Low Woodland		V	2:1 – 8:1
<i>Casuarina pauper</i> Woodland	Recorded as scattered patches in similar habitats to <i>Alectryon oleifolius</i> (Bullock Bush) woodlands and <i>Acacia papyrocarpa</i> (Western Myall). Often found on the foot slopes of ranges and sites with shallow soil profiles.	5	<i>Casuarina pauper</i> Low Woodland over <i>Maireana sedifolia</i> and <i>Atriplex vesicaria</i>			9:1
<i>Callitris gracilis</i> Woodland	Recorded as variable levels of dominance dependent on soil profiles. Prefers well drained soil profiles and the soil type can dictate largely what grows in association with it. Not typically a high habitat value associated with this association however there are communities which exhibit an aged stratum that have been largely cleared and fragmented, leaving remaining patches at a high risk of further degradation.	23	<i>Callitris gracilis</i> Low Woodland over <i>Alyxia buxifolia</i> and <i>Beyeria lechenaultii</i> +/- <i>Alectryon oleifolius</i> ssp. <i>canescens</i> +/- <i>Dodonaea viscosa</i> ssp. <i>angustissima</i>			10:1
		33	<i>Callitris gracilis</i> Very Open Woodland over <i>Austrostipa</i> spp.			6:1
		41	<i>Callitris gracilis</i> Low Woodland over <i>Geijera linearifolia</i> +/- <i>Allocasuarina verticillata</i> +/- <i>Pittosporum angustifolium</i>			3:1 – 6:1
<i>Callitris verrucosa</i> Woodland	Small patch identified within large intact patches of mallee vegetation within the Sheoak Hill CP.	73	<i>Callitris verrucosa</i> / <i>Eucalyptus leptophylla</i> Low Woodland			10:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
<i>Eucalyptus cladocalyx</i> Woodland	Large remnant patches of this association are present throughout the southern half of the alignment and provide some of the highest conservation significant patches recorded.	57	<i>Eucalyptus cladocalyx</i> Woodland / Open Woodland			4:1 – 9:1
		60	<i>Eucalyptus cladocalyx</i> Very Open Woodland over scattered native shrubs and exotics			3:1 – 6:1
<i>Eucalyptus petiolaris</i> Woodland	Mostly recorded as small remnant patches bordering creeks and in road reserves. High value association, providing habitat resources for a number of fauna species. Forms a large tree stratum in places. Threatened at national and State level.	58	<i>Eucalyptus petiolaris</i> +/- <i>Eucalyptus odorata</i> +/- <i>Allocasuarina verticillata</i> Open Grassy Woodland	EN	E	2:1 – 5:1
		70	<i>Eucalyptus petiolaris</i> Woodland over <i>Acacia pycnantha</i>	EN	E	3:1
Mallee						
<i>Eucalyptus oleosa</i> Mallee	Recorded near the Middleback range as an overstorey to the bluebush and as a mixed mallee stratum. Typically recorded in the sandy low rainfall areas.	14	<i>Eucalyptus oleosa</i> +/- <i>Eucalyptus</i> spp. Mallee over <i>Maireana sedifolia</i>			9:1
		16	<i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> Mallee			9:1 – 10:1
		71	<i>Eucalyptus oleosa</i> / <i>Eucalyptus gracilis</i> / <i>Eucalyptus phenax</i> Mallee			10:1
		74	<i>Eucalyptus oleosa</i> +/- <i>Callitris gracilis</i> over <i>Beyeria lechenaultii</i> / <i>Alyxia buxifolia</i> Mallee			10:1
<i>Eucalyptus socialis</i> / <i>E. brachycalyx</i> Mallee	The most widespread and largest vegetation association recorded along the alignment this covers much of the available mallee habitat. Prefers the deeper sand profile areas and is very commonly recorded with <i>Triodia</i> species in the understorey. The variation in associations is primarily due to the density and understorey structures recorded. Due to the very homogenous nature of the mallee there are areas hard to distinguish and transition rapidly across the landscape. Slight changes in elevation can give rise to abrupt change in understorey structures. Buckshot or ironstone outcrops give rise to largely <i>Melaleuca</i> dominant communities and can change in the space of 50 metres.	17	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>			4:1 – 10:1
		30	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Melaleuca lanceolata</i> and <i>Melaleuca acuminata</i>			2:1- 10:1
		32	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Atriplex stipitata</i> , <i>Nitraria billardierii</i> , <i>Maireana</i> spp. and <i>Disphyma</i> sp.			4:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
		34	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over Exotic Grasses +/- Chenopod spp.			3:1 – 5:1
		35	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Acacia</i> spp., <i>Leptospermum coriaceum</i> , <i>Triodia</i> spp., <i>Austrostipa</i> spp. and <i>Austrodanthonia caespitosa</i>			4:1 – 5:1
		39	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Melaleuca uncinata</i> +/- <i>Melaleuca lanceolata</i> +/- <i>Melaleuca acuminata</i>			2:1 – 5:1
		72	<i>Eucalyptus socialis</i> / <i>Eucalyptus phenax</i> Mallee over <i>Melaleuca lanceolata</i> , <i>Olearia floribunda</i> , <i>Melaleuca uncinata</i>			10:1
<i>Eucalyptus leptophylla</i> Mallee	Only very small patches of this association existed where <i>E. leptophylla</i> (Narrow-leaf Mallee) provided the dominant cover. Mostly recorded as being sometimes present in other associations.	20	<i>Eucalyptus leptophylla</i> +/- <i>Eucalyptus oleosa</i> +/- <i>Melaleuca lanceolata</i> mixed Mallee over <i>Cratystylis conocephala</i> and <i>Atriplex vesicaria</i>			10:1
<i>Eucalyptus porosa</i> Mallee	Recorded in the sandier areas often in association with <i>Callitris</i> woodlands and <i>Melaleuca</i> dominant patches. More likely to contain hollows than other mallee stratum.	25	<i>Eucalyptus porosa</i> Mallee over <i>Dodonaea viscosa</i> ssp. <i>angustissima</i> , <i>Senna artemisioides</i> ssp. <i>coriacea</i> , <i>Acacia wilhelmiana</i>			10:1
		36	<i>Eucalyptus porosa</i> Open Woodland +/- <i>Acacia notabilis</i>			4:1 – 8:1
<i>Eucalyptus incrassata</i> Mallee	Primarily dominant on the dune ridgelines south of the Middleback range. These are mostly remnant from areas not cleared for cropping due to the poor soil quality for cereals. Many highly degraded due to the fragmented nature of the remnant patches. Some higher quality patches exist in association with conservation parks.	26	<i>Eucalyptus incrassata</i> +/- <i>Callitris verrucosa</i> Mallee over <i>Leptospermum coriaceum</i> , <i>Phebalium bullatum</i> , <i>Triodia</i> spp. and <i>Calytrix tetragona</i>			10:1
		27	<i>Eucalyptus incrassata</i> +/- <i>Callitris verrucosa</i> Mallee over <i>Melaleuca uncinata</i> and <i>Calytrix tetragona</i>			4:1 – 10:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
		44	<i>Eucalyptus incrassata</i> +/- <i>Melaleuca uncinata</i> +/- <i>Melaleuca lanceolata</i> Mallee over <i>Ehrharta calycina</i>			2:1
		53	<i>Eucalyptus incrassata</i> +/- <i>Melaleuca uncinata</i> +/- <i>Melaleuca lanceolata</i> Mallee			9:1
<i>Eucalyptus incrassata</i> var. <i>angulosa</i> Mallee	Small patch in southern area of alignment.	59	<i>Eucalyptus incrassata</i> var. <i>angulosa</i> Mallee over <i>Melaleuca uncinata</i>			6:1 – 9:1
<i>Eucalyptus brachycalyx</i> Mallee	<i>E. brachycalyx</i> (Gilja) dominant patch in high value mallee stratum.	29	<i>Eucalyptus brachycalyx</i> +/- <i>Callitris verrucosa</i> Mallee over <i>Calytrix involucreta</i> and <i>Phebalium bullatum</i>			10:1
<i>Eucalyptus calycogona</i> ssp. <i>calycogona</i> Mallee	Remnant patch along ephemeral drainage channel with degraded understorey due to grazing. Low quantity recorded within alignment and may be poorly represented in region.	43	<i>Eucalyptus calycogona</i> ssp. <i>calycogona</i> +/- <i>Eucalyptus phenax</i> ssp. <i>phenax</i> Mallee over <i>Maireana brevifolia</i> and other exotics			4:1 – 5:1
<i>Eucalyptus diversifolia</i> Mallee	In similar habitat types to <i>E. incrassata</i> (Ridge-fruited Mallee), this is found as remnant on remaining uncleared dune ridges in cropping country. Condition varies due to amount of grazing allowed and quality of understorey vegetation.	45	<i>Eucalyptus diversifolia</i> +/- <i>Eucalyptus incrassata</i> Mallee over exotics and <i>Enchylaena tomentosa</i>			2:1
		69	<i>Eucalyptus diversifolia</i> Mallee			4:1
<i>Eucalyptus peninsularis</i> Mallee	Remnant vegetation patches in cropped areas, primarily found in shallow soils underlain by limestone. High value understorey mostly as scattered shrubs and tussocks due to high cover of canopy.	46	<i>Eucalyptus peninsularis</i> +/- <i>Eucalyptus dumosa</i> Mallee over <i>Enchylaena tomentosa</i> and emergents		E	2:1 – 6:1
		47	<i>Eucalyptus peninsularis</i> +/- <i>Eucalyptus dumosa</i> Mallee over <i>Gahnia deusta</i> and herbaceous annual spp.		E	4:1 – 9:1
<i>Eucalyptus odorata</i> Mallee	Very variable in habit but always found as small remnants along creek lines and road reserves. Due to the high quality soil profile this association is found, it is almost entirely cleared and very small linear patches are left. Understorey very often contains nationally threatened species in association. This mallee variety of the association is not regarded as the Nationally Threatened Community (TSSC), 2007).	48	<i>Eucalyptus odorata</i> +/- <i>Eucalyptus incrassata</i> Mallee over <i>Melaleuca uncinata</i>			4:1
		49	<i>Eucalyptus odorata</i> +/- <i>Eucalyptus pileata</i> Mallee over <i>Acacia imbricata</i> and <i>Melaleuca uncinata</i>			8:1
		56	<i>Eucalyptus odorata</i> +/- <i>Eucalyptus pileata</i> / <i>Eucalyptus leptophylla</i> Mallee over <i>Melaleuca uncinata</i>			4:1 – 9:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
		61	<i>Eucalyptus odorata</i> Woodland			2:1 – 4:1
		38	<i>Eucalyptus odorata</i> Woodland over <i>Leptospermum coriaceum</i> +/- <i>Callistemon rugulosus</i>			4:1 – 5:1
<i>Eucalyptus phenax</i> ssp. <i>phenax</i> Mallee	Typical mallee stratum found in small patches in association with <i>Allocasuarina</i> populations in some cases.	55	<i>Eucalyptus phenax</i> ssp. <i>phenax</i> Mallee over exotic grasses, <i>Austrodanthonia</i> spp., <i>Austrostipa</i> sp.			5:1
Shrublands						
<i>Acacia</i> spp. mixed Shrubland	Found in mallee habitats as low shrublands on stony outcropping areas	24	<i>Acacia wilhelmiana</i> +/- <i>Senna artemisioides</i> ssp. <i>coriacea</i> +/- <i>Eucalyptus gracilis</i> +/- <i>Melaleuca uncinata</i> Tall Shrubland over <i>Triodia</i> spp. +/- <i>Eucalyptus incrassata</i> +/- <i>Eucalyptus brachycalyx</i>			10:1
<i>Acacia burkittii</i> Shrubland	Recorded on rocky hill slope on northern side of Middleback range. Forms a transition from the Western Myall dominant plains to the north and he ranges associations. Primary <i>Santalum spicatum</i> (Sandalwood) habitat.	6	<i>Acacia burkittii</i> / <i>Acacia oswaldii</i> Tall Shrubland over <i>Dodonaea lobulata</i> / <i>Senna artemisioides</i> ssp. <i>artemisioides</i>			9:1
<i>Acacia dodonaeifolia</i> Shrubland	Small remnant patches on open hillsides heavily suckering with little to no understorey due to density. Most likely response from Wangary fires.	65	<i>Acacia dodonaeifolia</i> Tall Shrubland			2:1 – 3:1
<i>Acacia paradoxa</i> Shrubland	Common species forming large patches of thick scrub in association with sugar gum woodlands. Responds favourable to disturbance, such as fire.	63	<i>Acacia paradoxa</i> Shrubland +/- <i>Eucalyptus</i> spp.			2:1 – 4:1
<i>Callistemon rugulosus</i> Shrubland	Small patches forming dense stands mostly in creek line areas.	68	<i>Callistemon rugulosus</i> Tall Shrubland			2:1
<i>Eremophila</i> spp. Shrubland	Most commonly recorded in the Middleback range areas on low hills and rocky outcrops. Often mixed with chenopod shrubs in the understorey at low densities.	11	<i>Eremophila alternifolia</i> Tall Shrubland over <i>Aristida contorta</i> , <i>Austrostipa nitida</i> , <i>Maireana sedifolia</i> and <i>Ptilotus incanus/obovatus</i>			10:1
		13	<i>Eremophila oppositifolia</i> , <i>Eremophila alternifolia</i> , <i>Dodonaea lobulata</i> , <i>Acacia</i>			10:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
			<i>nyssophylla</i> Open Shrubland over <i>Maireana sedifolia</i> and <i>Rhagodia ulicina</i>			
<i>Geijera linearifolia</i> Shrubland	Association most prolific on the southern edge of the Middleback Range. Forms a transition from the stonier rises to the sandy mallee country.	21	<i>Geijera linearifolia</i> +/- <i>Senna artemisioides</i> ssp. <i>coriacea</i> +/- <i>Callitris gracilis</i> +/- <i>Acacia notabilis</i> +/- <i>Alyxia buxifolia</i> Shrubland			10:1
<i>Melaleuca lanceolata</i> Shrubland	This species most often occurs as a mix in mallee and coastal areas however in some places forms large stands of dominance. In association 42 occurs as remnant on linear dune rises.	42	<i>Melaleuca lanceolata</i> +/- <i>Eucalyptus phenax</i> ssp. <i>phenax</i> Tall Shrubland over exotic grasses			2:1 – 3:1
		19	<i>Melaleuca lanceolata</i> Tall Shrubland over <i>Atriplex stipitata</i> and <i>Dodonaea viscosa</i> ssp. <i>angustissima</i>			10:1
<i>Melaleuca halmaturorum</i> Shrubland	Recorded in the permanent creek lines in the southern section of the alignment. Often saline low lying areas and providing valuable habitat for waterfowl.	66	<i>Melaleuca halmaturorum</i> Tall Open Shrubland over <i>Juncus kraussii</i> and <i>Juncus pallidus</i>			2:1 – 6:1
<i>Melaleuca uncinata</i> Shrubland	Recorded on the ironstone outcrops present in the mallee areas south of the Middleback Range.	22	<i>Melaleuca uncinata</i> Tall Shrubland +/- <i>Eucalyptus incrassata</i> and <i>Eucalyptus brachycalyx</i>			4:1 – 10:1
		28	<i>Melaleuca uncinata</i> Tall Shrubland			4:1 – 10:1
		75	<i>Melaleuca uncinata</i> +/- <i>Eucalyptus brachycalyx</i> +/- <i>Callitris gracilis</i> +/- <i>Eucalyptus oleosa</i>			10:1
<i>Senna artemisioides</i> ssp. Shrubland	Dominant on the rocky hills of the Middleback Range this occupies a small overall area of the alignment.	18	<i>Senna artemisioides</i> ssp. <i>coriacea</i> , <i>Dodonaea lobulata</i> Tall Shrubland +/- <i>Myoporum platycarpum</i> , <i>Dodonaea viscosa</i> ssp. <i>angustissima</i> and <i>Acacia oswaldii</i>			10:1
Chenopod Shrublands						
<i>Atriplex vesicaria</i> Shrubland	Important stabilising species recorded in the arid zone north of the Middleback range. Widely known as an indicator species where high abundance correlates with good condition of the landscape.	10	<i>Atriplex vesicaria</i> Low Shrubland			9:1
<i>Maireana pyramidata</i> /		3	<i>Maireana pyramidata</i> / <i>Atriplex vesicaria</i> +/- <i>Maireana sedifolia</i> Low Open Shrubland			9:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
<i>Atriplex vesicaria</i> Shrubland	Low priority vegetation stratum where degraded condition and some weed infestation has occurred. Usually associated with heavy grazing impacts from sheep.	9	<i>Maireana pyramidata</i> Low Shrubland +/- <i>Myoporum platycarpum</i> , <i>Acacia papyrocarpa</i> , <i>Alectryon oleifolius</i> ssp. <i>canescens</i>			9:1
<i>Maireana sedifolia</i> Shrubland	Very long lived species that requires specific condition to germinate and establish. Very difficult to rehabilitate and should be avoided where possible.	12	<i>Maireana sedifolia</i> Low Shrubland +/- <i>Myoporum platycarpum</i> , <i>Acacia papyrocarpa</i> , <i>Eucalyptus gracilis</i> , <i>Alectryon oleifolius</i> ssp. <i>canescens</i>			9:1
		2	<i>Maireana sedifolia</i> Low Shrubland +/- <i>Acacia papyrocarpa</i> over <i>Austrostipa</i> spp. and <i>Austrodanthonia caespitosa</i>			9:1
<i>Tecticornia</i> sp. Shrubland	Occurs in saline habitats where few other species can survive. Samphire provides food resources for a number of threatened species.	37	<i>Tecticornia</i> sp. Low Open Shrubland			3:1 – 8:1
		50	<i>Tecticornia</i> sp. +/- <i>Melaleuca halmaturorum</i> shrubland over exotic grasses and emergent's			3:1
Grasslands / Sedgeland						
<i>Austrodanthonia</i> spp. / <i>Austrostipa</i> ssp. Grassland	Remnant patches of native grassland mostly recorded in road reserves and rough terrain unsuitable for traversing by machinery and subsequent application of phosphates.	31	<i>Austrodanthonia</i> spp. / <i>Austrostipa</i> ssp. +/- <i>Themeda triandra</i> Tussock Grassland		E	2:1 – 7:1
		51	<i>Austrostipa</i> sp. Tussock Grassland +/- <i>Eucalyptus</i> spp.			5:1
<i>Triodia</i> spp. Hummock Grassland	Common association recorded on steep rocky hills and dunes. High habitat value for small fauna species	8	<i>Triodia</i> spp. Hummock Grassland over <i>Austrostipa</i> spp., <i>Aristida contorta</i> , <i>Sida petrophila</i>			9:1
<i>Ficinia nodosa</i> Sedgeland	Very common association recorded on sands where temporary inundation occurs periodically. Infestation of <i>Ehrharta</i> sp (Veldt Grass) reduces the value.	54	<i>Ficinia nodosa</i> Sedgeland over <i>Ehrharta calycina</i>			3:1
<i>Gahnia</i> spp. / <i>Juncus kraussii</i> Sedgeland	Recorded on flood plains and adjacent to creeks and rivers where water pools for extended period following periods of flooding. Largely cleared due to location on high quality soils and availability through drainage.	62	<i>Gahnia</i> spp. / <i>Juncus kraussii</i> Sedgeland +/- <i>Eucalyptus petiolaris</i>		E	2:1 – 6:1
<i>Juncus</i> spp Sedgeland	Sedgeland recorded in the vicinity of Tod river. Common and widespread.	64	<i>Juncus</i> spp Sedgeland			1:1 – 3:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
<i>Juncus acutus</i> Sedgeland	Weed dominated Sedgeland.	67	<i>Juncus acutus</i> Sedgeland			0:1
Miscellaneous						
Grassland	Contains the odd scattered native shrub throughout.	15	Agricultural land (cropping / grazing)			1:1
Shrubland / woodland	Revegetation area	52	Planted			0:1

1 = Environment Protection and Biodiversity Conservation Act 1999)

2 = Provisional List of Threatened Ecosystems of South Australia (DEH in progress)

3 = Vegetation condition ratio, determined using criteria adopted by the Native Vegetation Council to calculate SEB offset requirements for native vegetation clearance (Table 10).

5.3.5 Threatened Ecological Communities

Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland has recently been listed as Endangered at a national level. The community is endemic to Eyre Peninsula. Some of the main threatening processes which have led to the decline in extent by approximately 91% and degradation of the remaining remnants include clearance and fragmentation, overgrazing, weed species such as perennial Veldt Grass (*Ehrharta longiflora*) and Bridal Creeper (*Asparagus asparagoides*), increasing salinisation through rising water tables, dieback and inappropriate fire regimes (TSSC, 2013). The examples mapped along the transmission line corridor were mostly degraded with only a few remnants in moderate condition. All have been compromised by exotic species in the understorey and some by inappropriate grazing levels and therefore some of these may not qualify as the TEC under the Approved Conservation Advice (TSSC, 2013).

DEWNR's *Provisional List of Threatened Ecosystems of South Australia* (DEH in progress), includes a number of plant communities mapped along the transmission line corridor which are considered threatened in South Australia. Descriptions and ratings of TEC's are provided in Table 27.

Table 27. State threatened plant communities within project area.

Veg Assoc #	Plant association	AUS Status	SA Status	Comments
58, 70	<i>Eucalyptus petiolaris</i> Woodland	EN	E	Mostly recorded as small remnant patches associated with creeks, drainage areas and in road reserves. High value association, providing habitat resources for a number of fauna species. Forms a large tree stratum in places. All examples are generally degraded (Moderate (5:1) – Very Poor (2:1)).
40	<i>Allocasuarina verticillata</i> Low Woodland		V	Occurs on clay loams of low hills. Formally extensive, but much has been extensively cleared and very little remains. Some good patches remain but most is highly modified by clearance, weeds and grazing. Approximately only 11 % of the mapped community is protected in reserves or Heritage Agreements. Examples within project area vary in condition from very poor (2:1) to very good (8:1).
4	<i>Alectryon oleifolius</i> ssp. <i>canescens</i> Low Woodland over <i>Atriplex vesicaria</i> / <i>Maireana sedifolia</i>		V	Occurs mainly north of the Middleback Ranges where it forms relatively large tracts on the alluvial soils and plains where soil depth and ephemeral runoff enable this species to outcompete other larger tree species. Threatened due to lack of regeneration as this species is preferentially grazed as juveniles by domestic and native herbivores. Approximately 5.3% of remaining association protected in Heritage Agreements and reserves.
46, 47	<i>Eucalyptus peninsularis</i> , <i>E. dumosa</i> complex Woodland		E	Occurs on flat or rarely hilly areas characterised by loams or clay-loams. Most remaining examples are small and/or degraded and/or atypical. Considered to have a limited range with only small areas occurring in

Veg Assoc #	Plant association	AUS Status	SA Status	Comments
				reserves. <i>Eucalyptus peninsularis</i> (Cummins Mallee) is endemic to the EP and occurs within the Eyre Hills IBRA Sub-region and is distributed between Cummins and Yeelanna and also through the Koppio Hills. Reserves and Heritage Agreements protect some areas of the community (DEH, 2002).
58, 70	<i>Eucalyptus petiolaris</i> (Eyre Peninsula Blue Gum) Grassy Woodland		E	Endemic community to the EP, the association has a limited distribution along watercourses, often with a dense understorey of <i>Callistemon rugulosus</i> (Scarlet Bottlebrush). Occurs on heavy, fertile soils on plains. Mostly confined to the Eyre Hills IBRA Subregion and is mainly distributed throughout the central and northern parts of the Koppio Hills. 11% of the mapped community is protected. Most mapped examples within the project area in moderately poor condition, compromised by weeds and grazing.
62	<i>Gahnia trifida</i> (Cutting Grass) Sedgeland		E	<i>Gahnia trifida</i> Sedgeland covers a very small area and is restricted to low lying swampy areas and some creeklines predominantly in the Lower Eyre Peninsula. Climate change projections indicate that these habitats are likely to be impacted further in the future (Brandle, 2010). On the EP it is confined to the Eyre Hills IBRA Sub-region.
31	<i>Austrodanthonia</i> spp. / <i>Austrostipa</i> ssp. +/- <i>Themeda triandra</i> Tussock Grassland		E	Small remnant examples of tussock grasslands occur in patches scattered throughout all IBRA Subregions on heavy fertile soils of plains and hill slopes. Most are highly modified by grazing and weed invasion.

5.3.6 Threatened Habitat Areas

Five threatened habitat areas across the Eyre Peninsula were identified based on a number of factors including regionally threatened ecosystems, low remnancy and highly fragmented and isolated vegetation blocks, low representation within the reserve system and large numbers of threatened species, many at a national level. Two of the threatened habitat areas are intersected by the proposed transmission line corridor; Cleve Hills (322,000ha) and Koppio Hills (96,000ha) (DEH, 2002).

Cleve Hills Threatened Habitat Area lies within the northern part of the Eyre Hills IBRA Subregion. The area is known to possess a high number of national and State threatened flora species, 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 rheticocarpa* (Neat Wattle), *Pterostylis aff despectans* (Lowly Greenhood), *Pterostylis xerophila* (Desert Greenhood) and *Arachnorchis brumalis* (Winter Spider-orchid). At the time the Threatened Habitat Areas were identified, approximately 34% of Cleve Hills was

protected in government reserves (DEH, 2002), however the 2012 proclamation of Ironstone Hill CP has increased the total proportion protected. Reserves intersected by the proposed transmission line corridor include Ironstone Hill CP, Sheoak Hill CP and Sheoak Hill CR.

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 communities are known to support a more diverse suite of native mammals and reptiles than other vegetation types including Southern Ningauai, Grey-bellied Dunnart, Crested Dragon and a range of other geckoes, snake-lizards, dragon lizards and snakes (DEH, 2002).

The Koppio Hills Threatened Habitat Area occupies an area of approximately 96,000ha and is located within the Eyre Hills IBRA Subregion. Approximately 18,000ha of remaining vegetation has been mapped across the area (DEH, 2002). 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 (DEH, 2002) and covers approximately 13,000 hectares (Brandle, 2010). The community offers valuable habitat for native fauna in the abundant hollows which form in the mature trees, and the fallen branches and litter in the understorey. An ample provision of nectar is also available in late summer to large numbers of lorikeets and honeyeaters (Brandle, 2010). 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. The 2010 Biological Survey of Eyre Peninsula (Brandle, 2010) showed through habitat analyses that many of the woodland communities supported the highest numbers of species per site, providing further evidence of the importance of Sugar Gum woodland as a unique bird habitat in South Australia (Carpenter 1995 as cited in Brandle, 2010).

A large number of nationally threatened flora species have been recorded from the Koppio Hills including *Acacia enterocarpa* (Jumping-jack wattle), *Acacia whibleyana* (Whibley Wattle), *Acacia pinguifolia* (Fat-leaved Wattle), *Pultenaea trichophylla* (Tufted Bush-pea), *Haloragis eyreana* (Prickly Raspwort), *Olearia pannosa subsp. pannosa* (Silver Daisy-bush), *Arachnorchis tensa* (Rigid Spider-orchid), *Arachnorchis brumalis* (Winter Spider-orchid), *Ptilotus beckerianus* (Ironstone Mulla Mulla), *Thelymitra epipactoides* (Metallic Sun-orchid), *Prasophyllum goldsackii* Goldsack's (Leek-orchid). In addition a large number of State listed flora species have also been recorded.

5.3.7 Invasive weeds

The weed species listed in Table 28 were recorded during the field surveys. It is possible more species are present within inaccessible areas. Five of these species are declared across the State under the *Natural Resources Management Act 2004*, however Onion Weed is not regarded as Declared within the District Councils of Whyalla, Franklin Harbour, Tumby Bay, Cleve and Lower Eyre Peninsula. Cane Cactus (*Austrocyllindropuntia cylindrica*) is not specifically listed as declared, however it is listed as a WONS (Weed of National Significance). Horehound was scattered but widespread throughout the project area and broader region, but was not observed within the larger more intact blocks of pristine mallee and woodland blocks. Onion Weed, Silver-leaf Nightshade and African Boxthorn only appeared to be associated with disturbances and mainly present along the margins of cleared and cultivated land. Both Silver-leaf Nightshade and African Boxthorn are also WONS (Thorp and Wilson, 1998 onwards). Individual landowners and managers are ultimately responsible for managing WoNS and the State government is responsible for overall legislation and administration. Under the NRM Act, landholders are obliged to control declared weeds on their property, as they are known to cause significant economic, social and environmental impacts.

A range of environmental weeds were also recorded, some having significant potential for further spread, particularly across property boundaries if unregulated. Most of these species were associated with disturbed edges of remnant vegetation, access tracks and across grazing and cropping land, particularly Bearded Oat, Wild Turnip, Perennial Veldt Grass, Coastal Galenia, Wild Sage and Apple of Sodom. Wards Weed was only widespread throughout the pastoral country north of the Middleback Ranges.

Control works should be undertaken in line with regional priorities, and co-ordinated with surrounding land managers. Control is considered most feasible for species of a limited occurrence and patchy distribution, to prevent their spread to non-affected areas.

Table 28. Key invasive weeds identified during the EBS field surveys.

Scientific name	Common name	Status
* <i>Aira sp.</i>	Hair-grass	
* <i>Asphodelus fistulosus</i>	Onion Weed	D+
* <i>Austrocyllindropuntia cylindrica</i>	Cane Cactus	D++
* <i>Avena barbata</i>	Bearded Oat	E
* <i>Brassica tournefortii</i>	Wild Turnip	E
* <i>Bromus madritensis</i>	Compact Brome	
* <i>Carrichtera annua</i>	Ward's Weed	E
* <i>Carthamus lanatus</i>	Saffron Thistle	E
* <i>Chamaecytisus palmensis</i>	Tree Lucerne	E
* <i>Citrullus lanatus</i>	Bitter Melon	
* <i>Cucumis myriocarpus</i>	Paddy Melon	
* <i>Ehrharta calycina</i>	Perennial Veldt Grass	E

Scientific name	Common name	Status
* <i>Galenia pubescens</i> var. <i>pubescens</i>	Coastal Galenia	E
* <i>Geranium dissectum</i>	Cut-leaf Geranium	
* <i>Limonium lobatum</i>	Winged Sea-lavender	E
* <i>Lycium ferocissimum</i>	African Boxthorn	D
* <i>Marrubium vulgare</i>	Horehound	D
* <i>Mesembryanthemum</i> sp.	Iceplant	E
* <i>Onopordum acaulon</i>	Horse Thistle	
* <i>Petrorhagia dubia</i>	Velvet Pink	
* <i>Reichardia tingitana</i>	False Sowthistle	
* <i>Salvia verbenaca</i> var.	Wild Sage	E
* <i>Solanum elaeagnifolium</i>	Silver-leaf Nightshade	D
* <i>Solanum linnaeanum</i>	Apple Of Sodom	E

D = Declared plant under the *Natural Resources Management Act 2004*

E = Environmental weed (DPTI Environmental Weeds List)

*Denotes exotic species

+Not declared in these local council areas

++ The genus *Opuntia* is Declared and *Austrocylindropuntia* listed as a WON (Weed of National Significance)

5.3.8 Sandhill Dunnart

(Information sourced from Ecological Horizons Pty. Ltd. (Appendix 3) - commissioned to undertake this targeted assessment).

Habitat modelling

Using the 77 survey sites previously sampled, the strongest explanatory variable for the presence or absence of Sandhill Dunnarts at a site was the 90th percentile *Triodia* height. The 90th percentile height was also the strongest variable explaining variation in the probability of capture of Sandhill Dunnarts. The model suggests that the probability of capturing a Sandhill Dunnart increases significantly when the 90th percentile of *Triodia* heights exceeds 400mm and peaks at 600mm (see Appendix 3 for graphs).

When the relationship between fire age and 90th percentile *Triodia* height was investigated, 90th percentile height peaked between 20 and 40 years post fire. However, sites older than 50 years could not be included in this model as their fire age was unknown. Fire mapping is only available for areas from the 1960's onwards. Sandhill Dunnarts were also recorded at many older fire age sites that also contained tall *Triodia*, suggesting that a minimum fire age is more important for predicting Sandhill Dunnart presence than maximum fire age. Sandhill Dunnarts were not captured at sites less than 10 years post fire.

Results suggest that the presence of at least some tall *Triodia* hummocks are important for Sandhill Dunnarts, supporting observations of Churchill (2001) who found adult females selected tall *Triodia* hummocks for nest sites. Sites on the Eyre Peninsula containing *Triodia* between 10 and 50 years post-fire are considered currently optimal for Sandhill Dunnarts, with sites > 50 years post fire requiring ground-truthing to measure *Triodia* height.

Transmission Line

Vegetation mapping within the transmission line corridor revealed a total of 1236.4 hectares of native vegetation contained *Triodia* habitat. Of this, 1213.3 hectares was considered suitable *Triodia* habitat for Sandhill Dunnarts. This equates to nearly 17% of the total native vegetation along the assessed portion of the corridor and includes four of the five *Triodia* vegetation associations identified (Table 29). The small isolated patch of the vegetation association "*Triodia* spp. Hummock Grassland over *Austrostipa* spp., *Aristida contorta*, *Sida petrophila*" located near Whyalla was not considered suitable for Sandhill Dunnarts due to the absence of mallee species and isolated location within chenopod clay swales. The main area of Sandhill Dunnart habitat was located between the Middleback Range and Sheoak Hill Conservation Park (Figure 15 and Figure 16). Patches of suitable *Triodia* habitat were interspersed with other habitat types which would likely be used by Sandhill Dunnarts for dispersal and feeding.

Table 29. Flora composition of *Triodia* vegetation associations within the proposed corridor. Vegetation association in bold is not considered suitable for Sandhill Dunnarts.

Detailed flora species composition of <i>Triodia</i> vegetation associations	ha	%*	SHD sites
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>	892.4	12.17%	7
<i>Eucalyptus incrassate</i> , <i>Callitris verrucosa</i> Mallee over <i>Leptospermum coriaceum</i> , <i>Phebalium bullatum</i> , <i>Triodia spp.</i> and <i>Calytrix tetragona</i>	186.7	2.55%	1
<i>Acacia wilhelmiana</i> , <i>Senna artemisioides ssp. coriacea</i> , <i>Eucalyptus gracilis</i> , <i>Melaleuca uncinata</i> Tall Shrubland over <i>Triodia spp.</i>	125.0	1.70%	
<i>Triodia spp.</i> Hummock Grassland over <i>Austrostipa spp.</i> , <i>Aristida contorta</i> , <i>Sida petrophila</i>	22.7	0.31%	
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Acacia spp.</i> , <i>Leptospermum coriaceum</i> , <i>Triodia spp.</i> , <i>Austrostipa spp.</i> and <i>Austrodanthonia caespitosa</i>	9.6	0.13%	

*Note: percentage calculation is based on total area of native vegetation.

The majority of the Sandhill Dunnart habitat was recorded in Ironstone Hill CP, Sheoak Hill CP, Secret Rocks Nature Reserve and adjacent heritage agreements. Only small isolated patches of *Triodia* habitat were recorded in other areas which are unlikely to support Sandhill Dunnart populations due to their small size and isolation.

Although all *Triodia* habitat is likely to be suitable for Sandhill Dunnarts, the fire history of the transmission line corridor was overlaid over the *Triodia* vegetation associations to determine current and future optimal habitat based on fire age (Figure 15 to Figure 19). Modelling suggests that habitat between 10 and 50 years post fire contains *Triodia* of suitable height for nesting Sandhill Dunnarts. These areas currently comprise 35% of the suitable *Triodia* habitat within the proposed corridor (Table 30). Approximately 11% of suitable *Triodia* habitat is currently < 10 years post burn and will likely be suitable for Sandhill Dunnarts within 10 years. More than half of the mapped *Triodia* habitat in the corridor is of unknown fire age and would require ground-truthing to determine whether it is currently suitable habitat. However, Sandhill Dunnarts have been recorded from some of these unknown fire age sites and even if these areas do not contain *Triodia* of sufficient height for nesting they would be considered future optimal habitat depending on fire regimes in the future. Importantly, all *Triodia* habitat between the Middleback Range and Sheoak Hill Conservation Park is likely to be important for Sandhill Dunnarts as it allows a mosaic of fire ages to be sustained over large areas.

Table 30. Sandhill Dunnart habitat.

Sandhill Dunnart habitat classification	Ha	%
Total area of unclassified SHD habitat (<i>Triodia</i> spp, no fire history)	664.04	54%
Total area of optimal SHD habitat (<i>Triodia</i> spp + 10-50 years post fire)	433.95	35%
Total area of future optimal SHD habitat (<i>Triodia</i> spp + < 10 years post fire)	138.42	11%

Ground-truthing

Twenty four sites within the five *Triodia* vegetation associations were randomly selected and recommended for future ground-truthing, should greater certainty about Sandhill Dunnart suitability be required (details in Moseby 2014). An additional five sites were visited in Sheoak Hill Conservation Park in unknown fire age *Triodia* habitat. The 90th percentile *Triodia* height at these sites ranged from 57-87cm with average *Triodia* height from 35-58cm. These measurements, along with visual appraisal, suggest that the *Triodia* in Sheoak Hill, although of unknown fire age, is also currently optimal for Sandhill Dunnarts.

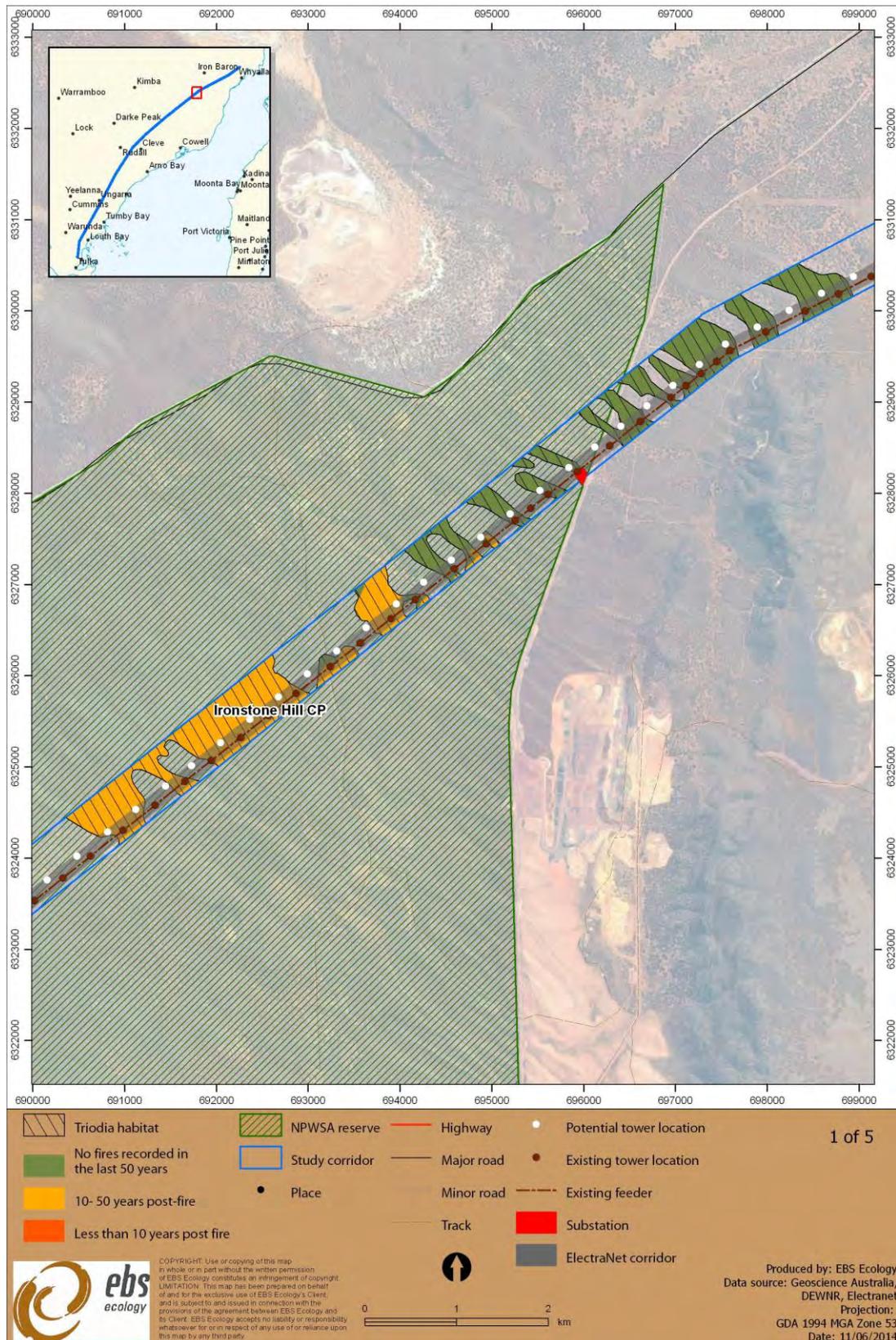


Figure 15. Sandhill Dunnart habitat classified according to fire age. Known optimal habitat is between 10 and 50 years post burn, future optimal habitat is less than 10 years post burn and green is unclassified habitat (unknown fire age, ground truthing required). Map 1 of 5.

Note: All *Triodia* habitat between Middleback Range and Sheoak Hill on sandy soils is suitable for sandhill dunnarts at some stage in its post-fire trajectory and large areas are required to support habitat mosaics of different fire age to ensure long term dunnart survival in the region.

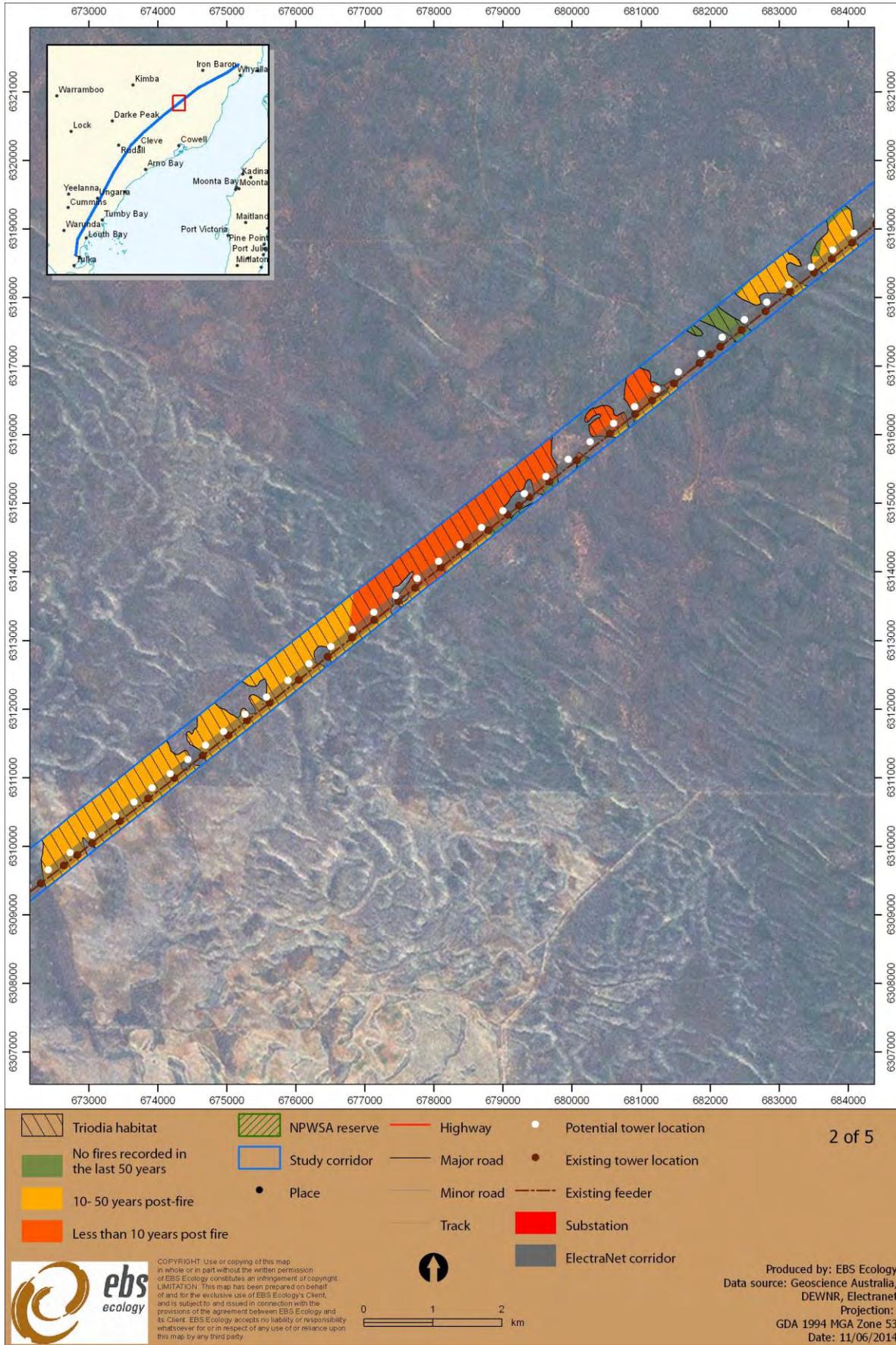


Figure 16. Sandhill Dunnart habitat classified according to fire age. Map 2 of 5.

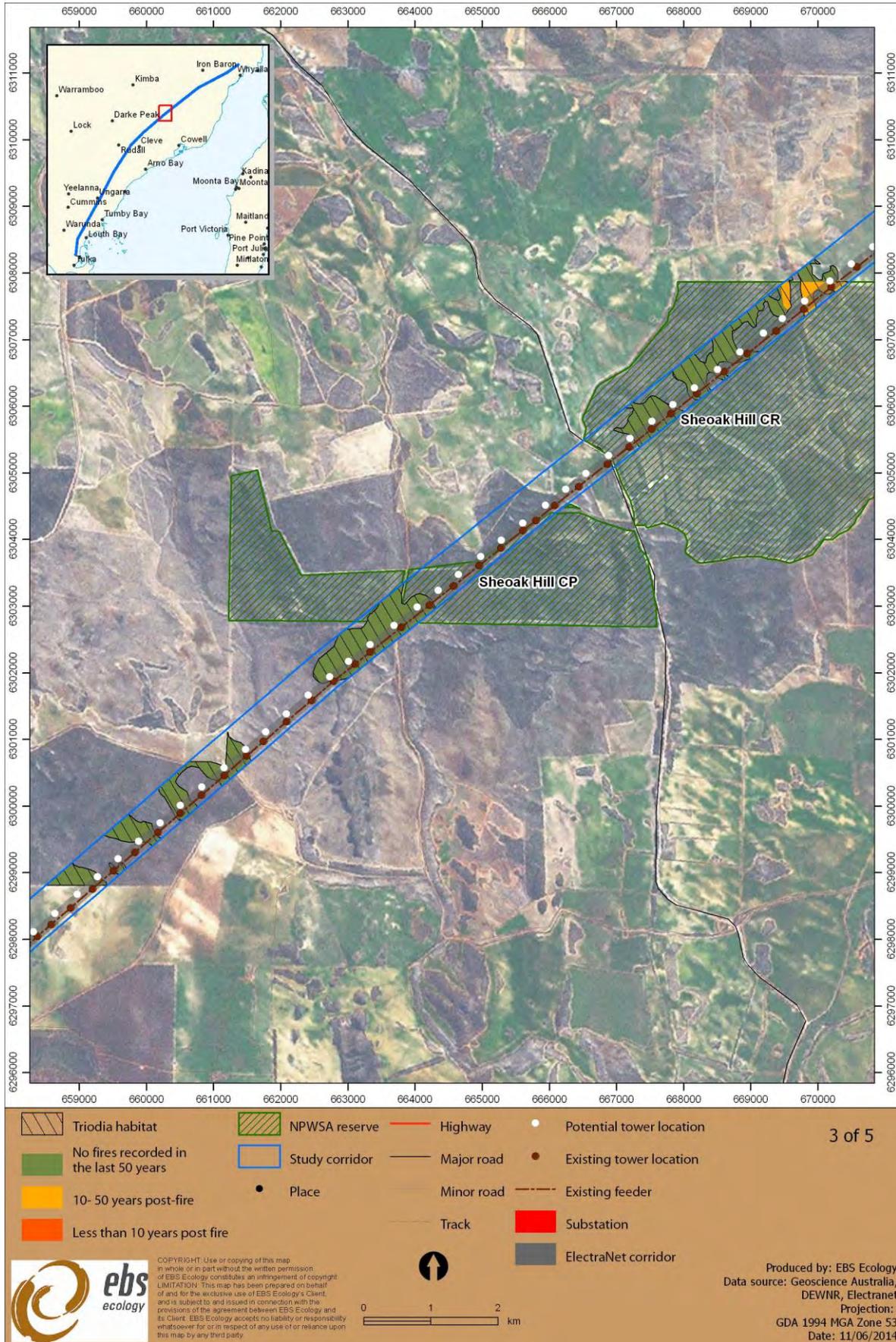


Figure 17. Sandhill Dunnart habitat classified according to fire age. Map 3 of 5.

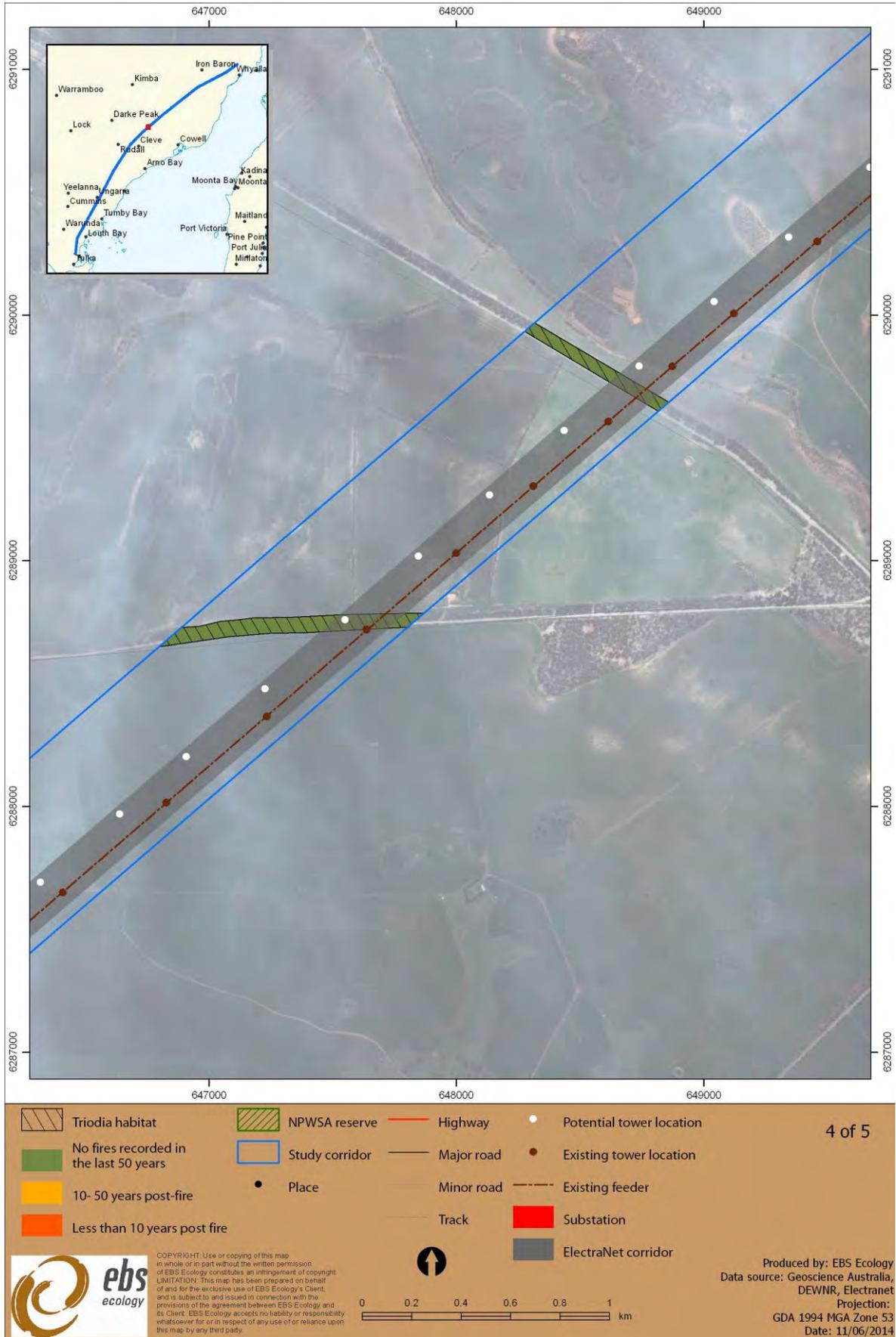


Figure 18. Sandhill Dunnart habitat classified according to fire age. Map 4 of 5.

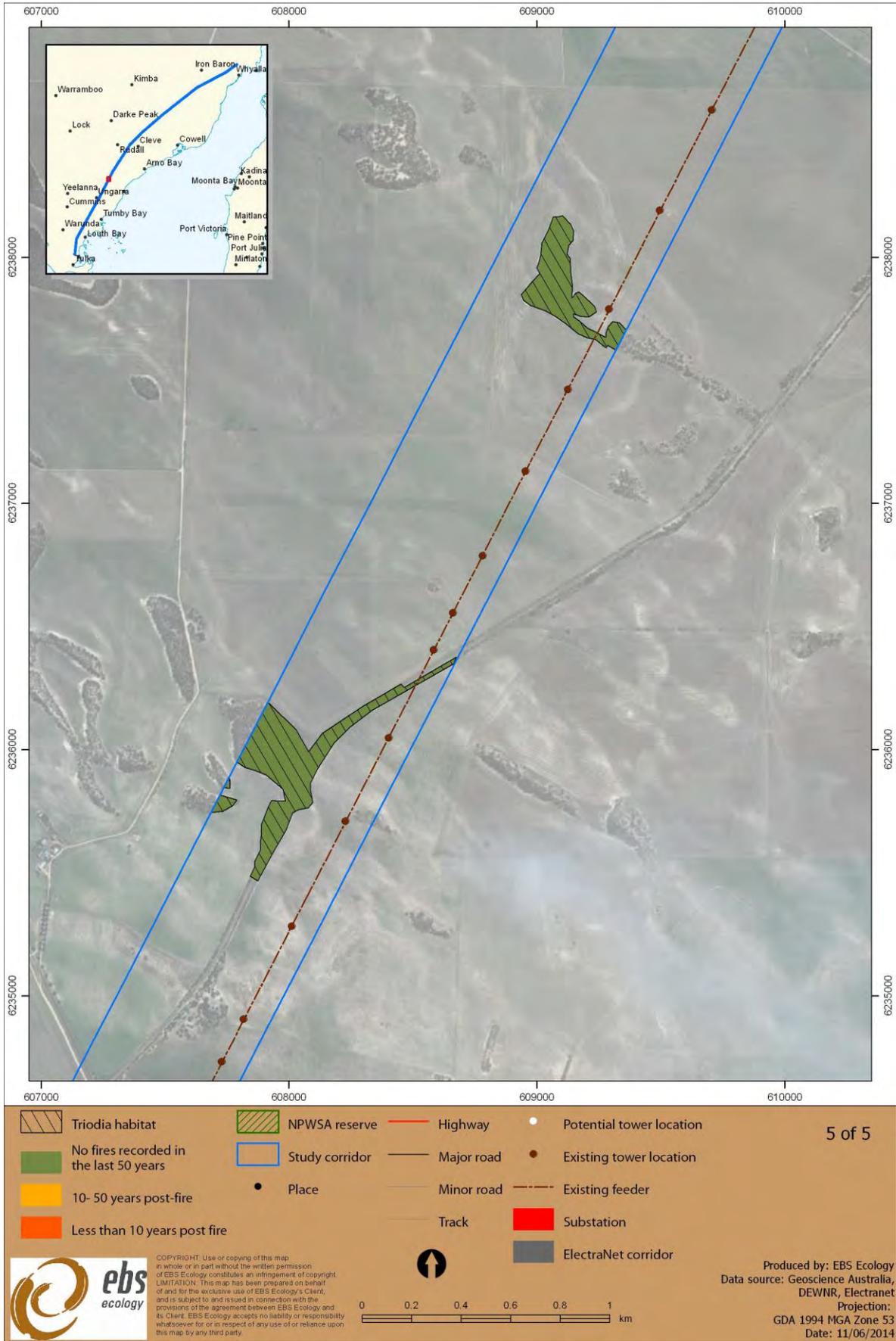


Figure 19. Sandhill Dunnart habitat classified according to fire age. Map 5 of 5.

5.3.9 Malleefowl

(Information sourced from Ecological Horizons Pty. Ltd. - commissioned to undertake this targeted assessment).

A total of 253 objects were identified using the airborne LiDAR survey. However, many of these were proven to be either mounds of dirt, large elevated lignotubers or other object rather than mounds. As such, 80 objects were removed simply from analysis by their height, shape and cross checking with the orthophotos. This resulted in 173 potential mounds being identified and was either 'confirmed' mounds (81) with a concave shape or 'possible' mounds (92) which were flat or domed. Of these 137 mounds (80% of the total) were ground truthed, consisting of 67 of the 81 'confirmed' (representing 83%) and 70 of the 92 'possible' (representing 76%). This was to confirm the mounds as being Malleefowl nest as well as establishing if the mound was either current or historical in its use.

Of these ground truthed mounds, 95% (64 of 67) of the 'confirmed' objects identified by LiDAR were found to be Malleefowl and only 8.5% (6 of 70) 'possible' objects were confirmed to be Malleefowl mounds. If the same percentage accuracy is assumed for the 14 'confirmed' objects and for the 22 'possible' which were not visited on the ground, we can assume another 13 'confirmed' and 2 'possible' objects would be mounds within the study area.

Comparison of transmission line and control transect

38 mounds were confirmed on 24.1 km of transmission line transect ground truthed (density of 3.2 mounds per km²), compared with 37 on 16.6 km (density of 4.4 mounds per km²) of the control transect (Figure 20 to Figure 25). These data suggest that Malleefowl mound density along the transmission line was 73% of that in areas remote from the transmission line.

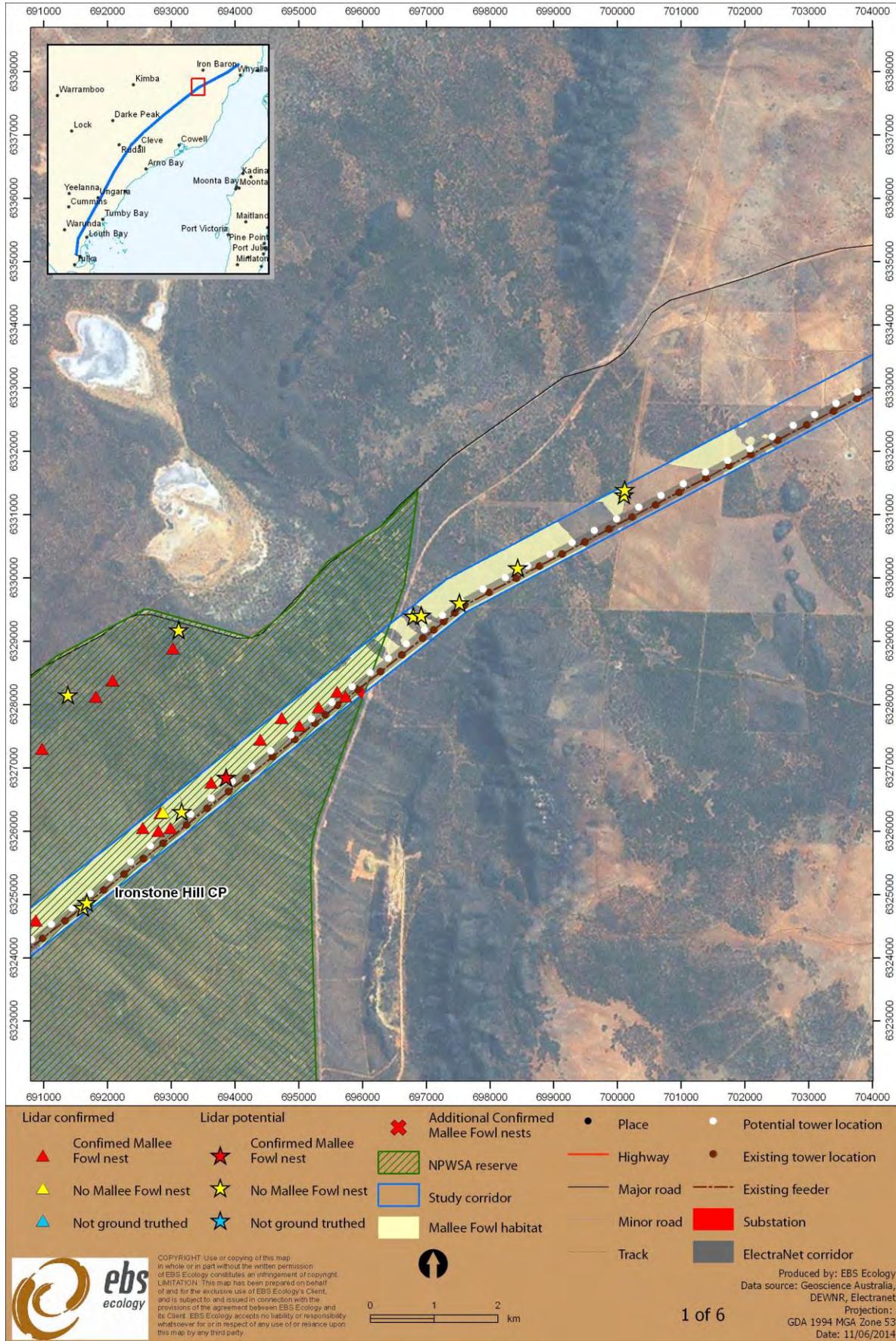


Figure 20. Location of Malleefowl mounds, confirmed and unconfirmed – Map 1 of 6.

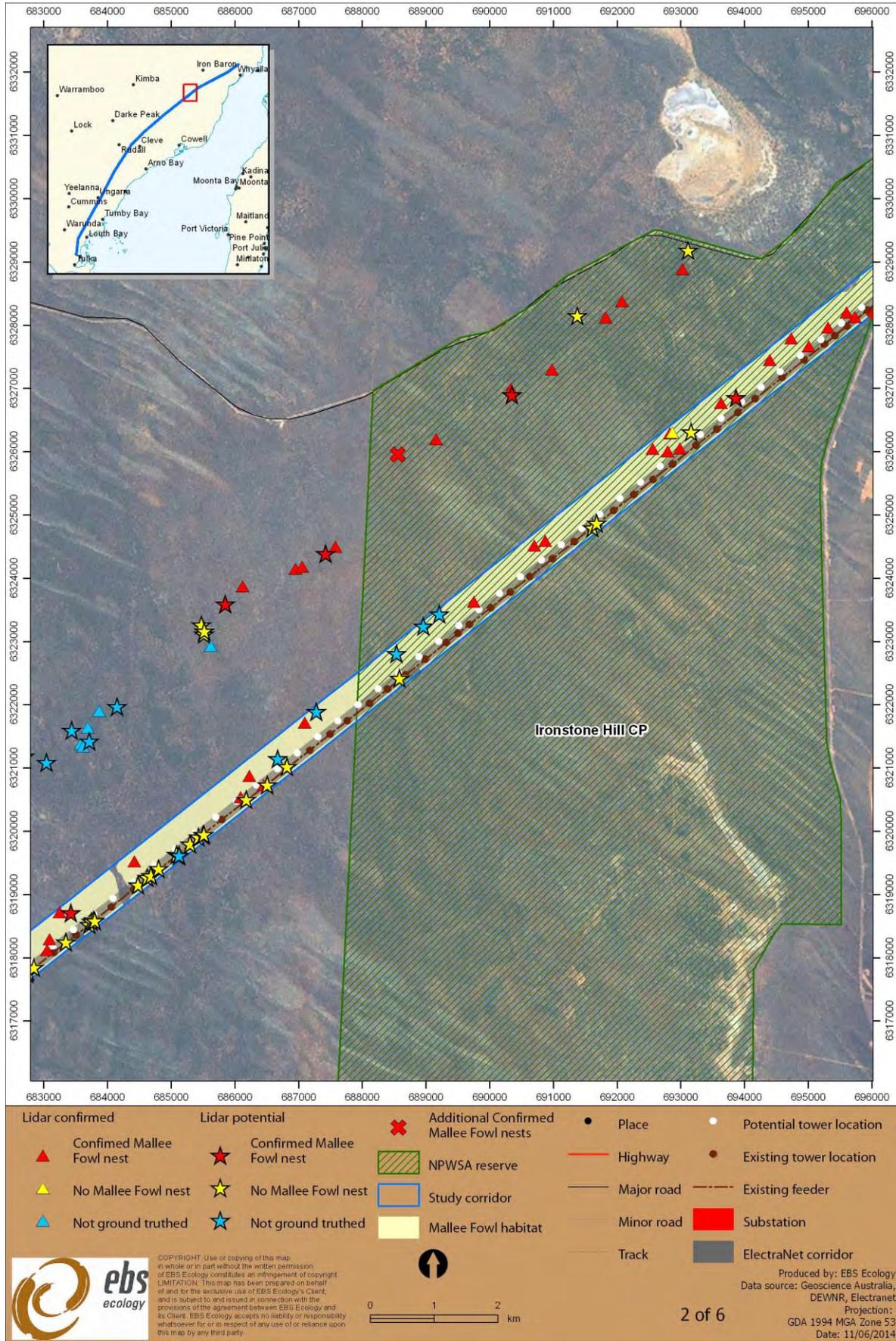


Figure 21. Location of Malleefowl mounds, confirmed and unconfirmed – Map 2 of 6.

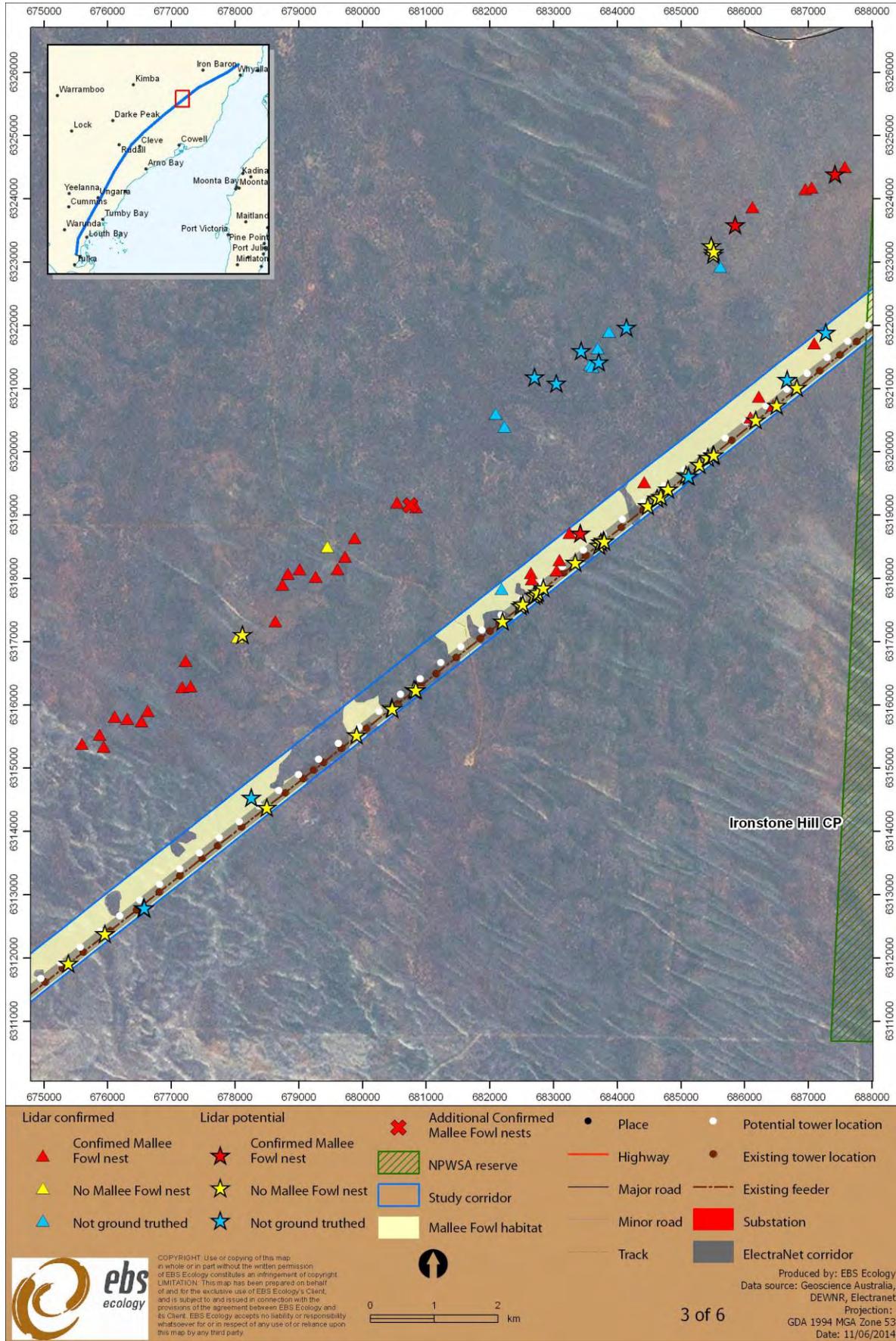


Figure 22. Location of Malleefowl mounds, confirmed and unconfirmed – Map 3 of 6.

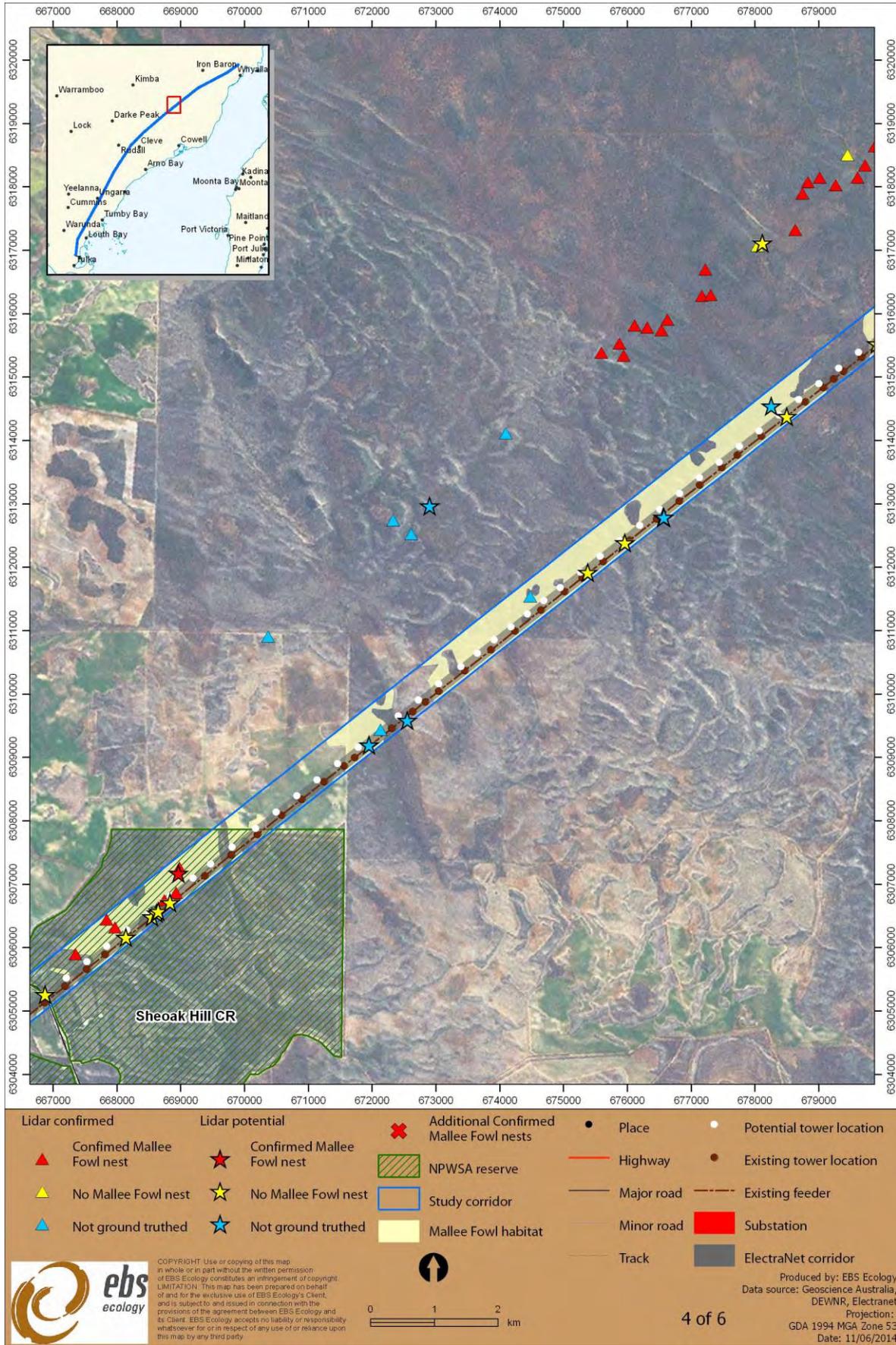


Figure 23. Location of Malleefowl mounds, confirmed and unconfirmed – Map 4 of 6.

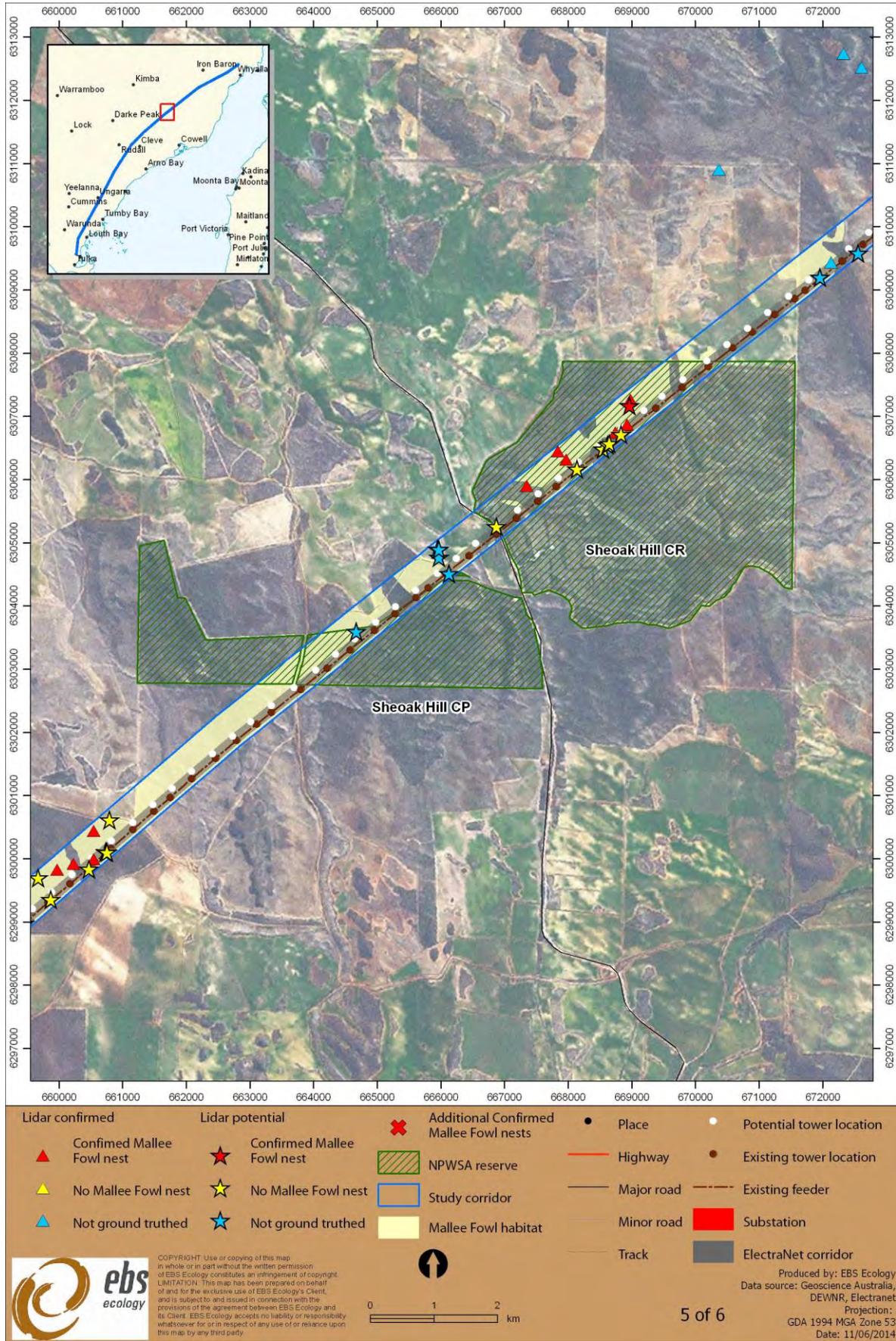


Figure 24. Location of Malleefowl mounds, confirmed and unconfirmed – Map 5 of 6.



Figure 25. Location of Malleefowl mounds, confirmed and unconfirmed – Map 6 of 6.

Within the transmission line transect, there was no obvious pattern in higher density of mounds or ratio of historic to active mounds with increasing distance from the existing transmission line (Figure 26). However, 17% (5 of 29) of the mounds on the transmission line transect were historic compared with 12% (4 of 34) of historic mounds on the remote control transect.

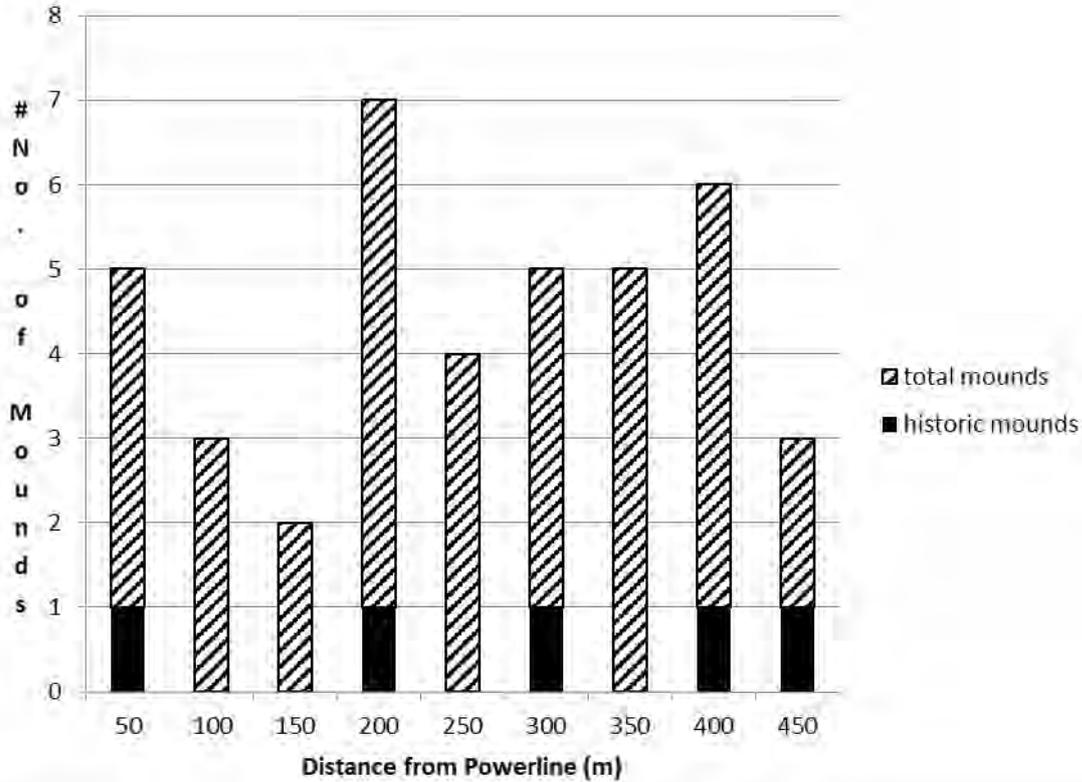


Figure 26. Distance of historic and more recent mounds from the transmission line on the transmission line transect.

Low percentages of active nests (2 from 70 mounds, 2.9%) along both transmission line 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 a nest near the southern extremity of the current transmission line transect. Fresh fox scats were evident on this mound which is only 70 m from the transmission line

False positives and false negatives

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 transmission line or fire-containment activities. Several others were the elevated lignotubers and associated soil mounding around old-growth mallees

False negatives

Four mounds identified by helicopter 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 25 cm cut-off. Three of these undetected mounds had previously been located in the three 1 km² grids methodically surveyed by chopper and on the ground. Assuming that half of each 1 km² grid was surveyed by the 500 m 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 mounds per km².

5.3.10 Avian fauna

A total of eighty-four dedicated point count surveys were undertaken along the ElectraNet easement during the December, January and March survey period. Along with these were multiple opportunistic sightings, resulting in 94 species being observed. Of these 94, three were introduced species and ten species had a State conservational rating. Only one species that was classified as migratory was observed. All rated (and introduced) species observed are listed below:

State rated

- Striated Grasswren (*Amytornis striatus*) rated as State Rare
- Peregrine Falcon (*Falco peregrinus*) rated as State Rare
- Restless Flycatcher (*Myiagra inquieta*) rated as State Rare
- Gilberts Whistler (*Pachycephala inornata*) rated as State Rare
- Diamond Firetail (*Stagonopleura guttata*) rated as State Vulnerable
- Cape Barren Goose (*Cereopsis novaehollandiae*) rated as State Rare
- Shy Heathwren (*Calamanthus cautus*) rated as State Rare
- Slender-billed Thornbill (*Acanthiza iredalei iredalei*) rated as State Rare
- White-winged Chough (*Corcorax melanorhamphos*) rated as State Rare
- Western Grasswren (*Amytornis textilis myall*) rated as Rare (species recently downgraded from EBPC).

Migratory

- Rainbow Bee-eater (*Merops ornatus*).

Introduced Species

- European Goldfinch (*Carduelis carduelis*)
- House Sparrow (*Passer domesticus*)
- Common Starling (*Sturnus vulgaris*)

Abundance

Nineteen hundred and seventy seven (1977) individual birds were observed along the entire easement over the three month dedicated point count surveys or observed opportunistically (Table 31). The most abundant species recorded during the survey were the introduced European Starling (*Sturnus vulgaris*) (430 records), Weebill (*Smicromnis brevirostris*) (112 records), White-browed Babbler (*Pomatostomus superciliosus*) (73 records), Superb Fairy-Wren (*Malurus cyaneus*) (73 records) and the introduced House Sparrow (*Passer domesticus*) (63 records).

Table 31. Field survey abundance counts for avian species.

Family	Species name	Common name	Conservation status		Number observed
			Aus	SA	
ACANTHIZIDAE	<i>Aphelocephala leucopsis</i>	Southern Whiteface	-	-	57
	<i>Pyrholaemus brunneus</i>	Redthroat	-	-	10
	<i>Acanthiza apicalis</i>	Inland Thornbill	-	-	46
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	-	-	32
	<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western ssp.)	-	R	12
	<i>Smicromnis brevirostris</i>	Weebill	-	-	112
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	-	-	41
	<i>Sericornis frontalis</i>	White-browed Scrubwren	-	-	11
	<i>Calamanthus cautus</i>	Shy Heathwren	-	R	9
ACCIPITRIDAE	<i>Aquila audax</i>	Wedge-tailed Eagle	-	-	5
	<i>Accipiter fasciatus</i>	Brown Goshawk	-	-	1
	<i>Elanus axillaris</i>	Black-shouldered Kite	-	-	1
	<i>Circus assimilis</i>	Spotted Harrier	-	-	1
	<i>Haliastur sphenurus</i>	Whistling Kite	-	-	1
ACROCEPHALIDAE	<i>Acrocephalus australis</i>	Australian Reed-Warbler	-	-	4
ANATIDAE	<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	-	R	6
ARDEIDAE	<i>Egretta novaehollandiae</i>	White-faced Heron	-	-	3
ARTAMIDAE	<i>Cracticus torquatus</i>	Grey Butcherbird	-	-	9
	<i>Gymnorhina tibicen</i>	Australian Magpie	-	-	47
	<i>Artamus cinereus</i>	Black-faced Woodswallow	-	-	10
	<i>Artamus cyanopterus</i>	Dusky Woodswallow	-	-	53
	<i>Strepera versicolor</i>	Grey Currawong	-	-	12
CACATUIDAE	<i>Eolophus roseicapilla</i>	Galah	-	-	23
	<i>Nymphicus hollandicus</i>	Cockatiel	-	-	4
CAMPEPHAGIDAE	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	-	2
CASUARIIDAE	<i>Dromaius novaehollandiae</i>	Emu	-	-	6
CHARADRIIDAE	<i>Vanellus tricolor</i>	Banded Lapwing	-	-	12
COLUMBIDAE	<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-	11
	<i>Phaps chalcoptera</i>	Common Bronzewing	-	-	23
	<i>Phaps elegans</i>	Brush Bronzewing	-	-	3
CORCORACIDAE	<i>Corcorax melanorhamphos</i>	White-winged Chough	-	R	12

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Family	Species name	Common name	Conservation status		Number observed
			Aus	SA	
CORVIDAE	<i>Corvus coronoides</i>	Australian Raven	-	-	2
	<i>Corvus mellori</i>	Little Raven	-	-	20
CUCULIDAE	<i>Cacomantis pallidus</i>	Pallid Cuckoo	-	-	1
ESTRILDIDAE	<i>Stagonopleura guttata</i>	Diamond Firetail	-	V	10
FALCONIDAE	<i>Falco cenchroides</i>	Nankeen Kestrel	-	-	9
	<i>Falco peregrinus</i>	Peregrine Falcon	-	R	8
	<i>Falco berigora</i>	Brown Falcon	-	-	6
FRINGILLIDAE	<i>Carduelis carduelis</i>	European Goldfinch	-	-	20*
HALCYONIDAE	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-	1
	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher	-	-	3
HIRUNDINIDAE	<i>Petrochelidon nigricans</i>	Tree Martin	-	-	2
	<i>Hirundo neoxena</i>	Welcome Swallow	-	-	9
	<i>Cheramoeca leucosterna</i>	White-backed Swallow	-	-	2
MALURIDAE	<i>Malurus splendens</i>	Splendid Fairy-wren	-	-	24
	<i>Amytornis textilis myall</i>	Thick-billed Grasswren	-	R	5
	<i>Malurus leucopterus</i>	White-winged Fairy-wren	-	-	9
	<i>Malurus lamberti</i>	Variiegated Fairy-wren	-	-	47
	<i>Amytornis striatus</i>	Striated Grasswren	-	R	5
	<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-	73
MEGALURIDAE	<i>Cincloramphus cruralis</i>	Brown Songlark	-	-	18
MELIPHAGIDAE	<i>Lichenostomus virescens</i>	Singing Honeyeater	-	-	40
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	-	-	47
	<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater	-	-	13
	<i>Manorina flavigula</i>	Yellow-throated Miner	-	-	53
	<i>Purnella albifrons</i>	White-fronted Honeyeater	-	-	39
	<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	-	-	1
	<i>Lichenostomus leucotis</i>	White-eared Honeyeater	-	-	9
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	-	-	38
	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	-	-	16
	<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater	-	-	1
	<i>Anthochaera carunculata</i>	Red Wattlebird	-	-	3
	<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	-	R	2
	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	-	-	1
	MEROPIIDAE	<i>Merops ornatus</i>	Rainbow Bee-eater	Mi	-
MONARCHIDAE	<i>Grallina cyanoleuca</i>	Magpie-lark	-	-	2
	<i>Myiagra inquieta</i>	Restless Flycatcher	-	R	1
MOTACILLIDAE	<i>Anthus novaeseelandiae</i>	Australasian Pipit	-	-	19
NECTARINIIDAE	<i>Dicaeum hirundinaceum</i>	Mistletoebird	-	-	3
NEOSITTIDAE	<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	-	12
PACHYCEPHALIDAE	<i>Oreoica gutturalis</i>	Crested Bellbird	-	-	11

Family	Species name	Common name	Conservation status		Number observed
			Aus	SA	
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	-	-	9
	<i>Pachycephala inornata</i>	Gilbert's Whistler	-	R	1
	<i>Pachycephala rufiventris</i>	Rufous Whistler	-	-	1
PARDALOTIDAE	<i>Pardalotus striatus</i>	Striated Pardalote	-	-	11
PASSERIDAE	<i>Passer domesticus</i>	House Sparrow	-	-	65*
PETROICIDAE	<i>Eopsaltria griseogularis</i>	Western Yellow Robin	-	-	1
	<i>Melanodryas cucullata</i>	Hooded Robin	-	-	3
	<i>Petroica goodenovii</i>	Red-capped Robin	-	-	5
	<i>Drymodes brunneopygia</i>	Southern Scrub-robin	-	-	5
PHASIANIDAE	<i>Coturnix pectoralis</i>	Stubble Quail	-	-	16
PODARGIDAE	<i>Podargus strigoides</i>	Tawny Frogmouth	-	-	5
POMATOSTOMIDAE	<i>Pomatostomus superciliosus</i>	White-browed Babbler	-	-	73
PSITTACIDAE	<i>Northiella haematogaster</i>	Blue Bonnet	-	-	16
	<i>Melopsittacus undulatus</i>	Budgerigar	-	-	10
	<i>Psephotus varius</i>	Mulga Parrot	-	-	16
	<i>Barnardius zonarius</i>	Australian Ringneck	-	-	34
	<i>Psephotus haematonotus</i>	Red-rumped Parrot	-	-	13
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	-	-	4
RHIPIDURIDAE	<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-	36
	<i>Rhipidura albiscapa</i>	Grey Fantail	-	-	8
STURNIDAE	<i>Sturnus vulgaris</i>	Common Starling	-	-	430*
TIMALIIDAE	<i>Zosterops lateralis</i>	Silvereye	-	-	31
Total					1977

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. **Mi:** Migratory. **Ma:** Marine. **ssp.** Sub-species. * Recently down listed under EPBC (DEWSPaC 2013)

5.3.11 Bats

In total, eight bat species were positively identified via AnaBat call analysis, with three more species potentially recorded as either *Mormopterus* 'species 3' or *Mormopterus* 'species 4'. Eight of these species were also identified by Brandle (2010) in a large scale biodiversity survey of the Eyre Peninsula during 2001 to 2005 that contained 37 dedicated bat surveys, with both Harp traps and AnaBats.

Mormopterus calls were most likely 'sp3', but there is a small chance that 'sp4' is present (Sp4 is only known north of the site). This species could only be confirmed by trapping.

The most widespread species recorded across the major vegetation types is *Chalinolobus gouldii* (Gould's Wattled Bat), *Nyctophilus geoffroyi* (Lesser Long-eared Bat) and *Nyctophilus major tor* (Central Long-eared Bat).

A summary of the AnaBat and trapping results in relation to vegetation associations is provided in Table 32 (note that not all vegetation associations were surveyed). Given the inherent limitations of the data (see Section 4.4), the relative activity levels recorded (e.g. by species, site or association) has not been reported as this information may be misleading.

Table 32. Bat species recorded on Eyre Peninsula from 2001 - 2013.

Species name	Common name	Conservation status		Broad Vegetation Type	Record Source
		Aus	SA		
<i>Austronomus australis</i>	White-striped Freetail-bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland	AnaBat+, Brandle*
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	-	-	Dense mallee vegetation, <i>Eucalyptus cladocalyx</i> Woodland, <i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside, <i>Melaleuca uncinata</i> / Mallee association	AnaBat, Brandle
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland	AnaBat, Brandle
<i>Mormopterus</i> sp 3	Inland Freetail-bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, Dense mallee vegetation	AnaBat
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, <i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside, <i>Melaleuca uncinata</i> / Mallee association, Dense mallee vegetation	AnaBat, Brandle
<i>Nyctophilus major tor</i>	Central Long-eared Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, <i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside, <i>Melaleuca uncinata</i> / Mallee association, Dense mallee vegetation	AnaBat, Brandle
<i>Vespadelus baverstocki</i>	Inland Forest Bat	-	-	Dense mallee vegetation	AnaBat, Brandle
<i>Vespadelus regulus</i>	Southern Forest Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, <i>Melaleuca uncinata</i> / Mallee association, Dense mallee vegetation	AnaBat, Brandle
Unlikely but possible					
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	-	R		AnaBat
<i>Mormopterus</i> sp 4	Southern Freetail Bat	-	-	Mainly known from north of the site, and would only be known from trapping (D. Matthews pers. comm., 2013)	AnaBat, Brandle
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	-	-		AnaBat

* Eyre Peninsula Biodiversity surveys 2001-2005 (Brandle 2010)

+ EBS Ecology AnaBat recordings spring 2013

6 DISCUSSION

The initial surveys undertaken in 2012/13 formed a general assessment across the project area. These were followed by a series of targeted surveys conducted in the following spring of 2013. The proposed, infrastructure and access track locations were not known at the time of the assessments and this analysis will form the basis of a separate report. The potential issues related to the project and associated mitigation options are highlighted within the discussion. Given the large scale of the Eyre Peninsula Transmission Line Project, a wide range of constraints are inevitable. A summary of the key ecological constraints and considerations is provided below.

6.1 Flora

This report presents findings on a broad flora assessment across the project area and targeted threatened species surveys. The potential issues related to the project and associated mitigation options are highlighted within the discussion.

6.1.1 Vegetation

Almost 7,095 hectares of native vegetation was recorded within the assessment corridor, representing approximately 45% of the project area. Woodland associations covered approximately 2,054.5ha (approximately 13% of the project area) whilst mallee vegetation covered approximately 3,120.4ha (approximately 20% of the project area). Tall shrublands contributed 641ha (4%) and chenopod shrublands covered to 1041ha (6.5%), whilst grasslands and sedgelands covered ha (0.7%). The level of remnancy of native vegetation in the northern half of the project and the corresponding IBRA Subregion (Myall Plains) is relatively high (98% and 97% respectively) whereas the southern areas which are subject to much higher levels of intensive farming, have much lower remnancy levels within the project area and the IBRA Subregions of Eyre Hills and Eyre Mallee (17%, 30% and 35% respectively).

The significant tracts of intact vegetation communities occupying the northern sections of project area were largely found to be in excellent condition (5,345.2ha or 94%). The remaining 6% (292.7ha) varied between moderate to very poor. Within the southern sections, 32.7% (567ha) was in good to excellent condition, 32% (571.3ha) in moderate condition and 34.4% (596.5ha) in poor to very poor condition. Condition ratings were based on the vegetation structure, quality of the understorey and level of weed invasion (Table 10) 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 attributed 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. Small and isolated patches of remnant vegetation are therefore more vulnerable to disturbance and degradation and are at greater risk to catastrophic event and genetic isolation (Neagle 2008). Clearance and further fragmentation of remnant vegetation patches across the landscape increases this risk significantly.

6.1.2 Threatened flora

There are numerous threatened flora species records in various locations along the proposed transmission line route. With careful planning and consideration of the threatened flora populations and their critical habitats, the total impacts of the proposal can potentially be minimised.

At least 18 nationally threatened flora species and 65 State threatened flora species are known to occur in, and in close proximity to the project area. Nine of the nationally threatened species are endemic to Eyre Peninsula whilst a further nine endemic State listed species are also known to occur only in the region. A number of other species are considered threatened on a regional level (Gillam 2009) but have not specifically been highlighted in this report.

Vegetation patches in good to excellent condition are considered extremely important for threatened flora, often representing the only remaining stronghold for the species. However, threatened flora was not limited to vegetation in good condition, with many of the threatened flora recorded along degraded roadsides, rail reserves and even SA Water pipelines. All known and potential habitat is critical to survival for the highlighted threatened flora species. The small size of threatened flora sub-populations and the isolated and scattered nature of the vegetation remnants make them vulnerable to localised extinction (Moritz and Bickerton, 2011).

The concentrations of nationally threatened flora species records are mostly due to widespread clearance of habitat and presence of high quality remnant habitat areas, particularly in the southerly areas of Eyre Peninsula. Likewise for State listed species which are concentrated within similar areas. Some of these have been identified as biodiversity 'hot spots' which are discussed in more detail in Section 6.3 and formed the basis of targeted surveys undertaken in the spring of 2013. Both national and State threatened flora species were targeted during these surveys, however only the nationally threatened flora species have been discussed further here.

Many of the threatened flora species previously recorded in the BDBSA search were not observed during the initial baseline surveys, due to factors such as survey timing (e.g. orchids) and limited survey effort. However, the recent records (< 20 years) combined with the high quality of the habitat on site means that most species were assessed as 'possible', 'likely' or 'highly likely' to occur within the project

area. Targeted surveys have helped provide a more accurate determination of potential impacts to threatened flora and will assist in directing project planning and design to minimise those impacts.

The following nationally threatened species were recorded on site during the targeted surveys. Further information can be sourced from recovery plans and species profiles which exist for the nationally threatened species discussed below (see DSEWPaC 2013).

***Acacia enterocarpa* (Jumping-jack Wattle), EPBC Endangered, State Endangered**

The species occurs as a disjunct population on EP, 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. Sub-populations are known from roadsides and rail reserves and amongst vegetation corridors along SA Water pipelines. The species was detected during the 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 imbricata* and *Melaleuca uncinata* and *Eucalyptus peninsularis* Mallee respectively.

***Acacia pinguifolia* (Fat-leaved Wattle), EPBC Endangered, State Endangered**

A dense spreading shrub, to 2 metres high with globular golden yellow flower heads. Considered a declining species in Eyre Hills IBRA subregion (Gillam and Urban 2009). Known from disjunct sub-populations across EP, 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 uncinata* (Broombush) shrubland. On northern EP, sub populations are known to occur near Cockaleechee, Ungarra, Bulter and several recent records east of Cleve near the Yeldulknie CP. Many sub-populations are located on roadsides and rail reserves. A single individual of the species was identified during the targeted surveys within a road reserve east of Koppio Township dominated by *Eucalyptus cladocalyx* Open Woodland.

***Arachnorchis tensa* (Rigid Spider-orchid), EPBC Endangered**

Widespread in South Australia from the west coast of Eyre Peninsula, and adjacent pastoral zone, Flinders Ranges, rare in the Mount Lofty Ranges, more common in the Murray and upper South-east. Occurs in dry woodland, mallee-heath, low scrub and about rock outcrops in a variety of soil types. The species was recorded from a single location during the targeted survey approximately 20m from the western boundary of assessment corridor along the Ungarra – Yeelana Road reserve.

***Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush), EPBC Vulnerable, State Vulnerable**

A widespread but rare species occurring also on the Fleurieu Peninsula, South East, Yorke Peninsula, Mid North and Kangaroo Island. Two main sub-populations on EP occurring in the Cleve Hills to

Coolanie Range area, north-west of Cowell, and in the Koppio Hills and Greenpatch area, Lower Eyre Peninsula. The perennial, low spreading shrub, occurs in the understorey of mallee, woodland and forest communities. Southern population associated with *Eucalyptus cladocalyx* (Sugar Gum), *Allocasuarina verticillata* (Drooping Sheoak), *Melaleuca uncinata* (Broombush), and less often with *Callitris* sp. (Native Pine). The 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. The species was detected during the targeted surveys from two populations, one of which is located just outside the assessment corridor. The other population was a single juvenile plant. Both occurrences were located east of Yallunda Flat in *Eucalyptus cladocalyx* Woodland and Open Woodland communities.

***Pultenaea trichophylla* (Tufted Bush-pea), EPBC Endangered, State Rare**

Endemic to southern Eyre Peninsula the species only occurs in Eyre Hills IBRA subregion, where it is considered rare but stable (Gillam and Urban 2009, Pobke 2007). Numerous recent records 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 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. Also occurs in tall shrublands dominated by *Melaleuca uncinata* (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 located

It is possible that the following additional species exist given that the entire corridor could not be completely searched. Once the layout plan is available it will be critical to micro-site the proposed infrastructure footprints to minimise disturbance to threatened flora species.

***Acacia praemorsa* (Senna Wattle), EPBC Vulnerable, State Endangered**

Endemic to Eyre Peninsula, where it occurs in localised populations in the ranges north-east and north-west 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. Whilst not recorded during the targeted survey, the species could easily be targeted during micro-siting surveys within the remnants north of Cleve to better determine presence or absence.

***Acacia cretacea* (Chalky Wattle), EPBC Endangered, State Endangered**

Endemic to Eyre Peninsula. A spindly, straggly, single-stemmed shrub or tree, growing 4-5 m high, occurs in an extremely restricted area about 30 km north to north-west of Cowell and north-east of Coolanie on the north-eastern EP. Total population consists of between a few hundred and 5000 plants. The species is found along roadsides and in adjacent leasehold farming land. 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. No *Acacia cretacea* (Chalky Wattle) were recorded during the survey however thorough searches were not undertaken throughout the large remnant mallee habitats.

***Acacia rheticarpa* (Resin Wattle), EPBC Vulnerable, State Vulnerable**

Grows in disjunct sub-populations on Eyre Peninsula (also YP southern MLR) on dune crests and dunes/hills, plains and swales. It is also known to survive in degraded sites largely devoid of remnant vegetation. Sub-populations occur from Kimba to just north of Arno Bay, Cleve and Lock and are known to survive within roadside and rail reserve vegetation. It is 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. Considered to be a declining species in Eyre Hills and Eyre Mallee subregions (Gillam and Urban 2009). The species was not detected during targeted surveys.

***Acacia whibleyana* (Whibley Wattle), EPBC Endangered, State Endangered**

Endemic to Eyre Peninsula, the species is described as a dense shrub growing to 2.5 metres high, with globular flower heads. The species grows on limestone and loam, sometimes near salt swamps. Known population contains 322 plants from two sub-populations restricted to near-coastal areas near Tumby Bay. The species was not detected during targeted surveys.

***Arachnorchis brumalis* (Winter Spider-orchid), EPBC Vulnerable, State Vulnerable**

Endemic to South Australia, the species is 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. The creamy coloured spider-orchid mostly found on Yorke Peninsula but likely to occur in the southern Eyre Peninsula. Four sub-populations are located within southern Eyre Peninsula near Edillilie and Wanilla and an outlying record near Tumby Bay. Found mostly on terra rossa soils or fertile sands over limestone, in mallee broom-bush associations, light woodland or sedge dominated grasslands. The orchid species was targeted during the known flowering times (Late June-July-August-September), within known habitat types, but was not detected.

***Arachnorchis macroclavia* (Large-club Spider-orchid), EPBC Endangered**

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 (Bickerton 2003) and is regarded as rare on central Eyre Peninsula, where it was last recorded on the Eyre Peninsula (from Stamford Hill) in 1985 (Bickerton 2003). The species grows in fertile shallow loams in mallee-boom brush woodland in sandy loam over limestone (Bates 2011). The orchid species was targeted during the known flowering times (September - October), within known habitat types, but was not detected.

***Frankenia plicata*, EPBC Endangered, State Vulnerable**

Small, densely branched, hairy shrub. Occurs in South Australia from north of Port Augusta along the Stuart Highway to the Northern Territory border and from Port Augusta north-east to Marree. No records within the BDBSA search area or in Eyre Hills or Eyre Mallee subregions (Gillam and Urban 2009). 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. It is likely that the species has been under reported due to difficulty of identification of *Frankenia* spp. This species was targeted during surveys in July – August survey, but was not detected.

***Haloragis eyreana* (Prickly Raspwort), EPBC Endangered, State Endangered**

Endemic to Eyre Peninsula, Prickly Raspwort is a perennial herb growing to 10-30 cm tall with about 14 fragmented sub-populations from west of Cummins to Moreenia (DEH, 2002). The species is found on predominantly historical grassland areas that have been cleared for agriculture and now only exists in roadsides and rail reserves. Occasionally found growing in more intact habitat, where it is associated with *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. dumosa* (Dumosa Mallee) or *Melaleuca decussata* (Totem-poles). This species was targeted during appropriate flowering times (October and November), particularly within privately owned remnants, but was not detected.

***Prasophyllum goldsackii* (Goldsack's Leek-orchid), EPBC Endangered, State Endangered**

Endemic to South Australia, the orchid is found only on Yorke Peninsula and lower EP Eyre Peninsula from 14 small populations not exceeding 500-1000 individuals. The Eyre Peninsula populations are located in the south-western to central area, and within 50 km of Port Lincoln. Considered declining in Eyre Hills subregion (Gillam and Urban 2009). Occurs largely on limestone, in shallow soil pockets but also in calcareous sands in *Eucalyptus cladocalyx* (Sugar Gum) forests, as well as *Allocasuarina verticillata* (Drooping Sheoak) low woodlands and *Melaleuca uncinata* (Broombush) tall open shrublands. The species was targeted during the known flowering times (September-October) within known habitat types, but was not detected.

***Prostanthera calycina* (West Coast Mintbush), EPBC Vulnerable, State Vulnerable**

Endemic to Eyre Peninsula, the perennial shrub species is known from several sub-populations restricted to western coast from Pt Lincoln to Streaky Bay. Commonly associated 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 Dryland Tea-tree (*Melaleuca lanceolata*) and *Eucalyptus porosa* (Mallee Box) low open woodland. This species was targeted during appropriate flowering times, but was not detected.

***Pterostylis* sp. Eyre Peninsula (R.Bates 19474), EPBC Vulnerable, State Vulnerable**

Endemic to Eyre Peninsula, the small herb is known from about 12 localities only (two populations) near Carpie Puntha Hill and Coolanie Valley (DEH, 2002). It grows mostly in shrublands of *Melaleuca uncinata* (Broombush), but also in woodlands dominated by *Callitris* and *Eucalyptus*, particularly in stony brown loams. This species was targeted during appropriate flowering times (late October-early January), but was not detected.

***Ptilotus beckerianus*, (Ironstone Mulla Mulla) EPBC Vulnerable, State Vulnerable**

Endemic to South Australia, the small, perennial herb also grows in disjunct populations on Kangaroo Island. It is known from roadside verges and private property within the District Council of Lower Eyre Peninsula, often growing in association with *Eucalyptus cladocalyx* (Sugar Gum) and *Xanthorrhoea* sp.(Yacca) in low open forest or low open woodland, *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. The species was targeted during the known flowering times (July - August) within known habitat types, but was not detected.

***Swainsona pyrophila* (Yellow Swainson-pea), EPBC Vulnerable, State Rare**

Occurs across the Eyre Peninsula and also in Yorke Peninsula and Murraylands, NSW and Victoria. Recent records from the north and eastern side of Ironstone Hill CP. It is known to occur on sandy or loamy soil in mallee scrub and is usually found after fire and populations are found to fluctuate (Gillam and Urban 2009). Associated vegetation communities on Eyre Peninsula include *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. socialis* (Beaked Red Mallee), *E. brachycalyx* (Gilja), *E. gracilis* (Yorrell), and *E. oleosa* (Red Mallee) mid mallee woodland over *Melaleuca uncinata* (Broombush) tall shrubland. Some recently burnt habitat observed during the field surveys was targeted to determine presence /absence of the species, but was not detected.

***Thelymitra epipactoides* (Metallic Sun-orchid), EPBC Endangered, State Endangered**

The extent of occurrence on Eyre Peninsula is approximately 900 km², growing within Edillilie in the north, and Mikkira in the south. Occurs also in parts of the Murraylands and South East regions of South Australia, 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. 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. The orchid species was targeted during the known flowering times (August-December), particularly within privately owned remnants within known habitat types, but was not detected.

6.1.3 Threatened Ecological Communities

One ecological community is considered threatened at a national level. *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Woodland was listed as Endangered at a national level in August 2013 and is endemic to the Eyre Peninsula. At the time of the initial surveys the patches were not assessed under the Approved Conservation Advice (TSSC, 2013) and therefore it is unknown if they qualify as the TEC under the EPBC Act. However, all mapped remnants have been compromised by exotic species in the understorey and some by inappropriate grazing levels, with only a few remnants in moderate condition. Approximately 8.5 ha of the community, which was mapped within the 120m assessment corridor, is in moderate condition and may possibly qualify as the TEC. Once the layout plan is available it will be critical to micro-site the proposed infrastructure footprints to ensure that disturbance to any potential nationally listed TEC is minimised or avoided.

Six of the ecosystems are listed under the *Provisional List of Threatened Ecosystems of South Australia* (DEH in progress). Approximately 125 ha of *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria* / *Maireana sedifolia*, was mapped within the project area and all patches were in excellent condition. The woodland is considered a State vulnerable plant community of which only 5.3% is protected in Heritage Agreements and reserves across South Australia.

Allocasuarina verticillata Low Woodland is also a State vulnerable plant community. Approximately 75 ha was mapped across the project area with examples varying in quality from very poor to excellent. Only 11% of the mapped community is protected in reserves or Heritage Agreements.

Both *Eucalyptus peninsularis*, *E. dumosa* complex Woodland and *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland are listed as endangered ecosystems under the *Provisional List of Threatened Ecosystems of South Australia*. Both are also endemic vegetation associations, occupying limited distributions. The total mapped areas within the project area were 41.1 ha and 57.8 ha respectively), however these areas are significantly reduced within the 120m assessment corridor (i.e. *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland 13.7 ha). *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland is restricted to creeklines and along watercourses and on heavy, fertile soils on plains. Only 11% of the mapped community is protected in reserves and Heritage Agreements and most mapped examples within the project area in moderately poor condition, compromised by exotic species, overgrazing and salinity. *Eucalyptus peninsularis*, *E. dumosa* complex Woodland occurs on flat or rarely hilly areas characterised by loams or clay-loams and has been extensively cleared for agricultural use (DEH, 2002). Most remaining examples are small and/or degraded and/or atypical.

Sedgeland dominated by *Gahnia trifida* (Cutting Grass) are considered State endangered. The mapped association covered a very small area (47.2 ha), being entirely restricted to watercourses and low lying swampy areas. The condition of these riparian communities ranged between moderate and very poor, often being degraded by exotic species, overgrazing or trampling and salinity.

Austrodanthonia spp. / *Austrostipa* spp. +/- *Themeda triandra* Tussock Grassland covered an area of approximately 6.4 ha, where most examples were in a moderate condition. The community grows on

heavy fertile soils of plains and hill slopes where most has been exposed to heavy grazing and weed invasion. Around 5% has been protected in reserves and Heritage Agreements (DEH, 2002).

Many of the mapped communities occupy relatively small patches throughout the project area and with careful consideration with regard to infrastructure design, significant impacts can likely be minimised.

6.2 Fauna

Given the large scale of the Eyre Peninsula Transmission Line project, a wide range of constraints are inevitable. It is considered that ecological considerations will present constraints regardless of the alignment that is chosen. A summary of the key ecological constraints and considerations is provided below.

Potential issues from the project will be from clearing remnant vegetation and the influences that this will have on fauna populations over time. A number of key hot spots are identified, with the mallee within the northern section of the alignment being of high concern. This is due to the habitat supporting a number of national listed species; namely the Malleefowl and Sandhill Dunnart. These two species could suffer due to clearing vegetation for construction of the new line as well as establishment of a vehicle trail that follows the line for visual inspection. This will allow greater access for introduced animals, namely the Red Fox (*Vulpes vulpes*) and feral Cat (*Felis catus*) (DEWHA 2008). Both these species prefer to move along open and cleared lands as well as hunting areas that are open (Dickman 1996). This affords easy unrestricted access, as well as removing cover and shelter for any prey items.

The area around the Koppio Hills is also of concern, as any levels of vegetation clearing may impact on breeding hollows or feed trees for the Eyre Peninsula Yellow-tailed Black Cockatoo or roosting areas for the common Brush-tailed Possums. This also could be prevalent for species such as the Southern Emu-Wren, who may be already extinct in the area.

6.2.1 Key habitats

The ElectraNet easement is approximately 290 km in length from Cultana Substation to Port Lincoln. As a result, a significant variety of habitats were present, due to factors such as soil type, climatic condition, topography and aspect. Levels of disturbance also varied markedly, with areas of pristine remnant vegetation through to severely cleared and fragmented areas used for cropping and/or stock grazing. Consequently, the bird survey results are discussed in three sections. These represent broad scale changes or boundaries and tended to have very defined and sudden changes in habitat and disturbance levels. As such the species assemblages within each area tended to vary markedly from the other areas.

Northern section- Cultana to Mangalo Road (approximately 15 km from Cleve)

This section contained large tracts of open chenopod shrubland dominated by *Acacia papyrocarpa* (Western Myall) before migrating into the Middleback Ranges and mallee country, with red and white sand dunes. Bird surveys were undertaken along this section of the easement during December 2012. This section contained the most rated species, with five species observed, with no introduced bird

species noted. Much of the vegetation was in good condition and would most likely support Malleefowl and Sandhill Dunnart, as habitat present contained appropriate tree species, correct density and sandy substrate with areas covered in dense leaf litter and large tracts of *Triodia* spp. (Spinifex).

Species such as Thick-billed Grasswren and Slender-billed Thornbills were observed in chenopod shrubland north of the Middleback Ranges in chenopod dominated pastoral areas. The pastoral areas appeared to be in good condition and are likely to support good numbers of both species.

Striated Grasswren were observed in Ironstone Hill Conversation Park, almost directly under the existing transmission line. This species requires dense *Triodia* spp. (Spinifex) growing under mallee, and areas throughout this section contained suitable habitat for this species. Gilberts Whistler was also observed at this location.

Bird density and species composition changed dramatically when the remnant mallee vegetation changed to cleared land.

Central Section- Mangalo Road to Stokes

The majority of this section is located within extensively cleared and fragmented habitats, with only a few small remnant patches of varying habitat value along the easement. Much of the remnant vegetation is located on the road reserves, providing some suitable habitat, however these are linear and relatively narrow, and highly compromised by edge effect.

This section contained the first noted introduced species, the European Starling and the House Sparrow. It also contained a number of native bird species that have adapted well to large scale landscape changes, such as the Galah (*Eolophus roseicapilla*), Yellow-throated Miner (*Manorina flavigula*) and Crested Pigeon (*Ocyphaps lophotes*). These generalist species have also benefited from excess seed production being available through cropping.

Only one species of conservation significance was observed, The Peregrine Falcon, resting on a transmission line tower on the fringes of Hincks Wilderness Area. This species was noted on a number of transmission line towers, and appears to be utilising the structures for roosting and hunting as a substitute for cliffs and other high natural features.

Southern section- Stokes to Port Lincoln

This section, while heavily utilised for a variety of agricultural purposes, traverses the Koppio Hills. The remnant woodland vegetation in the Koppio Hills is known to support high numbers of bird species compared to other habitats within the region (Brandle, 2010). A wide variety of species, including three species of conservation significance, were observed during the March 2013 survey. These species, Diamond Firetail, Shy Heathwren and Cape Barren Goose were observed in a number of habitats, ranging from large Sugar Gums to low heathy ridge tops to open, clear paddocks.

The area is also known to contain key habitats for the breeding of the Eyre Peninsula population of the Yellow-tailed Black Cockatoo, heathy areas suitable for Southern Emu-wrens and the small isolated population of the Western Gerygone (*Gerygone fusca*). Unfortunately, stochastic events such as the

'Black Tuesday' fires of 2005 have decimated these bird species in the area, and highlight the delicate nature of areas that are highly fragmented.

6.2.2 Threatened fauna

Numerous threatened species have been identified along the alignment via database searches, being either listed under national EPBC or the NPW act, South Australia. Many of the species listed may exist along the line to some extent; however species listed below were either observed, have a high chance of existing along the line due to suitable habitats existing, or may be affected by small scale changes to key habitats.

Malleefowl (*Leipoa ocellata*) EPBC Vulnerable, State Vulnerable

Critical habitat for the Malleefowl was found along approximately 35 km within the northern section, from between Iron Duchess to the southern end of She-oak Conservation Park. These areas consisted of semi-arid to arid shrublands and low woodlands dominated by mallee and associated habitats such as *Melaleuca uncinata* (Broombush) and *Callitris verrucosa* (Scrub Pine). A sandy substrate and abundance of leaf litter were present in almost the entire section, both of which are key requirements for the construction of the birds' incubator-nests.

The clearing and fragmentation of Malleefowl habitats is highlighted as a key threat to the species and it is considered that these actions are also likely to exacerbate other threats (Benshemesh 2007). There is potential for clearance of large tracts of mallee vegetation to facilitate the construction of the proposed transmission line. This may, in turn, cause extensive fragmentation of key habitat for the Malleefowl, placing further pressures on a population of animals that has suffered severe restrictions since European settlement on the Eyre Peninsula.

Although no Malleefowl were observed directly during the original survey, further efforts have located numerous Malleefowl mounds that are in close proximity to the current transmission easement. This confirms that the intact mallee vegetation traversed by the existing and proposed high voltage transmission line through the Middleback region of NE Eyre Peninsula is inhabited by Malleefowl. The area contains relatively low densities of Malleefowl mounds, approximately half of the median for other sites in South Australia, with a density of between 3.2-4.4 mounds per km². This is, however relatively high for an arid region (Ecological Horizons, 2014). Less arid areas with high density of mounds are typically restricted to small isolated remnants which suggest may that the Middleback region, whilst supporting a 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 key outcome of this study was the comparison of recently active Malleefowl mound density adjacent to and remote from the transmission line. This may provide evidence of the effect of the proximity to the transmission line affecting long-term nest site selection or its success. Confirmed mound densities along the transmission line were 28% lower than densities on the remote transect. There was also a 5% higher percentage of historic mounds on the transmission line 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 transmission line increased the likelihood of mounds being abandoned or led to higher predation rate of nesting birds. Together these data suggest that proximity to the transmission line 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 transmission line.

Relative densities of recently active Malleefowl mounds adjacent to the transmission line 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 transmission line transect, there was no indication that the distribution of recent or historic mounds showed any relationship with distance to the transmission line, as could have been expected if higher predation rates (foxes and raptors using the transmission line easement) affected nest location choice in the Malleefowl. It is possible that any effect of the transmission line could extend for the entire 500 m width of the transmission line 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 transmission line.

Sandhill Dunnart (*Sminthopsis psammophila*) EPBC Endangered, State Vulnerable

The Sandhill Dunnart is known to occur on sandy substrates in arid and semi-arid regions. The most consistent features of the habitat are the presence of *Triodia* spp. (*Spinifex*) and sand dunes (Churchill 2001). Suitable habitat for Sandhill Dunnarts on Eyre Peninsula is limited due to historical land clearance.

Previous records of the species are present across the project area (refer to Figure 12 and Figure 13). One of the key populations of Sandhill Dunnarts is located near Whyalla in the Middleback Ranges, an area that the current easements transect. There are also several conservation areas in the vicinity of the project area that contain habitat potentially suitable for the species; primarily Pinkawillinie CP, Lake Gilles CP, Hambidge CP, and Munyaroo CP (Churchill 2001). Previous surveys of Pinkawillinie, Lake Gilles, and Hambidge CPs have failed to detect the species, but further survey work is needed. Munyaroo CP has not been surveyed for the species. There has been limited survey effort in general for this species across the region. It is considered likely that the BDBSA records for this species in the vicinity of the proposed transmission line alignments are part of a larger population that extends to the west of the State, where there is a known population and historical records in the Yellabinna region (Churchill 2001).

Habitat modeling and subsequent assessment of the proposed transmission line corridor identified a total of 1213 hectares of native vegetation from Middleback Range to Sheoak Hill Conservation Park containing suitable *Triodia* habitat within four vegetation associations. At least two of these vegetation associations support confirmed records of Sandhill Dunnarts and although it is likely that the other two suitable *Triodia* associations also support dunnarts, these are currently unsurveyed. The patchy nature

of the *Triodia* habitat suggests that it is also likely that some of the remaining non-*Triodia* native vegetation along the corridor is used by Sandhill Dunnarts for dispersal and feeding.

The height of *Triodia* is an important variable that can be used to predict the abundance and presence of Sandhill Dunnarts and is dependent to some degree on fire age. The relationship between *Triodia* height and fire age is unclear for sites more than 50 years post fire, but Sandhill Dunnarts appear to require habitat more than 10 years post burn for local persistence.

Sandhill Dunnarts are currently only recorded from large, intact areas of mallee *Triodia* vegetation, possibly because such large areas can support fire mosaics of varying age, ensuring that at least some habitat is always suitable for Sandhill Dunnart breeding. The large area of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park contains the majority of Sandhill Dunnart habitat within the proposed corridor and there are numerous current records of the species from this area.

To increase certainty about Sandhill Dunnart occurrence in the corridor, ground trapping surveys of two of the *Triodia* vegetation associations (excluding the small patch of *Triodia* with *Austrostipa* on the Whyalla plain) currently not known to support Sandhill Dunnarts would be required. Additionally, *Triodia* height measurements of the unknown fire age *Triodia* habitat (54% of it) could be measured to finalise the map of current and future optimal habitat. Without further detailed surveys it should be assumed that the transmission line corridor mallee habitat from the Middleback Range to south of Sheoak Hill Conservation Park is suitable Sandhill Dunnart habitat and important for the preservation of the species.

There is potential for impacts to this species as a result of the proposed transmission line development, including:

- the direct removal, degradation or further fragmentation of suitable *Triodia* habitat (optimal, future and unclassified) used for shelter and breeding;
- the direct removal of individuals;
- the increased predation of the species via further accessibility of suitable habitat to exotic species such as Cats and Foxes; and
- removal or modification of connective non-*Triodia* habitat used for dispersal and feeding.

It is considered a referral under the EPBC Act is required for this species, given the potential impact to this species as a result of the proposed development.

Southern Emu-Wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) EPBC Vulnerable State Endangered

The Southern Emu-wren (Eyre Peninsula) is a small bird that has an overall length of 17–19 cm and a mass only 9 g. The tail is exceptional long in this small species, and is over 10 cm in length with some males exceeding 13 cm. The tail is a stick-like bunch, and comprised of only six emu-like feathers (Higgins et al. 2001).

The Southern Emu-wren (Eyre Peninsula) sub-species is restricted to the extreme south of the Eyre Peninsula (Pickett 2006), and exists in numerous small disjointed populations. Its range extends broadly

from Marble Range, South Block and Edillilie in the north-west and north, to Point Avoid in the west, Cape Wiles and West Point in the south and south-east, to McLaren Point-Carcase Rock and the central Koppio Hills in the east and north-east (Pickett 2006). The largest populations occur in the Kellidie Bay, Whalers Way, McLaren Point-Point Haselgrove and West Point areas (Pickett 2006). The extent of occurrence is estimated at 2545 km². The Southern Emu-wren (Eyre Peninsula) occurs in three types of habitat: shrubland or heathland, mallee and sedgeland (Pickett 2002). These habitats are characterised by one or two layers of dense vegetation up to 3 m in height (Morgan 1982; Pickett 2002).

Surveys for the species were undertaken during the March survey in areas historically known to have Southern Emu-wrens, however none were observed. This species can be very cryptic and shy making confirmed detection very difficult. The presence of Superb Fairy-wren (*Malurus cyaneus*) in the area also hampers searching, due to similarity in calls. Unfortunately, the population within the Koppio hills appears to have been decimated by the 2005 'Black Tuesday' fires that burnt through this region. Southern Emu-wrens were historically found within the Charlton Gully, an area which is in close proximity to the current power line, however they have not been observed at this area since 2005 (Pickett 2005). It is unknown if this species will re-habituate this area; suitable habitat has recovered and could sustain this species. However other populations are some distance away (Edillilie is approximately 18 km away and holds a stable population) and with the highly fragmented habitat between the sites, plus the species poor long distance movements, recruitment is more than likely limited. This may be the reason for not finding this species; however further searching may locate birds and re-recruitment to the area cannot be discounted.

Potential impacts to the species associated with the construction phase can be minimised by sensitive micro-siting of infrastructure, however a referral under the EPBC Act is considered necessary for the species.

Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*) (Eyre Peninsula population) State Rare

The Yellow-tailed Black Cockatoo is a large 56-66cm black parrot with a long tail, broad wings and strong bill. It is one of three species of Black Cockatoo that occur in South Australia and can be easily distinguished by the yellow panels in its tail and yellow ear coverts. Three recognised sub-species exist; *C. f. funereus* found through south-east Queensland, eastern New South Wales and eastern Victoria, *C. f. xanthanotus* that occurs in Tasmania and the islands of Bass Strait, and *C. Funereus whitei* that occurs in western Victoria, and southern South Australia.

Historically, there were three main vegetation communities on the Eyre Peninsula throughout the birds' current southern range: Sugar Gum woodlands and heathy woodlands, heathlands (typically on hill tops and ridges) and water courses characterised by *E. petiolaris* woodland (Eyre Peninsula Blue Gum) and/or swamp habitats. It is possible that the cockatoos may have also ranged more widely and historically utilised *Allocasuarina verticillata* (Sheoak) Grassy woodlands that have largely been cleared on Eyre Peninsula. The ironstone soils of Southern Eyre Peninsula are agriculturally productive and the majority of these vegetation communities in the region were historically cleared for cropping and sheep grazing

Numbers of the Eyre Peninsula Yellow-tailed Black Cockatoo have been monitored closely for the past 20 years, and showed a general steady increase in population. This was until 2005, when the “Black Tuesday” fires decimated the estimated 30-34 birds reducing the known maximum population to between 11 and 12 individuals. As such, the Eyre Peninsula population of Yellow-tailed Black-Cockatoo is considered Critically Endangered by the Eyre Peninsula Yellow-tailed Black-Cockatoo Recovery Team.

No Eyre Peninsula Yellow-tailed Black Cockatoos were observed during the survey period.

Fairy Tern (*Strenua nereis nereis*) – EPBC Vulnerable and migratory, State Endangered (likely to be fly-over species across the easement where it is closest to the coastline).

The Fairy Tern is like the Little Tern but has a larger head, with a more rounded profile. Fairy Terns also have a bulkier body and shorter, thicker legs. Legs are bright orange. They are found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons. It favours both fresh and saline wetlands and near-coastal terrestrial wetlands, including lakes and salt-ponds.

Movements are poorly known and the Fairy Tern appears partly migratory and partly non-migratory. The relationship between breeding and non-breeding ranges is not known. In South Australia Fairy Terns appear not to move regularly and are numerous at all times in some areas. Fairy Terns are predominantly located in the south east, Coorong and along the Eyre Peninsula coastline, with breeding colonies recorded on the Fleurieu Peninsula, Yorke Peninsula, Eyre Peninsula and the Coorong.

Fairy Terns normally breed in colonies (2 to 400 birds) but also nest solitary, above the high-tide mark on sheltered beaches, spits, bars, banks and ridges, usually of sand but also of shell grit or coral, either on the mainland or on inshore islands. They often nest in clear view of the water and on sites where the substrate is sandy and the vegetation low and sparse. Nests typically consist of a shallow scrape in the sand which is often lined with small shells and vegetation. Fairy Tern often nests in association with other species, especially Little Tern (*Strenua albifrons*).

The Fairy Tern population has dramatically declined over the past ten years. Results from the November 2010 State-wide census recorded a range between 650 and 750 Fairy Tern across South Australia. This species, if occurring on site, would likely to be as a fly-over species with impact from the proposed easement being difficult to predict but assumed as unlikely.

Thick-billed Grasswren (*Amytornis textilis myall*), State Rare (no longer listed under EPBC (DSEWPaC 2013)) now referred to as Western Grasswren

Western Grasswren are thickset, dull brown in colouration with dark stout bills. The underparts are pale grey-buff, with fine streaking from the chin to the breast and on the back. The Female Thick-billed Grasswren has chestnut flanks (Pizzey & Knight 1999).

A. textilis myall is restricted to South Australia and is one of a number of sub-species of Thick-billed Grasswren in the State. It is scattered and widespread on the north-eastern Eyre Peninsula, from

around Whyalla and Mt Middleback, northwest through the Gawler Ranges (particularly the eastern Gawler Ranges), north to around Lake MacFarlane and eastern Lake Gairdner (Black 2011).

Preferred habitats occur in open chenopod shrublands, often where dense stands of *Acacia tetragonophylla* (Dead Finish) or *Maireana pyramidata* (Black Bush) surround drainage lines (Higgins et al. 2001). It also occurs in *Atriplex* spp (Saltbush) with a sparse or open overstorey of low trees or shrubs, such as *Acacia papyrocarpa* (Western Myall), *Casuarina pauper* (Black Oak), *Lycium australe* (Australian Boxthorn), *Alectryon oleifolius* (Bullock Bush) and *Myoporum platycarpum* (Sugarwood); this is in contrast to other sub-species of *A. textilis*, who prefer lower shrubland. (Black et al 2011; Higgins et al. 2001)

The Gawler Ranges subspecies of the Thick-billed Grasswren is usually seen in pairs or small groups, but sometimes occurs singly (Higgins et al. 2001). EBS recorded this species in preferred chenopod shrublands on Middleback and Broadview station.

Striated Grasswren (*Amytornis striatus*), State Rare

This species is sedentary in nature, with local movements in the non-breeding season. They are secretive species, principally terrestrial in character, and live as singles, in pairs or small groups of up to five individuals. Territories of about 1 ha are maintained by breeding pairs during the breeding season. They are capable of breeding in fragmented Spinifex (*Triodia* sp.) habitats of less than 1ha in area (Higgins et al. 2001).

The Striated Grasswren inhabits dense, tall (mature) Spinifex with or without a shrub overstorey. This overstorey generally consists of Mallee, *Acacia*, *Grevillea* and/or *Hakea* spp. And tends to occupy vegetation with a post fire age of 6 to 30 years (Garnett et al 2011)

The species was observed within the study area; being found in an area with extensive *Triodia* sp groundcover with numerous short, but dense mallee trees within the Ironstone Hill Conservation Park. The species was found advertising calling actively in the morning and responded to call play back. This allowed visual confirmation of the species. This species was recorded within the 10 km of buffer on the line within the BDBSA database, with specimens recorded in Ironstone Hill CP in 2008. This may indicate that this area is a hot spot for this species and as Stated earlier their habitat requirements are similar to Sandhill Dunnarts.

Peregrine Falcon (*Falco peregrinus*), State Rare

The Peregrine Falcon is arboreal, foraging over plains, vegetated areas, wetlands, beaches, dunes and farmland, from a height or close to the ground, for small vertebrates, invertebrates, and occasionally fruit. The sedentary species is known to follow the distribution of prey from season to season and roosts and nests in cliffs, cavities, hollows, other bird nests, sink holes and on buildings.

The Peregrine Falcon is found across Australia, but is not common anywhere. Although these birds are not common, they have successfully spread worldwide, and will sometimes nest on artificial structures such as the window ledges of high buildings and in this instance, along the easement in towers. It is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine

areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water. Peregrine Falcons commonly occur at windy sites along ranges, and often nest in crevices of rocky cliff faces (Pizzey and Knight 1997). This species has a distinctive flight and call, and is often observed flying above the tree canopy or in open areas between patches of woodland, or over wetlands. Pairs are known to nest in the same locations for many years. Peregrine Falcon pairs are known to have large territories, and an estimated 3,000 to 5,000 pairs exist in Australia, of a world total of 12,000 to 18,000 pairs (Blakers et al. 1984). Given that Peregrines have large territories and nest in the same location for years, it would appear that the birds that were observed during the survey period are likely to remain on site in the future. This may have implications in terms of altering prey abundance or changing the behaviour of this species i.e. individuals were found quite close together along the easement resting on a tower on the fringes of Wharminda Conservation Park. This species was noted on a number of towers, and is possibly benefiting from the structures due to their use of cliffs for roosting and hunting.

6.2.3 Potential impacts to threatened fauna species

Introduced predators have taken a heavy toll on native Australian species, with both the Red Fox and Feral Cat proving to be extremely adaptable and accomplished hunters (Dickman 1996; Kinner et al 2002). The direct effect of these species is well documented (Saunders et al 2010; Letnic et al 2009; Read and Bowen, 2001; Paltridge et al 1998) and numerous species exist within the study area that may suffer due to an increase in predator numbers or accessibility. Both introduced species have been strongly implicated with the reductions in native mammal populations, or extinction of native mammals in the critical weight range (CWR) from 35-5000 g (Read and Bowen, 2001; May and Norton 1996). Both the Red Fox and Cat tend to prefer modified habitat and move into more highly degraded open habitats. This helps their movement as well as reducing available areas of cover for prey to shelter, assisting in hunting. Opening areas of remnant vegetation may assist in an increase in population of these two predators, which may have an impact on native species such as the Sandhill Dunnart, a national listed species which falls into the CWR.

The Red Fox have also been heavily linked with reductions and impacts on the Malleefowl (Benshemesh, 2007). This predator will predate young that have emerged the nest chamber 'mound' as well as predated unhatched eggs that are in the mound. They also have the potential to prey upon adults, and as such can cause large scale devastation to this species. Fragmentation and habitat alteration has also been shown to have an effect on this species and any increase of pressures on the small and isolated Eyre Peninsula population could prove to be a tipping point, and may cause long term reductions of this species.

It is recognised that feral animal movement along the current power line easement is already happening. The line has been cleared of vegetation for visual inspections as well as reducing fire risk facilitating accesses and movement for these species. The addition of a second line 120 m from the current line and a series of 'spur' tracks connecting the tower location between new and old alignments, will significantly increase the access and fragmentation of habitats. It will also effectively create small 'islands' of native vegetation between the cleared lines, which could limit movement from the 'islands'

due to the surrounding hostile cleared environment. Edge effects will also be more pronounced with some species tolerant of these conditions benefiting, which may increase pressures on sensitive species. It may also affect species which tend to be very specific in their habitat requirements and sensitive to disturbances.

A second line will also double the amount of towers (assuming that there is no decommissioning of the existing line undertaken) and will allow birds of prey such as the Peregrine Falcon extra areas for breeding and hunting. Numerous Peregrines were noted along the line, always resting on towers and many nests visible. Naturally this species rests and breeds on cliffs or similar high structures and as such artificial towers provide unnatural areas that they will utilise. Peregrines tend not to occur in habitats that do not have cliffs or rocky outcrops, and the construction of towers such as power poles may assist in this species habituating areas that they could not before. This may have an effect on bird species in the area that the Peregrine hunts. Methods of avoiding this potential issue are difficult to rectify, as a second line will need to be constructed while the existing line is in use, however techniques to limit available roosting or breeding areas may be possible.

Potential impacts on the flora and fauna associated with the proposed transmission line construction include direct removal of native vegetation and habitat (including vegetation, soil structure and resources), loss of habitat connection (e.g. through tracks), noise disturbance on fauna and direct mortality of fauna (e.g. through road-kills).

6.3 Biodiversity hot spots

A series of 'hot spots' have been highlighted along the project area that identify key constraints associated with areas possessing a high concentration of nationally and State threatened species records, TECs, protected areas and remnant native vegetation. Six areas have been identified and discussed individually (Figure 27 to Figure 32). Several of these are associated with the recognised threatened habitat areas, Koppio Hills and Cleve Hills.

Hot spot area 1

This area is located from Cultana substation at the northern extremity of the project area to the Middleback Ranges in the Myall Plains IBRA Subregion, encompassing the semi-arid pastoral lease country. These areas contained large tracts of open chenopod shrubland with *Acacia papyrocarpa* (Western Myall) before migrating into the Middleback ranges and Mallee country. Mallee was dominated by red and white sand, with areas of large dunes present. Much of the vegetation was in excellent condition with very low levels of weed invasion and grazing impacts generally associated with some boundary fences and water points. A number of key constraints were listed for this area:

- State Vulnerable *Santalum spicatum* (Sandalwood) recorded within the 120m wide assessment corridor.
- State Rare Slender-billed Thornbill (western) (*Acanthiza iredalei iredalei*)
- State Rare Western Grasswren (previously Thick-billed Grasswren) (*Amytornis textilis myall*) (no longer listed under EPBC (DSEWPaC 2013))

- State Vulnerable *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria* / *Maireana sedifolia*
- Protected areas
 - Whyalla CP

Hot spot area 2

This area is at the southern end of Hot Spot 1 and ends at the Plug Range CP, also identified as part of the Cleve Hills Threatened Habitat Area within the Eyre Hills IBRA Subregion. The vegetation is defined by large and continuous tracts of mallee / spinifex communities associated with large dune complexes and provides important refuge areas to a large number of fauna and flora species. The key constraints listed for this area are:

- Nationally Threatened Flora Species records within 10kms of the assessment corridor (may exist within the corridor)
 - *Acacia cretacea* (Chalky Wattle) (Endemic)
 - *Swainsona pyrophila* (Yellow Swainson-pea)
 - *Pterostylis xerophila* (Desert Greenhood)
- Nationally Threatened Fauna Species
 - Malleefowl (*Leipoa ocellata*)
 - Sandhill Dunnart (*Sminthopsis psammophila*)
- State Listed flora species - recorded within the 120m wide assessment corridor.
 - *Acacia rhigiophylla* (Dagger-leaf Wattle) – State Rare
- State Listed fauna species
 - Striated Grasswren (*Amytornis striatus*)
 - Gilberts Whistler (*Pachycephala inornata*)
- Protected Areas
 - Ironstone Hill CP
 - Sheoak Hill CP
 - Sheoak Hill CR
 - Plug Range CP
 - 9 Heritage Agreements
 - 1 SEB area
- Cleve Hills Threatened Habitat Area (DEH, 2002)

Hot spot area 3

This area extends from the Plug Range CP to just north-west of Cleve and is also located in the Cleve Hills Threatened Habitat Area within the Eyre Hills IBRA Subregion. The vegetation which is mainly characterised by mallee / broombush communities and Native Pine open woodlands are more

fragmented than Hot Spot Area 2, but are still known to provide valuable habitat to a number of threatened fauna and flora species. The key constraints listed for this area are:

- State Endangered vegetation associations
 - *Allocasuarina verticillata* Low Woodland
- Nationally Threatened Flora Species records within 10kms of the assessment corridor (may exist within the corridor)
 - *Acacia cretacea* (Chalky Wattle) (Endemic)
 - *Acacia praemorsa* (Senna Wattle) (Endemic)
 - *Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush)
 - *Acacia rhetinocarpa* (Neat Wattle)
 - *Acacia pinguifolia* (Fat-leaved Wattle)
- State Listed flora species - recorded within the 120m wide assessment corridor.
 - *Acacia hexaneura* (Six-nerve Spine-bush) – State Rare
 - *Goodenia benthamiana* (Bentham's Goodenia) – State Rare
 - *Acacia rhigiophylla* (Dagger-leaf Wattle) – State Rare
 - *Austrostipa breviglumis* (Cane Spear-grass) – State Rare
 - *Olearia adenolasia* (Musk Daisy-bush) – State Rare
- Cleve Hills Threatened Habitat Area (DEH, 2002)

Hot spot area 4

This area encompasses approximately 14 kilometres of the project area on the eastern side of Hincks Wilderness Area and west of Wharminda in the Eyre Mallee IBRA Subregion. The vegetation is predominately fragmented mallee / broombush patches, but is still known to provide valuable habitat to a number of threatened fauna and flora species. Most patches are isolated but in relatively close proximity to Wharminda CP, Hincks WA and a number of larger remnant patches of native Vegetation. A number of key constraints were listed for this area:

- Nationally Threatened Flora Species records within 10kms of the assessment corridor (may exist within the corridor)
 - *Arachnorchis tensa* (Greencomb Spider-orchid)
- State listed flora species - recorded within the 120m wide assessment corridor.
 - *Microtis* sp. Nash (R. Bates 44740) (Nash's onion orchid) – State Rare
- State listed fauna species
 - Peregrine Falcon (*Falco peregrinus*)
- Protected areas
 - Wharminda CP

Hot spot area 5

This area is located from just west of Butler and extends to Green Patch in the Eyre Hills IBRA Subregion, encompassing part of the Koppio Hills Threatened Habitat Area. The area contains highly significant, but highly fragmented vegetation, State and regionally listed TEC's, significant wildlife habitat, many nationally and State listed fauna and flora species. More specifically the constraints listed for the area are:

- Nationally Endangered and endemic vegetation association
 - *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Low Woodland
- State Endangered vegetation associations
 - *Allocasuarina verticillata* Low Woodland
 - *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Low Woodland
 - *Eucalyptus peninsularis*, *E. dumosa* complex Woodland
 - *Gahnia trifida* (Cutting Grass) Sedgeland
 - *Austrodanthonia* spp. / *Austrostipa* ssp. +/- *Themeda triandra* Tussock Grassland
- Regionally threatened vegetation association
 - *Eucalyptus cladocalyx* (Sugar Gum) Woodland (DEH, 2002)
- Nationally Threatened Flora Species
 - *Acacia enterocarpa* (Jumping-jack Wattle)
 - *Acacia pinguifolia* (Fat-leaved Wattle)
 - *Acacia whibleyana* (Whibley Wattle)
 - *Arachnorchis brumalis* (Winter Spider-orchid)
 - *Arachnorchis tensa* (Rigid Spider-orchid)
 - *Haloragis eyreana* (Prickly Raspwort),
 - *Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush)
 - *Prasophyllum goldsackii* Goldsack's (Leek-orchid)
 - *Prostanthera calycina* (West Coast Mintbush)
 - *Ptilotus beckerianus* (Ironstone Mulla Mulla)
 - *Pultenaea trichophylla* (Tufted Bush-pea)
 - *Thelymitra epipactoides* (Metallic Sun-orchid)
- State threatened flora species
 - *Acacia imbricata* (Feathery Wattle) – Stare Rare
 - *Daviesia pectinata* (Zig-zag Bitter-pea) – Stare Rare
 - *Eremophila gibbifolia* (Coccid Emubush) – Stare Rare
 - *Philothea angustifolia* ssp. *angustifolia* (Narrow-leaf Wax-flower) – Stare Rare
 - *Spyridium leucopogon* (Silvery Spyridium) - Stare Rare
 - *Spyridium spathulatum* (Spoon-leaf Spyridium) - Stare Rare

- *Eremophila gibbifolia* (Coccid Emubush) – Stare Rare
- *Philotheca angustifolia* ssp. *angustifolia* (Narrow-leaf Wax-flower) – Stare Rare
- *Spyridium leucopogon* (Silvery Spyridium) - Stare Rare
- *Spyridium spathulatum* (Spoon-leaf Spyridium) - Stare Rare

Hot spot Area 6

This section, whilst largely utilised for a variety of agricultural purposes, possess a few attributes of State conservation significance. Potential constraints listed for the area are:

- State Endangered and endemic vegetation associations
 - *Allocasuarina verticillata* Low Woodland
- State threatened fauna species
 - Diamond Firetail (*Stagonopleura guttata*)
 - Cape Barren Goose (*Cereopsis novaehollandiae*)

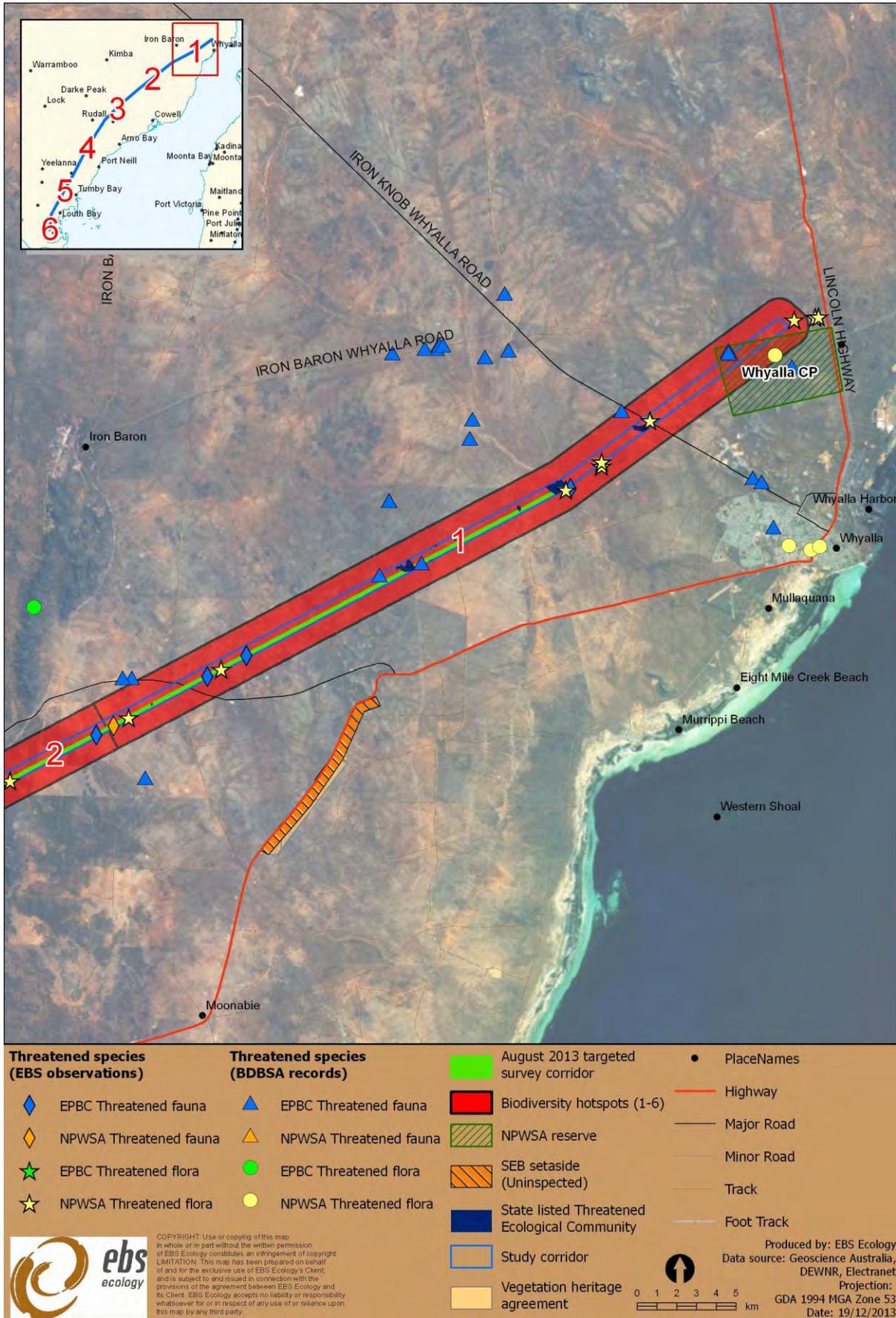


Figure 27. Project area hot spot 1.

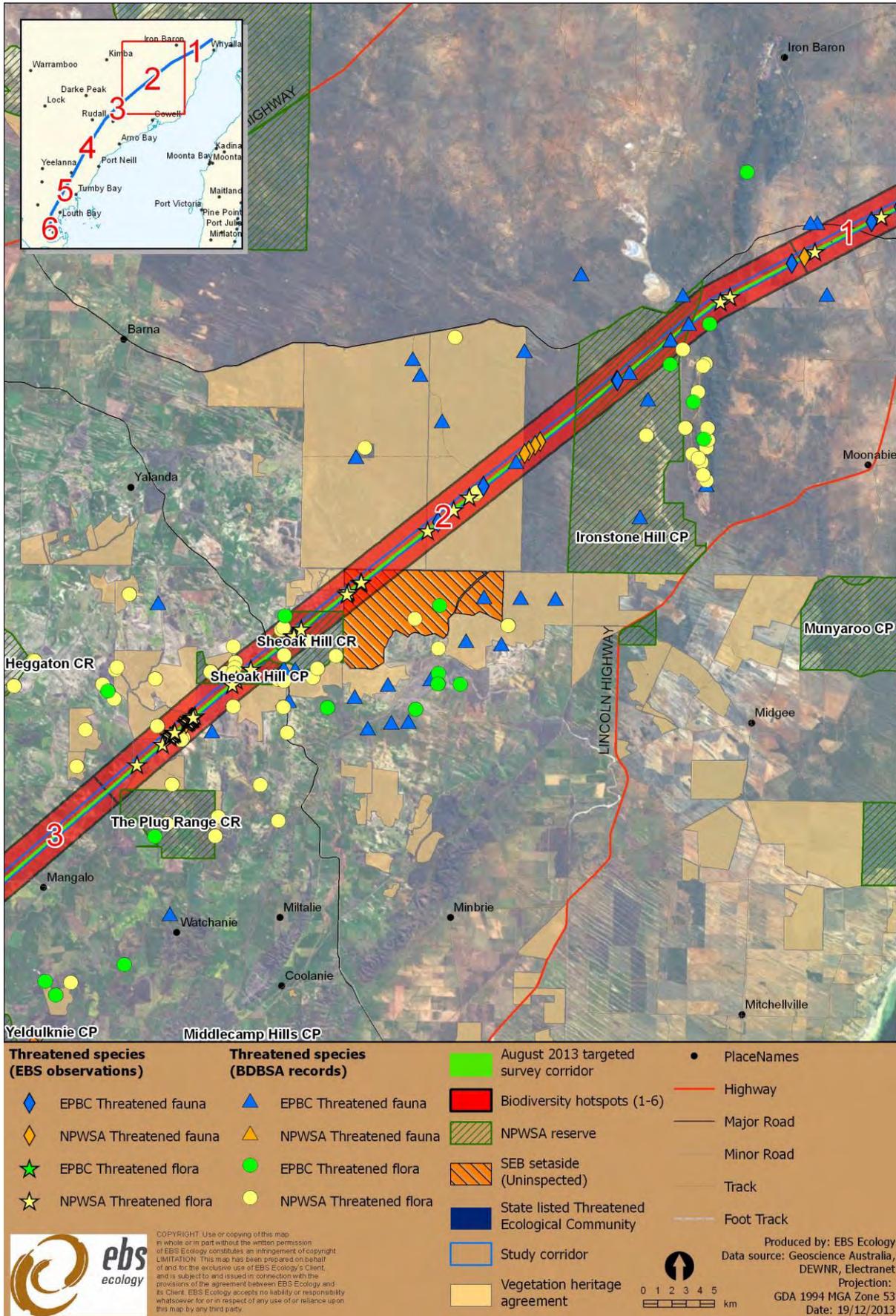


Figure 28. Project area hot spot 2.

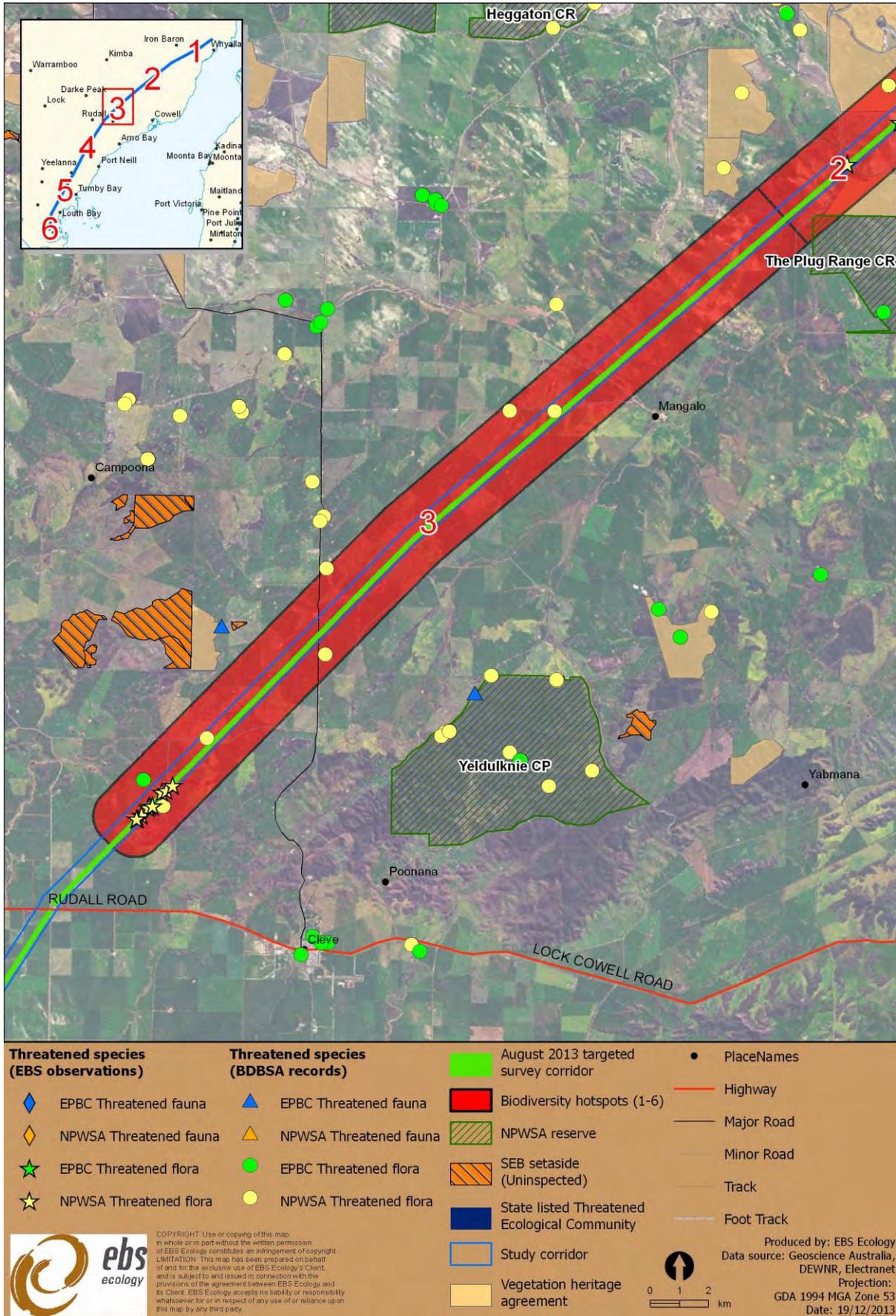


Figure 29. Project area hot spot 3.

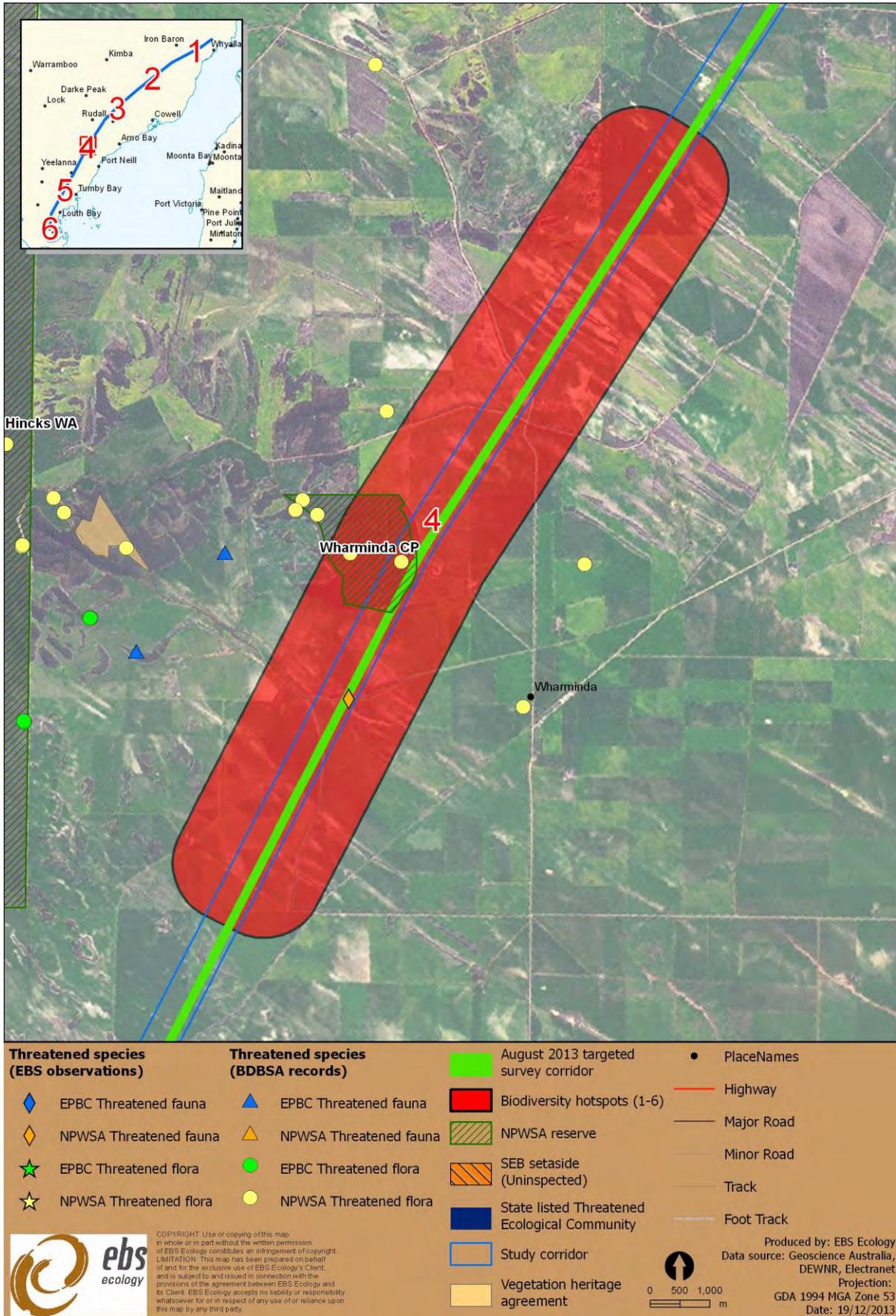


Figure 30. Project area hot spot 4.

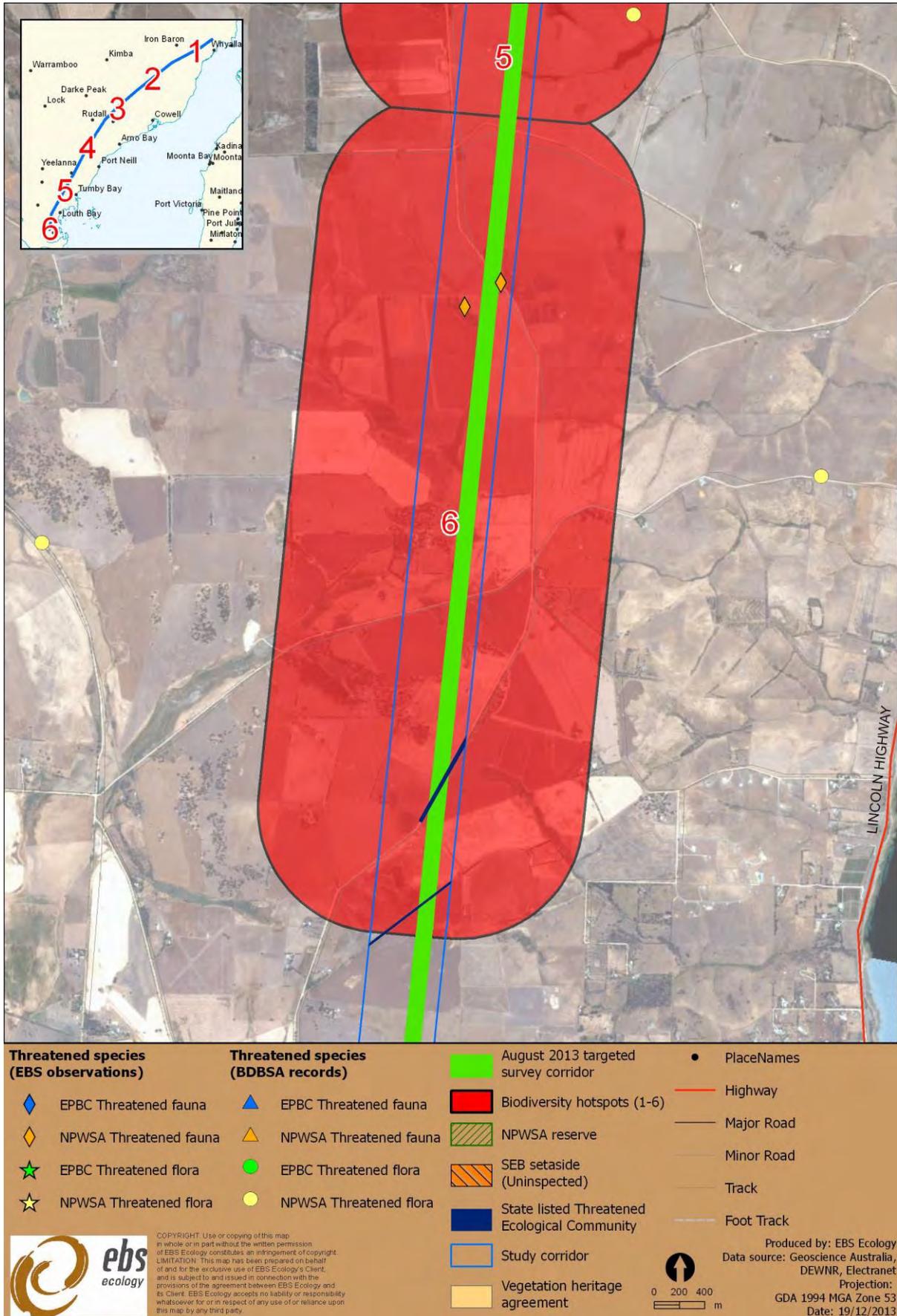


Figure 32. Project area hot spot 6.

6.4 Protected areas

The proposed alignment is sited within close proximity and, in some areas, intersects a number of protected areas (reserves under the NPW Act or Heritage Agreements and SEB areas under the NV Act). All protected areas should be avoided as far as practicable.

Information in relation to Heritage Agreements is not publicly available, so consultation with the NVC will be required to understand the reasons for protection of these areas and the extent to which the NVC would consent to establishment of a development easement within Heritage Agreements. An approval from the NVC and relevant Minister would be required if development within an existing Heritage Agreement is proposed (*P. Farmer, NVC, pers. comm. 2012*). The proponent would require support from the NVC in relation to the concept and design of the project, and management methods to be implemented to reduce impacts of native flora and fauna. Even if the NVC are receptive to consideration of an easement through a Heritage Agreement, this does not guarantee approval to proceed with the development. It is therefore considered preferable to explore all other alternatives for the alignment before planning an easement through an existing Heritage Agreement.

6.5 Road and rail corridors

A small proportion of the remnant native vegetation assessed within the project area occurred along roadsides and rail reserves, with the majority characterised by woodland and mixed mallee associations. Vegetation condition and width of the road reserve was variable with those located in the northern zone, in much better condition to those in the southern half. Roadsides and rail reserves often comprise the last stands of native vegetation in landscapes which have otherwise been extensively cleared and this is particularly poignant in the southern half of the project area. These areas can support significant populations of threatened flora and provide a refuge and corridor for local fauna. A number of the road and rail reserves contain rare and threatened plant species, including nationally threatened species such as *Acacia cretacea* (Chalky Wattle), *Acacia pinguifolia* (Fat-leaf Wattle), *Acacia whibleyana* (Whibley's Wattle), *Haloragis eyreana* (Prickly Raspwort), *Acacia enterocarpa* (Jumping-jack Wattle), *Acacia rheticarpa* (Resin Wattle), *Olearia pannosa ssp. pannosa* (Silver Daisy-bush), *Ptilotus beckerianus* (Ironstone Mulla Mulla), *Thelymitra epipactoides* (Metallic Sun-orchid), *Arachnorchis brumalis* (Winter Spider-orchid) and *Pultenaea trichophylla* (Tufted Bush-pea). Some of these, in particular, *Haloragis eyreana* (Prickly Raspwort) have sub-populations that persist almost entirely in roadside and rail reserves. Targeted surveys have helped identify the significance of each of the remnants and particular caution will need to be exercised in dealing with roadsides and rail reserves during the construction phase. Some of the roadside reserves containing threatened species include Baila Hill Road, Dray Pole Hill Road, Lipson-Ungarra Roar, Ungarra-Yeelanna Road, Pfitzner Road, North Spriggs Road, Schubert Road and a few minor tracks.

6.6 Potential mitigation actions

A variety of management actions could be implemented to mitigate the potential impacts of the proposed development. Some of these actions may be mandatory under relevant legislation. The

specific nature of these actions would need to be determined once the final route alignment has been selected and the extent of potential impacts has been determined. Potential actions include, but are not limited to:

- Micro-site all infrastructure prior to final design to ensure areas of least impact are utilised;
- Design towers to ensure minimal roosting sites for birds of prey and nesting sites for introduced bird species;
- Develop detailed and extensive environmental management processes and procedures for the construction phase of the project;
- Preparation of appropriate management plans, for implementation prior to, during and post construction, to ensure environmental impacts are minimised as far as practicable;
- Utilising low-impact construction methods within highly sensitive environments; for example, within dune and mallee habitats;
- Protection of critical habitat for threatened species;
- Provision of funding to support recovery objectives and actions for threatened species; for example:
 - Protection of habitat
 - Undertaking surveys
 - Research projects to further understand species ecology
 - Establishment of monitoring programs
 - Preparation of management plans
 - Threat abatement (e.g. feral predator control)
 - Education and support for landowners

Where impacts on native vegetation are unavoidable, areas of excellent condition (high SEB ratio) should be avoided over areas of poorer condition. This will reduce potential impact on native vegetation and fauna and reduce the required SEB offset under the *Native Vegetation Act 1991*.

- Establishment of a Significant Environmental Benefit (SEB) under the *Native Vegetation Act 1991*. Options include:
 - Heritage Agreement
 - Set-aside area
 - Payment into the Native Vegetation Fund

7 RECOMMENDATIONS

The following recommendations have been provided to minimise the impacts associated with the proposal on the biodiversity assets within the region.

Further investigations

- Investigate, in detail, the use of alternative construction and maintenance methods to minimise the footprint of the infrastructure / long-term impact of the works. This may include tower design, line stringing methods, maintenance methods that avoid the need for a track between towers and use of underground lines so sensitive areas can be rehabilitated.
- Undertake investigations as per the Approved Conservation Advice, to determine whether the *Eucalyptus petiolaris* Woodland remnants along the alignment qualify as the nationally Endangered TEC, *Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland*.
- Undertake spring micro-siting surveys once a layout plan is available, given that it was not practical to thoroughly search every area within the assessment corridor.

Minimise clearance of threatened flora, TECS, threatened fauna habitat

- Avoid areas of known threatened species and significant threatened fauna habitat and TECs (Vegetation Associations 4, 31, 40, 46, 47, 58, 62 and 70) by using alternative routes and positioning towers in cleared areas and avoiding large scale clearance along the corridor for access, by using alternative access routes where possible. Micrositing tower locations prior to construction should be undertaken to ensure any impact is minimised.

Avoid protected areas such as NPW reserves, Heritage Agreements and SEB set aside areas

- The project area currently intersects four Conservation Parks, one Conservation Reserve, 18 Heritage Agreements and two SEB offset areas which are protected in perpetuity for biodiversity conservation under the *Native Vegetation Act, 1991*. Where impacts to protected areas are unavoidable consider construction modifications such as altering the span between towers to avoid significant areas or consider undergrounding sections of the line and allowing the initial clearance to regenerate.

Minimise impact on threatened fauna

- Known locations of threatened fauna and potentially suitable habitat should be avoided where possible. In particular Hot Spot areas 2 and 5 which fall within the Threatened Habitat Areas of Cleve Hills and Koppio Hills.

Impact assessment

- The ecological constraints of the project need to be taken into consideration when designing this project. A suitably qualified and experienced ecologist should be included in the design team to ensure infrastructure locations and construction methodologies are ecologically sensitive.

- It is recommended that all infrastructure is micro-sighted prior to final design to ensure the areas of least impact are utilised.
- Once final design is complete, a full impact assessment will be required for the project which should include native vegetation clearance, fauna habitat clearance and impact on threatened species.

Legislation

- EPBC Act, 2003

Due to the number of Matters of National Environmental Significance along the current alignment, a referral under the EPBC Act will be required for the project. Extensive consultation with DSEWPaC will also be required.

- Native Vegetation Act, 1991

Once the infrastructure design is finalised, the extent of vegetation removal required will need to be determined to calculate the required SEB offset. The provision of an SEB can be undertaken in several forms including managing and conserving areas of native vegetation, undertaking native vegetation restoration activities or making a payment into the Native Vegetation Fund.

Seek Native Vegetation Council approval for any vegetation clearance required and provide an appropriate SEB offset. The intent of SEB is to not only replace the immediate and direct environmental values lost through clearing, but also to achieve a net gain that contributes to improving the condition of the environment and biodiversity of the region and account for the indirect impacts on flora and fauna as a result of the construction and operation of the transmission line.

Clearance of native vegetation

- Where the proposed transmission line corridor passes through:
 - Fragmented vegetation patches, position infrastructure (towers) in cleared areas, or if necessary in areas of poorer quality vegetation.
 - Large tracts of high quality remnant mallee vegetation (e.g. Biodiversity Hot spots 1 (part) and 2), position infrastructure away from known high habitat areas or known significant areas (e.g. Malleefowl mounds)
 - Large tracts of high quality pastoral country dominated by Western Myall, chenopod associations with patches of Bullock Bush and Black Oak, ensure micro-siting of towers aims to avoid all patches of significant vegetation (e.g. State listed Bullock Bush Tall Shrubland) and where possible avoid clearance of long-lived procumbent Western Myall trees.
- Where impacts on native vegetation are unavoidable, areas of high quality vegetation should be avoided over areas of poorer condition. This will assist in minimising potential impacts on

native vegetation and fauna and reduce the required SEB offset under the *Native Vegetation Act, 1991*.

- Ensure vegetation clearance or damage is restricted to the project area.
- Relocate any cleared hollows (if any) and large cut timbers to remnant areas of vegetation, where appropriate to do so, to enhance available habitat to native fauna species.
- All other cleared vegetation is to be disposed of sensitively (mulched or spread over restoration areas to encourage natural regeneration) and should not be pushed into adjacent vegetation.

Off-target impacts to vegetation

- All machinery and vehicles should not be parked or stored underneath the drip line of trees or within areas containing native vegetation. Use previously cleared areas such as existing easement clearance along existing transmission line.
- Rubble or any other materials should not be placed or compacted under the drip line of trees. Use previously cleared areas such as existing easement clearance along existing transmission line.

Weed & soil pathogen management

- Best practice environmental management measures should be adopted during and following the construction phase. 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.
- 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.

Minimum disturbance construction

- The construction footprint should be kept to a minimum for least impact on flora and fauna. Management strategies for the construction phase of the project need to be developed and incorporated into the environmental management plan. Ideally, construction and any required vegetation clearance should avoid the peak breeding time for fauna and nesting time for birds (e.g. spring-summer).

Implement an environmental management plan

- If the project is to proceed, a detailed environmental management plan, incorporating best practice principles, should be developed and implemented. This would include, but would not be limited to, threatened species management, vegetation management, weed management and rehabilitation requirements.

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9 APPENDICES

Appendix 1 – Flora list EBS Ecology 2012-13 Field Surveys

Family	Species name	Common name	Cons. status		Introduced
			AUS	SA	
MALVACEAE	<i>Abutilon sp.</i>	Lantern-bush			
LEGUMINOSAE	<i>Acacia acanthoclada ssp. acanthoclada</i>	Harrow Wattle			
LEGUMINOSAE	<i>Acacia ancistrophylla var. lissophylla</i>	Hook-leaf Wattle			
LEGUMINOSAE	<i>Acacia burkittii</i>	Pin-bush Wattle			
LEGUMINOSAE	<i>Acacia calamifolia</i>	Wallowa			
LEGUMINOSAE	<i>Acacia continua</i>	Thorn Wattle			
LEGUMINOSAE	<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R	
LEGUMINOSAE	<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E	
LEGUMINOSAE	<i>Acacia farinosa</i>	Mealy Wattle			
LEGUMINOSAE	<i>Acacia gillii</i>	Gill's Wattle			
LEGUMINOSAE	<i>Acacia hakeoides</i>	Hakea Wattle			
LEGUMINOSAE	<i>Acacia halliana</i>	Hall's Wattle			
LEGUMINOSAE	<i>Acacia hexaneura</i>	Six-nerve Spine-bush		R	
LEGUMINOSAE	<i>Acacia imbricata</i>	Feathery Wattle		R	
LEGUMINOSAE	<i>Acacia ligulata</i>	Umbrella Bush			
LEGUMINOSAE	<i>Acacia microcarpa</i>	Manna Wattle			
LEGUMINOSAE	<i>Acacia myrtifolia</i>	Myrtle Wattle			
LEGUMINOSAE	<i>Acacia notabilis</i>	Notable Wattle			
LEGUMINOSAE	<i>Acacia nyssophylla</i>	Spine Bush			
LEGUMINOSAE	<i>Acacia oswaldii</i>	Umbrella Wattle			
LEGUMINOSAE	<i>Acacia papyrocarpa</i>	Western Myall			
LEGUMINOSAE	<i>Acacia paradoxa</i>	Kangaroo Thorn			
LEGUMINOSAE	<i>Acacia pinguifolia</i>	Fat-leaf Wattle	EN	E	
LEGUMINOSAE	<i>Acacia pycnantha</i>	Golden Wattle			
LEGUMINOSAE	<i>Acacia rhigiophylla</i>	Dagger-leaf Wattle		R	
LEGUMINOSAE	<i>Acacia rigens</i>	Nealie			
LEGUMINOSAE	<i>Acacia rupicola</i>	Rock Wattle			
LEGUMINOSAE	<i>Acacia sclerophylla var. sclerophylla</i>	Hard-leaf Wattle			
LEGUMINOSAE	<i>Acacia spinescens</i>	Spiny Wattle			
LEGUMINOSAE	<i>Acacia wilhelmiana</i>	Dwarf Nealie			
ORCHIDACEAE	<i>Acianthus pusillus</i>	Mosquito Orchid			
COMPOSITAE	<i>Actinobole uliginosum</i>	Flannel Cudweed			
PROTEACEAE	<i>Adenanthos terminalis</i>	Yellow Gland-flower			
GRAMINEAE	<i>Aira sp.</i>	Hair-grass			*
SAPINDACEAE	<i>Alectryon oleifolius ssp. canescens</i>	Bullock Bush			
CASUARINACEAE	<i>Allocasuarina muelleriana ssp.</i>	Common Oak-bush			
CASUARINACEAE	<i>Allocasuarina verticillata</i>	Drooping Sheoak			
MALVACEAE	<i>Alyogyne huegelii</i>	Native Hibiscus			
APOCYNACEAE	<i>Alyxia buxifolia</i>	Sea Box			
GRAMINEAE	<i>Amphipogon caricinus var. caricinus</i>	Long Grey-beard Grass			
LORANTHACEAE	<i>Amyema miquelii</i>	Box Mistletoe			
LORANTHACEAE	<i>Amyema quandang var. quandang</i>	Grey Mistletoe			
LEGUMINOSAE	<i>Aotus subspinescens</i>	Mallee Aotus			

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Family	Species name	Common name	Cons. status		Introduced
			AUS	SA	
ORCHIDACEAE	<i>Arachnorchis cardiochila</i>	Heart-lip Spider-orchid			
ORCHIDACEAE	<i>Arachnorchis macroclavia</i>	Large-club Spider-orchid	EN	E	
ORCHIDACEAE	<i>Arachnorchis tensa</i>	Inland Green-comb Spider-orchid	EN		
GRAMINEAE	<i>Aristida contorta</i>	Curly Wire-grass			
LILIACEAE	<i>Arthropodium sp.</i>	Vanilla-lily			
LILIACEAE	<i>Asphodelus fistulosus</i>	Onion Weed			*
EPACRIDACEAE	<i>Astroloma conostephioides</i>	Flame Heath			
EPACRIDACEAE	<i>Astroloma humifusum</i>	Cranberry Heath			
CHENOPODIACEAE	<i>Atriplex holocarpa</i>	Pop Saltbush			
CHENOPODIACEAE	<i>Atriplex nummularia ssp.</i>	Old-man Saltbush			
CHENOPODIACEAE	<i>Atriplex stipitata</i>	Bitter Saltbush			
CHENOPODIACEAE	<i>Atriplex vesicaria ssp.</i>	Bladder Saltbush			
CACTACEAE	<i>Austrocylindropuntia cylindrica</i>	Cane Cactus			*
GRAMINEAE	<i>Austrostipa elegantissima</i>	Feather Spear-grass			
GRAMINEAE	<i>Austrostipa eremophila X</i>				
GRAMINEAE	<i>Austrostipa plumigera</i>				
GRAMINEAE	<i>Austrostipa exilis</i>	Heath Spear-grass			
GRAMINEAE	<i>Austrostipa nitida</i>	Balcarra Spear-grass			
GRAMINEAE	<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass			
GRAMINEAE	<i>Austrostipa puberula</i>	Fine-hairy Spear-grass			
GRAMINEAE	<i>Austrostipa scabra ssp. falcata</i>	Slender Spear-grass			
GRAMINEAE	<i>Austrostipa tenuifolia</i>			R	
GRAMINEAE	<i>Avena barbata</i>	Bearded Oat			*
MYRTACEAE	<i>Babingtonia behrii</i>	Silver Broombush			
MYRTACEAE	<i>Baeckea crassifolia</i>	Desert Baeckea			
EUPHORBIACEAE	<i>Beyeria lechenaultii</i>	Pale Turpentine Bush			
PITTOSPORACEAE	<i>Billardiera cymosa ssp.</i>				
PITTOSPORACEAE	<i>Billardiera uniflora</i>	One-flower Apple-berry			
RUTACEAE	<i>Boronia coerulescens ssp. coerulescens</i>	Blue Boronia			
RUTACEAE	<i>Boronia inornata ssp. leptophylla</i>	Dryland Boronia			
COMPOSITAE	<i>Brachyscome ciliaris var.</i>	Variable Daisy			
CRUCIFERAE	<i>Brassica tournefortii</i>	Wild Turnip			*
GRAMINEAE	<i>Bromus madritensis</i>	Compact Brome			*
LILIACEAE	<i>Bulbine bulbosa</i>	Bulbine-lily			
PITTOSPORACEAE	<i>Bursaria spinosa ssp. spinosa</i>	Sweet Bursaria			
ORCHIDACEAE	<i>Caladenia latifolia</i>	Pink Caladenia			
MYRTACEAE	<i>Callistemon rugulosus</i>	Scarlet Bottlebrush			
CUPRESSACEAE	<i>Callitris glaucophylla</i>	White Cypress-pine			
CUPRESSACEAE	<i>Callitris gracilis</i>	Southern Cypress Pine			
CUPRESSACEAE	<i>Callitris verrucosa</i>	Scrub Cypress Pine			
MYRTACEAE	<i>Calytrix involucrata</i>	Cup Fringe-myrtle			
MYRTACEAE	<i>Calytrix tetragona</i>	Common Fringe-myrtle			
CRUCIFERAE	<i>Carrichtera annua</i>	Ward's Weed			*
COMPOSITAE	<i>Carthamus lanatus</i>	Saffron Thistle			*
COMPOSITAE	<i>Cassinia complanata</i>	Sticky Cassinia			
COMPOSITAE	<i>Cassinia laevis</i>	Curry Bush			
COMPOSITAE	<i>Cassinia uncata</i>				
LAURACEAE	<i>Cassytha glabella f. dispar</i>	Slender Dodder-laurel			
LAURACEAE	<i>Cassytha melantha</i>	Coarse Dodder-laurel			
LAURACEAE	<i>Cassytha pubescens</i>	Downy Dodder-laurel			
CASUARINACEAE	<i>Casuarina pauper</i>	Black Oak			
LEGUMINOSAE	<i>Chamaecytisus palmensis</i>	Tree Lucerne			*

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Family	Species name	Common name	Cons. status		Introduced
			AUS	SA	
LILIACEAE	<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	Blue Squill			
EUPHORBIACEAE	<i>Chamaesyce drummondii</i>				
ADIANTACEAE	<i>Cheilanthes austrotenuifolia</i>	Annual Rock-fern			
ADIANTACEAE	<i>Cheilanthes lasiophylla</i>	Woolly Cloak-fern			
PITTIOSPORACEAE	<i>Cheiranthra alternifolia</i>	Hand-flower			
CHENOPODIACEAE	<i>Chenopodium curvispicatum</i>	Cottony Goosefoot			
CHENOPODIACEAE	<i>Chenopodium desertorum</i> ssp.	Desert Goosefoot			
SANTALACEAE	<i>Choretrum glomeratum</i> var.	Sour-bush			
COMPOSITAE	<i>Chrysocephalum apiculatum</i>	Common Everlasting			
COMPOSITAE	<i>Chrysocephalum semipapposum</i>	Clustered Everlasting			
CUCURBITACEAE	<i>Citrullus lanatus</i>	Bitter Melon			*
RANUNCULACEAE	<i>Clematis microphylla</i>	Old Man's Beard			
POLYGALACEAE	<i>Comesperma calymega</i>	Blue-spike Milkwort			
POLYGALACEAE	<i>Comesperma scoparium</i>	Broom Milkwort			
POLYGALACEAE	<i>Comesperma volubile</i>	Love Creeper			
STERCULIACEAE	<i>Commersonia tatei</i>	Trailing Commersonia			
PROTEACEAE	<i>Conospermum patens</i>	Slender Smoke-bush			
COMPOSITAE	<i>Cratystylis conocephala</i>	Bluebush Daisy			
RHAMNACEAE	<i>Cryptandra amara</i> var.	Cryptandra			
CUCURBITACEAE	<i>Cucumis myriocarpus</i>	Paddy Melon			*
ORCHIDACEAE	<i>Cyrtostylis robusta</i>	Robust Gnat-orchid			
GOODENIACEAE	<i>Dampiera dysantha</i>	Shrubby Dampiera			
GOODENIACEAE	<i>Dampiera lanceolata</i> var. <i>lanceolata</i>	Grooved Dampiera			
GOODENIACEAE	<i>Dampiera rosmarinifolia</i>	Rosemary Dampiera			
LEGUMINOSAE	<i>Daviesia asperula</i> ssp. <i>obliqua</i>	Eyre Peninsula Bitter-pea			
LEGUMINOSAE	<i>Daviesia benthamii</i> ssp. <i>humilis</i>	Mallee Bitter-pea		R	
LEGUMINOSAE	<i>Daviesia brevifolia</i>	Leafless Bitter-pea			
LEGUMINOSAE	<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R	
LILIACEAE	<i>Dianella revoluta</i> var.				
LILIACEAE	<i>Dianella revoluta</i> var. <i>divaricata</i>	Broad-leaf Flax-lily			
CHLOANTHACEAE	<i>Dicrastylis verticillata</i>	Whorled Sand-sage			
LEGUMINOSAE	<i>Dillwynia uncinata</i>	Silky Parrot-pea			
AIZOACEAE	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface			
CHENOPODIACEAE	<i>Dissocarpus paradoxus</i>	Ball Bindyi			
SAPINDACEAE	<i>Dodonaea baueri</i>	Crinkled Hop-bush			
SAPINDACEAE	<i>Dodonaea bursariifolia</i>	Small Hop-bush			
SAPINDACEAE	<i>Dodonaea hexandra</i>	Horned Hop-bush			
SAPINDACEAE	<i>Dodonaea lobulata</i>	Lobed-leaf Hop-bush			
SAPINDACEAE	<i>Dodonaea stenozyga</i>	Desert Hop-bush			
SAPINDACEAE	<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush			
DROSERACEAE	<i>Drosera auriculata</i>	Tall Sundew			
DROSERACEAE	<i>Drosera macrantha</i> ssp. <i>planchonii</i>	Climbing Sundew			
GRAMINEAE	<i>Ehrharta calycina</i>	Perennial Veldt Grass			*
CHENOPODIACEAE	<i>Einadia nutans</i> ssp.	Climbing Saltbush			
CHENOPODIACEAE	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush			
GRAMINEAE	<i>Enneapogon nigricans</i>	Black-head Grass			
MYOPORACEAE	<i>Eremophila alternifolia</i>	Narrow-leaf Emubush			
MYOPORACEAE	<i>Eremophila behriana</i>	Rough Emubush			
MYOPORACEAE	<i>Eremophila crassifolia</i>	Thick-leaf Emubush			

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			AUS	SA	
MYOPORACEAE	<i>Eremophila deserti</i>	Turkey-bush			
MYOPORACEAE	<i>Eremophila gibbifolia</i>	Coccid Emubush		R	
MYOPORACEAE	<i>Eremophila glabra ssp. glabra</i>	Tar Bush			
MYOPORACEAE	<i>Eremophila oppositifolia ssp.</i>	Opposite-leaved Emubush			
MYOPORACEAE	<i>Eremophila scoparia</i>	Broom Emubush			
MYOPORACEAE	<i>Eremophila serrulata</i>	Green Emubush			
MYOPORACEAE	<i>Eremophila subfloccosa ssp. Lanata (R.Bates 33587)</i>	Woolly Emubush			
CHENOPODIACEAE	<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush			
MYRTACEAE	<i>Eucalyptus brachycalyx</i>	Gilja			
MYRTACEAE	<i>Eucalyptus calycogona ssp.</i>	Square-fruit Mallee			
MYRTACEAE	<i>Eucalyptus cretata</i>	Darke Peak Mallee		R	
MYRTACEAE	<i>Eucalyptus dumosa</i>	White Mallee			
MYRTACEAE	<i>Eucalyptus gracilis</i>	Yorrell			
MYRTACEAE	<i>Eucalyptus incrassata</i>	Ridge-fruited Mallee			
MYRTACEAE	<i>Eucalyptus incrassata complex</i>	Ridge-fruited Mallee			
MYRTACEAE	<i>Eucalyptus leptophylla</i>	Narrow-leaf Red Mallee			
MYRTACEAE	<i>Eucalyptus odorata</i>	Peppermint Box			
MYRTACEAE	<i>Eucalyptus oleosa ssp.</i>				
MYRTACEAE	<i>Eucalyptus petiolaris</i>	Eyre Peninsula Blue Gum			
MYRTACEAE	<i>Eucalyptus phenax ssp.</i>				
MYRTACEAE	<i>Eucalyptus pileata</i>	Capped Mallee			
MYRTACEAE	<i>Eucalyptus porosa</i>	Mallee Box			
MYRTACEAE	<i>Eucalyptus socialis ssp.</i>				
LEGUMINOSAE	<i>Eutaxia microphylla</i>	Common Eutaxia			
SANTALACEAE	<i>Exocarpos aphyllus</i>	Leafless Cherry			
SANTALACEAE	<i>Exocarpos sparteus</i>	Slender Cherry			
FRANKENIACEAE	<i>Frankenia serpyllifolia</i>	Thyme Sea-heath			
CYPERACEAE	<i>Gahnia deusta</i>	Limestone Saw-sedge			
AIZOACEAE	<i>Galenia pubescens var. pubescens</i>	Coastal Galenia			*
RUTACEAE	<i>Geijera linearifolia</i>	Sheep Bush			
GERANIACEAE	<i>Geranium dissectum</i>	Cut-leaf Geranium			*
HALORAGACEAE	<i>Glischrocaryon behrii</i>	Golden Pennants			
ORCHIDACEAE	<i>Glossodia major</i>	Purple Cockatoo			
HALORAGACEAE	<i>Gonocarpus mezeianus</i>	Broad-leaf Raspwort			
GOODENIACEAE	<i>Goodenia benthamiana</i>	Bentham's Goodenia		R	
GOODENIACEAE	<i>Goodenia geniculata</i>	Bent Goodenia			
GOODENIACEAE	<i>Goodenia ovata</i>	Hop Goodenia			
GOODENIACEAE	<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia			
GOODENIACEAE	<i>Goodenia varia</i>	Sticky Goodenia			
PROTEACEAE	<i>Grevillea aspera</i>	Rough Grevillea			
PROTEACEAE	<i>Grevillea huegelii</i>	Comb Grevillea			
PROTEACEAE	<i>Grevillea ilicifolia ssp.</i>				
PROTEACEAE	<i>Grevillea juncifolia ssp. juncifolia</i>	Honeysuckle Grevillea			
PROTEACEAE	<i>Grevillea pterosperma</i>	Dune Grevillea			
GYROSTEMONACEAE	<i>Gyrostemon australasicus</i>	Buckbush Wheel-fruit			
GYROSTEMONACEAE	<i>Gyrostemon ramulosus</i>	Bushy Wheel-fruit			
PROTEACEAE	<i>Hakea cycloptera</i>	Elm-seed Hakea			
PROTEACEAE	<i>Hakea francisiana</i>	Bottlebrush Hakea			
PROTEACEAE	<i>Hakea mitchellii</i>	Heath Needlebrush			
PROTEACEAE	<i>Hakea rostrata</i>	Beaked Hakea			
BORAGINACEAE	<i>Halgania andromedifolia</i>	Scented Blue-flower			
BORAGINACEAE	<i>Halgania cyanea</i>	Rough Blue-flower			
LEGUMINOSAE	<i>Hardenbergia violacea</i>	Native Lilac			

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COMPOSITAE	<i>Helichrysum leucopsideum</i>	Satin Everlasting			
BORAGINACEAE	<i>Heliotropium europaeum</i>	Common Heliotrope			
DILLENACEAE	<i>Hibbertia cinerea</i>	Port Lincoln Guinea-flower			
DILLENACEAE	<i>Hibbertia exutiacies</i>	Prickly Guinea-flower			
DILLENACEAE	<i>Hibbertia riparia</i>	Bristly Guinea-flower			
DILLENACEAE	<i>Hibbertia virgata</i>	Twiggy Guinea-flower			
MALVACEAE	<i>Hibiscus krichauffianus</i>	Velvet-leaf Hibiscus			
MYRTACEAE	<i>Homoranthus homoranthoides</i>	Port Lincoln Ground-myrtle			
MYRTACEAE	<i>Homoranthus wilhelmii</i>	Wilhelm's Homoranthus			
VIOLACEAE	<i>Hybanthus floribundus</i> ssp. <i>floribundus</i>	Shrub Violet			
ORCHIDACEAE	<i>Hymenochilus pisinnus</i>	Tiny Shell-orchid			
CAMPANULACEAE	<i>Isotoma petraea</i>	Rock Isotome			
COMPOSITAE	<i>Ixiochlamys nana</i>	Small Fuzzweed			
ORCHIDACEAE	<i>Jonesiopsis capillata</i>	Wispy Spider-orchid			
COMPOSITAE	<i>Lagenophora huegelii</i>	Coarse Bottle-daisy			
STERCULIACEAE	<i>Lasiopetalum baueri</i>	Slender Velvet-bush			
STERCULIACEAE	<i>Lasiopetalum behrii</i>	Pink Velvet-bush			
CYPERACEAE	<i>Lepidosperma carphoides</i>	Black Rapier-sedge			
CYPERACEAE	<i>Lepidosperma laterale</i>	Tall Sword-sedge			
CYPERACEAE	<i>Lepidosperma</i> sp.	Sword-sedge/Rapier-sedge			
CYPERACEAE	<i>Lepidosperma viscidum</i>	Sticky Sword-sedge			
ORCHIDACEAE	<i>Leporella fimbriata</i>	Fringed Hare-orchid			
SANTALACEAE	<i>Leptomeria aphylla</i>	Leafless Currant-bush			
COMPOSITAE	<i>Leptorhynchos</i> sp.	Buttons			
MYRTACEAE	<i>Leptospermum coriaceum</i>	Dune Tea-tree			
EPACRIDACEAE	<i>Leucopogon cordifolius</i>	Heart-leaf Beard-heath			
LIMONIACEAE	<i>Limonium lobatum</i>	Winged Sea-lavender			*
EPACRIDACEAE	<i>Lissanthe strigosa</i> ssp. <i>subulata</i>	Peach Heath			
LOGANIACEAE	<i>Logania nuda</i>	Leafless Logania			
LOGANIACEAE	<i>Logania ovata</i>	Oval-leaf Logania			
LILIACEAE	<i>Lomandra collina</i>	Sand Mat-rush			
LILIACEAE	<i>Lomandra effusa</i>	Scented Mat-rush			
LILIACEAE	<i>Lomandra leucocephala</i> ssp. <i>robusta</i>	Woolly Mat-rush			
LILIACEAE	<i>Lomandra micrantha</i> ssp.	Small-flower Mat-rush			
SOLANACEAE	<i>Lycium australe</i>	Australian Boxthorn			
SOLANACEAE	<i>Lycium ferocissimum</i>	African Boxthorn			*
LORANTHACEAE	<i>Lysiana exocarpi</i> ssp. <i>exocarpi</i>	Harlequin Mistletoe			
CHENOPODIACEAE	<i>Maireana brevifolia</i>	Short-leaf Bluebush			
CHENOPODIACEAE	<i>Maireana erioclada</i>	Rosy Bluebush			
CHENOPODIACEAE	<i>Maireana georgei</i>	Satiny Bluebush			
CHENOPODIACEAE	<i>Maireana pentatropis</i>	Erect Mallee Bluebush			
CHENOPODIACEAE	<i>Maireana pyramidata</i>	Black Bluebush			
CHENOPODIACEAE	<i>Maireana radiata</i>	Radiate Bluebush			
CHENOPODIACEAE	<i>Maireana sedifolia</i>	Bluebush			
CHENOPODIACEAE	<i>Maireana suaedifolia</i>	Lax Bluebush		R	
CHENOPODIACEAE	<i>Maireana trichoptera</i>	Hairy-fruit Bluebush			
CHENOPODIACEAE	<i>Maireana turbinata</i>	Top-fruit Bluebush			
CHENOPODIACEAE	<i>Malacocera biflora</i>	Two-flower Soft-horns			
LABIATAE	<i>Marrubium vulgare</i>	Horehound			*
MYRTACEAE	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	Mallee Honey-myrtle			
MYRTACEAE	<i>Melaleuca brevifolia</i>	Short-leaf Honey-myrtle			
MYRTACEAE	<i>Melaleuca decussata</i>	Totem-poles			

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			AUS	SA	
MYRTACEAE	<i>Melaleuca lanceolata</i>	Dryland Tea-tree			
MYRTACEAE	<i>Melaleuca pauperiflora</i> ssp. <i>mutica</i>	Boree			
MYRTACEAE	<i>Melaleuca uncinata</i>	Broombush			
VIOLACEAE	<i>Melicytus dentatus</i>	Tree Violet			
AIZOACEAE	<i>Mesembryanthemum</i> sp.	Iceplant			*
RUTACEAE	<i>Microcybe multiflora</i> ssp. <i>baccharoides</i>	Scale-leaf Microcybe			
RUTACEAE	<i>Microcybe pauciflora</i> ssp. <i>pauciflora</i>	Yellow Microcybe			
COMPOSITAE	<i>Microseris lanceolata</i>	Yam Daisy			
ORCHIDACEAE	<i>Microtis</i> sp. Nash (R. Bates 44740)	Nash's onion orchid		R	
COMPOSITAE	<i>Minuria cunninghamii</i>	Bush Minuria			
COMPOSITAE	<i>Minuria denticulata</i>	Woolly Minuria			
MYOPORACEAE	<i>Myoporum brevipes</i>	Warty Boobialla			
MYOPORACEAE	<i>Myoporum montanum</i>	Native Myrtle			
MYOPORACEAE	<i>Myoporum platycarpum</i> ssp. <i>platycarpum</i>	False Sandalwood			
GRAMINEAE	<i>Neurachne alopecuroidea</i>	Fox-tail Mulga-grass			
ZYGOPHYLLACEAE	<i>Nitraria billardierei</i>	Nitre-bush			
COMPOSITAE	<i>Olearia adenolasia</i>	Musk Daisy-bush		R	
COMPOSITAE	<i>Olearia brachyphylla</i>	Short-leaf Daisy-bush			
COMPOSITAE	<i>Olearia decurrens</i>	Winged Daisy-bush			
COMPOSITAE	<i>Olearia floribunda</i> var. <i>floribunda</i>	Heath Daisy-bush			
COMPOSITAE	<i>Olearia lepidophylla</i>	Clubmoss Daisy-bush			
COMPOSITAE	<i>Olearia muelleri</i>	Mueller's Daisy-bush			
COMPOSITAE	<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V	
COMPOSITAE	<i>Olearia passerinoides</i> ssp. <i>passerinoides</i>	Feather Daisy-bush			
COMPOSITAE	<i>Olearia pimelioides</i>	Pimelea Daisy-bush			
COMPOSITAE	<i>Olearia ramulosa</i>	Twiggy Daisy-bush			
COMPOSITAE	<i>Olearia teretifolia</i>	Cypress Daisy-bush			
COMPOSITAE	<i>Onopordum acaulon</i>	Horse Thistle			*
RUBIACEAE	<i>Opercularia turpis</i>	Twiggy Stinkweed			
OXALIDACEAE	<i>Oxalis perennans</i>	Native Sorrel			
COMPOSITAE	<i>Ozothamnus decurrens</i>	Ridged Bush-everlasting			
COMPOSITAE	<i>Ozothamnus retusus</i>	Notched Bush-everlasting			
ORCHIDACEAE	<i>Petalochilus carneus</i>	Pink Fingers			
CARYOPHYLLACEAE	<i>Petrorhagia dubia</i>	Velvet Pink			*
RUTACEAE	<i>Phebalium bullatum</i>	Silvery Phebalium			
ORCHIDACEAE	<i>Pheladenia deformis</i>	Bluebeard Orchid			
RUTACEAE	<i>Philothea angustifolia</i> ssp. <i>angustifolia</i>	Narrow-leaf Wax-flower		R	
LEGUMINOSAE	<i>Phyllota remota</i>	Slender Phyllota			
THYMELAEACEAE	<i>Pimelea humilis</i>	Low Riceflower			
THYMELAEACEAE	<i>Pimelea microcephala</i> ssp. <i>microcephala</i>	Shrubby Riceflower			
THYMELAEACEAE	<i>Pimelea</i> sp.	Riceflower			
PITTOSPORACEAE	<i>Pittosporum angustifolium</i>	Native Apricot			
PLANTAGINACEAE	<i>Plantago drummondii</i>	Dark Plantain			
COMPOSITAE	<i>Podolepis capillaris</i>	Wiry Podolepis			
COMPOSITAE	<i>Podotrochea angustifolia</i>	Sticky Long-heads			
RHAMNACEAE	<i>Pomaderris flabellaris</i>	Fan Pomaderris			
RHAMNACEAE	<i>Pomaderris obcordata</i>	Wedge-leaf Pomaderris			
ORCHIDACEAE	<i>Prasophyllum occidentale</i>	Plains Leek-orchid			

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			AUS	SA	
ORCHIDACEAE	<i>Prasophyllum odoratum</i>	Scented Leek-orchid			
ORCHIDACEAE	<i>Prasophyllum sp.</i>	Leek-orchid			
LABIATAE	<i>Prostanthera ammophila</i>	Sand Mintbush			
LABIATAE	<i>Prostanthera aspalathoides</i>	Scarlet Mintbush			
LABIATAE	<i>Prostanthera chlorantha</i>	Green Mintbush		R	
LABIATAE	<i>Prostanthera serpyllifolia ssp. microphylla</i>	Small-leaf Mintbush			
LABIATAE	<i>Prostanthera serpyllifolia ssp. serpyllifolia (red flowers)</i>	Thyme Mintbush			
ORCHIDACEAE	<i>Pterostylis nana</i>	Dwarf Greenhood			
AMARANTHACEAE	<i>Ptilotus decipiens</i>				
AMARANTHACEAE	<i>Ptilotus obovatus var. obovatus</i>	Silver Mulla Mulla			
AMARANTHACEAE	<i>Ptilotus spathulatus f. spathulatus</i>	Pussy-tails			
LEGUMINOSAE	<i>Pultenaea canaliculata</i>	Soft Bush-pea			
LEGUMINOSAE	<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R	
ORCHIDACEAE	<i>Pyrorchis nigricans</i>	Black Fire-orchid			
COMPOSITAE	<i>Reichardia tingitana</i>	False Sowthistle			*
CHENOPODIACEAE	<i>Rhagodia candolleana ssp.</i>	Sea-berry Saltbush			
CHENOPODIACEAE	<i>Rhagodia crassifolia</i>	Fleshy Saltbush			
CHENOPODIACEAE	<i>Rhagodia parabolica</i>	Mealy Saltbush			
CHENOPODIACEAE	<i>Rhagodia preissii ssp. preissii</i>	Mallee Saltbush			
CHENOPODIACEAE	<i>Rhagodia spinescens</i>	Spiny Saltbush			
CHENOPODIACEAE	<i>Rhagodia ulicina</i>	Intricate Saltbush			
GRAMINEAE	<i>Rytidosperma caespitosum</i>	Common Wallaby-grass			
GRAMINEAE	<i>Rytidosperma racemosum var. racemosum</i>	Slender Wallaby-grass			
CHENOPODIACEAE	<i>Salsola tragus</i>	Buckbush			
LABIATAE	<i>Salvia verbenaca</i>	Wild Sage			*
SANTALACEAE	<i>Santalum acuminatum</i>	Quandong			
SANTALACEAE	<i>Santalum spicatum</i>	Sandalwood		V	
AIZOACEAE	<i>Sarcozona praecox</i>	Sarcozona			
GOODENIACEAE	<i>Scaevola aemula</i>	Fairy Fanflower			
GOODENIACEAE	<i>Scaevola spinescens</i>	Spiny Fanflower			
CYPERACEAE	<i>Schoenus sp.</i>	Bog-rush			
CHENOPODIACEAE	<i>Sclerolaena brachyptera</i>	Short-wing Bindyi			
CHENOPODIACEAE	<i>Sclerolaena decurrens</i>	Green Bindyi			
CHENOPODIACEAE	<i>Sclerolaena diacantha</i>	Grey Bindyi			
CHENOPODIACEAE	<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi			
CHENOPODIACEAE	<i>Sclerolaena uniflora</i>	Small-spine Bindyi			
CHENOPODIACEAE	<i>Sclerolaena uniflora hybrid</i>				
CHENOPODIACEAE	<i>Sclerolaena ventricosa</i>	Salt Bindyi			
COMPOSITAE	<i>Senecio quadridentatus</i>	Cotton Groundsel			
LEGUMINOSAE	<i>Senna artemisioides ssp. artemisioides x ssp. coriacea</i>	Desert Senna			
LEGUMINOSAE	<i>Senna artemisioides ssp. petiolaris</i>				
LEGUMINOSAE	<i>Senna artemisioides ssp. X artemisioides</i>	Silver Senna			
GRAMINEAE	<i>Setaria constricta</i>	Knotty-butt Paspalidium			
MALVACEAE	<i>Sida corrugata var.</i>	Corrugated Sida			
MALVACEAE	<i>Sida fibulifera</i>	Pin Sida			
MALVACEAE	<i>Sida intricata</i>	Twiggy Sida			
MALVACEAE	<i>Sida petrophila</i>	Rock Sida			
SOLANACEAE	<i>Solanum coactiliferum</i>	Tomato-bush			
SOLANACEAE	<i>Solanum elaeagnifolium</i>	Silver-leaf Nightshade			*

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			AUS	SA	
SOLANACEAE	<i>Solanum ellipticum</i>	Velvet Potato-bush			
SOLANACEAE	<i>Solanum linnaeanum</i>	Apple Of Sodom			*
RHAMNACEAE	<i>Spyridium bifidum var. bifidum</i>	Forked Spyridium			
RHAMNACEAE	<i>Spyridium leucopogon</i>	Silvery Spyridium		R	
RHAMNACEAE	<i>Spyridium nitidum</i>	Shining Spyridium			
RHAMNACEAE	<i>Spyridium spathulatum</i>	Spoon-leaf Spyridium		R	
RHAMNACEAE	<i>Spyridium subochreatum</i>				
RHAMNACEAE	<i>Spyridium vexilliferum var.</i>	Winged Spyridium			
STACKHOUSIACEAE	<i>Stackhousia monogyna</i>	Creamy Candles			
RHAMNACEAE	<i>Stenanthemum leucophractum</i>	White Cryptandra			
CHENOPODIACEAE	<i>Tecticornia sp.</i>	Samphire			
LEGUMINOSAE	<i>Templetonia egena</i>	Broombush Templetonia			
LEGUMINOSAE	<i>Templetonia retusa</i>	Cockies Tongue			
LABIATAE	<i>Teucrium sessiliflorum</i>	Mallee Germander			
ORCHIDACEAE	<i>Thelymitra albiflora</i>				
ORCHIDACEAE	<i>Thelymitra nuda</i>	Scented Sun-orchid			
ORCHIDACEAE	<i>Thelymitra pauciflora</i>	Slender Sun-orchid			
CHENOPODIACEAE	<i>Threlkeldia diffusa</i>	Coast Bonefruit			
LILIACEAE	<i>Thysanotus patersonii</i>	Twining Fringe-lily			
GRAMINEAE	<i>Triodia irritans</i>	Spinifex			
GRAMINEAE	<i>Triodia lanata</i>	Woolly Spinifex			
GRAMINEAE	<i>Triodia scariosa</i>	Spinifex			
COMPOSITAE	<i>Vittadinia cuneata var.</i>	Fuzzy New Holland Daisy			
COMPOSITAE	<i>Vittadinia gracilis</i>	Woolly New Holland Daisy			
COMPOSITAE	<i>Vittadinia sp.</i>	New Holland Daisy			
CAMPANULACEAE	<i>Wahlenbergia stricta ssp. stricta</i>	Tall Bluebell			
LABIATAE	<i>Westringia rigida</i>	Stiff Westringia			
LILIACEAE	<i>Wurmbea centralis</i>	Inland Nancy			
LILIACEAE	<i>Xanthorrhoea semiplana ssp. semiplana</i>	Yacca			
ZYGOPHYLLACEAE	<i>Zygophyllum aurantiacum ssp.</i>				

*Denotes exotic species

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

Appendix 2 – Fauna species identified in BDBSA database search

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	-	-	22/10/2008
<i>Acanthiza apicalis</i>	Inland Thornbill	-	-	16/05/2008
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	-	-	16/05/2008
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western ssp.)	-	R	1/08/2006
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	-	-	14/05/2008
<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk	-	-	13/12/2007
<i>Accipiter fasciatus</i>	Brown Goshawk	-	-	15/12/2004
<i>Acrocephalus australis</i>	Australian Reed-Warbler	-	-	10/01/2003
<i>Actitis hypoleucos</i>	Common Sandpiper	-	R	10/01/2003
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	-	-	15/05/2008
<i>Alauda arvensis</i>	Eurasian Skylark	-	-	14/12/2004
<i>Amytornis striatus</i>	Striated Grasswren	-	R	15/05/2008
<i>Amytornis textilis myall</i>	Thick-billed Grasswren		R	3/08/2006
<i>Anas castanea</i>	Chestnut Teal	-	-	4/08/2008
<i>Anas gracilis</i>	Grey Teal	-	-	17/11/2006
<i>Anas platyrhynchos</i>	Northern Mallard	-	-	26/04/2006
<i>Anas rhynchotis</i>	Australasian Shoveler	-	R	4/02/2006
<i>Anas superciliosa</i>	Pacific Black Duck	-	-	26/04/2006
<i>Anas superciliosa x anas platyrhynchos</i>	Pacific Black Duck/Mallard Hybrid	-	-	22/11/1987
<i>Anthochaera carunculata</i>	Red Wattlebird	-	-	16/05/2008
<i>Anthus novaeseelandiae</i>	Australasian Pipit	-	-	14/05/2008
<i>Aphelocephala leucopsis</i>	Southern Whiteface	-	-	3/08/2006
<i>Aphrodroma brevirostris</i>	Kerguelen Petrel	-	-	8/08/1994
<i>Apus pacificus</i>	Fork-tailed Swift	-	-	28/03/1996
<i>Aquila audax</i>	Wedge-tailed Eagle	-	-	14/05/2008
<i>Ardea alba</i>	Great Egret	-	-	9/10/2001
<i>Ardea ibis</i>	Cattle Egret	-	R	22/06/1998
<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	-	-	1/01/1900
<i>Ardeotis australis</i>	Australian Bustard	-	V	26/03/2005
<i>Arenaria interpres</i>	Ruddy Turnstone	-	R	21/02/1981
<i>Artamus cinereus</i>	Black-faced Woodswallow	-	-	3/08/2006
<i>Artamus cyanopterus</i>	Dusky Woodswallow	-	-	15/05/2008
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	-	-	4/01/1992
<i>Artamus personatus</i>	Masked Woodswallow	-	-	7/10/2001
<i>Artamus superciliosus</i>	White-browed Woodswallow	-	-	7/10/2001
<i>Aythya australis</i>	Hardhead	-	-	4/02/2006
<i>Barnardius zonarius</i>	Australian Ringneck	-	-	14/05/2008

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Barnardius zonarius zonarius</i> (NC)	Port Lincoln Parrot	-	-	5/09/1996
<i>Biziura lobata</i>	Musk Duck	-	R	4/02/2006
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	V	1/02/1965
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	-	-	25/08/2002
<i>Cacomantis pallidus</i>	Pallid Cuckoo	-	-	3/08/2006
<i>Calamanthus campestris</i>	Rufous Fieldwren	-	-	1/08/2006
<i>Calamanthus cautus</i>	Shy Heathwren	-	R	15/05/2008
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	-	4/02/2006
<i>Calidris alba</i>	Sanderling	-	R	2/10/2000
<i>Calidris ferruginea</i>	Curlew Sandpiper	-	-	2/11/2003
<i>Calidris ruficollis</i>	Red-necked Stint	-	-	19/01/2010
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	-	V	27/02/2008
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	-	R	19/01/2010
<i>Chalcites basalus</i>	Horsfield's Bronze-Cuckoo	-	-	13/12/2007
<i>Chalcites lucidus</i>	Shining Bronze-Cuckoo	-	-	15/12/2004
<i>Chalcites osculans</i>	Black-eared Cuckoo	-	-	3/08/2006
<i>Charadrius australis</i>	Inland Dotterel	-	-	1/08/2006
<i>Charadrius bicinctus</i>	Double-banded Plover	-	-	10/04/2007
<i>Charadrius mongolus</i>	Lesser Sand Plover	-	R	17/02/1973
<i>Charadrius ruficapillus</i>	Red-capped Plover	-	-	19/01/2010
<i>Chenonetta jubata</i>	Australian Wood Duck	-	-	16/12/2004
<i>Chlidonias hybrida</i>	Whiskered Tern	-	-	14/12/2004
<i>Chroicocephalus novaehollandiae</i>	Silver Gull	-	-	19/01/2010
<i>Chrysococcyx</i> sp.	(blank)	-	-	15/12/2004
<i>Cincloramphus cruralis</i>	Brown Songlark	-	-	14/05/2008
<i>Cincloramphus mathewsi</i>	Rufous Songlark	-	-	7/10/2001
<i>Cinclosoma castanotum fordianum</i>	Chestnut Quail-thrush	-	-	15/05/2008
<i>Circus approximans</i>	Swamp Harrier	-	-	18/02/2001
<i>Circus assimilis</i>	Spotted Harrier	-	-	14/12/2004
<i>Cladorhynchus leucocephalus</i>	Banded Stilt	-	V	26/04/2006
<i>Climacteris rufus</i>	Rufous Treecreeper	-	-	16/05/2008
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	-	-	16/05/2008
<i>Columba livia</i>	Rock Dove	-	-	14/12/2004
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	-	16/05/2008
<i>Corcorax melanorhamphos</i>	White-winged Cough	-	R	15/05/2008
<i>Corvus bennetti</i>	Little Crow	-	-	2/08/2006
<i>Corvus coronoides</i>	Australian Raven	-	-	16/05/2008
<i>Corvus mellori</i>	Little Raven	-	-	13/12/2007
<i>Corvus</i> sp.	(blank)	-	-	5/10/2001
<i>Coturnix pectoralis</i>	Stubble Quail	-	-	13/12/2004

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Coturnix sp.</i>	(blank)	-	-	5/12/2003
<i>Cracticus torquatus</i>	Grey Butcherbird	-	-	16/05/2008
<i>Cygnus atratus</i>	Black Swan	-	-	11/11/2008
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-	13/12/2007
<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	-	14/05/2008
<i>Dicaeum hirundinaceum</i>	Mistletoebird	-	-	3/08/2006
<i>Dromaius novaehollandiae</i>	Emu	-	-	14/05/2008
<i>Drymodes brunneopygia</i>	Southern Scrub-robin	-	-	13/12/2007
<i>Egretta garzetta</i>	Little Egret	-	R	26/01/2000
<i>Egretta novaehollandiae</i>	White-faced Heron	-	-	19/01/2010
<i>Elanus axillaris</i>	Black-shouldered Kite	-	-	26/04/2006
<i>Elsayornis melanops</i>	Black-fronted Dotterel	-	-	4/02/2006
<i>Eolophus roseicapilla</i>	Galah	-	-	13/05/2008
<i>Eopsaltria griseogularis</i>	Western Yellow Robin	-	-	29/03/2008
<i>Epthianura albifrons</i>	White-fronted Chat	-	-	27/11/2007
<i>Epthianura aurifrons</i>	Orange Chat	-	-	31/10/1963
<i>Epthianura sp.</i>	(blank)	-	-	13/05/2008
<i>Epthianura tricolor</i>	Crimson Chat	-	-	3/11/1991
<i>Erythronyctes alba</i>	Red-kneed Dotterel	-	-	10/01/2003
<i>Eudyptula minor</i>	Little Penguin	-	-	7/01/1999
<i>Eurostopodus argus</i>	Spotted Nightjar	-	-	3/10/2003
<i>Falco berigora</i>	Brown Falcon	-	-	4/12/2006
<i>Falco cenchroides</i>	Nankeen Kestrel	-	-	14/05/2008
<i>Falco longipennis</i>	Australian Hobby	-	-	13/12/2004
<i>Falco peregrinus</i>	Peregrine Falcon	-	R	23/11/2006
<i>Falco subniger</i>	Black Falcon	-	-	1/01/1900
<i>Fulica atra</i>	Eurasian Coot	-	-	26/04/2006
<i>Gallinula tenebrosa</i>	Dusky Moorhen	-	-	10/01/2003
<i>Gallirallus philippensis</i>	Buff-banded Rail	-	-	1/01/1900
<i>Geopelia placida</i>	Peaceful Dove	-	-	3/10/2003
<i>Gerygone fusca</i>	Western Gerygone	-	R	13/12/2007
<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater	-	-	22/10/2008
<i>Glossopsitta concinna</i>	Musk Lorikeet	-	-	16/12/2004
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	-	-	15/05/2008
<i>Grallina cyanoleuca</i>	Magpie-lark	-	-	26/04/2006
<i>Gymnorhina tibicen</i>	Australian Magpie	-	-	14/05/2008
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	-	R	19/01/2010
<i>Haematopus longirostris</i>	Australian Pied Oystercatcher	-	R	19/01/2010
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	E	26/01/2000
<i>Haliastur sphenurus</i>	Whistling Kite	-	-	3/10/2003

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Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Hieraaetus morphnoides</i>	Little Eagle	-	-	12/12/2004
<i>Himantopus himantopus</i>	Black-winged Stilt	-	-	26/04/2006
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	-	26/03/1990
<i>Hirundo neoxena</i>	Welcome Swallow	-	-	13/05/2008
<i>Hydroprogne caspia</i>	Caspian Tern	-	-	8/03/2007
<i>Lalage tricolor</i>	White-winged Triller	-	-	14/12/2004
<i>Larus pacificus</i>	Pacific Gull	-	-	19/01/2010
<i>Leipoa ocellata</i>	Malleefowl	VU	V	13/11/2007
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater	-	R	15/12/2004
<i>Lichenostomus leucotis</i>	White-eared Honeyeater	-	-	16/05/2008
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	-	-	15/05/2008
<i>Lichenostomus virescens</i>	Singing Honeyeater	-	-	15/05/2008
<i>Limosa lapponica</i>	Bar-tailed Godwit	-	R	4/06/2004
<i>Limosa limosa</i>	Black-tailed Godwit	-	R	5/01/1999
<i>Lophoictinia isura</i>	Square-tailed Kite	-	E	20/12/1972
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	-	-	4/02/2006
<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-	22/02/2008
<i>Malurus lamberti</i>	Variiegated Fairy-wren	-	-	15/05/2008
<i>Malurus leucopterus</i>	White-winged Fairy-wren	-	-	13/05/2008
<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren	-	-	15/05/2008
<i>Malurus splendens</i>	Splendid Fairy-wren	-	-	2/08/2006
<i>Manorina flavigula</i>	Yellow-throated Miner	-	-	2/08/2006
<i>Megalurus gramineus</i>	Little Grassbird	-	-	16/12/2004
<i>Melanodryas cucullata</i>	Hooded Robin	-	-	3/08/2006
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	-	-	15/05/2008
<i>Melopsittacus undulatus</i>	Budgerigar	-	-	7/10/2001
<i>Merops ornatus</i>	Rainbow Bee-eater	-	-	3/10/2003
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	-	-	22/02/2008
<i>Microeca fascinans</i>	Jacky Winter	-	-	16/05/2008
<i>Milvus migrans</i>	Black Kite	-	-	7/10/2001
<i>Mirafrja javanica</i>	Horsfield's Bushlark	-	-	15/12/2004
<i>Morus serrator</i>	Australasian Gannet	-	-	3/03/2001
<i>Myiagra inquieta</i>	Restless Flycatcher	-	R	13/05/2008
<i>Neophema elegans</i>	Elegant Parrot	-	R	2/08/2006
<i>Neophema petrophila</i>	Rock Parrot	-	R	22/10/2008
<i>Neophema sp.</i>	(blank)	-	-	8/03/2007
<i>Neopsephotus bourkii</i>	Bourke's Parrot	-	-	8/08/2006
<i>Ninox boobook</i>	Southern Boobook	-	-	13/05/2008
<i>Northiella haematogaster</i>	Blue Bonnet	-	-	2/08/2006

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Northiella haematogaster</i> <i>haematogaster</i>	Yellow-vented Bluebonnet	-	-	6/09/1996
<i>Numenius madagascariensis</i>	Eastern Curlew	-	V	10/02/1985
<i>Numenius phaeopus</i>	Whimbrel	-	R	2/01/1973
<i>Nycticorax caledonicus</i>	Nankeen Night-Heron	-	-	25/09/2001
<i>Nymphicus hollandicus</i>	Cockatiel	-	-	17/11/2001
<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-	13/12/2007
<i>Oreoica gutturalis</i>	Crested Bellbird	-	-	15/05/2008
<i>Oxyura australis</i>	Blue-billed Duck	-	R	14/12/2004
<i>Pachycephala inornata</i>	Gilbert's Whistler	-	R	15/05/2008
<i>Pachycephala pectoralis</i>	Golden Whistler	-	-	15/05/2008
<i>Pachycephala rufiventris</i>	Rufous Whistler	-	-	13/12/2007
<i>Pandion cristatus</i>	Eastern Osprey	-	E	10/02/2008
<i>Pardalotus punctatus</i>	Spotted Pardalote	-	-	15/05/2008
<i>Pardalotus striatus</i>	Striated Pardalote	-	-	16/05/2008
<i>Passer domesticus</i>	House Sparrow	-	-	26/04/2006
<i>Pelagodroma marina</i>	White-faced Storm-Petrel	-	-	25/03/1996
<i>Pelecanus conspicillatus</i>	Australian Pelican	-	-	24/11/2009
<i>Petrochelidon ariel</i>	Fairy Martin	-	-	10/01/2003
<i>Petrochelidon nigricans</i>	Tree Martin	-	-	14/05/2008
<i>Petroica boodang</i>	Scarlet Robin	-	V	15/12/2004
<i>Petroica goodenovii</i>	Red-capped Robin	-	-	15/05/2008
<i>Petroica rosea</i>	Rose Robin	-	-	3/06/1981
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	-	-	13/01/1919
<i>Phalacrocorax carbo</i>	Great Cormorant	-	-	16/12/2004
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant	-	-	9/10/2001
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	-	-	4/02/2006
<i>Phalacrocorax varius</i>	Pied Cormorant	-	-	24/11/2009
<i>Phalaropus lobatus</i>	Red-necked Phalarope	-	-	17/02/1973
<i>Phaps chalcoptera</i>	Common Bronzewing	-	-	1/08/2006
<i>Phaps elegans</i>	Brush Bronzewing	-	-	20/03/2005
<i>Phaps sp.</i>	(blank)	-	-	15/05/2008
<i>Philomachus pugnax</i>	Ruff	-	R	21/02/1981
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	-	-	22/10/2008
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	-	-	15/12/2004
<i>Plegadis falcinellus</i>	Glossy Ibis	-	R	21/11/1987
<i>Pluvialis squatarola</i>	Grey Plover	-	-	8/03/2007
<i>Podargus strigoides</i>	Tawny Frogmouth	-	-	15/12/2004
<i>Podiceps cristatus</i>	Great Crested Grebe	VU	R	16/12/2004
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe	-	-	4/02/2006

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Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Pomatostomus superciliosus</i>	White-browed Babbler	-	-	16/05/2008
<i>Porphyrio porphyrio</i>	Purple Swamphen	-	-	1/10/1982
<i>Porzana fluminea</i>	Australian Spotted Crake	-	-	29/10/2002
<i>Porzana pusilla</i>	Baillon's Crake	-	-	2/09/1994
<i>Psephotus haematonotus</i>	Red-rumped Parrot	-	-	13/04/1996
<i>Psephotus varius</i>	Mulga Parrot	-	-	16/05/2008
<i>Pterodroma lessonii</i>	White-headed Petrel	-	-	13/11/1989
<i>Puffinus gavia</i>	Fluttering Shearwater	-	-	1/01/1900
<i>Purnella albifrons</i>	White-fronted Honeyeater	-	-	15/05/2008
<i>Pyrrholaemus brunneus</i>	Redthroat	-	-	3/08/2006
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet	-	-	16/12/2004
<i>Rhipidura albiscapa</i>	Grey Fantail	-	-	15/05/2008
<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-	16/05/2008
<i>Rhipidura sp.</i>	(blank)	-	-	5/12/2003
<i>Sericornis frontalis</i>	White-browed Scrubwren	-	-	17/12/2004
<i>Smicronis brevirostris</i>	Weebill	-	-	16/05/2008
<i>Stagonopleura guttata</i>	Diamond Firetail	-	V	17/11/2008
<i>Stercorarius parasiticus</i>	Arctic Jaeger	-	-	26/03/2006
<i>Sterna hirundo</i>	Common Tern	-	R	26/01/2000
<i>Strenua nereis</i>	Fairy Tern	VU	E	19/01/2010
<i>Stictonetta naevosa</i>	Freckled Duck	-	V	10/01/2003
<i>Stigmatopelia chinensis</i>	Spotted Dove	-	-	28/11/2002
<i>Stipiturus malachurus</i>	Southern Emu-wren	VU	E	3/11/2002
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula ssp.)	VU	E	1/07/2004
<i>Strepera versicolor</i>	Grey Currawong	-	-	16/05/2008
<i>Sturnus vulgaris</i>	Common Starling	-	-	13/12/2007
<i>Sugomel nigrum</i>	Black Honeyeater	-	-	6/10/2001
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	-	-	4/02/2006
<i>Tadorna tadornoides</i>	Australian Shelduck	-	-	16/12/2004
<i>Taeniopygia guttata</i>	Zebra Finch	-	-	7/10/2001
<i>Thalasseus bergii</i>	Crested Tern	-	-	22/10/2008
<i>Threskiornis molucca</i>	Australian White Ibis	-	-	8/04/1985
<i>Todiramphus sanctus</i>	Sacred Kingfisher	-	-	17/12/2004
<i>Tribonyx ventralis</i>	Black-tailed Native-hen	-	-	26/04/2006
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	-	-	17/12/2004
<i>Tringa glareola</i>	Wood Sandpiper	-	R	16/12/2004
<i>Tringa nebularia</i>	Common Greenshank	-	-	19/01/2010
<i>Tringa stagnatilis</i>	Marsh Sandpiper	-	-	26/01/2000
<i>Turdus merula</i>	Common Blackbird	-	-	4/02/2006

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Turnix varius</i>	Painted Button-quail	-	R	14/12/2004
<i>Turnix velox</i>	Little Button-quail	-	-	5/12/2003
<i>Tyto delicatula</i>	Australian Barn Owl	-	-	14/12/2004
<i>Vanellus miles</i>	Masked Lapwing	-	-	19/01/2010
<i>Vanellus tricolor</i>	Banded Lapwing	-	-	1/08/2006
<i>Xenus cinereus</i>	Terek Sandpiper	-	R	6/12/1981
<i>Zosterops lateralis</i>	Silvereye	-	-	15/05/2008

*Denotes exotic species

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.

Appendix 3 – Sandhill Dunnart Targeted Survey Report

**Sandhill Dunnart Habitat Assessment
Proposed ElectraNet Transmission Line Corridor
Eastern Eyre Peninsula
March 2014**



Report prepared by Ecological Horizons Pty. Ltd.
Author: Dr Katherine Moseby

Limitations Statement

In preparing this document Ecological Horizons Pty Ltd has presumed accurate and up-to-date information provided by certain State government agencies as identified herein. No warranty or guarantee, whether expressed or implied, is made 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 information available to Ecological Horizons Pty Ltd at the time of this study.

Introduction

The sandhill dunnart is an insectivorous marsupial inhabiting dune fields in southern semi-arid Australia. Weighing 40-50g, these dunnarts are within the critical weight range (Burbidge and McKenzie 1989) of mammals that have declined or become extinct since European settlement. The sandhill dunnart is nationally listed under the Australian Federal EPBC Act (1999) as Endangered and is thought to have significantly declined in range. First recorded in 1894 at Lake Amadeus in the southern Northern Territory (Spencer 1896), the species was next recorded 75 years later in 1969 on the Eyre Peninsula, South Australia. Between 1969 and 2001 the species was recorded from only five sites within three isolated localities; the Middleback Range, Eyre Peninsula; and the Ooldea region in South Australia (Copley and Kemper 1987) and Mulga Rock and Queen Victoria Spring regions of the Great Victoria Desert in Western Australia (Hart and Kitchener 1986, Pearson and Robinson 1989). All locations are characterised by semi-arid dunefields.

Although sandhill dunnarts have recently been recorded almost exclusively from *Triodia* grasslands with mallee understorey on sand dunes, little is known of the specific habitat requirements of this elusive species. Trapping in apparently suitable habitat does not guarantee capture of the species, particularly of adults (Middleback Alliance 2012). Churchill (2001) radio-tracked sandhill dunnarts and found they preferred to nest within large domed *Triodia* hummocks and highlighted the role that fire may play in creating suitable habitat. *Triodia* hummocks provide excellent thermal insulation and predator protection. However, *Triodia* cover is removed by fire and gradually re-establishes from seed, forming first dense hummocks and then rings as they age. Radio-collared sandhill dunnarts preferred dense thick hummocks and Churchill (2001) suggested these hummocks may be present on the Eyre Peninsula between 8 and 28 years post fire. However, in long unburnt areas sandhill dunnarts have been found to construct burrows under ageing *Triodia* (Churchill 2001), suggesting that a minimum age of post-fire age habitat may be more likely to restrict occurrence than a maximum. Other arid and semi-arid mammals have been found to respond to seral succession with Kelly et al. (2011) finding the dasyurid, *Ningauai yvonnae*, in higher abundance in mature *Triodia* more than 40 years post fire and Masters (1993) also finding mulgara (*Dasyercus blythi*) preferring areas of mature *Triodia*. Other variables could also influence the occurrence or abundance of the species in an area including productivity, area of continuous habitat, time of year, *Triodia* cover and *Triodia* species.

Scope

ElectraNet have proposed constructing an additional high voltage electricity transmission line in the Eastern Eyre Peninsula which passes through known sandhill dunnart habitat. This proposed line will be placed approximately 300m north of the existing high voltage powerline and pass through several conservation parks and nature reserves (Ironstone Hill Conservation Park, Sheoak Hill Conservation Park, Secret Rocks Nature Reserve). Ecological Horizons Pty. Ltd. was subcontracted by EBS to provide a desktop habitat assessment for the likelihood of sandhill dunnart occurrence along the proposed new transmission line based on fire and vegetation characteristics. The impact corridor was stated as all habitat within a 300m strip between the existing line and the new proposed line to the north. Information collected from more than 70 previous sandhill dunnart survey sites were also analysed to provide underlying models to predict likely habitat utilisation by the sandhill dunnart.

This assessment of likely habitat suitability was considered more valuable than trapping for sandhill dunnarts at certain sites for the following reasons:

- 1) Considerable long term survey effort had already confirmed the presence of sandhill dunnarts at several sites along the corridor
- 2) Even the minimum survey effort recommended by the Sandhill Dunnart Recovery team of 4 nights of trapping with large deep pitfall traps fails to record the species at sites where it is known to occur
- 3) Sandhill dunnart occupancy can be predicted with some certainty by measuring habitat variables
- 4) Habitat suitability and site occupancy by sandhill dunnarts changes through time, hence informed habitat assessment is likely to be more useful for infrastructure projects than trapping at limited sites.



Methods

Habitat modelling

Site surveys

Data were taken from seventy seven survey sites trapped between April 2009 and May 2013 within the extent of occurrence of the sandhill dunnart in South Australia. Survey sites also included previously known capture locations of the species recorded between 1980 and 2007. All sites were in suitable habitat and were in sand plain or sand dune habitat in *Triodia* vegetation associations with mallee overstorey.

At each site, one to two pitfall lines were established consisting of between two and six deep pits (225mm diameter or 150mm diameter x 600mm deep) per line. Additional short (500mm) pits were used at some sites and Elliott traps were also used at some sites. All sites were trapped for four nights. Captured animals were weighed, sexed, checked for reproductive status and marked with a temporary mark to distinguish same session recaptures. All animals were released at point of capture.

The presence/absence of first and second year cohorts of sandhill dunnarts was recorded at each site as well as the trap success of each cohort in deep pits. Animals captured in Elliott traps or short pits were only included in presence/absence comparisons to standardise trap success for deep pits.

Habitat and Site Variables

At each site the following measurements were taken; *Triodia* height, separation, cover and length. For details of methods see Ward 2009. Fire history data was derived from the DEWNR 2014 Fire History Dataset (GDA 1994) containing fire history data from 1956 until present. A number of site and habitat variables were compared with sandhill dunnart presence and abundance using generalised linear models. These included seral age, distance from edge of burn, *Triodia* height, *Triodia* cover, 90th percentile *Triodia* height, *Triodia* separation and *Triodia* length.

Data Analysis

Sandhill dunnart trapping parameters were compared with habitat and site variables using generalised linear models. All analyses were conducted using R statistical package. The dependent variables included sandhill dunnart presence/absence, adult presence/absence, total pitfall trap success and adult pitfall trap success. For each response variable, ten models were compared;

0. null model
1. fire age
2. fire age + distance from edge

3. *Triodia* cover
4. *Triodia* height
5. *Triodia* separation
6. *Triodia* length
7. *Triodia* height 90th percentile
8. global *Triodia* model (fire age+distance from edge+*Triodia* cover+*Triodia* height+*Triodia* separation+*Triodia* length+*Triodia* height 90th percentile)
9. global model (all parameters)

For those models that were selected as having enough evidence for a response, we used Tjur's Coefficient of Discrimination (Tjur, 2009), with output ranging from 0 (model has no discriminatory power) to 1 (model has perfect discriminatory power).

The relationship between the important non-fire habitat variables (as determined from the analyses above) and fire age were also investigated. As it was not possible to determine the fire age for sites that were greater than 50 years post fire, these sites were excluded from these analyses. As with the analyses above, generalised linear models were used to determine the relationships between fire age and habitat variables.

Transmission Line

The total area of native vegetation encompassed by the proposed powerline corridor was calculated in ArcMap 10 using the field geometry function in the attribute table. All area calculations are in ha.

Sandhill dunnart habitat was identified by only selecting native vegetation associations which included *Triodia* spp. Data were derived from the vegetation shapefile provided by EBS (EBS veg mapping GDA94 Zone 53 region). Again, area of vegetation associations including *Triodia* spp was calculated in ArcMap 10 using the field geometry function.

A shapefile was then created based on the selected *Triodia* vegetation associations and classified as sandhill dunnart habitat. Previous sandhill dunnart trapping locations were overlaid with the sandhill dunnart habitat data.

To identify currently optimal sandhill dunnart habitat, all *Triodia* spp vegetation association and areas of 10 – 50 years post fire (1974 – 2004) were selected and then classified as optimum sandhill dunnart habitat. Future optimal sandhill dunnart habitat was classified based on areas including *Triodia* spp vegetation associations and less than 10 year post fire history (<2004 until present). Areas with no known fire history were classified as sandhill dunnart habitat but would require ground truthing to determine if the *Triodia* characteristics are currently suitable for sandhill dunnarts.

Separate shapefiles were created based on the sandhill dunnart habitat classifications for map display. Again, areas of optimal and future optimal habitats were calculated in ArcMap 10 using the field geometry function.

Ground Truthing

Twenty four sites in the five *Triodia* vegetation associations were randomly chosen for ground truthing. Although ground truthing was outside of the scope of the brief, five sites were visited in Sheoak Hill Conservation Park where targeted surveys for sandhill dunnarts have not occurred. At these sites, the maximum height of 30 random *Triodia* hummocks was measured using a range pole. The average height and 90th percentile height were calculated.

Results

Habitat modelling

Using the 77 survey sites previously sampled, the strongest explanatory variable for the presence or absence of sandhill dunnarts at a site was the 90th percentile *Triodia* height (Fig. 1). The 90th percentile height was also the strongest variable explaining variation in the probability of capture of sandhill dunnarts (Fig. 2). The model suggests that the probability of capturing a sandhill dunnart increases significantly when the 90th percentile of *Triodia* heights exceeds 400mm and peaks at 600mm.

When the relationship between fire age and 90th percentile *Triodia* height was investigated, 90th percentile height peaked between 20 and 40 years post fire (Fig. 3). However, sites older than 50 years could not be included in this model as their fire age was unknown. Fire mapping is only available for areas from the 1960's onwards. Sandhill dunnarts were also recorded at many older fire age sites that

also contained tall *Triodia*, suggesting that a minimum fire age is more important for predicting sandhill dunnart presence than maximum fire age. Sandhill dunnarts were not captured at sites less than 10 years post fire.

Results suggest that the presence of at least some tall *Triodia* hummocks are important for sandhill dunnarts, supporting observations of Churchill (2001) who found adult females selected tall *Triodia* hummocks for nest sites. Sites on the Eyre Peninsula containing *Triodia* between 10 and 50 years post-fire are considered currently optimal for sandhill dunnarts with sites > 50 years post fire requiring ground truthing to measure *Triodia* height. *Triodia* species where sandhill dunnarts have been recorded include *T. lanata*, *T. bunicola* and *T. scariosa*.

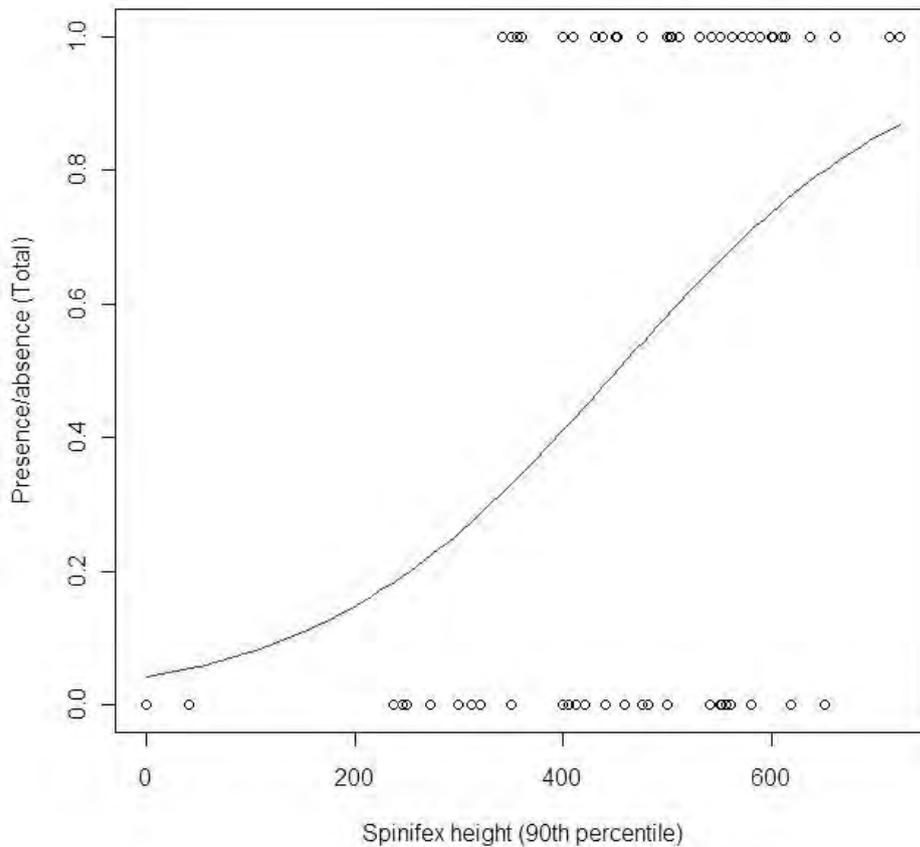


Figure 1: Relationship between the 90th percentile *Triodia* height and the presence/absence of sandhill dunnarts.

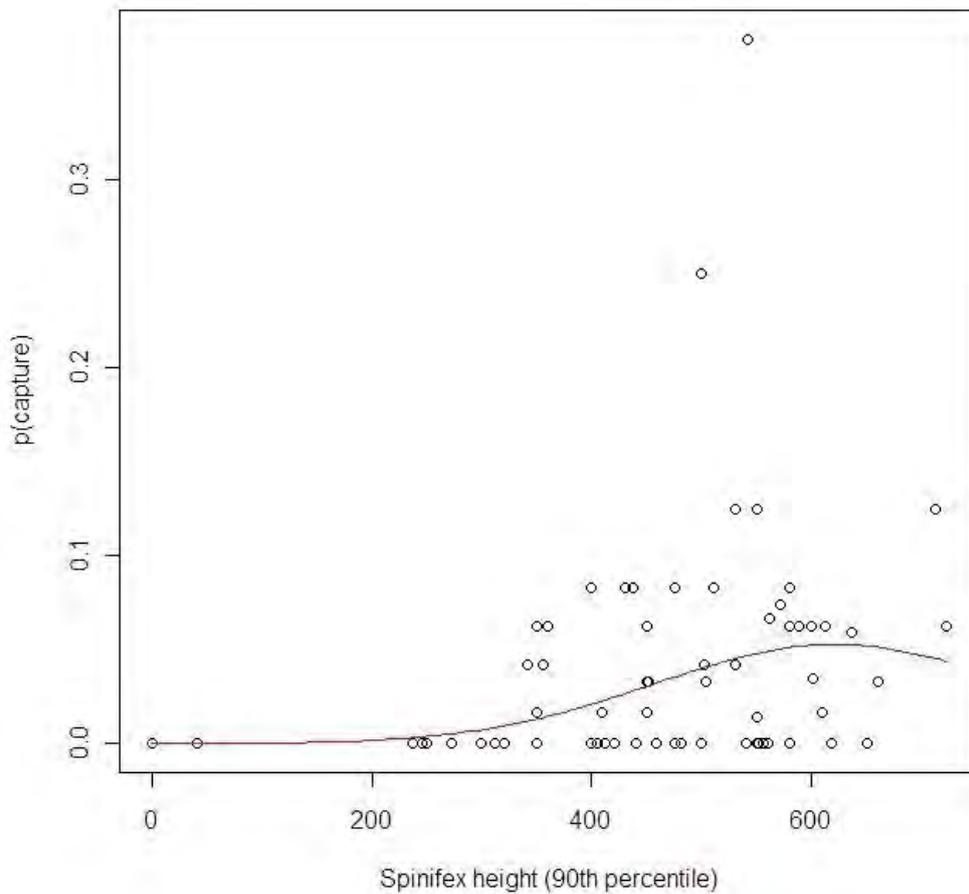


Figure 2: Relationship between the 90th percentile *Triodia* height and the probability of capture of sandhill dunnarts.

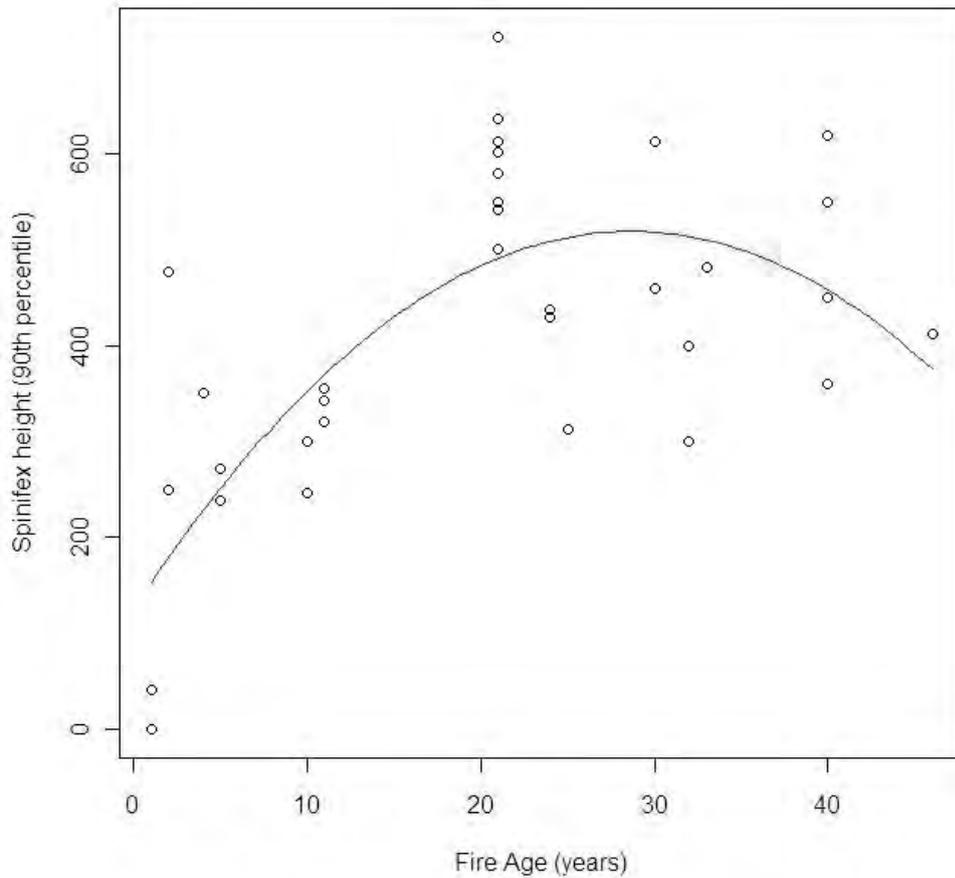


Figure 3: Relationship between *Triodia* height and fire age. Sites > 50 years post fire were excluded due to unknown fire age.

Transmission Line

Using the vegetation data provided by EBS, a total of 1,236.4 hectares of native vegetation within the transmission line corridor contained *Triodia* habitat. Of this, 1,213.3 hectares was considered suitable *Triodia* habitat for sandhill dunnarts. This equates to nearly 17% of the total native vegetation along the assessed portion of the corridor and includes four of the five *Triodia* vegetation associations identified (Table 2). The small isolated patch of the vegetation association “*Triodia* spp. Hummock Grassland over *Austrostipa* spp., *Aristida contorta*, *Sida petrophila*” located near Whyalla was not considered suitable for sandhill dunnarts due to the absence of mallee species and isolated location within chenopod clay swales (Fig. 4). The main area of sandhill dunnart habitat was located between the Middleback Range and Sheoak Hill Conservation Park (Fig. 5). Patches of suitable *Triodia* habitat were interspersed with other habitat types which would likely be used by sandhill dunnarts for dispersal and feeding.

Table 1. Native vegetation within the proposed powerline corridor

Native vegetation in development area	ha	%
Total area of native vegetation	7,332.9	100%
Total area of native vegetation containing <i>Triodia</i> spp	1,236.4	16.86%

Within *Triodia* habitat, five vegetation associations were recorded (Table 2). The vegetation association *Eucalyptus socialis* / *Eucalyptus oleosa* / *Eucalyptus brachycalyx* *Eucalyptus leptophylla* Mallee over *Triodia scariosa* / *Triodia lanatus* comprised the majority of the *Triodia* habitat within the corridor. Seven of the eight sites where sandhill dunnarts have been recorded within the proposed transmission line

corridor are located in this vegetation association and one in *Eucalyptus incrassata*, *Callitris verrucosa* Mallee over *Leptospermum coriaceum*, *Phebalium bullatum*, *Triodia* spp. and *Calytrix tetragona* (Table 2). There are currently no known sandhill dunnart survey locations within three of the five vegetation associations. Although all of the five associations contain *Triodia* the relative importance of each association as sandhill dunnart habitat is unknown due to as absence of stratified sampling within the region.

Table 2. Flora composition of *Triodia* vegetation associations within the proposed corridor. Vegetation association in bold is not considered suitable for sandhill dunnarts.

Detailed flora species composition of <i>Triodia</i> vegetation associations	ha	%*	SHD sites
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>	892.4	12.17%	7
<i>Eucalyptus incrassata</i> <i>Callitris verrucosa</i> Mallee over <i>Leptospermum coriaceum</i> , <i>Phebalium bullatum</i> , <i>Triodia</i> spp. and <i>Calytrix tetragona</i>	186.7	2.55%	1
<i>Acacia wilhelmiana</i> <i>Senna artemisioides</i> ssp. <i>coriacea</i> <i>Eucalyptus gracilis</i> <i>Melaleuca uncinata</i> Tall Shrubland over <i>Triodia</i> spp.	125.0	1.70%	
<i>Triodia</i> spp. Hummock Grassland over <i>Austrostipa</i> spp., <i>Aristida contorta</i>, <i>Sida petrophila</i>	22.7	0.31%	
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Acacia</i> spp., <i>Leptospermum coriaceum</i> , <i>Triodia</i> spp. , <i>Austrostipa</i> spp. and <i>Austrodanthonia caespitosa</i>	9.6	0.13%	

*Note: percentage calculation is based on total area of native vegetation.

The majority of the sandhill dunnart habitat was recorded in Ironstone Hill CP, Sheoak Hill CP, Secret Rocks Nature Reserve and adjacent heritage agreements (Figs 5 and 6). Only small isolated patches of *Triodia* habitat were recorded in other areas which are unlikely to support sandhill dunnart populations due to their small size and isolation (Figs. 4,7,8,9).

Although all *Triodia* habitat is likely to be suitable for sandhill dunnarts, the fire history of the transmission line corridor was overlaid over the *Triodia* vegetation associations to determine current and future optimal habitat based on fire age (Fig. 10). Modelling suggests that habitat between 10 and 50 years post fire contains *Triodia* of suitable height for nesting sandhill dunnarts. These areas currently comprise 35% of the suitable *Triodia* habitat within the proposed corridor (Table 3). Approximately 11% of suitable *Triodia* habitat is currently < 10 years post burn and will likely be suitable for sandhill dunnarts within 10 years. More than half of the mapped *Triodia* habitat in the corridor is of unknown fire age and would require ground truthing to determine whether it is currently suitable habitat. However, sandhill dunnarts have been recorded from some of these unknown fire age sites (Fig. 5) and even if these areas do not contain *Triodia* of sufficient height for nesting they would be considered future optimal habitat depending on fire regimes in the future. Importantly, all *Triodia* habitat between the Middleback Range and Sheoak Hill Conservation Park is likely to be important for sandhill dunnarts as it allows a mosaic of fire ages to be sustained over large areas.

Table 3. Sandhill dunnart habitat

Sandhill dunnart habitat classification	Ha	%
Total area of SHD habitat (<i>Triodia</i> spp, no fire history)	664.04	54%
Total area of optimal SHD habitat (<i>Triodia</i> spp + 10-50 years post fire)	433.95	35%
Total area of future optimal SHD habitat (<i>Triodia</i> spp + < 10 years post fire)	138.42	11%

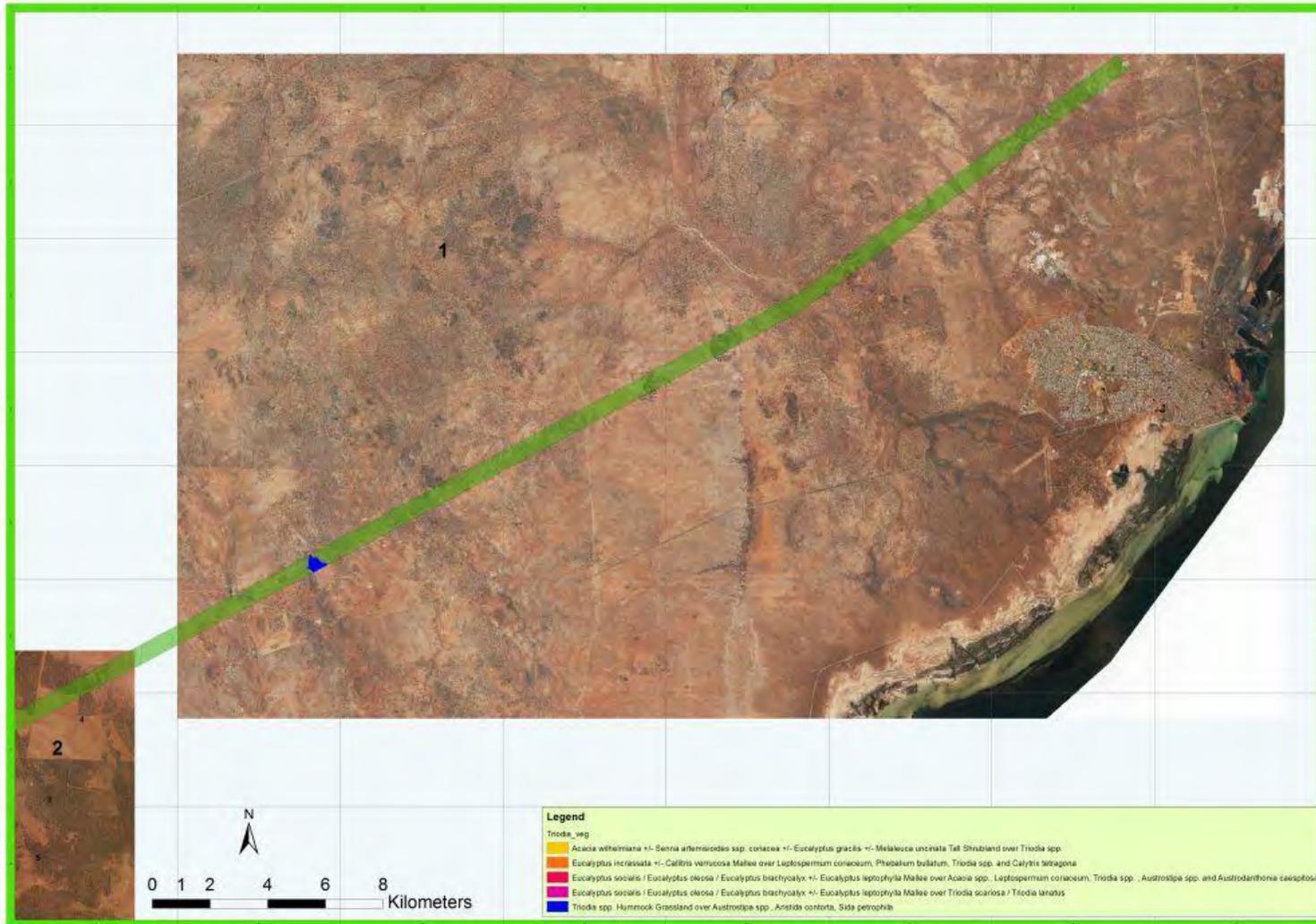


Figure 4: *Tridonia* habitat along the proposed ElectraNet transmission line corridor, Whyalla to Moola Station.

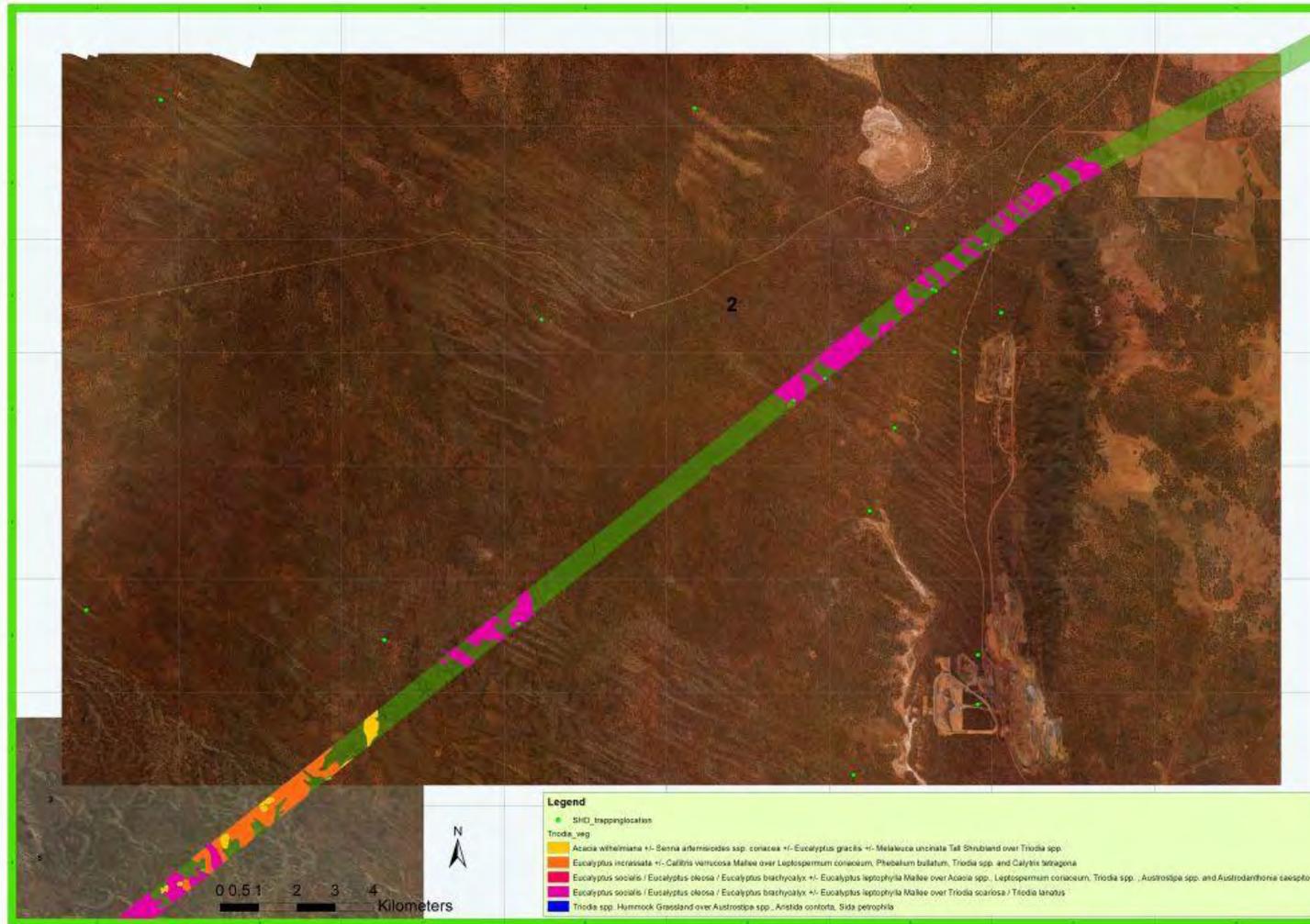


Figure 5: *Triodia* habitat along the proposed ElectraNet transmission line corridor, Middleback Range to Secret Rocks Nature Reserve.

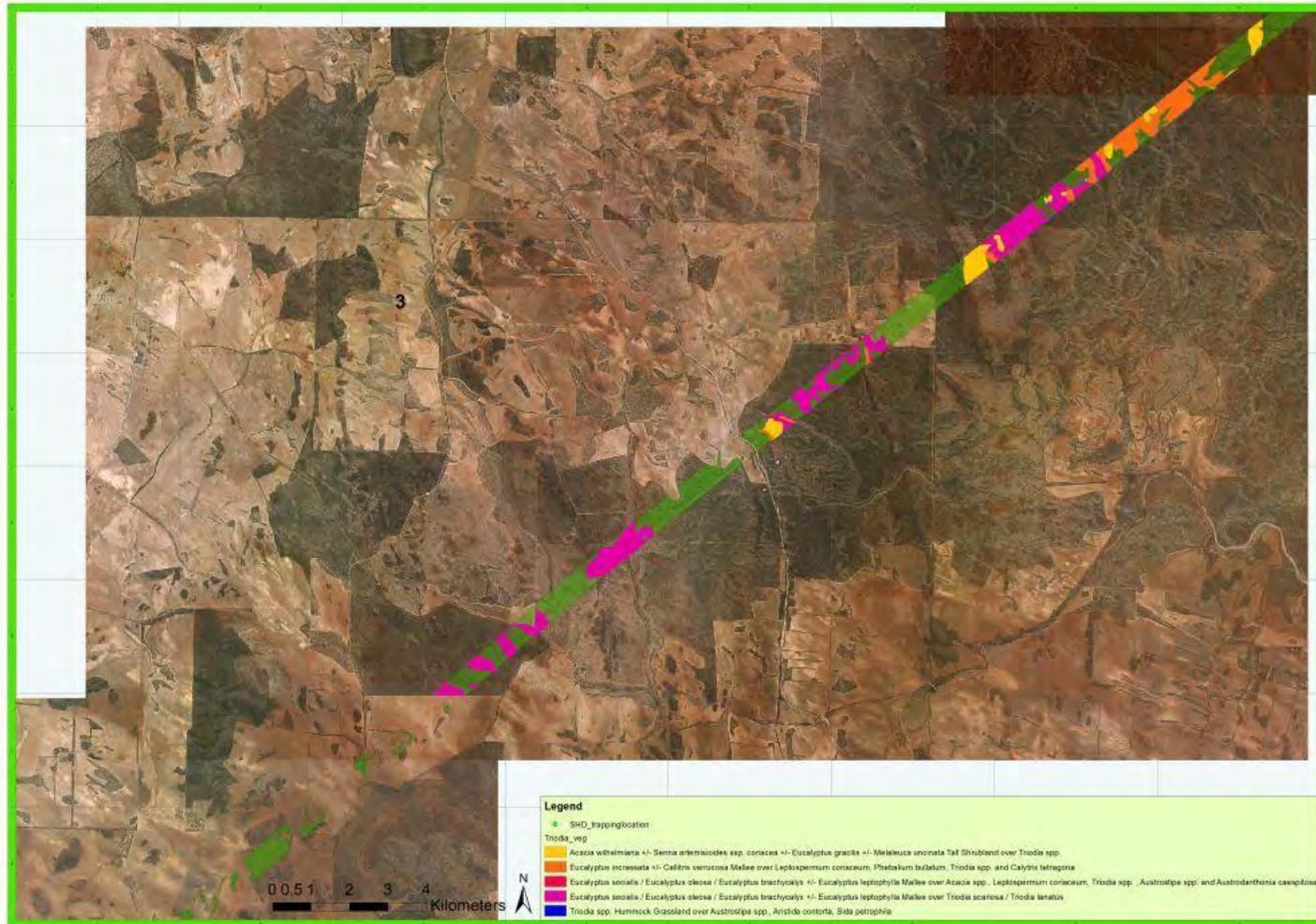


Figure 6: *Tridodia* habitat along the proposed ElectraNet transmission line corridor from Secret Rocks Nature Reserve to Sheoak Hill CP.



Figure 7: *Tridonia* habitat along the proposed ElectraNet transmission line corridor, Sheoak Hill Conservation Park to Southern EP.



Figure 8: *Triodia* habitat along the proposed ElectraNet transmission line corridor, southern EP

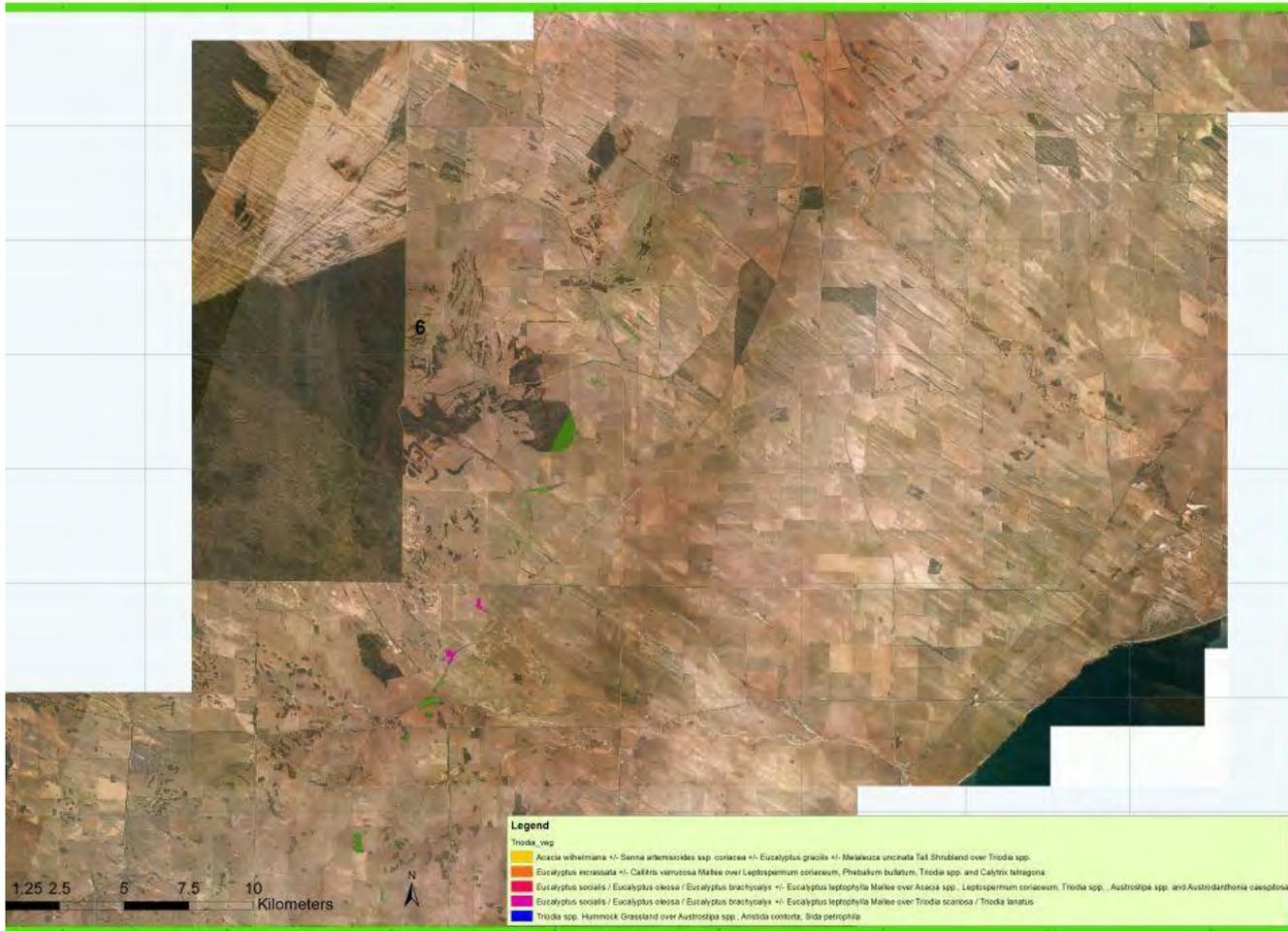


Figure 9: *Tridonia* habitat along the proposed ElectraNet transmission line corridor, Hambidge CP vicinity.



Figure 10: Sandhill Dunnart habitat classified according to fire age. Known optimal habitat is between 10 and 50 years post burn, future optimal habitat is less than 10 years post burn and green is unclassified habitat (unknown fire age, ground truthing required). Note: All *Triodia* habitat between Middleback Range and Sheoak Hill on sandy soils is suitable for sandhill dunnarts at some stage in its post-fire trajectory and large areas are required to support habitat mosaics of different fire age to ensure long term dunnart survival in the region.

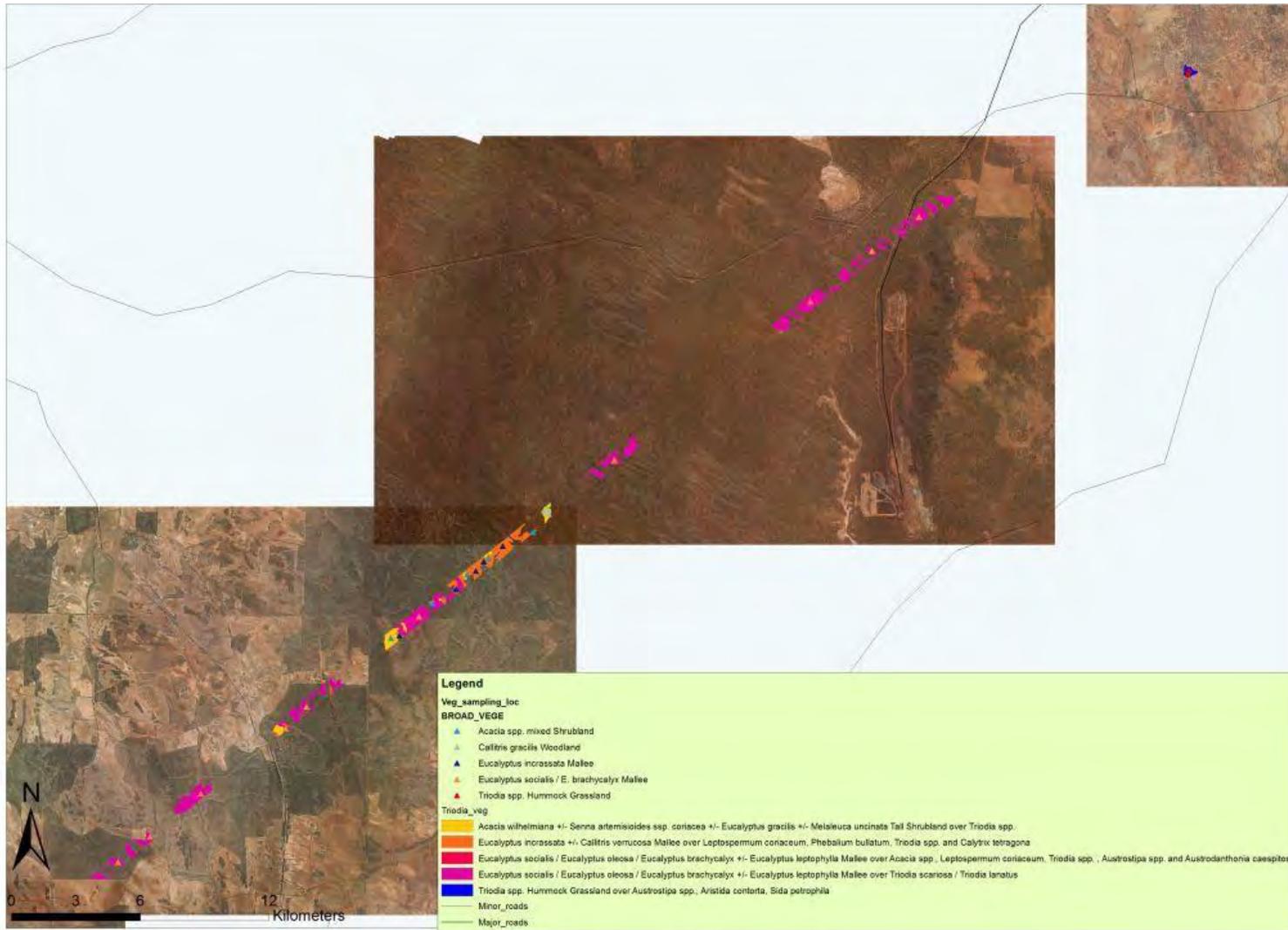


Figure 11: Suggested ground truth sites for the five *Tridodia* associations identified along the proposed powerline corridor

Table 4: Suggested ground truth sites for the five *Triodia* associations identified along the proposed powerline corridor.

FID	VEG_NO	Easting	Northing	TYPE	BROAD_VEGE	Species
0	24	672617.241	6309968.176	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
1	24	679251.441	6314885.54	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
2	24	677139.968	6313652.203	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
3	24	676151.325	6312924.041	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
4	24	674547.001	6311609.798	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
5	23	679976.182	6315724.616	Mallee	Callitris gracilis Woodland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
6	23	679765.577	6315877.309	Mallee	Callitris gracilis Woodland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.

FID	VEG_NO	Easting	Northing	TYPE	BROAD_VEGE	Species
7	23	679947.842	6315946.444	Mallee	Callitris gracilis Woodland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
8	26	676955.325	6313523.122	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
9	26	676586.11	6313085.751	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
10	26	677841.907	6314227.482	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
11	26	675659.411	6312237.156	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
12	26	673023.945	6310095.839	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
13	17	697257.26	6329472.82	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
14	17	695047.981	6327898.545	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
15	17	692190.476	6325556.977	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus

FID	VEG_NO	Easting	Northing	TYPE	BROAD_VEGE	Species
						leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
16	17	683043.695	6318211.866	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
17	17	673928.693	6310957.517	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
18	17	668681.552	6306800.106	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
19	17	663756.094	6302768.457	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
20	17	659895.601	6299611.6	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
21	17	667711.674	6305792.194	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
22	17	661397.96	6300790.668	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
23	8	709839.79	6336253.67	Grassland/ Sedgeland	<i>Triodia</i> spp. Hummock Grassland	Myall Plains
24	8	709795.81	6336093.46	Grassland/ Sedgeland	<i>Triodia</i> spp. Hummock Grassland	Myall Plains

Ground Truthing

Twenty four sites within the 5 *Triodia* vegetation associations were randomly chosen for future ground truthing, should greater certainty about sandhill dunnart suitability be required (Fig. 11, Table 4). An additional 5 sites were visited in Sheoak Hill Conservation Park in unknown fire age *Triodia* habitat. The 90th percentile *Triodia* height at these sites ranged from 57-87cm with average *Triodia* height from 35-58cm. These measurements, along with visual appraisal, suggest that the *Triodia* in Sheoak Hill, although of unknown fire age, is also currently optimal for sandhill dunnarts.

Conclusions

Using the vegetation data provided by EBS, a total of 1,213 hectares of native vegetation within the transmission line corridor from Middleback Range to Sheoak Hill Conservation Park contained suitable *Triodia* habitat within four vegetation associations. At least two of these vegetation associations support confirmed records of sandhill dunnarts and although it is likely that the other two suitable *Triodia* associations also support dunnarts, these are currently unsurveyed. The patchy nature of the *Triodia* habitat suggests that it is also likely that some of the remaining non-*Triodia* native vegetation along the corridor is used by sandhill dunnarts for dispersal and feeding.

The height of *Triodia* is an important variable that can be used to predict the abundance and presence of sandhill dunnarts and is dependent to some degree on fire age. The relationship between *Triodia* height and fire age is unclear for sites more than 50 years post fire but sandhill dunnarts appear to require habitat more than 10 years post burn for local persistence.

Sandhill dunnarts are currently only recorded from large, intact areas of mallee *Triodia* vegetation, possibly because such large areas can support fire mosaics of varying age, ensuring that at least some habitat is always suitable for sandhill dunnart breeding. The large area of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park contains the majority of sandhill dunnart habitat and there are numerous current records of the species from this area.

To increase certainty about sandhill dunnart occurrence in the corridor, ground trapping surveys of two of the *Triodia* vegetation associations (excluding the small patch of *Triodia* with *Austrostipa* on the Whyalla plain) currently not known to support sandhill dunnarts would be required. Additionally, *Triodia* height measurements of the unknown fire age *Triodia* habitat could be measured to finalise the map of current and future optimal habitat. Without further detailed surveys it should be assumed that the transmission line corridor mallee habitat from the Middleback Range to south of Sheoak Hill Conservation Park is suitable sandhill dunnart habitat and important for the preservation of the species.

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Appendix 4 – Malleefowl Targeted Survey Report – Ecological Horizons Pty Ltd, 2014.

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 km² 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.

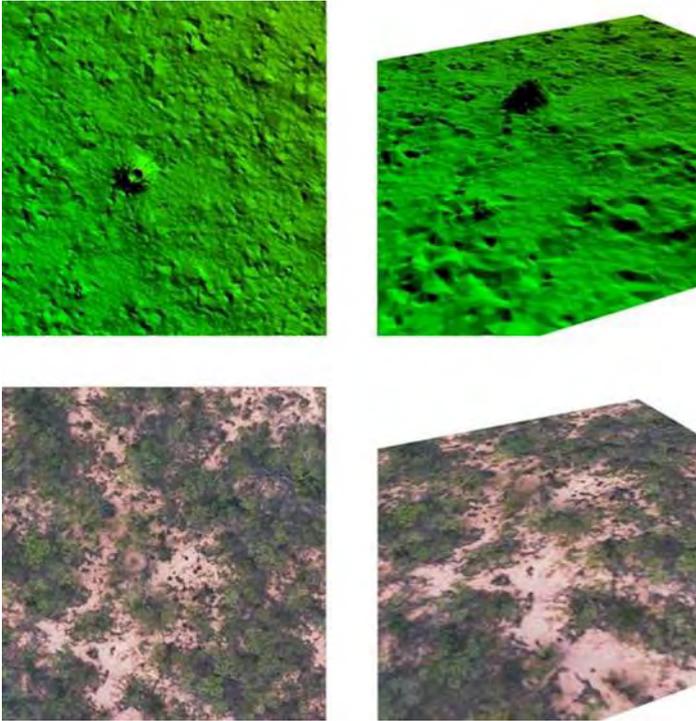


Figure 1 examples of LiDAR and aerial photography (used to 'confirm' mounds) for Malleefowl mound MA78.

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)	Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)
C001	659975.633	6299827.400	Y	5	30	C042	682645.868	6318082.946	Y	20	40
C002	660228.671	6299919.637	Y	22	30	C043	682662.963	6317985.012	Y	58	30
C003	660547.790	6299994.841	Y	80	25	C044	683052.233	6318123.875	Y	40	22
C004	660548.000	6300442.949	Y	41	30	C045	683093.672	6318290.032	Y	68	30
C005	667351.788	6305897.792	Y	25	30	C046	683252.955	6318719.118	Y	35	10
C006	667841.333	6306445.494	Y		35	C047	683577.561	6321380.893			
C007	667971.185	6306314.599	Y	80	45	C048	683618.377	6321344.196			
C008	668744.953	6306746.870	Y	35	37	C049	683693.986	6321636.841			
C009	668928.654	6306866.762	Y	50	25	C050	683872.424	6321901.325			
C010	668980.626	6307262.578	Y	65	30	C051	684426.101	6319521.788	Y	90	20
C011	670373.505	6310905.514				C052	685621.851	6322930.396			
C012	672130.529	6309435.465				C053	686091.062	6320539.980	Y	15	29
C013	672328.452	6312737.143				C054	686124.571	6323869.939	Y	22	12
C014	672613.192	6312519.329				C055	686226.554	6320872.192	Y	38	18
C015	674101.473	6314112.707				C056	686450.115	6320733.117	Y	5	20
C016	674479.808	6311541.158				C057	686955.589	6324153.005	Y	80	26
C017	675598.523	6315381.544	Y	17	16	C058	687056.079	6324181.159	Y	35	25
C018	675875.703	6315527.551	Y	10	18	C059	687097.772	6321716.992	Y	45	35
C019	675944.283	6315340.136	Y		10	C060	687577.515	6324500.903	Y	33	47
C020	676113.234	6315813.358	Y	25	18	C061	689163.149	6326201.243	Y	54	30
C021	676311.676	6315780.073	Y	29	15	C062	689754.915	6323628.166	Y	30	5
C022	676537.052	6315743.031	Y	24	15	C063	690335.412	6326997.619	Y	28	20
C023	676633.574	6315905.773	Y	6	21	C064	690701.710	6324521.656	Y	37	7
C024	677170.668	6316280.683	Y	13	25	C065	690875.899	6324588.790	Y	58	12
C025	677226.526	6316695.647	Y	8	22	C066	690978.059	6327298.420	Y	32	27
C026	677307.496	6316293.676	Y	15	18	C067	691819.175	6328124.635	Y	40	28
C027	678040.093	6317068.903	N			C068	692081.276	6328378.277	Y	45	30
C028	678635.355	6317323.626	Y	25	33	C069	692558.388	6326050.132	Y	12	22
C029	678747.896	6317898.716	Y	32	30	C070	692798.206	6326005.031	Y	20	32
C030	678831.111	6318071.397	Y	35	2	C071	692832.095	6326288.127	Y	30	15
C031	679019.752	6318145.398	Y	30	17	C072	692872.380	6326301.009	N		
C032	679270.423	6318028.566	Y			C073	692988.770	6326052.632	Y	66	15
C033	679451.223	6318500.112	N			C074	693029.122	6328889.554	Y	17	23
C034	679612.512	6318144.539	Y			C075	693632.026	6326770.823	Y	15	20
C035	679731.966	6318340.684	Y			C076	694398.012	6327449.056	Y		
C036	679879.841	6318640.846	Y	40	40	C077	694732.562	6327791.718	Y		
C037	680548.879	6319199.669	Y	30	12	C078	695011.948	6327668.613	Y	34	25
C038	680846.239	6319125.122	Y	23	20	C079	695317.386	6327962.825	Y	45	42
C039	682096.118	6320604.151				C080	695601.345	6328202.223	Y	40	32
C040	682187.520	6317835.435				C081	695737.826	6328129.194	Y	50	17

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Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)	Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)
P001	659451.692	6298991.592	N			P048	683438.702	6321595.102			
P002	659466.353	6298977.497	N			P049	683716.105	6321421.663			
P003	659673.349	6299693.253	N			P050	683721.525	6318521.114	N		
P004	659874.158	6299354.658	N			P051	683749.672	6318574.386	N		
P005	660476.012	6299835.202	N			P052	683786.055	6318597.318	N		
P006	660736.414	6300103.745	N			P053	683802.054	6318585.348	N		
P007	660743.979	6300112.150	N			P054	684152.405	6321967.943			
P008	660758.043	6300098.895	N			P055	684483.630	6319149.269	N		
P009	660796.581	6300610.877	N			P056	684630.287	6319265.084	N		
P010	664675.006	6303594.606				P057	684689.616	6319293.570	N		
P011	665954.090	6304895.652				P058	684805.916	6319407.791	N		
P012	665969.355	6304765.196				P059	685087.051	6319632.179	N		
P013	665970.668	6304892.148				P060	685123.490	6319612.201	N		
P014	666130.093	6304511.098				P061	685127.943	6319616.723	N		
P015	666879.200	6305257.309	N			P062	685297.923	6319796.892	N		
P016	668144.602	6306161.985	N			P063	685430.719	6319908.618	N		
P017	668550.321	6306482.790	N			P064	685479.233	6323259.800	N		
P018	668624.824	6306543.808	N			P065	685506.300	6319940.534	N		
P019	668651.675	6306565.790	N			P066	685516.468	6323116.630	N		
P020	668834.035	6306709.009	N			P067	685519.746	6319948.644	N		
P021	668966.420	6307169.228	Y	50		P068	685523.521	6323162.384	N		
P022	671957.621	6309194.628				P069	685854.700	6323589.330	Y	5	45
P023	672557.090	6309580.513				P070	686180.642	6320500.828	N		
P024	672903.799	6312966.116				P071	686510.136	6320732.874	N		
P025	675385.363	6311914.863	N			P072	686676.374	6321145.401	N		
P026	675964.107	6312380.529	N			P073	686822.754	6321018.531	N		
P027	676566.491	6312787.656				P074	687280.427	6321889.277			
P028	676580.303	6312786.378				P075	687424.719	6324389.042	Y	60	29
P029	678119.496	6317113.559	N			P076	688543.719	6322807.986			
P030	678259.830	6314536.791				P077	688584.302	6322416.442	N		
P031	678505.377	6314375.212	N			P078	688960.271	6323239.433			
P032	679912.273	6315523.278	N			P079	689213.941	6323429.410			
P033	680470.264	6315957.622	N			P080	690354.967	6326897.682	Y	10	20
P034	680475.444	6315937.501	N			P081	691381.703	6328148.468	N		
P035	680815.028	6316243.092	N			P082	691618.455	6324796.056	N		
P036	680845.375	6316235.100	N			P083	691681.608	6324869.347	N		
P037	682209.413	6317319.056	N			P084	693122.087	6329180.321	N		
P038	682491.593	6317566.530	N			P085	693168.043	6326308.982	N		
P039	682526.003	6317593.379	N			P086	693868.655	6326850.112	Y	48	25
P040	682701.056	6317729.647	N			P087	696804.698	6329396.058	N		
P041	682704.746	6321182.557				P088	696926.541	6329405.308	N		
P042	682743.711	6317743.042	N			P089	697528.210	6329604.653	N		
P043	682758.847	6317776.618	N			P090	698440.568	6330159.263	N		
P044	682846.597	6317847.490	N			P091	700108.507	6331313.898	N		
P045	683048.883	6321085.216				P092	700119.406	6331393.236	N		
P046	683348.262	6318249.111	N			MFM14b	688556.000	6325955.000	Y	30	17
P047	683428.016	6318710.894	Y	30	32	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 km² grids methodically surveyed by chopper and on the ground. Assuming that half of each 1 km² 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 km².

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.

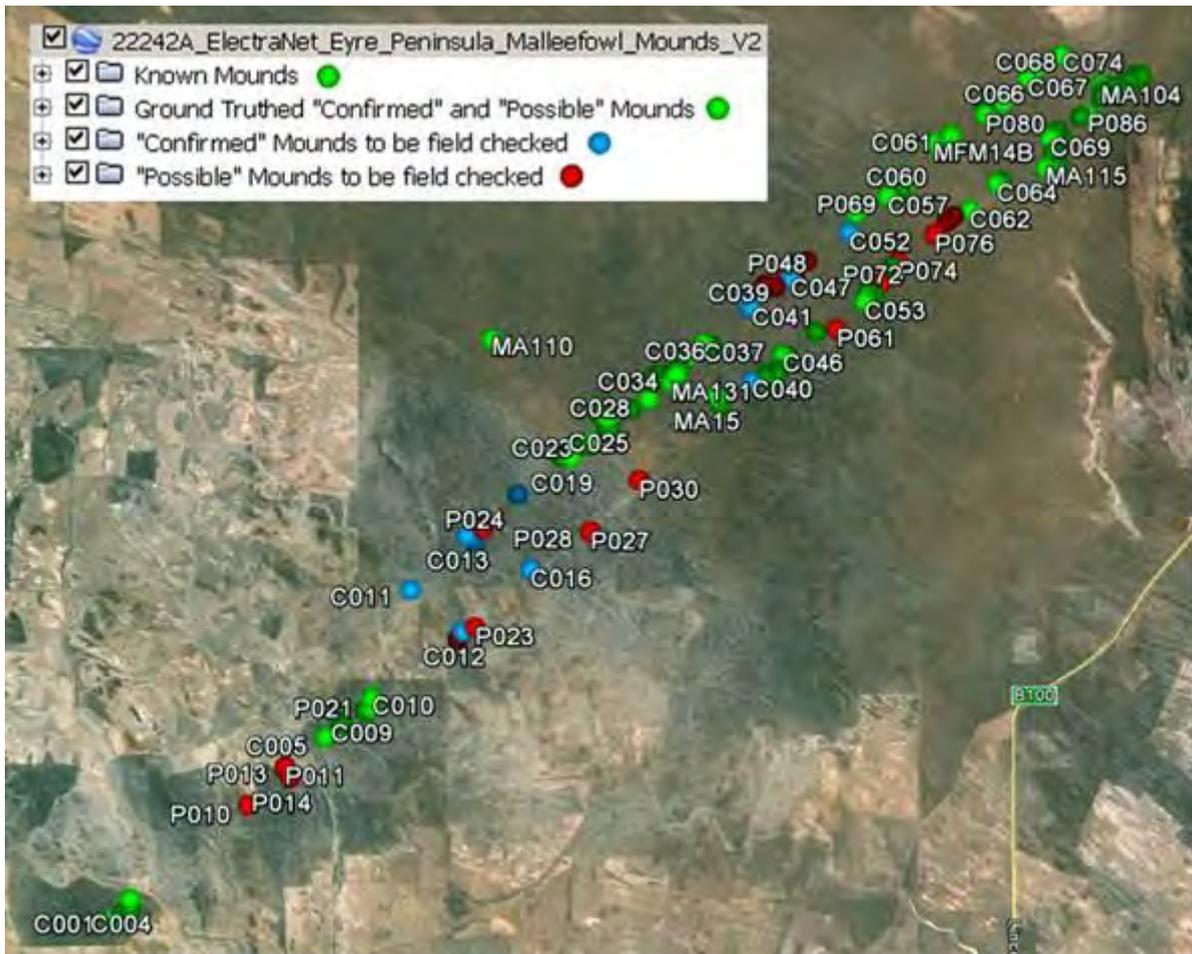


Figure 5. Green dots: confirmed (ground truthed) Malleefowl mounds; blue dots: not ground-truthed but 95% likely based on confirmed percentage of 'confirmed' objects; and red dots: not ground-truthed but 8.5% likely (based on confirmed percentage of 'possible' objects).

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.

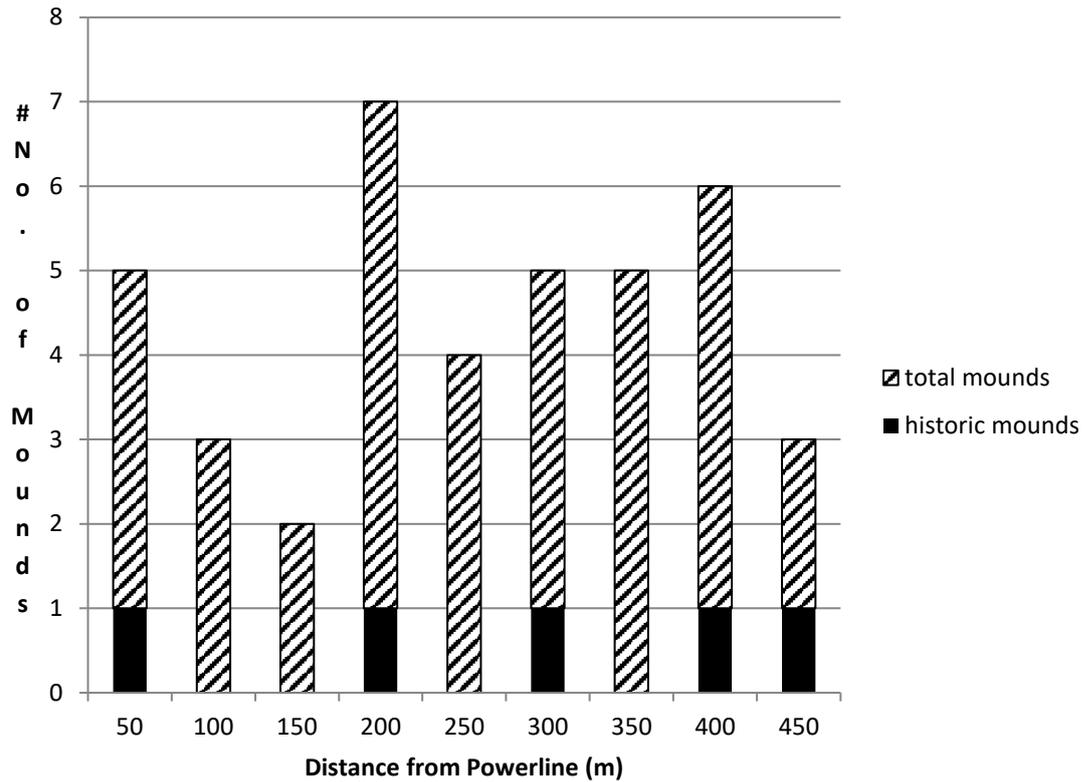


Figure 6. Distance of historic and more recent mounds from the powerline on the powerline transect

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 km². 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.



EBS Ecology
3/119 Hayward Avenue
Torrensville, SA 5031
www.ebsecology.com.au
t. 08 7127 5607



11 December 2017

GEOTECHNICAL INVESTIGATION REPORT

TRANSMISSION LINE UPGRADE, CULTANA TO PORT LINCOLN

ElectraNet Pty Ltd

Ref: **ADL2017-0170AC** Rev: 0

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APPENDICES

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Appendix B – DETAILED GEOLOGIC INFORMATION

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Appendix F – CALCRETE LOCATIONS

Appendix G – ENGINEERING LOGS and SITE LOCATION PLAN

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29 August 2017	0	ADL2017-0170AB Initial Version – for comment
11 December 2017	0	ADL2017-0170AC Updated following completion of Stage 1 Ground Investigation Major additions highlighted by <i>italics</i>

1. INTRODUCTION

CMW Geosciences (East Coast) Partnership (CMW) has prepared this Geotechnical Investigation Report for ElectraNet as part of the geotechnical investigation and design reporting for the proposed transmission line from Cultana to Port Lincoln, Eyre Peninsula, South Australia. The scope of work has been detailed in our proposal (ADL2017-0170AA Rev B) dated 10 August 2017.

A desktop investigation has been conducted using published data and information provided by the client. Using this data, a preliminary geotechnical model of the line has been established.

The geotechnical input to the project is being delivered in a staged approach including:

- Stage 1: Desktop Study (Rev 0);
- Stage 2: Preliminary site investigation and derivation of design ground models and parameters; and
- Stage 3: Concept footing design for a range of typical structures (to be provided in a subsequent submission).

2. PROJECT BACKGROUND

Based on the information provided by ElectraNet the project comprises the construction of a new transmission line (adjacent to an existing line) that for concept design costing (+/-30%) requires:

- Geotechnical investigation and design of pile parameters; and
- Freestanding lattice tower footing design for the each of the proposed structural footing types. The structure types for the concept footing design are subject to confirmation by ElectraNet.

Most of the proposed line is to be constructed directly west of existing transmission lines F1810 (Cultana to Yadnarie) and F1811 (Yadnarie to Port Lincoln). The envisaged location of the new transmission line is attached in Appendix A.

The transmission line is to be comprised of two sections:

- **Section 1:** Cultana substation to Yadnarie substation along the existing line F1810 (approximately 342 structures). No new substations proposed. Refer to Section 4.2 of this report for details; and
- **Section 2:** Yadnarie substation to Port Lincoln North substation (new substation) along the existing line F1811 (approximately 325 structures). Refer to Section 4.3 of this report for details.

According to the location data provided to CMW by ElectraNet, the location of the structures at the Northern end of the line deviate from the given location of the proposed line 'F1810 NEW ALIGNMENT'. The line indicated by the proposed location of the structures is indicated in Appendices A, C and D.

3. FIELD INVESTIGATION

3.1. Scope of Fieldwork

The limited intrusive field investigation was carried out between 10 October 2017 to 18 October 2017. All fieldwork was carried out under the direction of CMW Geosciences (East Coast) in general accordance with AS1726 (1993), Geotechnical Site Investigations. The scope of fieldwork completed was as follows:

- Undertake a walkover survey of the site to assess the general landform and site conditions; and
- Drilling twenty (20) boreholes to a target depth of 8m, or shallower upon refusal, using a trailer mounted MultidDrill 2 drilling rig using solid auger, washbore and HQ3 drilling techniques;

The approximate locations of the respective investigation sites referred to above are shown on the attached site plan presented in Appendix G. Engineering logs for each borehole are also presented in Appendix G.

3.2. Laboratory testing

Laboratory testing was carried out generally in accordance with the requirements of the current edition of AS 1289. All testing was scheduled by CMW and carried out by SMS Geotechnical, a NATA registered testing laboratory, with the exception of the point load index testing, which was completed by CMW.

The quantity of testing carried out to provide the geotechnical parameters required for this study included:

- 7 x Particle Size Distribution tests
- 7 x Atterberg Limits test;
- 7 x Linear Shrinkage tests; and
- 24 x Point Load Index tests.

Certificates for the test results outlined above are presented in Appendix D.

4. GEOTECHNICAL MODEL DEVELOPMENT

4.1. OVERVIEW

This section gives a high-level overview of the different geological units identified along the line corridor. The analysis has been divided between the two sections of the proposed line. Section 4.2 of this report details the northern line, between Cultana to Yadnarie (referred as 'SITE 1' for the purpose of this report). Section 4.3 details the southern line, between Yadnarie to Port Lincoln North (referred as 'SITE 2').

The analysis has been split into the main geological units that have been documented in published maps along the line and is presented from North to South. The following information provided is for each major geology unit identifies;

- Graphical extent of geological unit
- Graphic extent of soil unit
- Brief description of the geology
- Indicative geotechnical parameters
- Considerations for design

A description of each geological unit, at each structure location, are attached in Appendix B. The geological units have been named for the purposes of this report from 'A' to 'J' for brevity and ease to the reader. We have also provided tables and graphical charts to assist in illustrating the anticipated geology and hazards through the proposed transmission line route, which will be updated and adjusted through the ground investigation reporting process.

4.2. Reference Information

The following available information has been referred to during the development of the desk study (Rev0 of the report). This information has been supplemented by limited intrusive geotechnical investigation.

- Existing as-built information of the current transmission line;
- South Australian Resources Information Gateway (SARIG), which provides information regarding;
 - Groundwater
 - Regolith (soil);
 - Geology (underlying bedrock); and
 - Calcareous induration of sediment
- Previous geotechnical investigations conducted by others and supplied by ElectraNet, including:
 - Cultana Substation Geotechnical Investigation. Reference 117662047-001-L-Rev0 dated 25 January 2012 by Golder Associates.
 - Yadnarie Electrical Substation Geotechnical Investigation. Reference 06554AA-AB2 dated 7 December 2010 by Coffey Geotechnics;
 - Port Lincoln Substation Geotechnical Investigation. Reference GEOTMEND07613AA dated

4.3. SITE 1 – CULTANA TO YADNARIE (approximately 260 km)

Figure 1 provides an indicative distribution of geological units per Structure for Site 1.

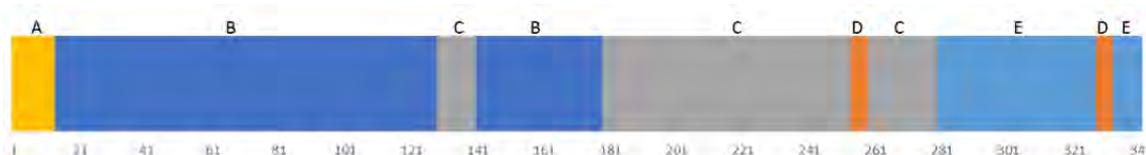
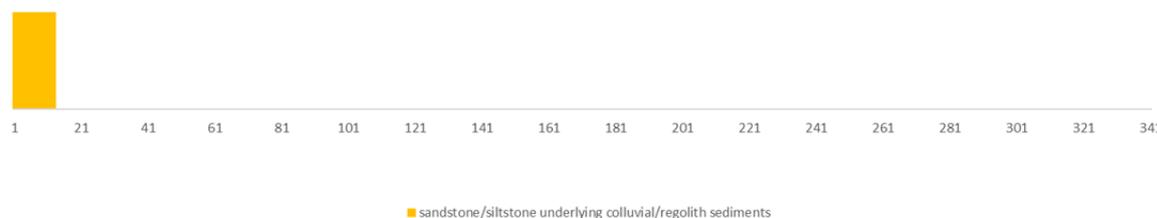


Figure 1 – Overview of geological units along proposed line (by structure number; North to South)

4.3.1. GEOLOGICAL UNIT A – Sandstone / Siltstone underlying Colluvial / Regolith

At the following Site 1 structures, Unit A is expected to be encountered.



4.3.1.1. Regional Geology Description

Sandstone/siltstone underlying colluvial/regolith sediments

Subsoils are expected to be a medium grained and gritty, cross bedded sandstone, overlain by colluvium. The colluvium is anticipated to be a heterogeneous material of variable grain size accumulated on slopes by gravity, creep, sheet flow, rainwash, mudflows or solifluction.

4.3.1.2. Encountered Subsurface Conditions

Two boreholes 'BHF1810-003' and 'BHF1810-011' separated by 3.3 km distance apart were drilled in this geological unit to the target depth of 8.0m. The ground conditions encountered and inferred from the investigation were generally consistent with the desk study report for this area. These can be generalised to be comprised of heterogeneous material of variable grain size (sand and gravel) captured in a matrix of fines (clay) that might have accumulated on low lying area by gravity, creep, sheet flow, rain wash, mudflows or solifluction. Other notable elements highlighted by ground investigation;

- Some layers contain no fines (i.e. no matrix of clays)
- No groundwater encountered during investigation
- SPTs can decrease with depth which is not uncommon with colluvium deposits
- No sandstone/siltstone was encountered within the target depth of 8.0m however its occurrence at deeper depth should be anticipated.

4.3.1.3. Preliminary Geotechnical Parameters

The generalised geotechnical ground model provided in Table 1 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, high bearing and moderate shaft adhesion but variable depth to a suitable foundation.

Table 1: Geotechnical ground model for Geological Unit A

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_y (kPa)
0.0 – 6.0	Hard CLAY	-	300	80	20	70	2,700	2,500
6.0 – 8.0	Medium Dense GRAVEL	38	-	40	20	40	3,000	3,000

Where ϕ' = angle of internal friction, Cu = Undrained Shear Strength, E_v' = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_y = Lateral yield pressure.

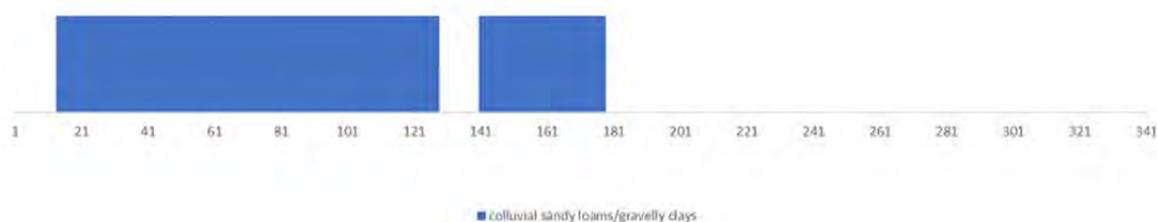
4.3.1.4. Design Considerations/Limitations

The following constraints are considered applicable to this anticipated geology;

- Typical to low lying areas most likely comprised of colluvium;
- High possibility of calcrete duricrust overlying unconsolidated sediment (refer appendices D, F), and;
- Unknown depth to competent bedrock.

4.3.1.5. GEOLOGICAL UNIT B – Colluvial Sandy Loams / Gravelly Clays

At the following Site 1 structures Unit B is expected to be encountered.



4.3.1.6. Regional Geology Description

Colluvial sandy loams/gravelly clays

Subsoils are expected at these locations to be colluvium derived sandy loams and gravelly clays. Being colluvium, it is derived by the erosion, slope failure and weathering of the surrounding sloped geology. It can be quite heterogeneous, with grain sizes ranging from gravelly to clay. Bedding is mostly thin, with colours consisting of reddish, orange and yellow-browns. Nodules of calcite have also been noted.

4.3.1.7. Encountered Subsurface Conditions

Two boreholes denoted by 'BHF1810-060' and 'BHF1810-150' separated by 35.5 km were drilled in this geological unit to the target depth of 8.0m. The ground conditions encountered and inferred from the investigation were generally consistent with the published geology and the desk study report for this area and can be generalised to be comprised of sandy clay and clayey sandy gravel, very strongly cemented at deeper depth giving it a higher consistency. The angular nature of gravel indicates it being colluvium is derived by the erosion, slope failure and weathering of the surrounding sloped geology. It can be quite heterogeneous, with grain sizes ranging from gravelly to clay. Bedding is mostly thin, with colours consisting of reddish, orange and yellow-browns.

Other notable elements highlighted by ground investigation:

- No groundwater encountered during investigation;
- SPTs generally high, which highlight very stiff, or very dense nature of the soils at the exploratory holes;
- SPTs refusals as high as 6 blows for 10mm movement; and
- Lower SPTs in top 2.5m may be due to inducement of water during auger drilling

4.3.1.8. Indicative Geotechnical Parameters

The generalised geotechnical ground model provided in Table 2 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, high bearing and moderate shaft adhesion but variable depth to a suitable foundation.

Table 2: Geotechnical ground model for Geological Unit B

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_v (kPa)
0.0 – 3.0	Very Stiff CLAY	-	180	50	20	60	1,600	1,600
3.0 – 8.0	Hard CLAY	-	350	100	20	90	3,200	3,200

Where ϕ' = angle of internal friction, Cu = Undrained Shear Strength, E_v' = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_v = Lateral yield pressure.

4.3.1.9. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Inherent heterogeneity of colluvial soils;
- Alluvial, unconsolidated soils will be encountered at current and historic river/creek channels, but have not been considered;
- Potential of ferricrete formation in places close to the proposed transmission line;
- High possibility of calcrete duricrust overlying unconsolidated sediment in places (refer appendices D, F); and
- Possibility of highly variable soil strengths, dependent on natural consolidation and soil type.

4.3.1.10. GEOLOGICAL UNIT C – Quartzite/Schist/Dolomite/Iron

At the following Site 1 structures, Unit C is expected to be encountered.



4.3.1.11. Regional Geology Description

Quartzite, schist, dolomite and iron formations

Subsoils at the site are expected to be undifferentiated metasediments and metavolcanics of the paleoprotozoic. These bed rock units are comprised of metamorphized sedimentary and volcanic rocks forming hills of primarily fresh to moderately weathered low to high strength bedrock. Highly abrasive bedrock.

4.3.1.12. Encountered Subsurface Conditions

Two boreholes denoted by 'BHF1810-256' and 'BHF1810-330' were cored at this geological unit at separate locations to a depth of 3.5m and 8.0m respectively. The BHF1810-256 was terminated at 3.5m after 3.0m of solid rock of very high strength and minimal fracture spacing was recovered from the ground.

The ground condition encountered was consistent with the desk study. The rock units are comprised of partially metamorphized high strength sandstone quartz at BHF1810-256 and mudstone at BHF1810-330 with varying degree of weathering from fresh to highly weathered and correspondingly the varying degree of rock strength from very high to low.

Other notable elements highlighted by ground investigation;

- No groundwater encountered during investigation however water flush used for drilling process limited observation of groundwater;
- Soil to 0.5m to 0.8m below ground level at the two exploratory hole locations; and
- Rock Strength within the High to Very High Strength range

4.3.1.13. Indicative geotechnical parameters

The generalised geotechnical ground model provided in Table 3 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, high bearing and high shaft adhesion but variable depth to a suitable foundation.

Table 3: Geotechnical ground model for Geological Unit C

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_y (kPa)
0.0 – 1.0	Overburden	Ignore for foundation design						
1.0 – 3.0	Medium Strength Schist	-	-	12,000	22	400	10,000	5,000
3.0 – 8.0	High Strength Schist	-	-	20,000	24	500	12,000	6,000

Where ϕ' = angle of internal friction, Cu = Undrained Shear Strength, E_v' = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_y = Lateral yield pressure.

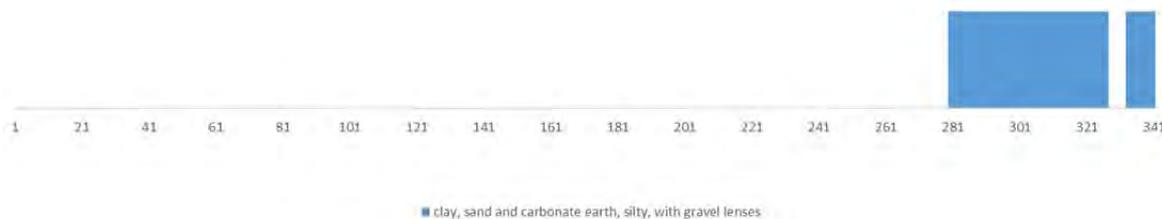
4.3.1.14. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Difficult drilling conditions;
- Highly variable rock lithology; and
- Unknown depth to rock.

4.3.1.15. GEOLOGICAL UNIT D – Carbonate Clay and Sand

At the following Site 1 structures, Unit D is expected to be encountered.



4.3.1.16. Regional Geology Description

Clay, sand and carbonate earth, silty, with gravel lenses

An alluvial derived sediment of the Quaternary, comprising reddish-brown and yellowish-brown gravelly and sandy clay, silt and sand. Soft, earthy carbonate is noted in the literature.

4.3.1.17. Encountered Subsurface Conditions

Two boreholes denoted by ‘BHF1810-300’ and ‘BHF1810-337’ were cored on the same geological unit separated apart by 43 km to the target depth of 8.0m.

At one of these two (2) locations which is BHF1810-337, the ground condition encountered was consistent with the desk study indicating the presence of Pooraka Formation comprised of high plasticity clay with consistency equal to stiff overlying silty sandy gravel. The silt fraction underlying clay layer below 2.0m could have resulted from the extremely weathered siltstone with very dense consistency.

The ground condition encountered at other location ‘BHF1810-300’ comprised of metamorphosed mudstone with higher fracture frequency at shallower depth up to 3.0m below ground level improving both core strength and defect spacing at deeper depth below 4.0m. A layer of medium to high strength volcanic granite was encountered between 4.5m and 6.0m. The ground condition for this borehole does not correlate well with the information provided in the desk study report. However, as evidenced from the published geology for this location, there are other minor but multiple geological sections around this area showing the very similar ground conditions as encountered in the field investigation. The presence of ‘Yadnarie Schist – locally quartz-sericite banded metasilstone’ may account for this variability.

Other notable elements highlighted by ground investigation;

- No groundwater encountered during investigation however water flush used for drilling process; and
- All SPTs completed within the underlying residual soil met refusal whilst those completed within the Pooraka Formation soils indicated the materials were of stiff consistency.

4.3.1.18. Indicative geotechnical parameters

The generalised geotechnical ground model provided in Table 4 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, high bearing and high shaft adhesion but variable depth to a suitable foundation.

Table 4: Geotechnical ground model for Geological Unit D

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_v (kPa)
0.0 - 3.0	Pooraka Clay	-	80	30	20	50	800	800

	(stiff)							
3.0 – 8.0	Residual Soil (Hard)	-	350	100	20	90	3,200	3,200

Where ϕ' = angle of internal friction, C_u = Undrained Shear Strength, E_v = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_y = Lateral yield pressure.

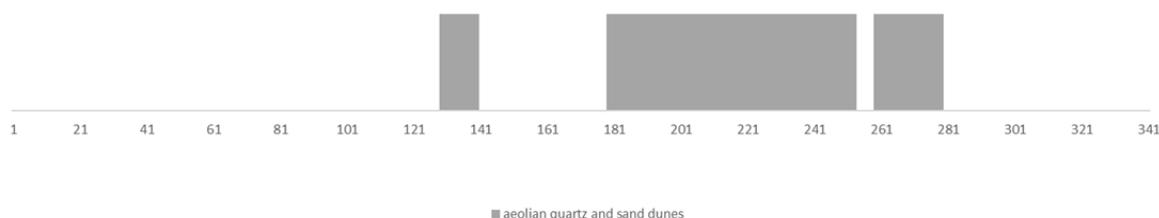
4.3.1.19. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Alluvial, unconsolidated soils will be encountered at historic river channels, but have not been considered.

4.3.1.20. GEOLOGICAL UNIT E – AEOLIAN QUARTZ AND SAND DUNES

At the following Site 1 structures, Unit E is expected to be encountered.



4.3.1.21. Regional Geology Description

Aeolian quartz and sand dunes

Subsoils at these locations are poorly graded, typically fine-grained calcareous sands. These wind transported sediments form inland dunes comprising mainly quartz and sand sized soil grains. These dunes can be vegetated and are deposited in thin veneers.

4.3.1.22. Encountered Subsurface Conditions

Two boreholes BHF1810-221 and BHF1810-267 were drilled on this geological unit. BHF1810-221 was shifted 800m south from the proposed location and BHF1810-267 by 200m due to the site being comprised of a very loose sandy surface (which gave rise to access/tracking concerns). However, the ground condition encountered at the sites correlate very well with the information provided in the desk study. The Aeolian sands at BHF1810-221 were underlain by inferred Pooraka Formation and by colluvium deposits at BH1810-267.

Other notable elements highlighted by ground investigation;

- No groundwater encountered during investigation however water flush used for drilling process;
- SPTs generally indicate dune sands to be of loose consistency; and
- Risk of poor consolidation in areas.

4.3.1.23. Indicative geotechnical parameters

The generalised geotechnical ground model provided in Table 5 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, low bearing and low shaft adhesion within the Aeolian sands. Variable depth to a suitable foundation should be expected.

Table 5: Geotechnical ground model for Geological Unit E

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_y (kPa)
0.0 - 2.0	Aeolian Sand (medium dense)	30	-	30	17	20	NA	200
2.0 – 8.0	Hard CLAY	-	300	80	20	70	2,700	2,500

Where ϕ' = angle of internal friction, Cu = Undrained Shear Strength, E_v' = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_y = Lateral yield pressure.

4.3.1.24. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Potential of ferricrete formation;
- Additional geological units could also be encountered, primarily older metasediments and Hutchison Group volcanics;
- Risk of poor consolidation in areas, and;
- Potential for buried topsoil/vegetation.

4.4. Site 1 – Groundwater Review

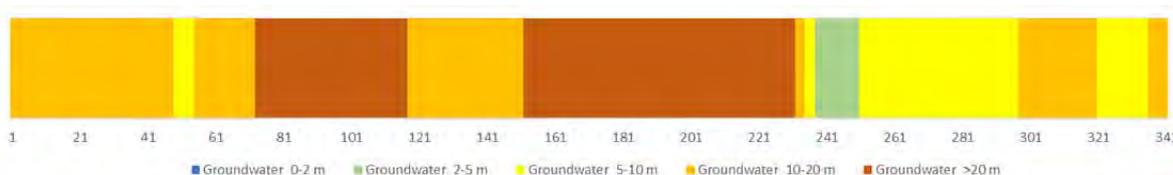


Figure 2 – Overview of expected groundwater conditions between Cultana to Yadnarie (by structure number; from North to South)

Groundwater information from SARIG for Site 1 indicates that groundwater is predominately greater than 10m from ground level in geological units’ B and C, and greater than 5m in unit E. However, 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 thus may be encountered in units’ B and E. Locations of active and dry streams, creeks or river channels are not defined. These locations may have higher groundwater levels.

Should further information on permanent site groundwater levels be required, additional investigation would need to be carried out (i.e. installation of groundwater monitoring wells) with ongoing monitoring of levels.

A geographic overview of expected groundwater levels for the entire line is attached in Appendix C.

4.5. SITE 2 – YADNARIE TO PORT LINCOLN NORTH (approximately 250 km)

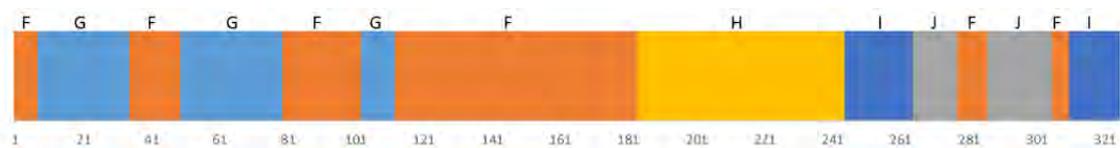
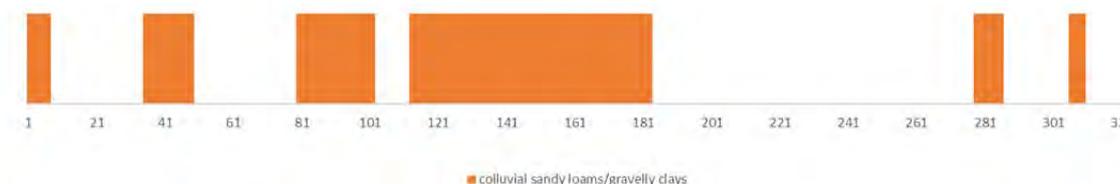


Figure 3 – Overview of geological units along proposed line (by structure number; North to South)

4.5.1.1. GEOLOGICAL UNIT F – Colluvial Sandy Loams / Gravelly Clays

At the following Site 2 structures, Unit F is expected to be encountered.



4.5.1.2. Regional Geology Description

Colluvial sandy loams/gravelly clays

Subsoils at the site are expected to be colluvium derived sandy loams and gravelly clays. Being colluvium, it is derived by the erosion, slope failure and weathering of the surrounding sloped geology. It can be quite heterogeneous, with grain sizes ranging from gravel to clay. Bedding is mostly thin, with colours consisting of reddish, orange and yellow-browns. Nodules of calcite have also been noted.

4.5.1.3. Encountered Subsurface Conditions

Sandstone/siltstone underlying colluvial/regolith sediments. Two boreholes denoted by 'BHF1811-092' and 'BHF1811-138' were drilled within this geological unit. The primary geology at these locations is colluvium derived sandy loams and gravelly clays. Being colluvium, it is derived by the erosion, slope failure and weathering of the surrounding sloped geology. It can be quite heterogeneous, with grain sizes ranging from gravel to clay.

At BHF1811-092, auger drill refusal occurred at 2.5m on a high strength sandstone forcing to switch the drill methodology to diamond coring. At BHF1811-138, the material encountered was high plasticity red brown clay with consistency ranging from very stiff at shallower depth to hard below 3.0m. Bedding is mostly thin, with colours consisting of reddish, orange and yellow-browns. Nodules of calcite have also been noted.

Other notable elements highlighted by ground investigation;

- No groundwater encountered during investigation however water flush used for drilling process
- Sandy Gravel noted within logs for borehole BHF1811-092 at 6.6m bgl underlying the more competent sandstone.
- SPTs generally high where conducted.

4.5.1.4. Indicative geotechnical parameters

The generalised geotechnical ground model provided in Table 6 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, high bearing and moderate shaft adhesion but variable depth to a suitable foundation.

Table 6: Geotechnical ground model for Geological Unit F

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_v (kPa)
0.0 – 4.0	Very Stiff CLAY	-	180	50	20	60	1,600	1,600
4.0 – 8.0	Hard CLAY	-	350	100	20	90	3,200	3,200

Where ϕ' = angle of internal friction, Cu = Undrained Shear Strength, E_v' = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_y = Lateral yield pressure.

4.5.1.5. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Inherent heterogeneity of colluvial soils;
- Alluvial, unconsolidated soils will be encountered at historic river channels, but have not been considered;
- Possibility of calcrete duricrust overlying unconsolidated sediment; and
- Possibility of highly variable soil strengths, dependent on natural consolidation and soil type.

4.5.1.6. GEOLOGICAL UNIT G – AEOLIAN QUARTZ SAND DUNES

At the following Site21 structures, Unit G is expected to be encountered.



4.5.1.7. Regional Geology Description

Aeolian quartz and sand dunes

Subsoil at these locations are expected to be wind transported sediment, forming inland dunes comprising mainly quartz and sand sized soil. These dunes can be vegetated, and are deposited in thin veneers.

4.5.1.8. Encountered Subsurface Conditions

Two boreholes denoted by 'BHF1811-018' and 'BHF1811-060' were drilled on these geological units. The primary geology at these locations is wind transported sediment, forming inland dunes comprising mainly the soil material ranging in size from clay to sand and gravel. These dunes can

be vegetated, and are deposited in thin veneers or could have been eroded by wind or rain over time leaving cohesive and cemented material below.

BHF1811-018 encountered only a very thin 0.3m thick veneer of Aeolian sand. A soft sandy clay was logged to a depth of 2.3m. Below 2.3m a hard gravelly sandy clay of high plasticity with strong cementation between the grains was encountered. The upper clay strata encountered at BHF1811-018 was the lowest strength material found during the CMW investigation. SPTs completed below 2.3m all recorded refusals.

BHF1811-060 did not encounter Geology Type G. A residual soil comprising strongly cemented, very dense sandy gravel captured in a matrix of clay was encountered to 4.0m below the ground level. Below 4.0m depth a high strength white sandstone was encountered.

Other notable elements highlighted by ground investigation;

- No groundwater encountered during investigation however water flush used for drilling process
- Considerable difference in ground type over a relatively short distance, in what was anticipated by desk study to be comparable stratum; and
- SPTs completed generally refused.

4.5.1.9. Indicative Geotechnical Parameters

Given the thin veneer of Geology Type G – Aeolian Sands encountered at BHF1811-018 only it is not appropriate to provide a generalised ground model for this unit based on the boreholes drilled. Reference should be made to Geology Type E discussed in Section 4.3.5 for an inferred preliminary ground model for this geological unit.

Further site investigation is recommended to further identify the extent of soft soil encountered at BHF1811-018 and whether other future foundations may be impacted by the ground conditions encountered.

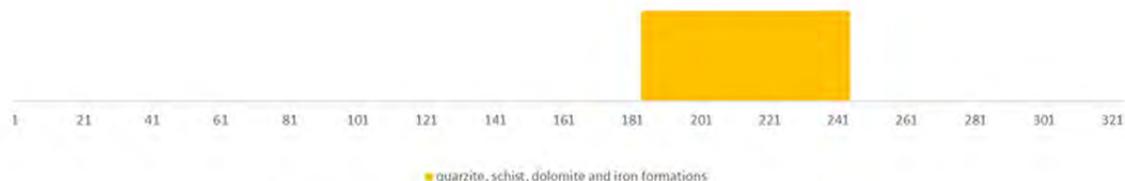
4.5.1.10. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Risk of soft soils in areas, and;
- Potential for buried topsoil/vegetation.

4.5.1.11. GEOLOGICAL UNIT H – Quartzite/Schist/Dolomite/Iron Formations

At the following Site 2 structures, Unit H is expected to be encountered.



4.5.1.12. Regional Geology Description

Quartzite, schist, dolomite and iron formations

Subsoils are expected to be undifferentiated metasediments and metavolcanics of the paleoprotozoic. These units are comprised of metamorphized sedimentary and volcanic rocks forming hills of primarily fresh to moderately weathered rock.

4.5.1.13. Encountered Subsurface Conditions

Two boreholes ‘BHF1811-211’ and ‘BHF1811-194’ were drilled within this geological unit. The primary geology at this location is undifferentiated metasediments and metavolcanics of the paleoprotozoic. These units are comprised of metamorphized sedimentary and volcanic rocks forming hills of primarily fresh to moderately weathered rock.

The geological profile encountered at location BHF1811-211 is comprised of clay and clay sandy gravel/gravelly sand overlying low to very low strength sandstone. A possible occurrence of calcrete high in lime content and quartz gravel cannot be ruled out at this location.

Borehole BHF1811-194 encountered soil strength ground conditions to target depth of 8.0m. SPT results were between 5 (at 4.0m bgl) and 23 (at 7.0m bgl) indicating firm to stiff ground conditions.

Other notable elements highlighted by ground investigation;

- Groundwater was encountered within BHF1811-194 at 2.3m below ground level;
- The two boreholes were conducted 5.2km apart, but has a height difference of 120m, the lower chainage borehole being lower in elevation; and
- Desk study does not appear to be accurate within this region.

4.5.1.14. Indicative geotechnical parameters

Given the difference between the anticipated ground conditions from the desk study and those encountered in the site investigation, it is not appropriate to extrapolate the results of the boreholes to other structures.

Further site reconnaissance is recommended to identify the extent of the encountered ground conditions.

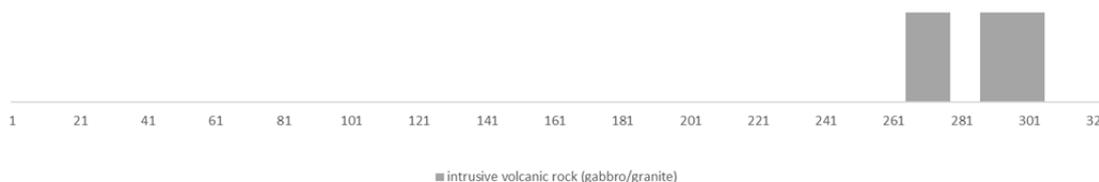
4.5.1.15. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Low lying areas most likely comprised of colluvium;
- Highly variable rock lithology, and;
- Unknown depth to rock.

4.5.1.16. GEOLOGICAL UNIT I – Intrusive Volcanic Rock

At the following Site 1 structures, Unit A is expected to be encountered.



4.5.1.17. Regional Geology Description

Intrusive volcanic / metamorphosed rock

Subsoil units at this location are expected to be Donington Granitoid Suite comprising of metamorphosed intrusive volcanic rock including gabbro-norite, granite and gneiss. This underlying geology is overlain by quaternary colluvium in low lying areas. Where exposed the rock ranges from fresh to moderately weathered on erosional plains and hills.

4.5.1.18. Encountered Subsurface Conditions

Two boreholes 'BHF1811-263' and 'BHF1811-292' were cored in this geological unit. The primary geological unit at this location is Donington Granitoid Suite comprising of metamorphosed intrusive volcanic rock including granodiorite, gabbro-norite, granite and gneiss. This underlying geology is overlain by quaternary colluvium in low lying areas, while exposed, ranging from fresh to moderately weathered on erosional plains and hills.

At BHF1811-263, the ground condition encountered was a moderately metamorphosed Gneiss below 0.8m depth with very high fracture frequency throughout the whole depth infilled with clay and sand.

At BHF1811-292, variably weathered schist / gneiss of generally high strength was encountered below 1m depth. This is consistent with the ground conditions anticipated by the desk study.

Other notable elements highlighted by the ground investigation;

- No groundwater was encountered during the investigation; and
- Schist / Gneiss was highly fractured and of variable strength.

4.5.1.19. Indicative geotechnical parameters

The generalised geotechnical ground model provided in Table 7 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, high bearing and high shaft adhesion but variable depth to a suitable foundation.

Table 7: Geotechnical ground model for Geological Unit I

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_y (kPa)
0.0 – 1.0	Overburden	Ignore for foundation design						
1.0 – 4.0	High Strength Schist / Gneiss	-	-	20,000	24	500	12,000	6,000
4.0 – 8.0	Medium Strength Schist	-	-	12,000	22	400	10,000	5,000

Where ϕ' = angle of internal friction, Cu = Undrained Shear Strength, E_v' = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_y = Lateral yield pressure.

4.5.1.20. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Inherent heterogeneity of overburden soils;
- Depth to bedrock is unknown in this area, and;
- Additional geological units could also be encountered, primarily older metasediments and metavolcanics Hutchison Group.

4.5.1.21. GEOLOGICAL UNIT J – Colluvium over Ferricrete

At the following Site 2 structures, Unit J is expected to be encountered.



4.5.1.22. Regional Geology Description

Colluvial sandy loams/gravelly clays over ferricrete

Subsoils in these areas are expected to be the same colluvium is noted as Geology Type F. However, geological maps of the locations suggest the possibility of underlying tertiary ferricrete developed within Wanilla Formation sediments.

4.5.1.23. Encountered Subsurface Conditions

Two boreholes 'BHF1811-313', 'BHF1811-324' were drilled in this geological unit. The ground condition encountered was consistent with the published geology for this area comprising of loamy loamy sand/sandy loam/gravelly clay. The geological maps of the locations suggest the possibility of underlying tertiary ferricrete developed within Wanilla Formation sediments but these were not encountered over the depth investigated.

4.5.1.24. Indicative geotechnical parameters

The generalised geotechnical ground model provided in Table 6 may be used for preliminary design of piled footings for transmission line structures. Conditions expected to be dry, high bearing and moderate shaft adhesion but variable depth to a suitable foundation.

Table 8: Geotechnical ground model for Geological Unit J

Depth (m)	Unit	ϕ' (°)	Cu (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b^* (kPa)	P_y (kPa)
0.0 – 2.0	Very Stiff CLAY	-	180	50	20	60	1,600	1,600
2.0 – 8.0	Hard Sandy CLAY	-	350	100	20	90	3,200	3,200

Where ϕ' = angle of internal friction, Cu = Undrained Shear Strength, E_v' = Vertical elastic modulus, γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing and P_y = Lateral yield pressure.

4.5.1.25. Design Considerations/Limitations

The following constraints are considered applicable to this type of anticipated geology;

- Depth to ferricrete is not defined (not encountered within 8m depth of investigation);and
- Inherent heterogeneity of colluvial soils.

4.6. Site 2 – Groundwater Review



Figure 4 – Overview of expected groundwater conditions between Yadnarie to Port Lincoln North (by structure number; from North to South)

Groundwater information from SARIG for Site 2 indicates that groundwater levels are likely to be highly variable. In the southern section of Site 2, satellite images show many streams cutting through the hilly topography, with ground water shown to be less than 5 m from structure 240 to structure 300. North of structure 240, groundwater level begins to deepen. 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.

Locations of active and dry streams, creeks or river channels are not defined. These locations will have likely high groundwater levels.

Should further information on permanent site groundwater levels be required, additional investigation would need to be carried out (i.e. installation of groundwater monitoring wells) with ongoing monitoring of levels.

A geographic overview of expected groundwater levels for the entire line is attached in Appendix C.

4.7. Summary of Desk Study Review

Table 9 and Table 10 and Figure 5 summarise statistically the completed desk study for ease of review and reading. Refer Appendix B for further information.

Table 9: Indicative Summary of Geotechnical Units

Line I.D	Geology	No. of Structures	Approx. Length (m)	% of overall Project (based upon I.D)	Borehole	Matches Anticipated Geology
1	A	13	TBC	4	F1810-003 F1810-011	Yes
1	B	153	TBC	45	F1810-060 F1810-150	Yes
1	C	22	TBC	6	F1810-256 F1810-330	Yes
1	D	46	TBC	13	F1810-300 F1810-337	Yes
1	E	108	TBC	32	F1810-221 F1810-267	Yes
2	F	150	TBC	44	F1811-092 F1811-138	Yes
2	G	67	TBC	20	F1811-018 F1811-060	No
2	H	61	TBC	18	F1811-194 F1811-211	No
2	I	32	TBC	9	F1811-263 F1811-292	Yes
2	J	15	TBC	4	F1811-313 F1811-324	Yes

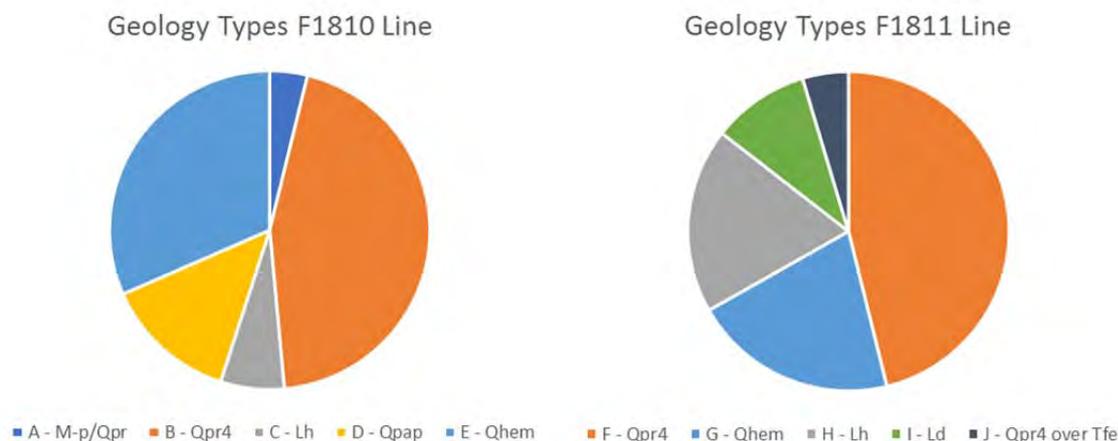


Figure 5: Summary of Geological Units per Line

Table 10: Overall Summary of Anticipated Geological Unit

Geological Unit	No.	% of overall Project
A - M-p/Qpr	13	2%
B and F - Qpr4	303	45%
C and H - Lh	83	12%
D - Qpap	46	7%
E and G - Qhem	175	26%
I - Ld	32	5%
J - Qpr4 over Tfe	15	2%
Total	667	

5. SAFETY IN DESIGN

CMW has completed a preliminary hazard analysis as shown within Table 11, including aspects of constructability (which give rise to commercial and programme risks) for consideration during detailed design development and engagement with all stakeholders.

Table 11: Preliminary Hazard Analysis

Hazard	Risk of Injury or Harm	Control	Responsible Party
Unanticipated ground investigation specified. Minimal ground investigation scheduled.	None – commercial and programme risk	Adaptable generic foundation solutions to be developed to allow flexibility on site. Risk of construction delays etc to be accepted by client due to unforeseen conditions, otherwise further ground investigation to be scoped and completed.	Client

Hazard	Risk of Injury or Harm	Control	Responsible Party
Colluvium – possible perched water tables, potential for variable soil type over short distance	None – commercial and programme risk	Design to be based upon worst credible geotechnical parameters. Clear definitions of ground type to be detailed upon standard foundation drawings/details to allow verification on-site.	Designer
Using the SARIG database, Calcrete was identified along the proposed line.	None – commercial and programme risk	Contractor to have equipment to deal with the strength of the calcrete during foundation construction	Contractor
Carbonate within ground. Can give rise to a hard crust affecting construction.	None – commercial and programme risk	Shrink swell characteristics not envisaged to be problematic for transmission line structures. Suitable amounts of cover to be detailed on embedded metallic elements.	Designer

6. CLOSURE

The findings contained within this report are the result of a desktop study and limited site investigation. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all locations.

For and on behalf of CMW Geosciences (East Coast)

Compiled by:



Chris Brown

Senior Geotechnical Engineer

Approved by:



John Slade

Principal Geotechnical Engineer

APPENDIX A

AERIAL VIEW OF LINE ALIGNMENT

ADL2017_0170 LINE ALIGNMENT

Date: 18/08/2017

Prepared By: EM

Legend

-  F1810-NEW ALIGNMENT
-  F1811-NEW ALIGNMENT
-  INDICATED PATH



Google Earth

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

70 km Vincent

APPENDIX B

DETAILED GEOLOGICAL INFORMATION

SITE 1 - CULTANA TO YADNARIE (342 Structures)

GEOLOGICAL UNIT	GEOLOGY	STRUCTURE NUMBERS
A	M-p/Qpr: Sandstone, shale and siltstone, arenaceous, red beds underlying undifferentiated Pleistocene colluvial/regolith sediments. (Sandstone/siltstone underlying colluvial/regolith sediments)	1 to 13 [13 total]
B	Qpr4: Thin, Colluvial, reddish brown, orange brown, yellow brown loamy sand and gravelly clay with nodules of calcrete. Possibly includes Hindmarsh clay equivalents. (Colluvial sandy loams/gravelly clays)	14 to 128 141 to 178* [153 total]
C	Lh: Quartzite, schist, dolomite and iron formations. (Undifferentiated Hutchison Group metasediments and metavolcanics)	254 to 258 328 to 332 [22 total]
D	Qpap: POORAKA FORMATION: gravels, sands and clayey sands with clay lenses. Overlies lower Pleistocene HINMARSH CLAY in many places. (Clay, sand and carbonate earth, silty, with gravel lenses)	280 to 327 333 to 342 [46 total]
E	Qhem: Vegetated quartz self dunes, sand spreads and as veneers on pleistace cores of inland dunes. Partly reworked to form thin veneer of Qhe3. (Aeolian quartz and sand dunes)	129 to 140* 179 to 253* 259 to 279* [108 total]

***Areas with variable outcrops of scattered volcanic and sedimentary derived rock, primarily of the Hutchison Group**

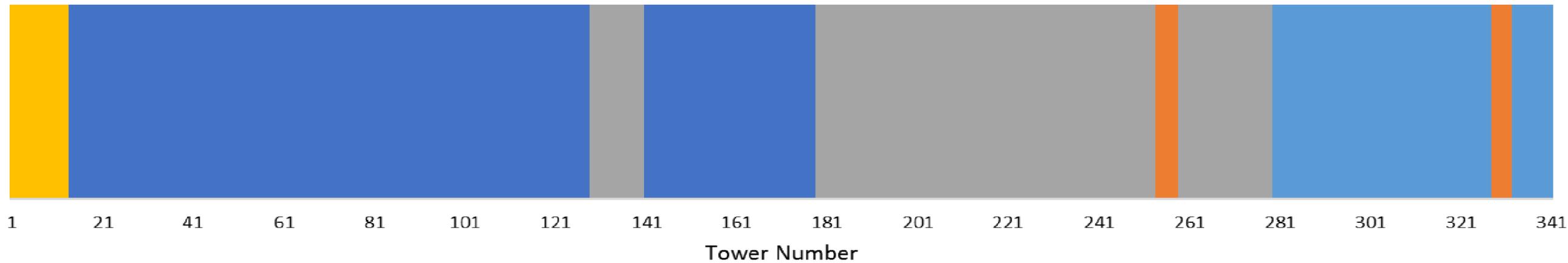
SITE 2- YADNARIE TO PORT LINCOLN NORTH (325 Structures)

GEOLOGICAL UNIT	GEOLOGY	STRUCTURE NUMBERS
F	Qpr4: Thin, Colluvial, reddish brown, orange brown, yellow brown loamy sand and gravelly clay with nodules of calcrete. Possibly includes Hindmarsh clay equivalents. (colluvial sandy loams/gravelly clays)	1 to 7 35 to 49 80 to 102 113 to 183 245 to 264 278 to 286 306 to 310 [150 total]
G	Qhem: Vegetated quartz self dunes, sand spreads and as veneers on pleistace cores of inland dunes. Partly reworked to form thin veneer of Qhe3. (Aeolian quartz and sand dunes)	8 to 34 50 to 79 103 to 112 [67 total]
H	Lh: Quartzite, schist, dolomite and iron formations. (Undifferentiated Hutchison Group metasediments and metavolcanics)	184 to 244 [61 total]
I	Ld: DONINGTON SUITE: Gabbro, enderbite, charnockite and alkali granite, plus granite gneiss. (intrusive volcanic rock (gabbro/granite))	287 to 305 265 to 277 [32 total]
J	Qpr4 over Tfe: Thin, colluvial, loamy sand/gravelly clay over nodular, mottled and pisolitic fercrete and massive to botryoidal limonite-geothlie developed within WANILLA FORMATION sediments and a capping on top of ferruginised and bleached Gawler Craton Basement	311 to 325 [15 total]

Cultana to Yadarie= Approximately 260km		91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Regolith	colluvial sediments	1																	1																											
	fresh to moderately weathered bedrock	1																	1																											
	alluvial sediments	1																	1																											
	moderately to highly weathered bedrock	1																	1																											
Geology	soil on bedrock	1																	1																											
	residual material	1																	1																											
	colluvial sandy loams/gravelly clays	1																	1																											
	quartzite, schist, dolomite and iron formations	1																	1																											
Groundwater	aeolian quartz and sand dunes	1																	1																											
	sandstone/siltstone underlying colluvial/regolith sediments	1																	1																											
	clay, sand and carbonate earth, silty, with gravel lenses	1																	1																											
Groundwater	Illustrated depth to groundwater, based upon SARAG website (m)	1																	1																											
		1																	1																											

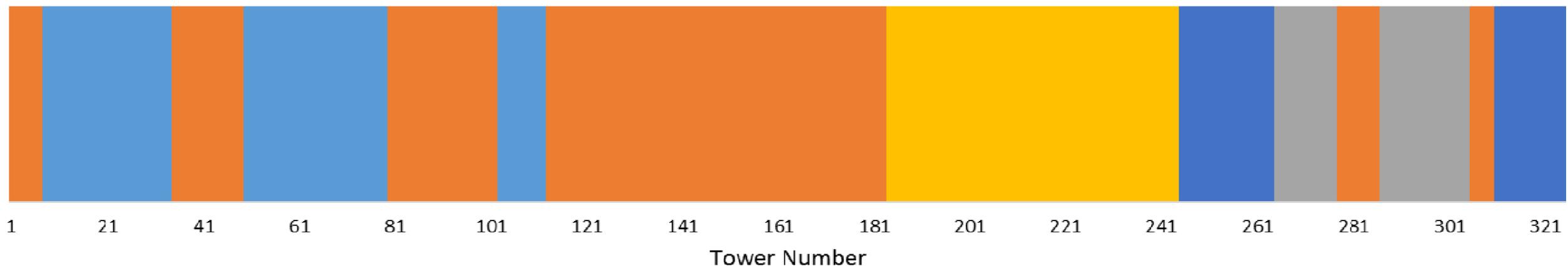
APPENDIX C

ELEVATION PROFILE



- colluvial sandy loams/gravelly clays
- quartzite, schist, dolomite and iron formations
- aeolian quartz and sand dunes
- sandstone/siltstone underlying colluvial/regolith sediments
- clay, sand and carbonate earth, silty, with gravel lenses

		Client	Description
		ElectraNet	ADL2017_0170 F1810 Site elevation and geology with proposed borehole locations Date 28/08/2017 Prepared by: EM



- colluvial sandy loams/gravelly days over fericrete
- colluvial sandy loams/gravelly days
- intrusive volcanic rock (gabbro/granite)
- quartzite, schist, dolomite and iron formations
- aeolian quartz and sand dunes



Client	Description
ElectraNet	ADL2017_0170 F1811 Site elevation and geology with proposed borehole locations Date 28/08/2017 Prepared by: EM

APPENDIX D

GROUNDWATER

**ADL2017_0170
GROUNDWATER**

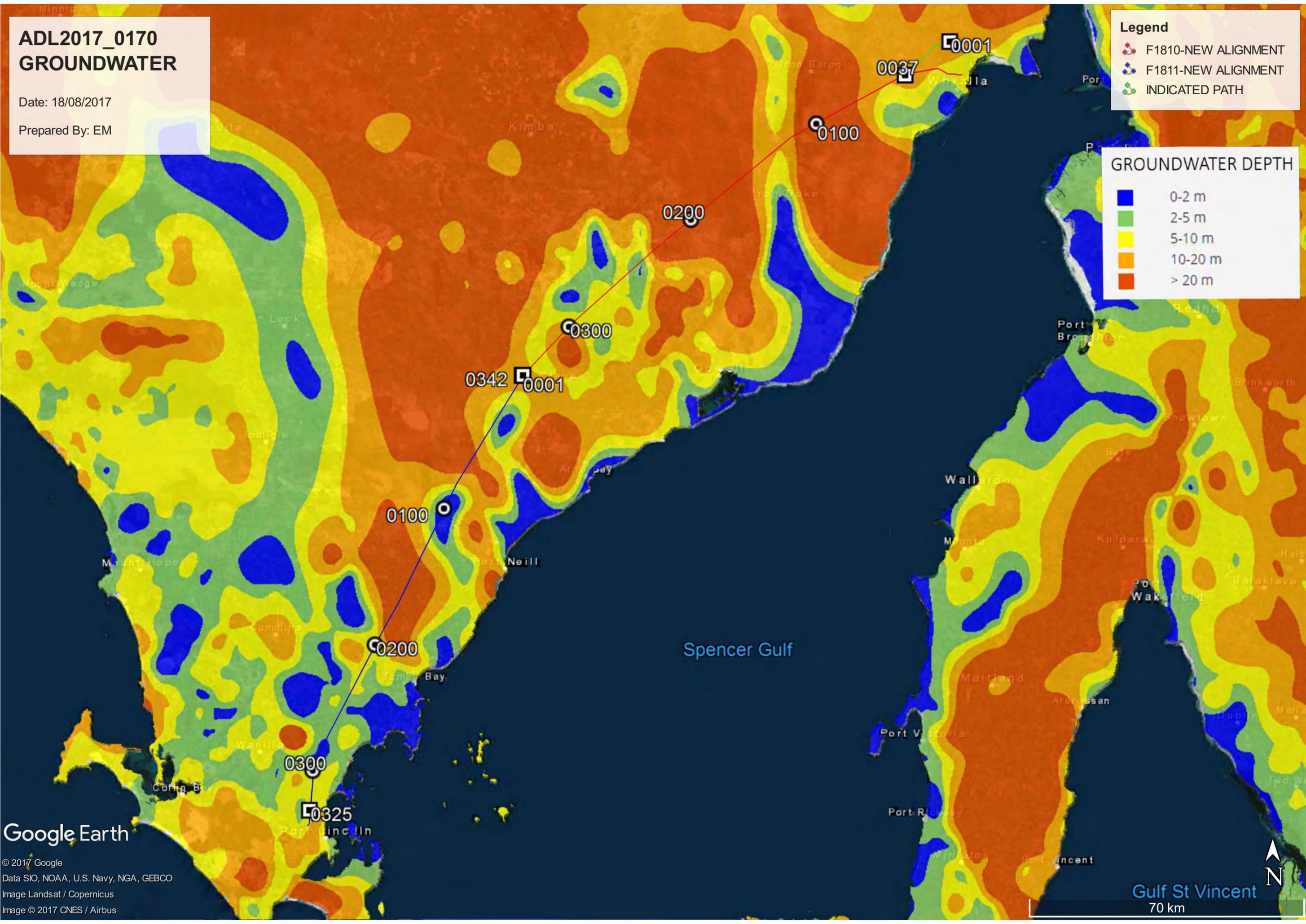
Date: 18/08/2017
Prepared By: EM

Legend

-  F1810-NEW ALIGNMENT
-  F1811-NEW ALIGNMENT
-  INDICATED PATH

GROUNDWATER DEPTH

	0-2 m
	2-5 m
	5-10 m
	10-20 m
	> 20 m



Google Earth

© 2017 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Image © 2017 CNES / Airbus

Gulf St Vincent
70 km



APPENDIX E

LOCATION OF CARBONATE

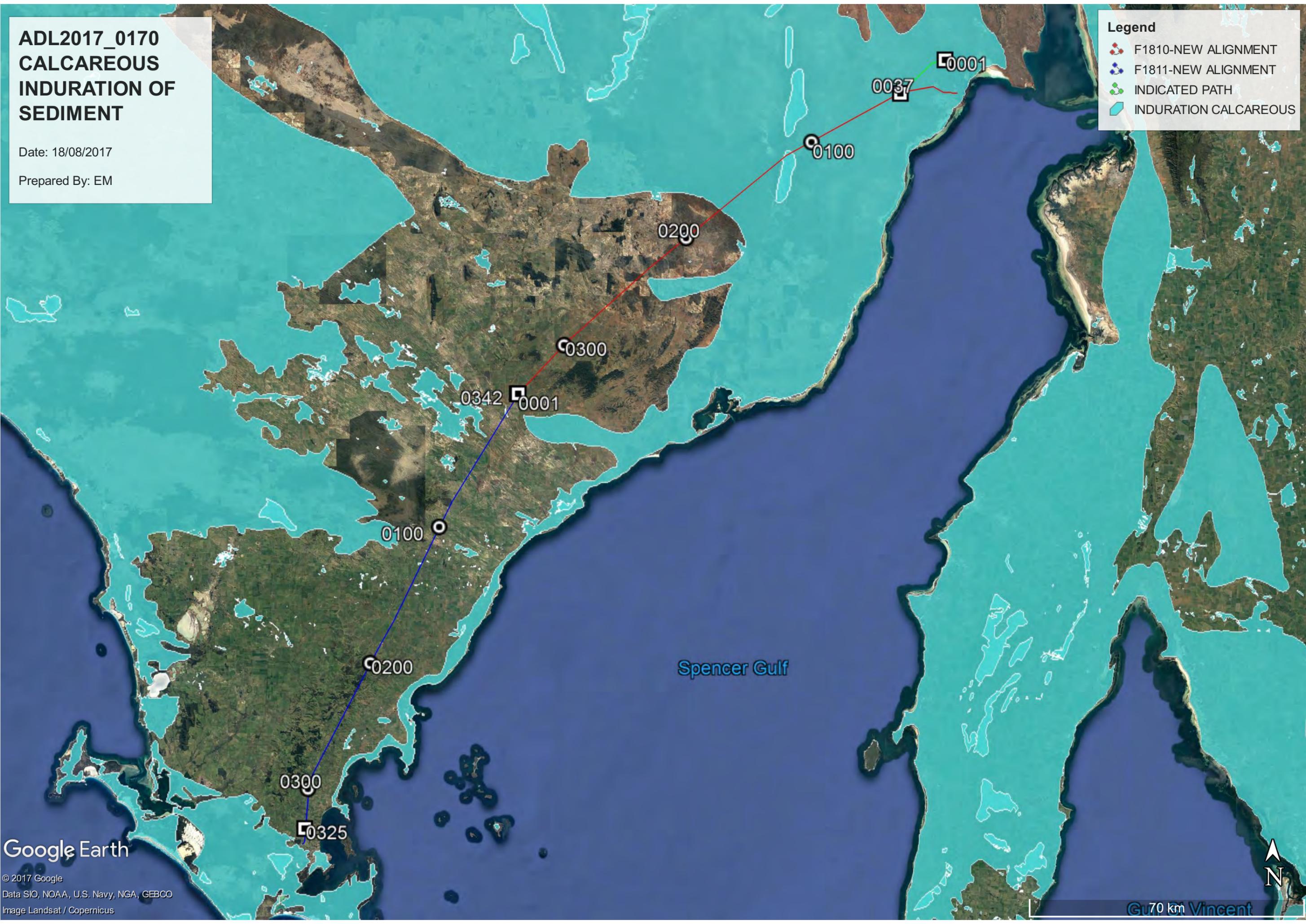
ADL2017_0170 CALCAREOUS INDURATION OF SEDIMENT

Date: 18/08/2017

Prepared By: EM

Legend

- F1810-NEW ALIGNMENT
- F1811-NEW ALIGNMENT
- INDICATED PATH
- INDURATION CALCAREOUS



Google Earth

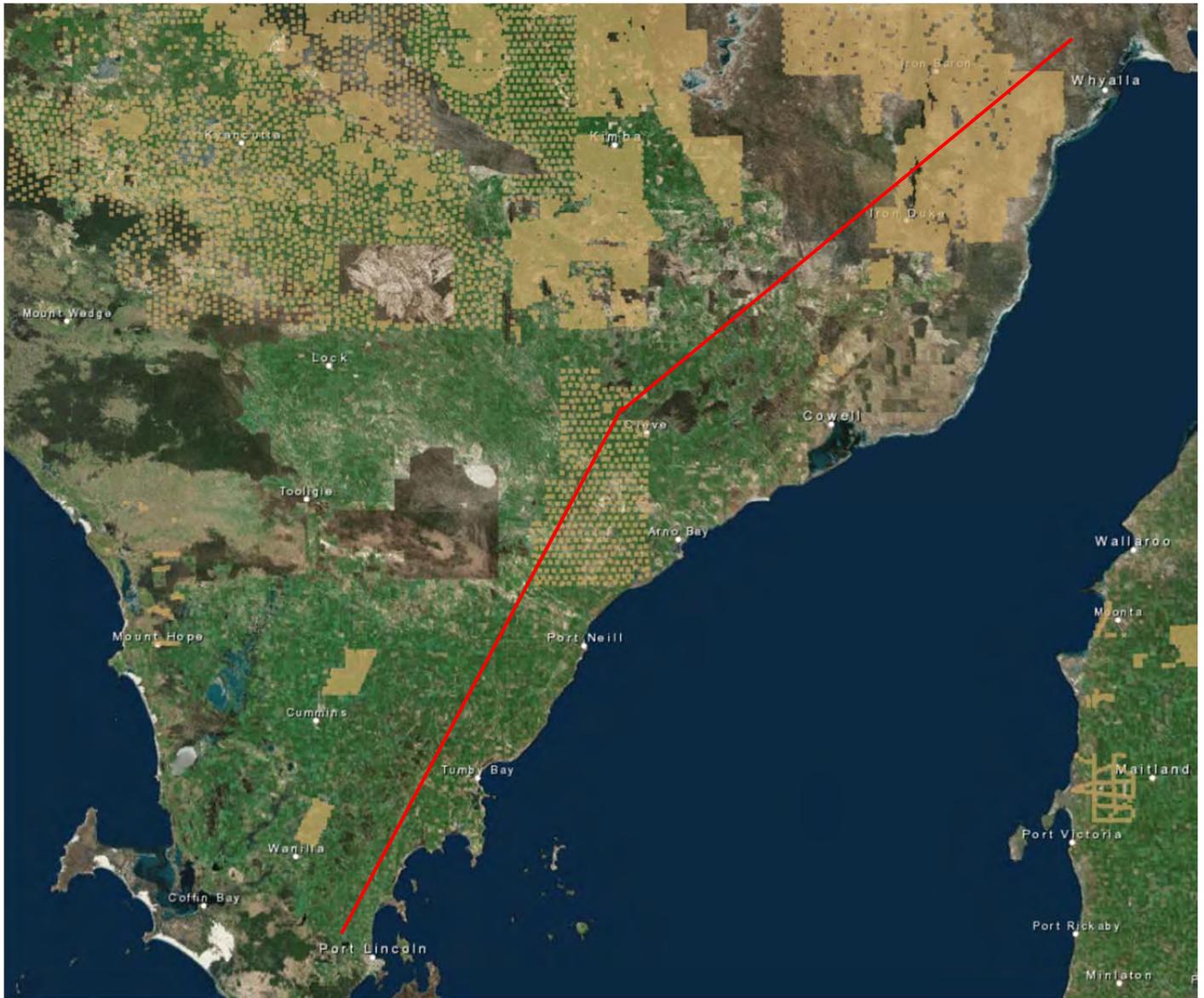
© 2017 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

70 km Vincent

APPENDIX F

CALCRETE LOCATIONS

Red line = approximate location of Electranet proposal



Geotechnical Engineer: 	Client	Description
	ElectraNet	Analysed calcrete locations in areas surrounding proposed line. Sourced from SARIG. Not to scale. Ref ADL2017_0170 Date: 18/08/2017 Prepared by: EM

APPENDIX G

ENGINEERING LOGS

Explanatory Notes – Soil Description



	GRAVEL		Gravelly SAND		Sandy CLAY		FILL
	Silty GRAVEL		Silty SAND		SILT		TOPSOIL
	Clayey GRAVEL		Clayey SAND		Gravelly SILT		COBBLES & BOULDERS
	Sandy GRAVEL		CLAY		Sandy SILT		CONCRETE
	SAND		Gravelly CLAY		PEAT		NO CORE

GP	Poorly Graded Gravel	SM	Silty Sand	CH	High Plasticity Clay
GW	Well Graded Gravel	SC	Clayey Sand	OL	Organic Soils (LP)
GM	Silty Gravel	ML	Low Plasticity Silt	OH	Organic Soils (HP)
GC	Clayey Gravel	MH	High Plasticity Silt	PT	Peat
SP	Poorly Graded Sand	CL	Low Plasticity Clay		Cobbles & Boulders
SW	Well Graded Sand	CI	Medium Plasticity Clay		Fill

WATER	
	Groundwater Level

CLASSIFICATION AND INFERRED STRATIGRAPHY (with reference to AS1726-1993, Table A1)

Particle Size		
Major Division	Sub Division	Particle Size
Boulders		> 200 mm
Cobbles		63 to 200 mm
Gravel	Coarse	20 to 63 mm
	Medium	6.0 to 20 mm
	Fine	2.0 to 6.0 mm
Sand	Coarse	0.6 to 2.0 mm
	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2 mm
Silt		0.002 to 0.075 mm
Clay		< 0.002 mm

MINOR COMPONENTS	
TERM	ASSESSMENT GUIDE
with... (coarse = >5%, <12%) (fine = >15%, <30%)	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.
trace... (coarse = <5%) (fine = <15%)	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.

MOISTURE CONDITION (Cohesionless Soils)

Symbol	Term	Description
D	Dry	Looks and feels dry. Cohesionless and free-running.
M	Moist	No free water on remoulding. Soil feels cool, darkened in colour. Soil tends to cohere.
W	Wet	Free water on remoulding. Soil feels cool, darkened in colour. Soil tends to cohere.

(Cohesive Soils)

Symbol	Term	Description
<PL	Dry	Looks and feels dry. Hard and friable or powdery, well dry of the plastic limit
=PL	Moist	Soil feels cool, darkened in colour. Soil can be moulded. Near plastic limit.
>PL	Wet	Soils feels cool, darkened in colour. Usually weakened and free water forms when remoulding. Wet of plastic limit.

CONSISTENCY AND DENSITY (Cohesionless Soils)

Sym.	Term	Density Index (%)	SPT 'N'
VL	Very Loose	Less than 15	0 to 4
L	Loose	15 to 35	4 to 10
MD	Medium Dense	35 to 65	10 to 30
D	Dense	65 to 85	30 to 50
VD	Very Dense	Above 85	Above 50

(Cohesive Soils - AS1726 - 1993, Table A4)

Sym.	Term	Undrained Shear Strength
VS	Very Soft	0 to 12 kPa
S	Soft	12 to 25 kPa
F	Firm	25 to 50 kPa
St	Stiff	50 to 100 kPa
VSt	Very Stiff	100 to 200 kPa

SAMPLING AND TESTING

AMAL	Amalgamated Sample	D	Small Disturbed Sample	M	Mazier Type Sample
B	Bulk Disturbed Sample	ES	Environmental Soil Sample	P	Piston Sample
BLK	Block Sample	EW	Environmental Water Sample	UT	Undisturbed Push-in Sample
C	Core Sample	G	Gas Sample	SPTLS	Standard Penetration Test
CBR	CBR Mould Sample	LB	Large Bulk Disturbed Sample	W	Water Sample

DRILLING/EXCAVATION METHOD

AC	Air Core	HA	Hand Auger	RC	Rotary Cored
ADH	Hollow Auger Drilling	HQ	Rotary Core 63.5mm	RO	Rotary Open Hole
AD/V	Auger with V-Bit	HQ3	Rotary Core 61.1mm	SPT	Standard Penetration Test
AD/T	Auger with TC-Bit	PQ3	Rotary Drill 83mm	TP	Test Pit
DPP	Direct Push Probe	PT	Push Tube	W	Wash Bore

BOREHOLE LOG - BHF1810-003

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 10/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.737598m N.6353261m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (6,17,23) N=40		1		CI: CLAY: medium plasticity, red brown, with some fine to coarse grained sand and fine grained gravel.	<PL	H	
		3.00	SPT: (12,17,20) N=37		3		CH: Sandy CLAY: high plasticity, red brown, fine to coarse grained sand, with some subangular to subrounded, fine to medium grained gravel.			
					4					

Termination Reason: Target depth reached
 Remarks: 15m south-west of existing pole F1808, relatively dry and flat ground surface

BOREHOLE LOG - BHF1810-003

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 10/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.737598m N.6353261m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.50	SPT: (10,15,18) N=33		5		CH: Sandy CLAY: high plasticity, red brown, fine to coarse grained sand, with some subangular to subrounded, fine to medium grained gravel.	<PL	Vst to H	
		6.00	SPT: (11,12,12) N=24		6		GC: Clayey GRAVEL: subangular to subrounded, fine to medium grained gravel, red brown, high plasticity, trace fine to coarse grained sand.			
		7.00	SPT: (6,6,7) N=13		7			M	MD	
					8	Borehole terminated at 8.0 m				

Termination Reason: Target depth reached
 Remarks: 15m south-west of existing pole F1808, relatively dry and flat ground surface

BOREHOLE LOG - BHF1810-011

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 10/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.734332m N.6352148m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (12,) N=R		1		CL: Sandy CLAY: low plasticity, fine to medium grained sand, brown, with some subangular to subrounded, fine to medium grained gravel, calcareous.	<PL	Vst to H	1.10m: SPT refusal
		2.50	SPT: (13,20,21) N=41		2		GP: Sandy GRAVEL: angular, fine to medium grained gravel, brown to grey, fine to coarse grained sand.	D to M	D	

Termination Reason: Target depth reached
 Remarks: dry and flat ground surface

BOREHOLE LOG - BHF1810-011

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 10/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.734332m N.6352148m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.00	SPT: (15/105mm) N=R				GP: Sandy GRAVEL: angular, fine to medium grained gravel, brown to grey, fine to coarse grained sand.			4.11m: SPT refusal
		5.50	SPT: (11,13,20) N=33		5		CH: CLAY: high plasticity, brown, trace fine grained sand, trace fine grained gravel, calcareous.			
		7.00	SPT: (11,14,10/70mm) N=R		6		... from 7.00m to 8.00m, highly calcareous	<PL	H	7.37m: SPT refusal
					8		Borehole terminated at 8.0 m			

Termination Reason: Target depth reached
 Remarks: dry and flat ground surface

BOREHOLE LOG - BHF1810-060

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 11/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.717804m N.6340304m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (10,13,25) N=38		1		SC: Clayey SAND: fine grained sand, red brown, low plasticity.	D	L	
		2.50	SPT: (6/10mm) N=R		2		GP: Sandy GRAVEL: angular, fine to medium grained gravel, brown, fine to coarse grained sand.	D	VD	
					3					
					4					

Termination Reason: Equipment refusal

Remarks: flat surface with some undulations, dry at the time of investigation, 6m south-west of existing pole

BOREHOLE LOG - BHF1810-060

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 11/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.717804m N.6340304m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.50	SPT: (10/10mm) N=R		5		GP: Sandy GRAVEL: angular, fine to medium grained gravel, brown, fine to coarse grained sand.			
		6.00	SPT: (10/0mm) N=R		6					
					7	Borehole terminated at 7.0 m				
					8					

Termination Reason: Equipment refusal

Remarks: flat surface with some undulations, dry at the time of investigation, 6m south-west of existing pole

BOREHOLE LOG - BHF1810-150

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 11/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.687983m N.6321935m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (10,10,13) N=23		1		SP: SAND: fine to coarse grained sand, brown.	D	L	
		2.50	SPT: (8,8,8) N=16		2		CH: Sandy CLAY: high plasticity, red brown, fine to medium grained sand, calcareous.	<PL	VSt	
					3		CL: Sandy CLAY: low plasticity, pale brown, fine to medium grained sand.			
					4					

Termination Reason: Target depth reached
 Remarks: sandy ground, with some undulations, 10m from existing easement

BOREHOLE LOG - BHF1810-150

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 11/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.687983m N.6321935m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations	
		Depth	Type & Results								
		4.00	SPT: (10/40mm) N=R				CL: Sandy CLAY: low plasticity, pale brown, fine to medium grained sand.				
		6.00	SPT: (10/55mm) N=R						<PL	H	
		7.00	SPT: (11/75mm) N=R								
					8		Borehole terminated at 8.0 m				

Termination Reason: Target depth reached
 Remarks: sandy ground, with some undulations, 10m from existing easement

BOREHOLE LOG - BHF1810-221

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 11/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.666183m N.6304624m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (6,10,15) N=25		1		SP: SAND: fine to medium grained sand, off-white, calcareous.	D	MD	0.00-2.00m: Moornaba Sand
		2.50	SPT: (13,23,) N=R		2		CL: Sandy CLAY: low plasticity, orange brown, fine to medium grained sand.			2.00-8.00m: ? Pooraka Formation
					3					
					4					

Termination Reason: Target depth reached

Remarks: 20m west from existing easement, poor access to proposed site due to sandy track, hole shifted 800m south from proposed location

BOREHOLE LOG - BHF1810-221

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 11/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.666183m N.6304624m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.00	SPT: (10/40mm) N=R				CL: Sandy CLAY: low plasticity, orange brown, fine to medium grained sand.			
		5.50	SPT: (10/45mm) N=R							
		7.00	SPT: (10/40mm) N=R							
					8	Borehole terminated at 8.0 m				

Termination Reason: Target depth reached

Remarks: 20m west from existing easement, poor access to proposed site due to sandy track, hole shifted 800m south from proposed location

BOREHOLE LOG - BHF1810-256

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 12/10/2017



1:20 Sheet 1 of 1

Logged by: BND		Position: E.654688m N.6294813m		Plant: Multidrill 2															
Checked by: DBA		Elevation:		Angle from horizontal: 90° Contractor: RB Drilling															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength Classification					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH			
AD/V									GP: Sandy GRAVEL: brown, fine to coarse grained gravel.	MD	D								0.40m: HWT casing to 0.4m
HQ			87	87	83		1		Quartzite, massive, white, micaceous						MW			0.50-3.50m: Warrow Quartzite 0.50m: auger refusal, switch to diamond coring 0.50m: SM, 0°, IR, VR, infilled, sandy clay 0.55m: SM, 20°, IR, VR, infilled, sandy clay 0.61m: SM, ST, VR, infilled, sandy clay 0.64m: SM, 0°, IR, VR, CO, sandy clay 0.92m: JT, 0°, UN, RO, CN	
							2								SW			1.40m: SM, 0°, UN, RO, infilled, sandy clay 1.53m: JT, 0°, IR, RO, CN 1.84m: SM, 5°, UN, RO, infilled, sandy clay 1.90m: JT, 0°, UN, RO, CN 2.09m: JT, 0°, UN, RO, CN 2.38m: JT, 5°, UN, RO, CN 2.53m: JT, 0°, UN, RO, CN	
			100	100	75		3											2.73-2.75m: SM, 0°, UN, RO, infilled, sandy gravel 2.85m: JT, 0°, ST, RO, CN 2.95m: JT, 80°, IR, RO, CN	
			100	100	67		3											3.23m: JT, 10°, IR, RO, VN, sand 3.28m: JT, 10°, IR, RO, VN, sandy gravel 3.42-3.42m: SM, 10°, IR, RO, infilled, sandy clay 3.50m: JT, 5°, IR, RO, VN, clay	
							4		Borehole terminated at 3.5 m										

Termination reason: Soil rock recovery > 3.0m

Remarks: 10m to the East from existing tower, rocky outcrop, sloping 15°-20° East, rocky outcrop further above on the hill, highly weathered rock on surface - no visible bedding dip observed on surface

This report must be read in conjunction with accompanying notes and abbreviations.

CORE PHOTOGRAPHS: BHF1810-256

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 12/10/2017



Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1810-256: 0.0m to 3.5m

BOREHOLE LOG - BHF1810-267

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 12/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.651274m N.6291859m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (2,3,19) N=22		1		SP: SAND: fine to medium grained sand, off-white	D to M	MD	0.00-1.30m: Moornaba Sand
		2.50	SPT: (9,18,13) N=31		2		GC: Clayey GRAVEL: subrounded, fine to medium grained, red brown, low plasticity, calcar	<PL	VSt	
					3		GP: Sandy GRAVEL: angular, fine to medium grained, brown mottled green, fine to coarse grained sand.			
					4		GP: Sandy GRAVEL: angular, fine to medium grained, brown mottled green, fine to coarse grained sand.			

Termination Reason: Equipment failure

Remarks: very loose sandy ground surface, 6m south of existing tower, 200m from the proposed bore hole due to poor site access - crop land

BOREHOLE LOG - BHF1810-267

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 12/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.651274m N.6291859m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.00	SPT: (19,8/20mm) N=R		5		GP: Sandy GRAVEL: angular, fine to medium grained, brown mottled green, fine to coarse grained sand.	D	D to VD	
					6		Borehole terminated at 6.0 m			
					7					
					8					

Termination Reason: Equipment failure

Remarks: very loose sandy ground surface, 6m south of existing tower, 200m from the proposed bore hole due to poor site access - crop land

CORE PHOTOGRAPHS: BHF1810-300

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 13/10/2017

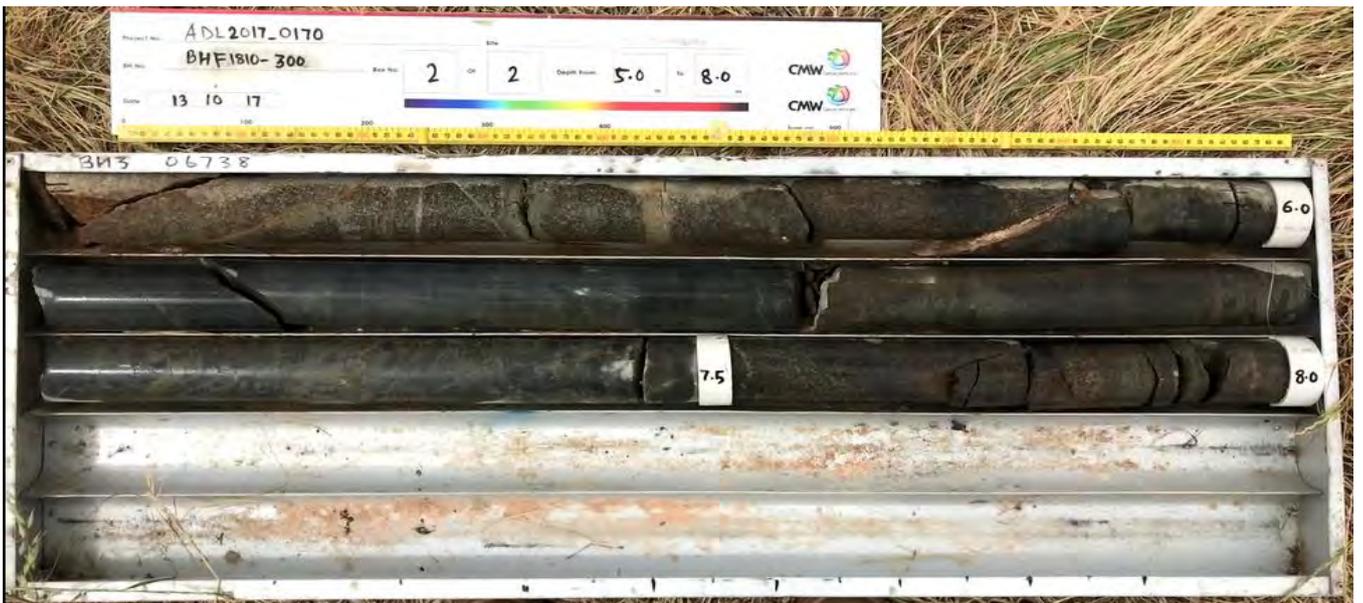


Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1810-300: 0.0m to 5.0m



BHF1810-300: 5.0m to 8.0m

BOREHOLE LOG - BHF1810-330

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 13/10/2017



1:20 Sheet 1 of 2

Logged by: BND		Position: E.633480m N.6275102m		Plant: Multidrill 2															
Checked by: DBA		Elevation:		Angle from horizontal: 90° Contractor: RB Drilling															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength Classification					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH			
HQ									GC: Clayey GRAVEL: angular, fine to coarse grained, grey, low to medium plasticity.	D	D								
									CORE LOSS.										0.60m: auger refusal, switch to diamond coring
									Schist: foliated, grey, micaceous.										0.90-8.00m: Yadnarie Schist
			67	22	22		1												1.00-1.30m:PT, 70°, PL, RO, highly fractured, @ 20-30 mm spacing
																			1.50m:JT, 60°, IR, VR, infilled, (clay)
			100	35	35		2												1.85m:JT, 0°, IR, RO, CO, (clay)
																			1.90-2.09m:CS, 0°, infilled, (clayey gravel)
																			2.09-2.32m:PT, 80°, PL, RO, CO, (clay)
																			2.16m:JT, 5°, IR, CO, (clay)
																			2.21m:JT, 5°, IR, CN
																			2.34-2.50m:, highly fractured
																			2.68m:JT, 10°, PL, SO, SN, Fe
																			2.85m:JT, 30°, PL, SO, SN, Fe
			100	100	100		3												3.17m:PT, 80°, PL, SO, SN, Fe, two subvertical partings crossing each other
																			3.33m:JT, 0°, IR, VR, SN, Fe
																			3.50m:JT, ST, RO, SN, Fe

Termination reason: Target depth reached

Remarks: approx. 100m from proposed borehole location due to poor site access, underneath existing easement, sloping (15° - 20°) east

This report must be read in conjunction with accompanying notes and abbreviations.

CORE PHOTOGRAPHS: BHF1810-330

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 14/10/2017



Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1810-330: 0.0m to 5.0m



BHF1810-330: 5.0m to 8.0m

BOREHOLE LOG - BHF1810-337

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 14/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.631538m N.6272755m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (7,8,9) N=17		1		CH: CLAY: high plasticity, red brown, trace fine to coarse grained sand and trace fine to coarse grained gravel.	<PL	St	0.00-8.00m: Pooraka Formation
		2.50	SPT: (6/20mm) N=R		2		Sandy GRAVEL: angular, fine to medium grained gravel, red mottled grey, fine to coarse grained sand, calcareous			
					3					
					4					

Termination Reason: Target depth reached
 Remarks: 200m south-east of existing easement

BOREHOLE LOG - BHF1810-337

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 14/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.631538m N.6272755m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.00	SPT: (13,8/25mm) N=R				Sandy GRAVEL: angular, fine to medium grained gravel, red mottled grey, fine to coarse grained sand, calcareous			
		6.00	SPT: (8/60mm) N=R							
		7.00	SPT: (10/65mm) N=R							
					8	Borehole terminated at 8.0 m				

Termination Reason: Target depth reached
 Remarks: 200m south-east of existing easement

BOREHOLE LOG - BHF1811-018

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 14/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.626372m N.6265958m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (3,1,1) N=2		1		SP: SAND: fine to medium grained sand, brown.	D	L	0.00-0.30m: Moornaba Sand
		2.50	SPT: (4,13,10/30mm) N=R		2		CH: Sandy CLAY: high plasticity, orange brown, fine to medium grained sand	~PL	S	
					3		CH: Sandy CLAY: high plasticity, red brown, fine to coarse grained sand, trace angular fine to medium grained gravel			3.00-8.00m: ? Pooraka Formation
					4					

Termination Reason: Target depth reached
 Remarks: relatively flat sandy ground surface, 15m from easement

BOREHOLE LOG - BHF1811-018

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 14/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.626372m N.6265958m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.00	SPT: (10/50mm) N=R				CH: Sandy CLAY: high plasticity, red brown, fine to coarse grained sand, trace angular fine to medium grained gravel			
					5					
					6			<PL	H	5.50m: SPT refusal, no penetration
		7.00	SPT: (10/45mm) N=R		7					
					8		Borehole terminated at 8.0 m			

Termination Reason: Target depth reached
 Remarks: relatively flat sandy ground surface, 15m from easement

BOREHOLE LOG - BHF1811-060

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 15/10/2017



1:20 Sheet 2 of 2

Logged by: BND		Position: E.617557m N.6252148m		Plant: Multidriill 2															
Checked by: DBA		Elevation:		Angle from horizontal: 90° Contractor: RB Drilling															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength Classification					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH			
HQ			100	100	60	4.10			GP: Sandy GRAVEL: angular, fine to medium grained gravel, red brown, fine to coarse grained sand, calcareous. SANDSTONE: coarse grained, white, massive.									4.10m: Blue Range Beds Formation 4.15m:JT, 90°, IR, RO, infilled, (sand) 4.20m:JT, 90°, IR, RO, infilled, (sand) 4.50m:JT, 90°, IR, RO, infilled, (sand) 4.52m:JT, 90°, IR, RO, infilled, (sand) 4.60m:JT, 90°, IR, RO, infilled, (sand) 4.68m:JT, 90°, IR, RO, infilled, (sand)	
			100	100	90	5.85												5.85m:JT, 90°, IR, RO, infilled, (sand) 5.86m:JT, 90°, IR, RO, infilled, (sand) 6.00-6.25m: multiple JT sets 6.25m:JT, 50°, IR, RO, infilled, (sand) 6.35-6.50m:CS 6.35m:JT, 50°, IR, RO, infilled, (sand)	
			100	100	90	7.35												7.35m:JT, 90°, IR, RO, infilled, (sand) 7.40m:JT, 90°, IR, RO, infilled, (sand) 7.50m:JT, 90°, IR, RO, infilled, (sand)	
						8.00			Borehole terminated at 8.0 m										

Termination reason: Target depth reached
 Remarks: relatively flat and stiff sandy ground, 10m north of existing pole

CORE PHOTOGRAPHS: BHF1811-060

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 15/10/2017



Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1811-060: 4.1m to 8.0m

BOREHOLE LOG - BHF1811-092

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 15/10/2017



1:20 Sheet 1 of 2

Logged by: BND		Position: E.611110m N.6241386m		Plant: Multidrill 2															
Checked by: DBA		Elevation:		Angle from horizontal: 90° Contractor: RB Drilling															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength Classification					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH			
ADV							0.00		CH: CLAY: high plasticity, brown.	H	<PL							0.00-2.50m: Pooraka Formation	
							1.00											1.0m:SPT: (10,15,24) N=39	
							2.00		GP: Sandy GRAVEL: angular, fine to coarse grained, red-brown, fine to coarse grained sand.	D	D								
							2.50											2.5m:SPT: (10/50mm) N=R	
							2.60											2.60m:JT, 90°, IR, RO, infilled, (sand)	
							2.70											2.70m:JT, 30°, IR, RO, infilled, (sand)	
							2.72											2.72m:JT, 90°, IR, RO, infilled, (sand)	
							3.00		Sandstone: coarse grained, orange, red and pale yellow.										
							3.60											3.60m:JT, 90°, IR, RO, infilled, (sand)	
							3.80											3.80m:JT, 90°, IR, RO, infilled, (sand)	
							4.00												

Termination reason: Target depth reached
 Remarks: 10m west of existing easement, 20m from transmission tower

BOREHOLE LOG - BHF1811-092

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 15/10/2017



1:20 Sheet 2 of 2

Logged by: BND		Position: E.611110m N.6241386m		Plant: Multidrill 2																															
Checked by: DBA		Elevation:		Angle from horizontal: 90° Contractor: RB Drilling																															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength Classification					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data																
			TCR	SCR	RQD							VL	L	M	H	VH				EH															
HQ			100	100	100		4.20		Sandstone: coarse grained, orange, red and pale yellow.	H	<PL										4.20m:JT, 90°, IR, RO, infilled, (sand)														
																																	4.40m:JT, 90°, IR, RO, infilled, (sand)		
																																		4.55m:JT, 90°, IR, RO, infilled, (sand)	
																																		4.65m:JT, 90°, IR, RO, infilled, (sand)	
																																		4.80m:JT, 90°, IR, RO, infilled, (sand)	
																																			5.05m:JT, 90°, IR, RO, infilled, (sand)
																																			5.10m:JT, 90°, IR, RO, infilled, (sand)
																																			5.15m:JT, 90°, IR, RO, infilled, (sand)
																																			5.30m:JT, 90°, IR, RO, infilled, (sand)
																																			5.35m:JT, 90°, IR, RO, infilled, (sand)
																					5.50m:JT, 90°, IR, RO, infilled, (sand)														
																					5.60m:JT, 90°, IR, RO, infilled, (sand)														
																					5.80m:JT, 90°, IR, RO, infilled, (sand)														
																					6.00-6.40m: medium to coarse grained gravel seam														
																					6.50m:JT, 90°, IR, RO, infilled, (sand)														
																					6.70m:JT, 90°, IR, RO, infilled, (sand)														
																					Borehole terminated at 8.0 m														

Termination reason: Target depth reached
 Remarks: 10m west of existing easement, 20m from transmission tower

CORE PHOTOGRAPHS: BHF1811-092

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 15/10/2017



Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1811-092: 0.0m to 5.0m

BOREHOLE LOG - BHF1811-138

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 16/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.602982m N.6225550m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (11,13,11) N=24		1		M	L		
		2.50	SPT: (6,9,11) N=20		2				Vst	
					3					
					4					
										4.00m: SPT refusal

Termination Reason: Target depth reached
 Remarks: 30m west of easement, 9m north of Brooker Rd

BOREHOLE LOG - BHF1811-138

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 16/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.602982m N.6225550m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		4.00	SPT: (10/40mm) N=R				CH: CLAY: high plasticity, brown to red brown, trace sand, trace fine to medium grained sand.			
					5					
					6			<PL	H	5.50m: SPT refusal
					7					
					8					7.50m: SPT refusal
							Borehole terminated at 8.0 m			

Termination Reason: Target depth reached
 Remarks: 30m west of easement, 9m north of Brooker Rd

BOREHOLE LOG - BHF1811-194

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 16/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.593002m N.6207016m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (3,3,4) N=7		1		CL: SILTY CLAY: low plasticity, brown, trace fine to medium grained sand.	<PL	F	
	▼	2.50	SPT: (2,3,4) N=7		2		CLAY: high plasticity, brown.			
		4.00	SPT: (1,2,3) N=5		3			>PL	F	

Termination Reason: Target depth reached
 Remarks: 10m from the easement, 7m north of Prime Hill Rd

BOREHOLE LOG - BHF1811-194

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 16/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.593002m N.6207016m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
					5		CLAY: high plasticity, brown.			
		6.00	SPT: (5,7,7) N=14		6		SP: Gravelly SAND: subangular to subrounded, medium to coarse grained sand, subangular to subrounded, fine to medium grained gravel, white.			
		7.00	SPT: (4,10,13) N=23		7					
					8		Borehole terminated at 8.0 m			

W MD

Termination Reason: Target depth reached
 Remarks: 10m from the easement, 7m north of Prime Hill Rd

CORE PHOTOGRAPHS: BHF1811-211

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 16/10/2017



Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1811-211: 0.0m to 5.0m



BHF1811-211: 5.0m to 8.0m

BOREHOLE LOG - BHF1811-263

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 17/10/2017



1:20 Sheet 1 of 2

Logged by: BND		Position: E.581317m N.6185626m		Plant: Multidrill 2															
Checked by: DBA		Elevation:		Angle from horizontal: 90° Contractor: RB Drilling															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength Classification					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH			
ADV									GP: Sandy GRAVEL: angular, medium to coarse grained gravel, dark brown, fine to coarse grained sand.	D	D to M								
			100	66	37		1		Gneiss: banded grey and white.										0.80-8.00m: Donington Suite 0.80m: auger refusal, switch to diamond coring 1.00m:PT, 0°, IR, VR, infilled, (clay) 1.31m:SM, 5°, PL, VR, infilled, (clayey gravel from host rock) 1.41m:PT, 5°, PL, RO, VN, (sand) 1.50-1.68m: highly fractured
			100	56	0		2												1.68-1.80m:JT, ST, stepped fracture, infilled with sandy clay 1.80-1.86m:CS, sandy clay with host rock fragments 1.91m:JT, 50°, PL, RO, SN, Fe 1.96-2.00m:JT, infilled, sandy clay with host fragments 2.00m:PT, 5°, ST, RO, CO, (clay), Fe stain 2.10m:SM, 5°, (clay), Fe stain 2.14-2.24m: 5°, (clay), JTs @ 20mm, with infilled sandy clay 2.24m:PT, 5°, PL, RO, CO, (clay), Fe stain 2.31m:PT, 5°, PL, RO, CO, (clay), Fe stain 2.40m:PT, 5°, PL, RO, infilled, (clayey sand) 2.41-4.17m:PT, 5°, PL, RO, infilled, (sandy clay), highly fractured, PT @ 20mm, infilled with sandy clay, with parallel bedding at an angle 5
			100	15	0		3		... from 2.30m to 4.17m, highly fractured, PT @ 20mm, infilled @ every 20mm with sandy clay, with parallel bedding at an angle 5°										
			88	18	0		4												

Termination reason: Target depth reached

Remarks: on top of a hill, 10m west of easement, 50m from existing tower, 5%-10% rock exposure on surface

This report must be read in conjunction with accompanying notes and abbreviations.

CORE PHOTOGRAPHS: BHF1811-263

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 17/10/2017



Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1811-263: 0.0m to 4.0m



BHF1811-263: 4.0m to 8.0m

BOREHOLE LOG - BHF1811-292

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 17/10/2017



1:20 Sheet 1 of 2

Logged by: BND Checked by: DBA		Position: E.576233m N.6176314m Elevation:		Plant: Multidrill 2 Contractor: RB Drilling		Angle from horizontal: 90°													
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength Classification					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH			
ADV									GP: Sandy GRAVEL: angular, medium to coarse grained gravel, dark brown, fine to medium grained sand.	MD to D	M							0.00-1.00m: Donington Suite	
																		0.60m: auger refusal, switch to diamond coring	
				100	100	100		1	Schist: medium, brown, foliated.									1.49-1.65m:SS, 0°, IR, RO, infilled, (sand)	
								2										2.00-2.20m:CS 2.20m:JT, 80°, IR, RO, infilled, (gravel) 2.35m:JT, 130°, IR, RO, infilled, (sand) 2.50-3.00m:CS 2.50m:JT, 80°, IR, RO	
								3	Gneiss: banded white and black.									3.05m:JT, 50°, IR, RO, CO, (clay) 3.23m:JT, 50°, IR, RO, VN, (clay) 3.24-3.30m:JT, IR, RO, VN, (clay), subvertical fracture 3.36-3.80m:SM, 80°, PL, RO, infilled, (clay) 3.55m:JT, 10°, ST, RO, SN 3.58-3.77m:JT, 70°, PL, RO, VN, (sand) 3.60m:JT, 5°, ST, RO, SN 3.67m:JT, 20°, ST, RO, VN, (clay) 3.73m:JT, 20°, ST, RO, VN, (sand) 3.85-3.90m: XW host rock 3.90-4.01m: highly fractured, assume drill induced	
								4											

Termination reason: Target depth reached

Remarks: 10m north-west of existing tower, sloping down east by 10°-12°

This report must be read in conjunction with accompanying notes and abbreviations.

CORE PHOTOGRAPHS: BHF1811-292

Client: ElectraNet
Project: EC14172 - Geotechnical Investigation for Eyre Peninsula
Location: Eyre Peninsula, SA
Project ID: ADL2017-0170
Date: 18/10/2017



Sheet No. 1 of 1

Logged by: BND
Checked by: DBA



BHF1811-292: 0.0m to 4.0m



BHF1811-292: 4.0m to 8.0m

BOREHOLE LOG - BHF1811-313

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 18/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.575368m N.6168750m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (15,22, N=R		1		CH: CLAY: high plasticity, red brown, with iron nodules.	<PL	Vst to H	
		2.50	SPT: (17,12/75mm) N=R		2 3 4		SC: Clayey SAND: fine to medium grained sand, pale grey, low plasticity, calcareous.			

Termination Reason: Target depth reached
 Remarks: 30m east of easement, undulated ground surface

BOREHOLE LOG - BHF1811-313

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 18/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.575368m N.6168750m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations		
		Depth	Type & Results									
		4.00	SPT: (13,20/130mm) N=R				SC: Clayey SAND: fine to medium grained sand, pale grey, low plasticity, calcareous.			4.15m: SPT refusal		
		5.50	SPT: (10/65mm) N=R									5.50m: SPT refusal
		7.00	SPT: (11,14,17) N=31								D	Vst to H
					8		Borehole terminated at 8.0 m					

Termination Reason: Target depth reached
 Remarks: 30m east of easement, undulated ground surface

BOREHOLE LOG - BHF1811-324

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 18/10/2017



1:20 Sheet 1 of 2

Logged by: BND Position: E.574930m N.6164883m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		Depth	Type & Results							
		1.00	SPT: (11,13,15) N=28		1	<p>SP: SAND: fine to medium grained sand, pale grey.</p> <p>GP: Sandy GRAVEL: subangular to subrounded, fine to medium grained gravel, brown, fine to coarse grained sand.</p> <p>CH: CLAY: high plasticity, dark yellow.</p>	D to M	L		
		2.50	SPT: (15/75mm) N=R		2	<p>CH: Sandy CLAY: high plasticity, orange brown, fine to medium grained sand.</p>	<PL	VSt		

Termination Reason: Target depth reached
 Remarks: flat sandy ground, 30m east of easement

BOREHOLE LOG - BHF1811-324

Client: ElectraNet
 Project: EC14172
 Location: Eyre Peninsula, South Australia
 Project ID: ADL2017-0170
 Date: 18/10/2017



1:20 Sheet 2 of 2

Logged by: BND Position: E.574930m N.6164883m Plant used: Multidrill 2
 Checked by: DBA Elevation: Angle from horizontal: 90° Contractor: RB Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Structure & other observations	
		Depth	Type & Results								
		4.10	SPT: (15/100mm) N=R				CH: Sandy CLAY: high plasticity, orange brown, fine to medium grained sand.			4.10m: SPT refusal	
		5.50	SPT: (10/60mm) N=R								5.50m: SPT refusal
		7.00	SPT: (12,13,17) N=30							<PL	H
					8		Borehole terminated at 8.0 m				

Termination Reason: Target depth reached
 Remarks: flat sandy ground, 30m east of easement

APPENDIX H

LABORATORY TEST CERTIFICATES

L



Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
1 Dalmore Drive Scoresby VIC 3179
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 12472

Client Details

Client	SMS Geotechnical
Attention	S Nelson
Address	Unit 9, 21 Beafield Rd, Para Hills West, SA, 5096

Sample Details

Your Reference	S2017.010
Number of Samples	1 Soil
Date samples received	23/11/2017
Date completed instructions received	23/11/2017

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	27/11/2017
Date of Issue	27/11/2017
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Chris De Luca, Senior Chemist

Authorised By

Pamela Adams, Laboratory Manager

Miscellaneous Inorg - soil		
Our Reference		12472-1
Your Reference	UNITS	172690 (BHF1810-003 7.00-7.45m)
Type of sample		Soil
Date prepared	-	22/11/2017
Date analysed	-	22/11/2017
pH 1:5 soil:water	pH Units	7.3
Electrical Conductivity 1:5 soil:water	µS/cm	3,100
Chloride, Cl 1:5 soil:water	mg/kg	900
Sulphate, SO4 1:5 soil:water	mg/kg	5,000
Resistivity in soil*	ohm m	3

Moisture		
Our Reference		12472-1
Your Reference	UNITS	172690 (BHF1810-003 7.00-7.45m)
Type of sample		Soil
Date prepared	-	24/11/2017
Date analysed	-	27/11/2017
Moisture	%	5.5

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 12 hours.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

QUALITY CONTROL: Miscellaneous Inorg - soil				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			22/11/2017	[NT]	[NT]	[NT]	[NT]	22/11/2017	[NT]
Date analysed	-			22/11/2017	[NT]	[NT]	[NT]	[NT]	22/11/2017	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	112	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	107	[NT]
Resistivity in soil*	ohm m	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

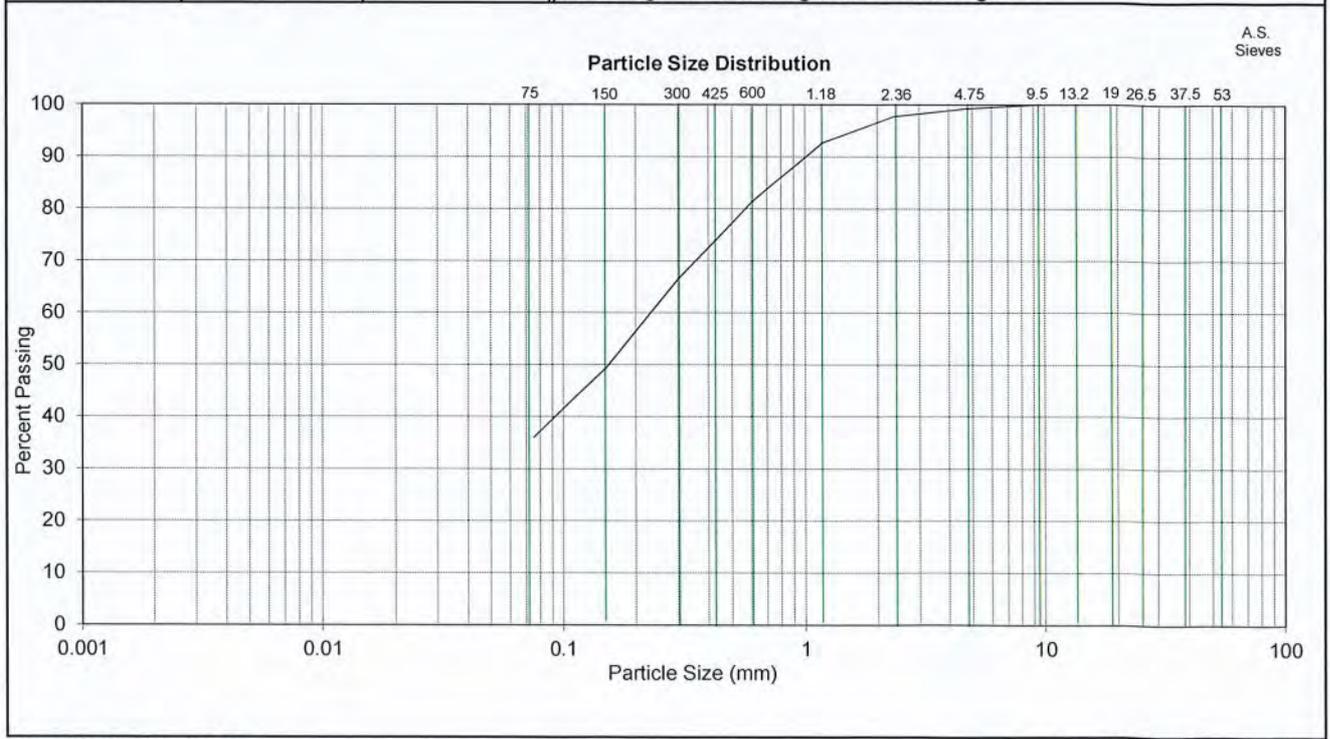
Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Particle Size Distribution & Consistency Limits Test Report

Client:	CMW Geosciences, 1284 South Road, Clovelly Park, SA, 5042		
Project:	Geotechnical Testing	Date:	15-Nov-17
Location:	Submitted Samples	Job No.	S2017.010
		Report No.	S2017.010 / R137
Lab Reference No.	172689	Sample Identification:	BHF1810-003 1.00m - 1.45m
Laboratory Specimen Description:		(CI) Sandy CLAY, medium plasticity, red/brown, approx. 60% fine to coarse sand, trace of fine gravel.	

Particle Size Distribution			Consistency Limits and Moisture Content			
Sieve Size	% Passing	Specification	Test	Method	Result	Spec.
150 mm	100	AS1289 3.6.1	Liquid Limit	% AS1289 3.1.2	40	
75 mm	100		Plastic Limit	% AS1289 3.2.1	15	
53 mm	100		Plasticity Index	% AS1289 3.3.1	25	
37.5 mm	100		Linear Shrinkage	% AS1289 3.4.1	10.5	
26.5 mm	100		Moisture Content	% AS1289 2.1.1	ND	
19.0 mm	100		Moisture / Dry Density Relationship		AS 1289 5.2.1	
13.2 mm	100		Maximum Dry Density:	ND	t/m3	
9.5 mm	100		Optimum Moisture Content:	ND	%	
6.7 mm	100		Notes : Tested as received			
4.75 mm	99		Sample History: Air Dried, Preparation Method: Dry Sieved			
2.36 mm	98		Linear Shrinkage Mould Length: 251mm,			
1.18 mm	93		Cracking: Yes, Curling: No, Crumbling: No			
600 um	81					
425 um	74					
300 um	66					
150 um	49					
75 um	36					



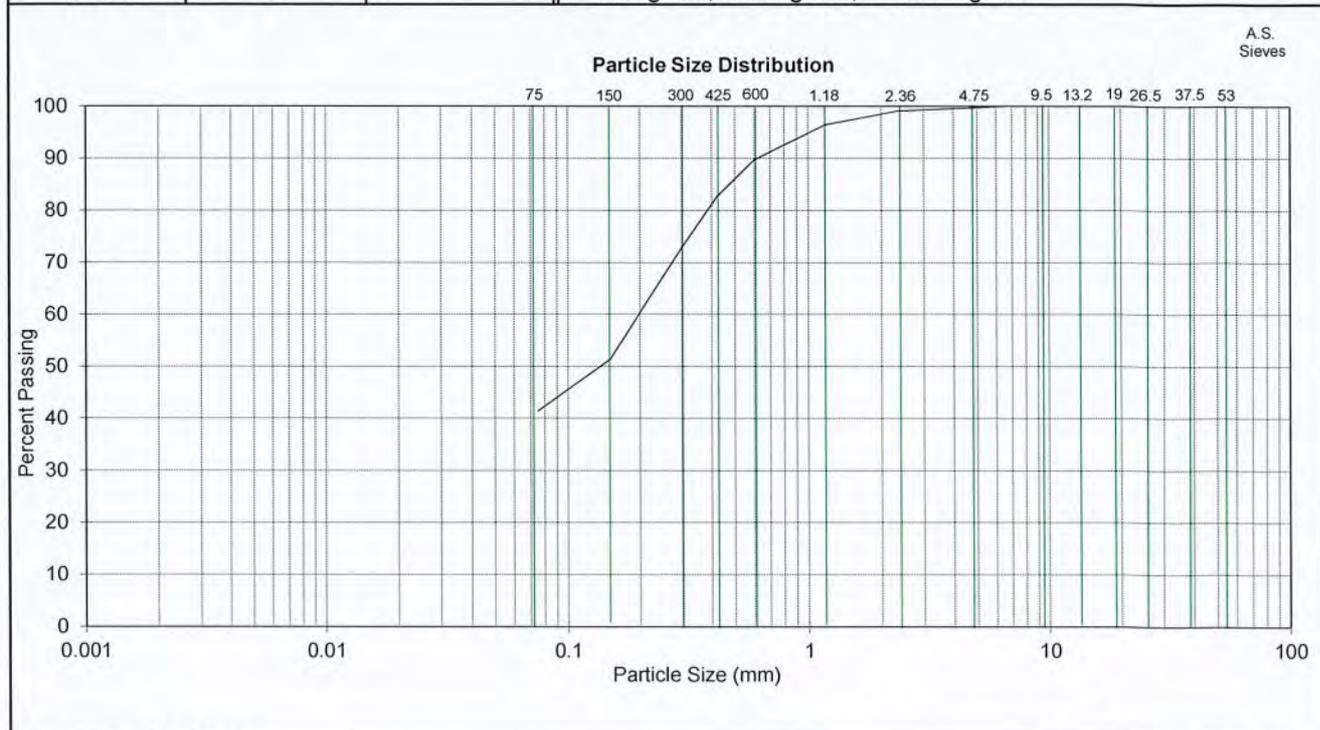
Accreditation for compliance with ISO/IEC 17025.
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Approved Signatory, Damien Mashford - Director

Particle Size Distribution & Consistency Limits Test Report

Client:	CMW Geosciences, 1284 South Road, Clovelly Park, SA, 5042		
Project:	Geotechnical Testing	Date:	15-Nov-17
Location:	Submitted Samples	Job No.:	S2017.010
		Report No.:	S2017.010 / R138
Lab Reference No.:	172692	Sample Identification:	BHF1810-150 1.00m - 1.45m
Laboratory Specimen Description:	(CL) Sandy CLAY, low plasticity, red/brown, approx. 60% fine to coarse sand, trace of fine gravel.		

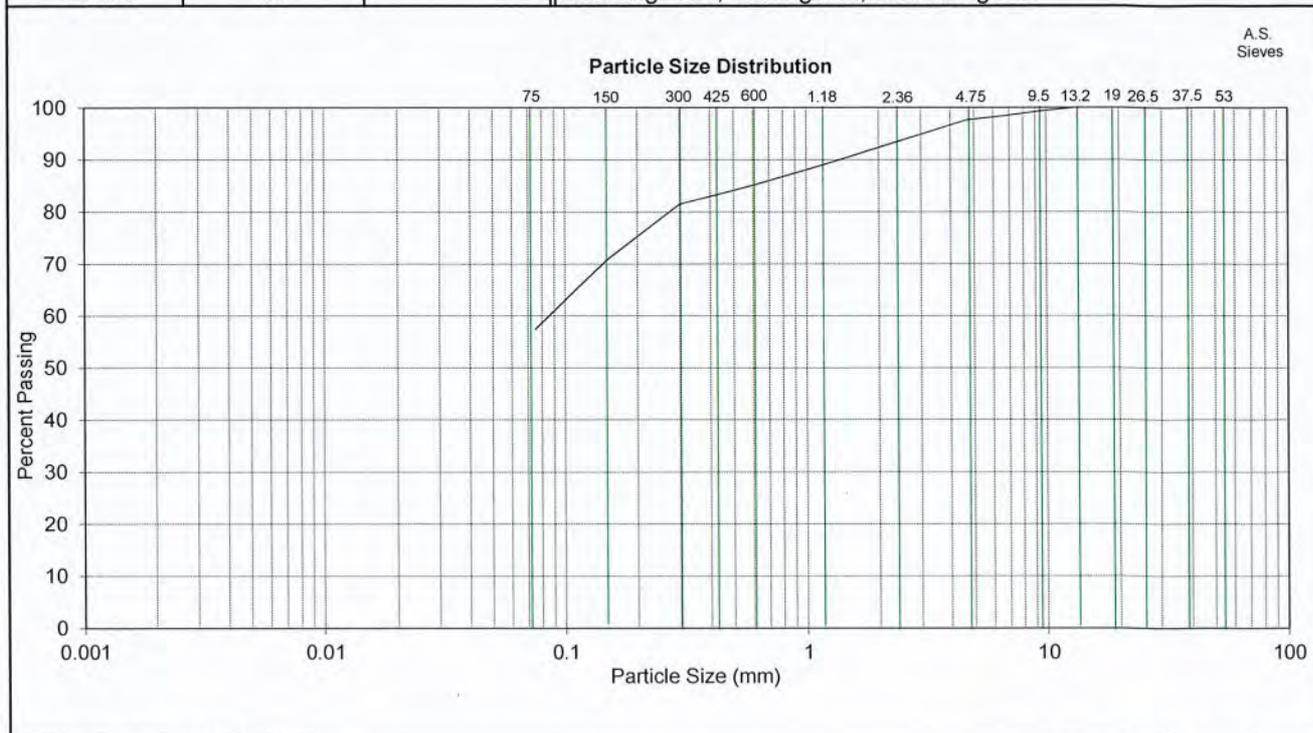
Particle Size Distribution			Consistency Limits and Moisture Content			
Sieve Size	% Passing	Specification	Test	Method	Result	Spec.
150 mm	100	AS1289 3.6.1	Liquid Limit	%	AS1289 3.1.2	31
75 mm	100		Plastic Limit	%	AS1289 3.2.1	12
53 mm	100		Plasticity Index	%	AS1289 3.3.1	19
37.5 mm	100		Linear Shrinkage	%	AS1289 3.4.1	9.0
26.5 mm	100		Moisture Content	%	AS1289 2.1.1	ND
19.0 mm	100		Moisture / Dry Density Relationship AS 1289 5.2.1			
13.2 mm	100		Maximum Dry Density:	ND	t/m3	
9.5 mm	100		Optimum Moisture Content:	ND	%	
6.7 mm	100		Notes : Tested as received Sample History: Air Dried, Preparation Method: Dry Sieved Linear Shrinkage Mould Length: 250mm, Cracking: No, Curling: No, Crumbling: No			
4.75 mm	100					
2.36 mm	99					
1.18 mm	96					
600 um	90					
425 um	83					
300 um	73					
150 um	51					
75 um	41					



Particle Size Distribution & Consistency Limits Test Report

Client:	CMW Geosciences, 1284 South Road, Clovelly Park, SA, 5042		
Project:	Geotechnical Testing	Date:	15-Nov-17
Location:	Submitted Samples	Job No.	S2017.010
		Report No.	S2017.010 / R139
Lab Reference No.	172693	Sample Identification:	BHF1810-337 1.00m - 1.45m
Laboratory Specimen Description:		(CH) Sandy CLAY, high plasticity, red/brown, approx. 35% fine to coarse sand, trace of fine to medium gravel.	

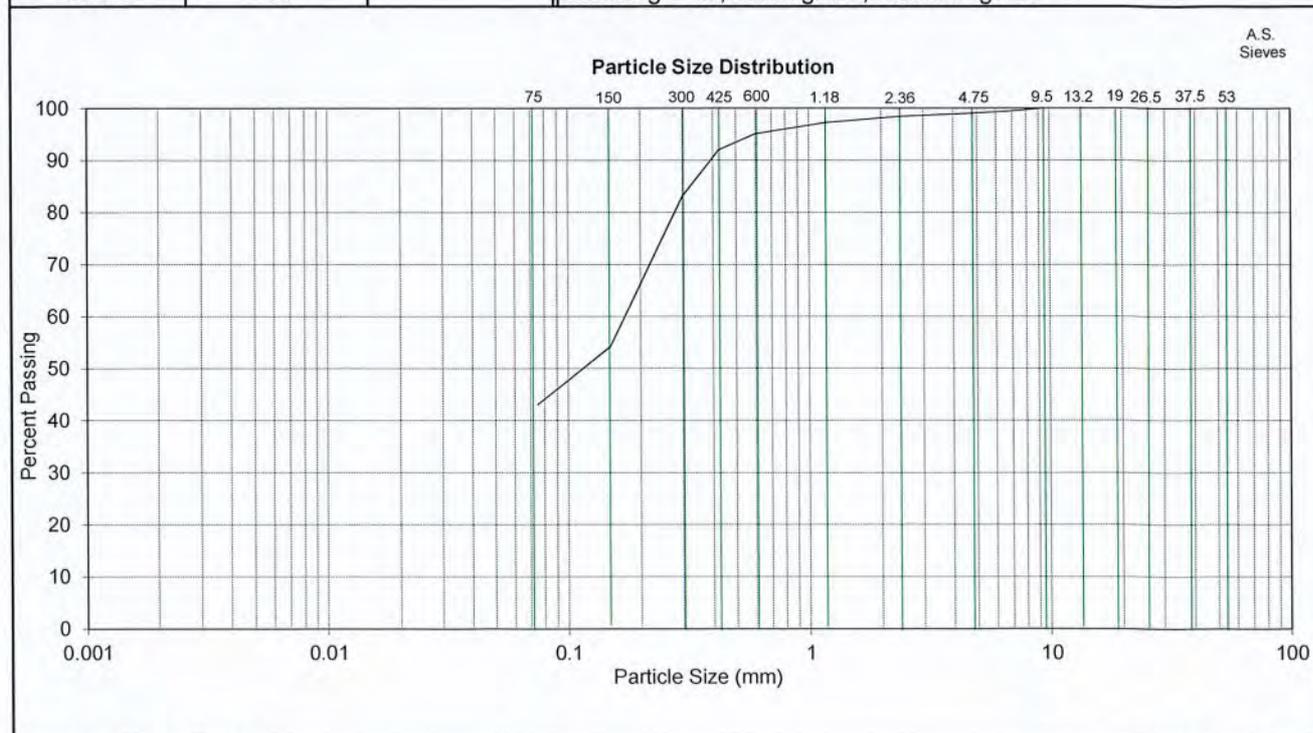
Particle Size Distribution AS1289 3.6.1			Consistency Limits and Moisture Content			
Sieve Size	% Passing	Specification	Test	Method	Result	Spec.
150 mm	100		Liquid Limit	% AS1289 3.1.2	51	
75 mm	100		Plastic Limit	% AS1289 3.2.1	15	
53 mm	100		Plasticity Index	% AS1289 3.3.1	36	
37.5 mm	100		Linear Shrinkage	% AS1289 3.4.1	11.5	
26.5 mm	100		Moisture Content	% AS1289 2.1.1	ND	
19.0 mm	100		Moisture / Dry Density Relationship AS 1289 5.2.1			
13.2 mm	100		Maximum Dry Density:	ND	t/m3	
9.5 mm	99		Optimum Moisture Content:	ND	%	
6.7 mm	98		Notes : Tested as received			
4.75 mm	98		Sample History: Air Dried, Preparation Method: Dry Sieved			
2.36 mm	93		Linear Shrinkage Mould Length: 250mm,			
1.18 mm	89		Cracking: Yes, Curling: No, Crumbling: No			
600 um	85					
425 um	83					
300 um	82					
150 um	71					
75 um	57					



Particle Size Distribution & Consistency Limits Test Report

Client:	CMW Geosciences, 1284 South Road, Clovelly Park, SA, 5042		
Project:	Geotechnical Testing	Date:	15-Nov-17
Location:	Submitted Samples	Job No.	S2017.010
		Report No.	S2017.010 / R140
Lab Reference No.	172694	Sample Identification:	BHF1811-018 1.00m - 1.45m
Laboratory Specimen Description:	(Cl) Sandy CLAY, medium plasticity, pale red/brown, approx. 55% fine to coarse sand, trace of fine gravel.		

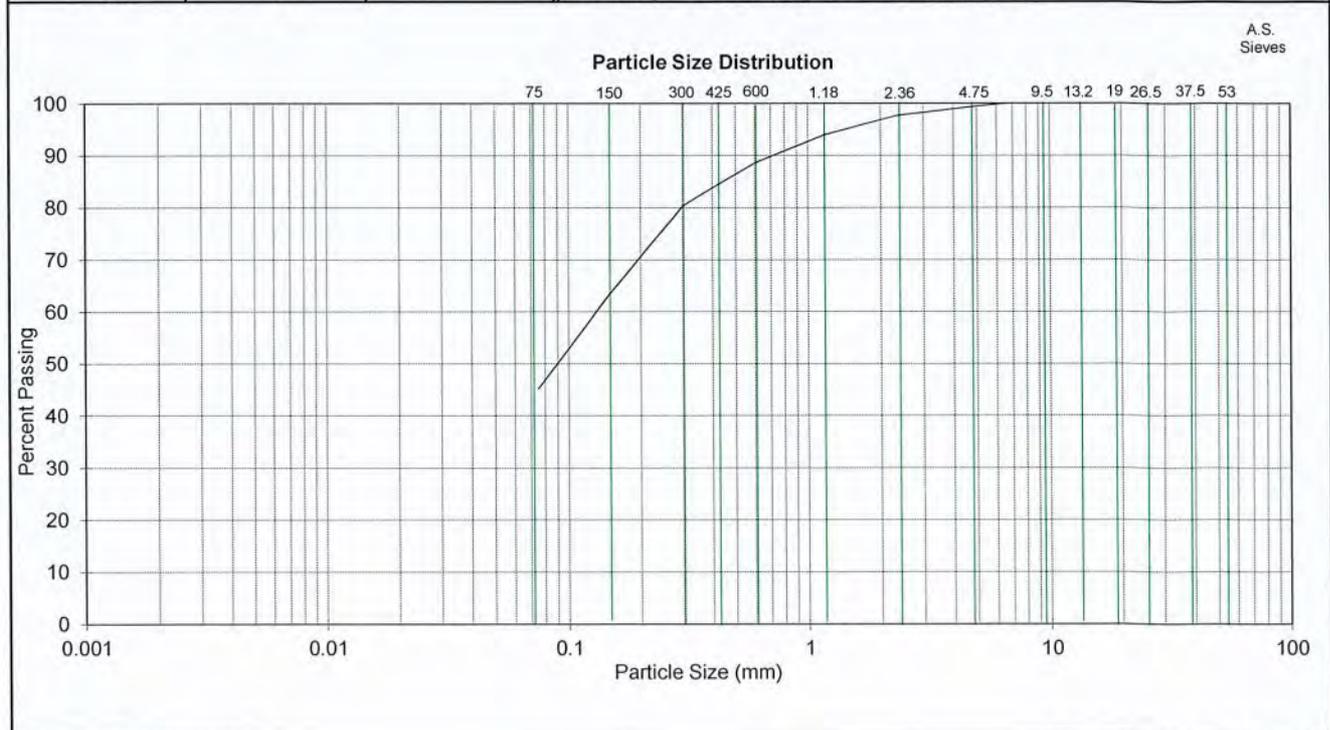
Particle Size Distribution AS1289 3.6.1			Consistency Limits and Moisture Content			
Sieve Size	% Passing	Specification	Test	Method	Result	Spec.
150 mm	100		Liquid Limit	% AS1289 3.1.2	40	
75 mm	100		Plastic Limit	% AS1289 3.2.1	13	
53 mm	100		Plasticity Index	% AS1289 3.3.1	27	
37.5 mm	100		Linear Shrinkage	% AS1289 3.4.1	9.0	
26.5 mm	100		Moisture Content	% AS1289 2.1.1	ND	
19.0 mm	100		Moisture / Dry Density Relationship AS 1289 5.2.1			
13.2 mm	100		Maximum Dry Density:	ND	t/m3	
9.5 mm	100		Optimum Moisture Content:	ND	%	
6.7 mm	99		Notes : Tested as received			
4.75 mm	99		Sample History: Air Dried, Preparation Method: Dry Sieved			
2.36 mm	98		Linear Shrinkage Mould Length: 250mm,			
1.18 mm	97		Cracking: Yes, Curling: No, Crumbling: No			
600 um	95					
425 um	92					
300 um	83					
150 um	54					
75 um	43					



Particle Size Distribution & Consistency Limits Test Report

Client:	CMW Geosciences, 1284 South Road, Clovelly Park, SA, 5042		
Project:	Geotechnical Testing	Date:	15-Nov-17
Location:	Submitted Samples	Job No.	S2017.010
		Report No.	S2017.010 / R141
Lab Reference No.	172696	Sample Identification:	BHF1811-092 1.00m - 1.45m
Laboratory Specimen Description:		(Cl) Sandy CLAY, medium plasticity, pale red/brown, approx. 55% fine to coarse sand, trace of fine gravel.	

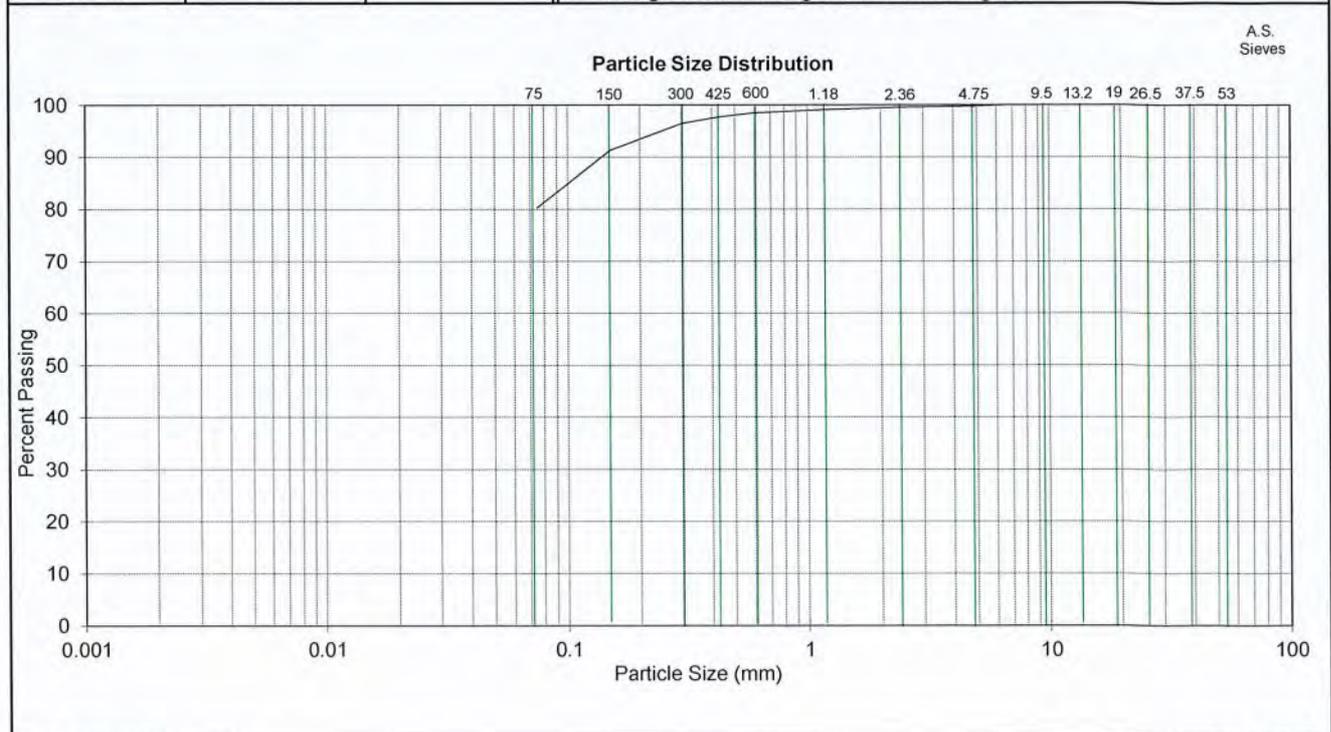
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Sieve Size	% Passing	Specification	Test	Method	Result	Spec.
150 mm	100		Liquid Limit	% AS1289 3.1.2	45	
75 mm	100		Plastic Limit	% AS1289 3.2.1	16	
53 mm	100		Plasticity Index	% AS1289 3.3.1	29	
37.5 mm	100		Linear Shrinkage	% AS1289 3.4.1	11.0	
26.5 mm	100		Moisture Content	% AS1289 2.1.1	ND	
19.0 mm	100		Moisture / Dry Density Relationship AS 1289 5.2.1			
13.2 mm	100		Maximum Dry Density:	ND	t/m3	
9.5 mm	100		Optimum Moisture Content:	ND	%	
6.7 mm	100		Notes : Tested as received			
4.75 mm	99		Sample History: Air Dried, Preparation Method: Dry Sieved			
2.36 mm	98		Linear Shrinkage Mould Length: 250mm,			
1.18 mm	94		Cracking: Yes, Curling: No, Crumbling: No			
600 um	89					
425 um	84					
300 um	80					
150 um	64					
75 um	45					



Particle Size Distribution & Consistency Limits Test Report

Client:	CMW Geosciences, 1284 South Road, Clovelly Park, SA, 5042		
Project:	Geotechnical Testing	Date:	15-Nov-17
Location:	Submitted Samples	Job No.	S2017.010
		Report No.	S2017.010 / R142
Lab Reference No.	172697	Sample Identification:	BHF1811-194 1.00m - 1.45m
Laboratory Specimen Description:	(CI) CLAY, medium plasticity, dark brown, with fine to coarse sand.		

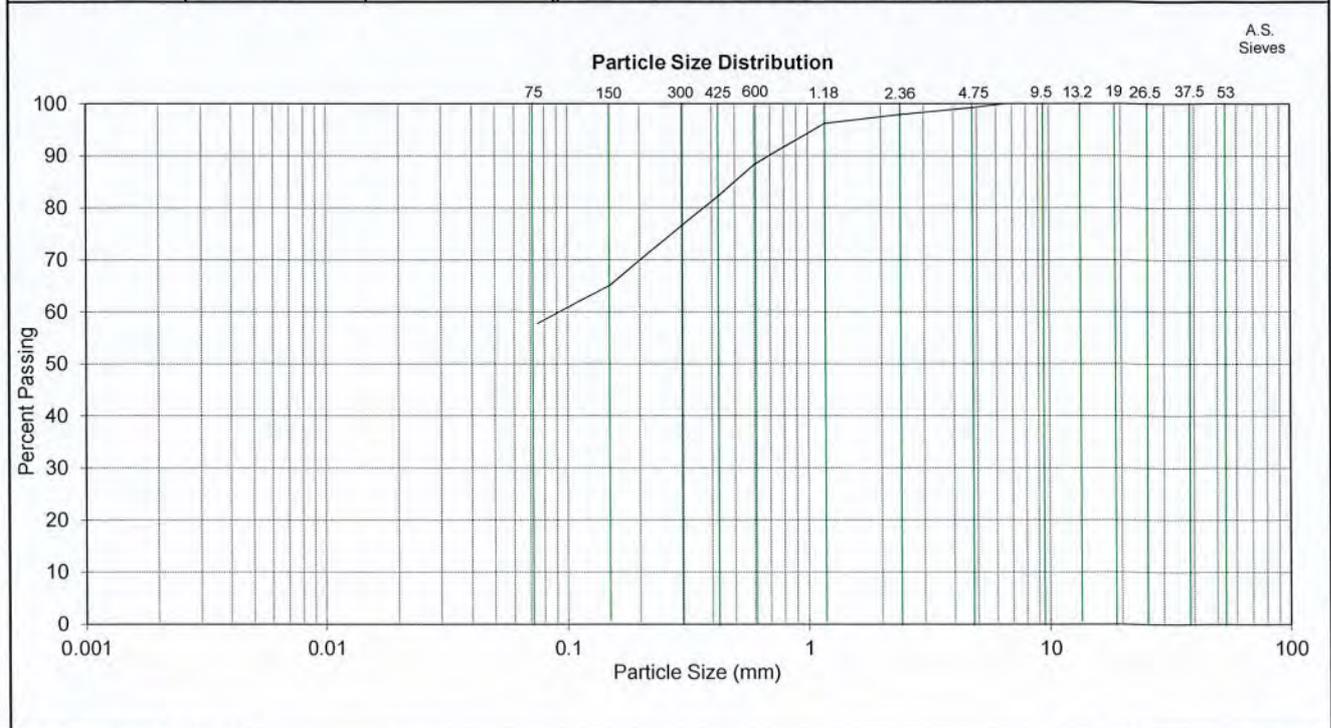
Particle Size Distribution AS1289 3.6.1			Consistency Limits and Moisture Content			
Sieve Size	% Passing	Specification	Test	Method	Result	Spec.
150 mm	100		Liquid Limit	% AS1289 3.1.2	40	
75 mm	100		Plastic Limit	% AS1289 3.2.1	18	
53 mm	100		Plasticity Index	% AS1289 3.3.1	22	
37.5 mm	100		Linear Shrinkage	% AS1289 3.4.1	11.0	
26.5 mm	100		Moisture Content	% AS1289 2.1.1	ND	
19.0 mm	100		Moisture / Dry Density Relationship AS 1289 5.2.1			
13.2 mm	100		Maximum Dry Density:	ND	t/m3	
9.5 mm	100		Optimum Moisture Content:	ND	%	
6.7 mm	100		Notes : Tested as received			
4.75 mm	100		Sample History: Air Dried, Preparation Method: Dry Sieved			
2.36 mm	100		Linear Shrinkage Mould Length: 250mm,			
1.18 mm	99		Cracking: Yes, Curling: No, Crumbling: No			
600 um	98					
425 um	98					
300 um	96					
150 um	91					
75 um	80					



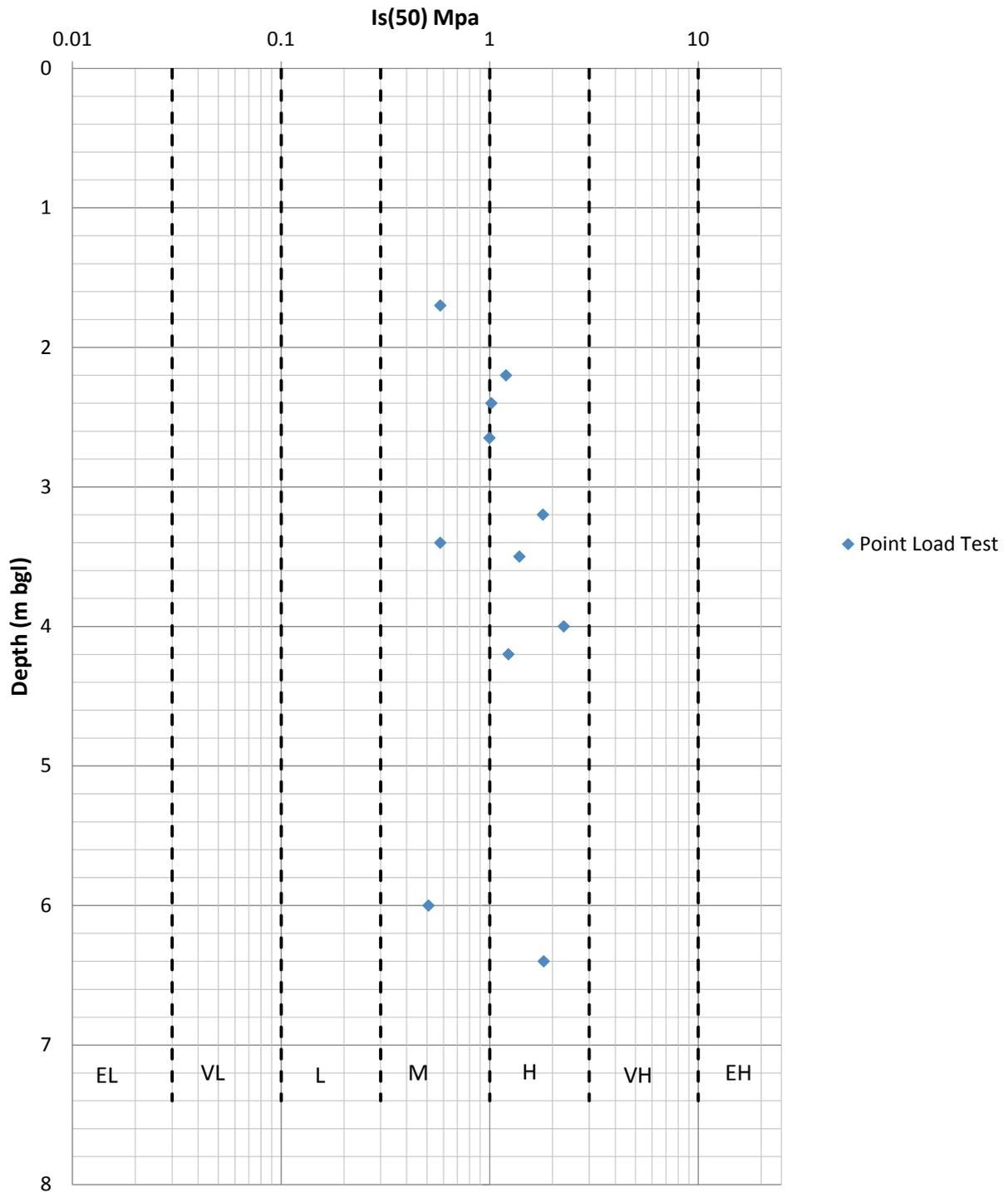
Particle Size Distribution & Consistency Limits Test Report

Client:	CMW Geosciences, 1284 South Road, Clovelly Park, SA, 5042		
Project:	Geotechnical Testing	Date:	15-Nov-17
Location:	Submitted Samples	Job No.	S2017.010
		Report No.	S2017.010 / R143
Lab Reference No.	172699	Sample Identification:	BHF1811-324 1.00m - 1.45m
Laboratory Specimen Description:	(CI) Sandy CLAY, medium plasticity, mottled grey/brown/red, approx. 40% fine to coarse sand, trace of fine gravel.		

Particle Size Distribution AS1289 3.6.1			Consistency Limits and Moisture Content			
Sieve Size	% Passing	Specification	Test	Method	Result	Spec.
150 mm	100		Liquid Limit	% AS1289 3.1.2	45	
75 mm	100		Plastic Limit	% AS1289 3.2.1	18	
53 mm	100		Plasticity Index	% AS1289 3.3.1	27	
37.5 mm	100		Linear Shrinkage	% AS1289 3.4.1	7.5	
26.5 mm	100		Moisture Content	% AS1289 2.1.1	ND	
19.0 mm	100		Moisture / Dry Density Relationship AS 1289 5.2.1			
13.2 mm	100		Maximum Dry Density:	ND	t/m3	
9.5 mm	100		Optimum Moisture Content:	ND	%	
6.7 mm	100		Notes : Tested as received			
4.75 mm	99		Sample History: Air Dried, Preparation Method: Dry Sieved			
2.36 mm	98		Linear Shrinkage Mould Length: 250mm,			
1.18 mm	96		Cracking: Yes, Curling: No, Crumbling: No			
600 um	88					
425 um	82					
300 um	77					
150 um	65					
75 um	58					

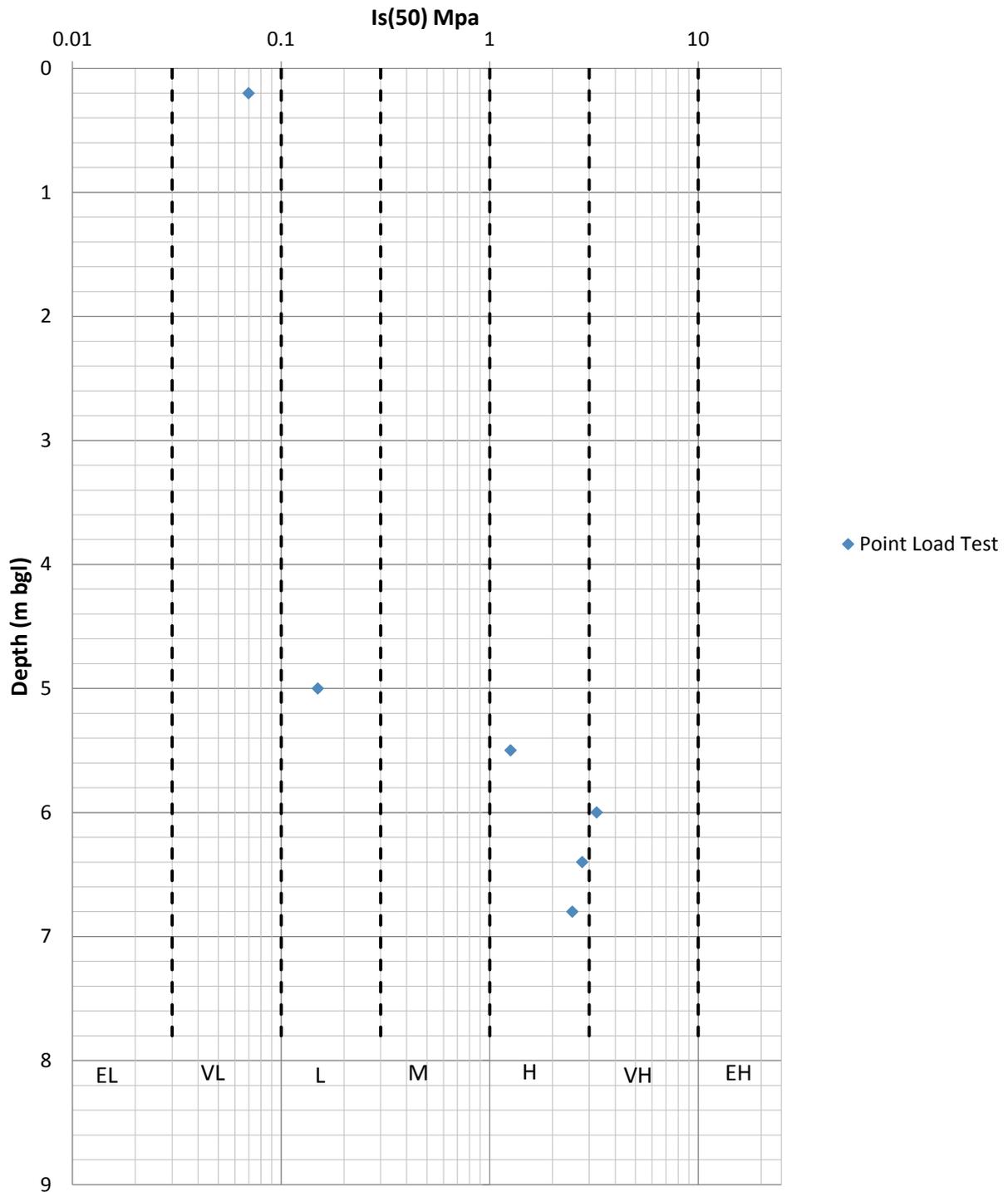


Corrected Strength Index



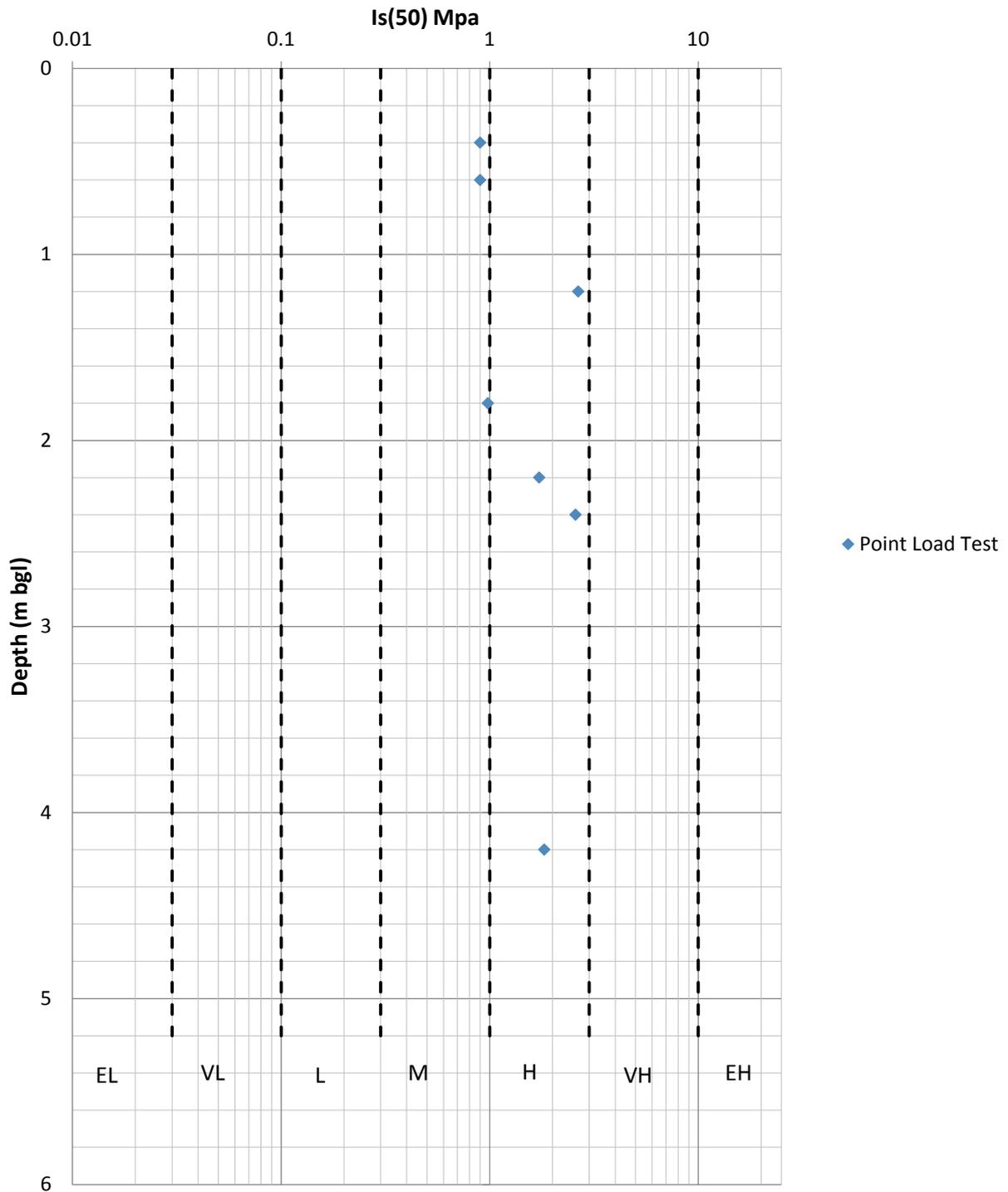
	CLIENT:	ElectraNet	CHECKED:	DBA	GROUND LEVEL:	Varies
	PROJECT:	EC14172	DATE:	4/12/2017	FIGURE:	1
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			PROJECT ID:	ADL2017-0170		

Corrected Strength Index



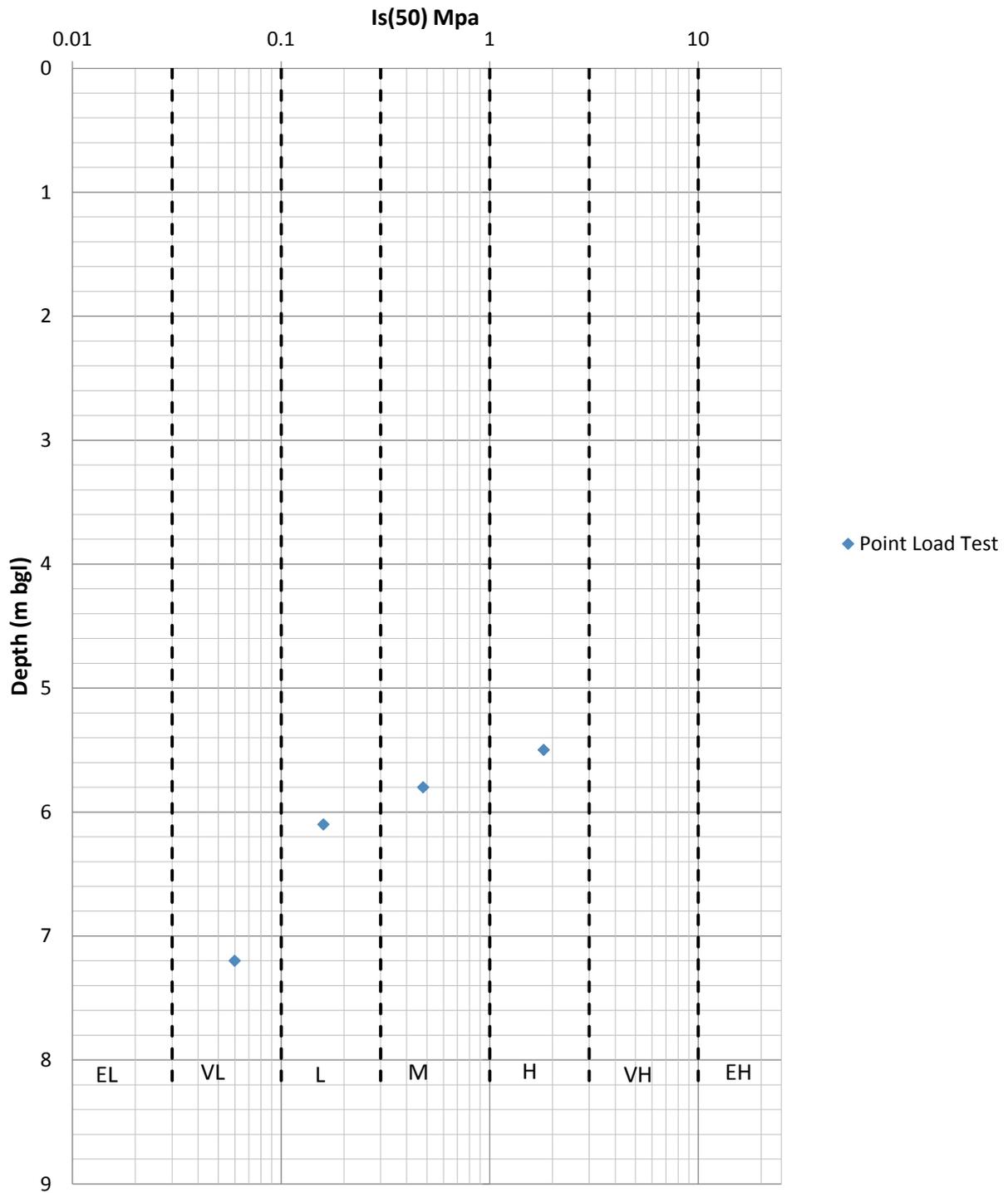
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			PROJECT ID:	ADL2017-0170		

Corrected Strength Index



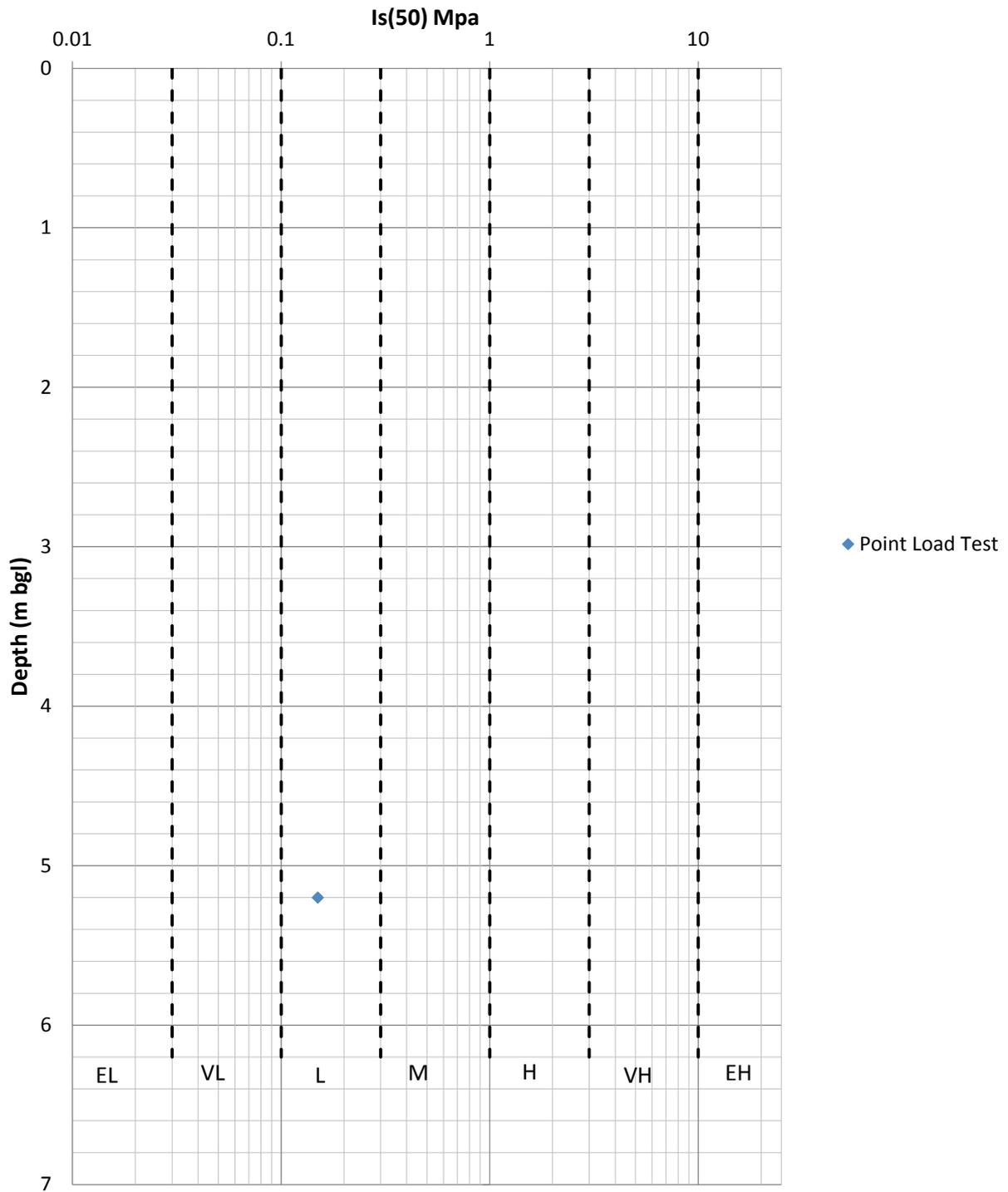
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Corrected Strength Index



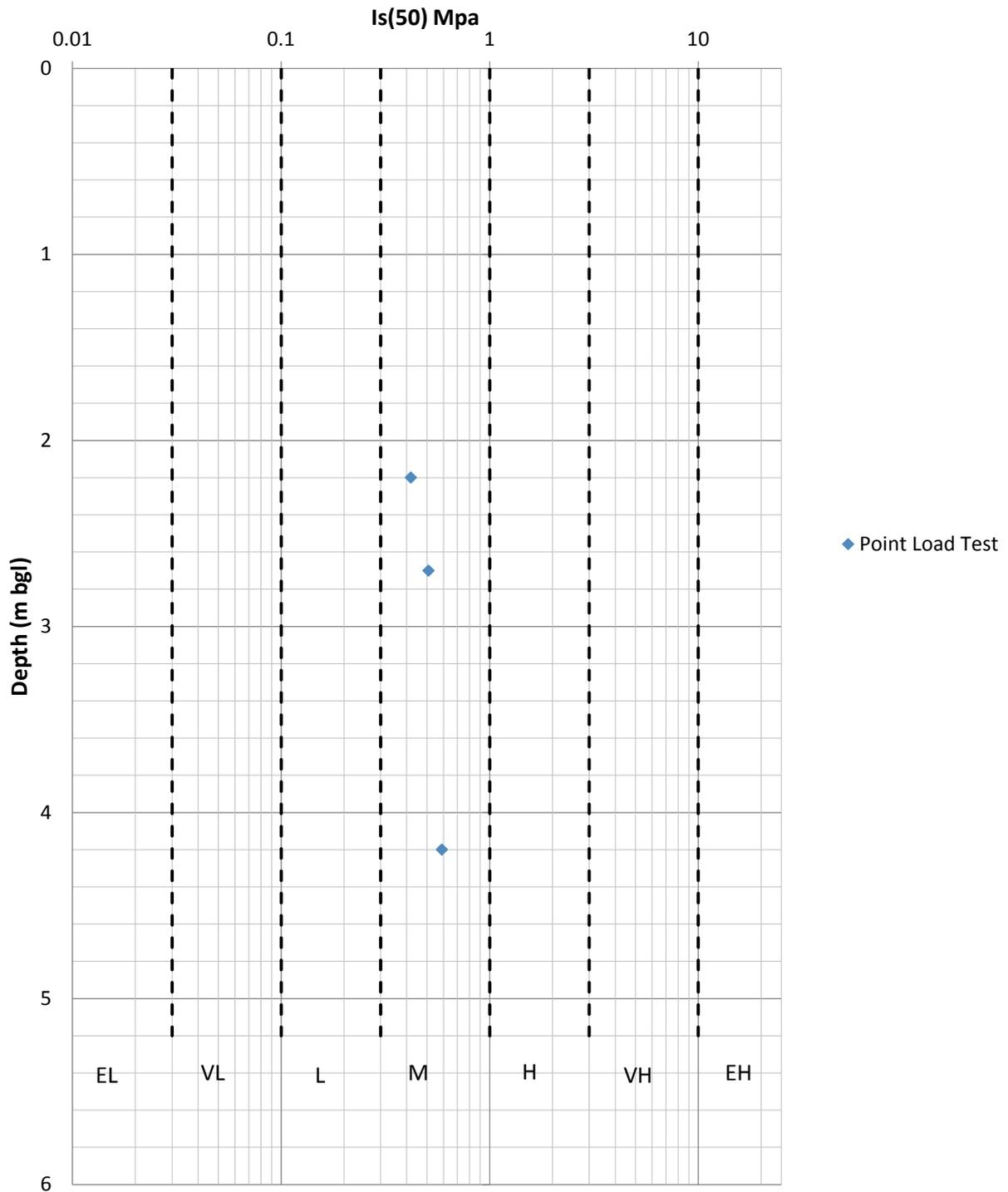
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	PROJECT:	EC14172	DATE:	4/12/2017	FIGURE:	1
	TITLE:	Point Load Testing Summary	BOREHOLE ID:	BHF1811-060		
			PROJECT ID:	ADL2017-0170		

Corrected Strength Index



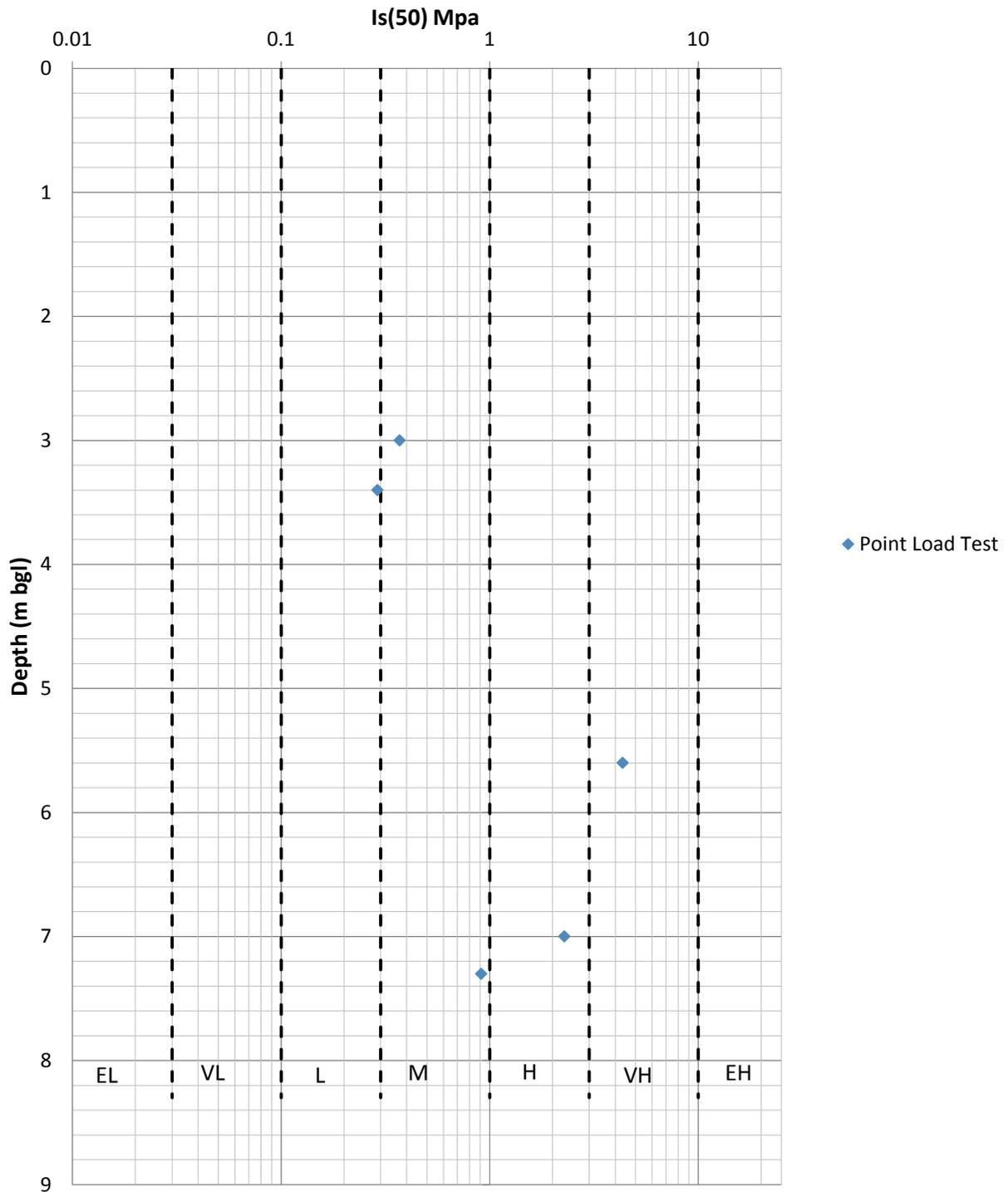
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	PROJECT:	EC14172	DATE:	4/12/2017	FIGURE:	1
	TITLE:	Point Load Testing Summary	BOREHOLE ID:	BHF1811-092		
			PROJECT ID:	ADL2017-0170		

Corrected Strength Index



	CLIENT:	ElectraNet	CHECKED:	DBA	GROUND LEVEL:	Varies
	PROJECT:	EC14172	DATE:	4/12/2017	FIGURE:	1
	TITLE:	Point Load Testing Summary	BOREHOLE ID:	BHF1811-211		
			PROJECT ID:	ADL2017-0170		

Corrected Strength Index



	CLIENT:	ElectraNet	CHECKED:	DBA	GROUND LEVEL:	Varies
	PROJECT:	EC14172	DATE:	4/12/2017	FIGURE:	1
	TITLE:	Point Load Testing Summary	BOREHOLE ID:	BHF1811-292		
			PROJECT ID:	ADL2017-0170		

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Encalyptus petiolaris
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
<i>Ecological communities</i>						
Area of community	Yes	Transmission line towers with 50 x 50 m hardstands, access/spur tracks and stringing impact area overlaid with records from targeted surveys in 2013 (plus 100 m buffer).	Area	1.44	Hectares	EBS Ecology (2019) Eyre Peninsula Transmission Line EPBC Assessment. Report to Electranet. EBS Ecology, Adelaide.
			Quality	5	Scale 0-10	
			Total quantum of impact	0.72	Adjusted hectares	
<i>Threatened species habitat</i>						
Area of habitat	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species</i>						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Birth rate e.g. Change in nest success	No					
Mortality rate e.g. Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator																			
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source			
<i>Ecological Communities</i>																			
Area of community	Yes	0.72	Adjusted hectares	ElectraNet are looking into options for potential on-ground EPBC offset areas.	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	6.1	Risk of loss (%) without offset	10%	Risk of loss (%) with offset	1%	0.55	95%	0.52	0.41	0.73	100.97%	Yes
					Future area without offset (adjusted hectares)	5.5	Future area with offset (adjusted hectares)	6.0	0.55	95%	0.52	0.41							
					Time until ecological benefit	0	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	4	Future quality with offset (scale of 0-10)	5	1.00	95%	0.95	0.95			
<i>Threatened species habitat</i>																			
Area of habitat	No				Time over which loss is averted (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset								
					Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0											
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)								
<i>Threatened species</i>																			
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source			
Number of features e.g. Nest hollows, habitat trees	No																		
Condition of habitat Change in habitat condition, but no change in extent	No																		
Birth rate e.g. Change in nest success	No																		
Mortality rate e.g. Change in number of road kills per year	No																		
Number of individuals e.g. Individual plants/animals	No																		

Summary							
Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)		
					Direct offset (\$)	Other compensatory measures (\$)	Total (\$)
Birth rate	0				\$0.00		\$0.00
Mortality rate	0				\$0.00		\$0.00
Number of individuals	0				\$0.00		\$0.00
Number of features	0				\$0.00		\$0.00
Condition of habitat	0				\$0.00		\$0.00
Area of habitat	0				\$0.00		\$0.00
Area of community	0.72	0.73	100.97%	Yes	\$0.00	N/A	\$0.00
					\$0.00	\$0.00	\$0.00

Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland - Endangered

Calculator	Input parameter	Value	Reasoning
Impact	Area (ha)	1.44	Transmission line towers with 50 x 50 m hardstands, access/spur tracks and stringing impact area.
	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)	6.1	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%)	100.97	Refer to Offset Assessment Guide.	

A large background image for the header section. It shows a tall, metal lattice transmission tower in the center, with power lines extending across the frame. The background is a landscape of dry, orange-brown grass and shrubs under a clear blue sky, with low mountains in the distance. A large green graphic element, consisting of several overlapping diagonal bands, is positioned in the upper right corner, partially overlapping the tower and sky.

ENVIRONMENTAL MANAGEMENT POLICY STATEMENT

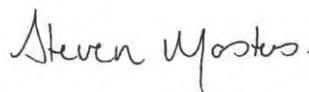
This policy statement outlines ElectraNet's commitment to developing and maintaining an Environmental Management System that delivers improved environmental performance in accordance with the Environmental Protection Act 1993 (SA) and other relevant legislation, regulations, standards and codes of practice (depending on where business activities are being undertaken).

To fulfil this commitment, ElectraNet will:

- Develop and maintain an Environmental Management System appropriate to the nature and scale of ElectraNet's operations and risks.
- Assess our activities and assets (including property) regularly to identify environmental aspects and impacts, and develop objectives and targets which prevent pollution and achieve continual 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 Environmental Management System 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 Environmental Management System 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 our Environmental Management System 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 Environmental Management System, and strive to identify and deliver reductions in our greenhouse gas emissions.

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

A handwritten signature in black ink that reads "Steve Masters".

Steve Masters
Chief Executive
25 January 2016

6-OP01

ENVIRONMENTAL MANAGEMENT POLICY

This policy is in line with the organisation's Health Safety and Sustainability Policy

Document Control

Approved By	Position	Chief Executive	Name	Steve Masters
Contact Position	Position	Senior Manager Safety, Quality & Environment	Name	Graham Smith
Contact Details	environment.enet@electranet.com.au			
First Release Date	25 January 2016			
Date of Last Review				

Revision Record

Date	Ver.	Description	Author	Checked By	Approved By
09/12/15	0.1	Initial draft policy	A. Johnston	A. Briggs	
13/01/16	0.2	Reformat to conform with applicable policies	A. Johnston	G. Smith	
21/01/16	0.3	Incorporate feedback from Executive	A. Johnston	G. Smith	
25/01/16	1.0	First release	A. Johnston	G. Smith	S. Masters

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1. Policy Statement

This policy statement outlines ElectraNet's commitment to developing and maintaining an Environmental Management System that delivers improved environmental performance in accordance with the *Environmental Protection Act 1993 (SA)* and other relevant legislation, regulations, standards and codes of practice.

2. Purpose

ElectraNet recognises that continual improvement of its environmental performance underpins its ability to achieve its business goals.

This purpose of this policy is to guide ElectraNet in establishing and maintaining an Environmental Management System that proactively achieves continual improvement in environmental management while achieving organisational business goals.

3. Scope

This policy applies to all ElectraNet workers, including employees, contractors, consultants and outsourced providers that can influence and contribute to our commitment to continual improvement in environmental management.

4. Terms and Acronyms

Term/Acronym	Definition
AS/NZS	Australian / New Zealand Standard
CEIP	Corporate Environmental Improvement Plan
EMC	Environmental Management Committee
ISO 14001	International Standards Organisation 14001: International Environmental Management System Standard
SQE	Safety, Quality and Environment
Sustainable	Capacity to endure; practices that would ensure the continued viability of a product or practice well into the future; use and growth of natural resources to meet present and future needs.

5. Policy Details

Environmental Management Principles

ElectraNet is committed to applying the environmental management principles set out in the Environmental Management Policy Statement in 9.1.

Environmental Management System

ElectraNet will establish, implement, maintain and continually improve an Environmental Management System in accordance with, and accredited to AS/NZS ISO 14001.

ElectraNet will review its Environmental Management System at planned intervals to ensure its continuing suitability, adequacy and effectiveness and to assess the need for any changes.

Leadership and Commitment

ElectraNet will:

- ensure that this environmental management policy and environmental objectives and targets are established, implemented and compatible with organisational objectives
- ensure the integration of the Environmental Management System requirements into its business processes
- ensure that the resources required to support and implement the Environmental Management System are available
- communicate regularly to all stakeholders the importance of effective environmental management and of conforming to Environmental Management System requirements
- direct and support persons to contribute to the effectiveness of the Environmental Management System
- promote cross-functional collaboration within the organisation to support the effective operation of the Environmental Management System
- promote continual improvement of the Environmental Management System, and
- ensure that the approach used for managing risk in environmental management is aligned with the organisation’s approach to risk management.

Environmental management objectives and targets will be captured within the CEIP.

The Environmental Management Framework documents the role of the wider Environmental Management System in achieving CEIP objectives and targets.

Environmental Management Committee

The Environmental Management Committee (EMC) oversees and promotes the effective operation and continuous improvement of ElectraNet’s Environmental Management System, consistent with ElectraNet’s overall business objectives.

6. Policy Responsibilities

Responsible Position	Responsibilities
Chief Executive and Executives	Approve and ensure execution of this policy.
Environmental Management Committee	Oversee and promote the effective operation and continuous improvement of ElectraNet’s Environmental Management System, consistent with ElectraNet’s overall business objectives for the benefit of consumers, customers, the community and shareholders.
Managers/Senior Managers	Ensure awareness of and compliance with this policy. Develop and implement associated operational policies and procedures.
Environmental Advisor	Provide strategic and project specific guidance to facilitate successful Environmental Management System implementation and continuous improvement.
All Employees, Contractors, Consultants and Outsourced Providers	Comply with and act in accordance with this policy.
Document Controllers	Facilitate the review and publication of this policy.

7. Evaluation and Review

7.1 Evaluation

Compliance with this policy must be reviewed from time to time through environmental inspections, auditing (internal and external) and management reviews.

7.2 Review

This policy will be reviewed every two years (or earlier, if so required) in accordance with 2-FR01-P001 Policy Development & Review Procedure.

8. Associated Documents

8.1 Relevant Legislation

8.1.1 Commonwealth

Environment Protection and Biodiversity Conservation Act (1999) (Commonwealth)

National Environment Protection Council Act (1994) (Commonwealth)

8.1.2 State

Environmental Protection Act (1993) (South Australia)

Environmental Protection Act (1994) (Queensland)

Environmental Planning and Assessment Act (1979) (New South Wales)

Environment Protection Act (1970) (Victoria)

Environment Protection Act (1997) (Australian Capital Territory)

Environmental Protection Act (1986) (Western Australia)

Northern Territory Environment Protection Authority Act (2012) (Northern Territory)

Environmental Management and Pollution Control Act (1994) (Tasmania)

8.1.3 Legal Register

[Register of applicable environmental legislation](#)

8.2 Policies

[1.Asset Management Policy](#)

[6 Health, Safety and Sustainability Policy](#)

8.3 Procedures

Procedures that apply to the integration of the Environmental Management System within ElectraNet can be accessed on [Maxwell](#).

8.4 Forms

Forms that apply to the integration of the Environmental Management System within ElectraNet can be accessed on [Maxwell](#).

9. Appendices and References

9.1 Environmental Management Policy Statement

This policy statement outlines ElectraNet's commitment to developing and maintaining an Environmental Management System that delivers improved environmental performance in accordance with the *Environmental Protection Act 1993 (SA)* and other relevant legislation, regulations, standards and codes of practice (depending on where business activities are being undertaken).

To fulfil this commitment, ElectraNet will:

- Develop and maintain an Environmental Management System appropriate to the nature and scale of ElectraNet's operations and risks.
- Assess our activities and assets (including property) regularly to identify environmental aspects and impacts, and develop objectives and targets which prevent pollution and achieve continual 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 Environmental Management System 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 Environmental Management System 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 our Environmental Management System 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 Environmental Management System, and strive to identify and deliver reductions in our greenhouse gas emissions.

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

Steve Masters
Chief Executive
25 January 2016



Section 4.3 Environmental Operating Requirements (EOR)

**For Capital & Operational Works Projects
and Asset Maintenance Service Providers**

April 2019

Version 3.2

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
Tel: (08) 8404 7966 • Fax: (08) 8404 7956 • Toll Free: 1800 243 853

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09/03/16	2.0	Detailed review	A. Johnston	Dean Smit; Faraz Sabetzadeh, Scott Haynes, Dave Manley	Andy Briggs, SQE Manager
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03/05/16	2.2	Final review and recommended changes made	B. Williams	Andy Briggs, Faraz Sabetzadeh, Andrew Johnston	Andy Briggs, SQE Manager; Faraz Sabetzadeh Systems & Standards Manager; Andrew Johnston, Environmental Advisor
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09/04/2019	3.2	Updated section 2.1.2. to mandate SCEMP preparation, aligned with Legal requirements & formatted	M.Nilova	J. Mazzone A. Johnston	Joseph Mazzone, Manager Health, Safety and Environment

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Glossary of Terms

Term	Description
ACD	Asbestos-contaminated dust or debris – refers to dust or debris that has settled within a workplace and is (or assumed to be) contaminated with asbestos.
ACM	Asbestos containing material – refers to any material or thing that, as part of its design, contains asbestos.
AIR	Aspects and Impacts Register – documents project/site specific environmental aspects, assesses risk, and outlines control strategies.
AMEMP	Asset Maintenance Environmental Management Plan.
Brownfield Site	A site which has previously been disturbed or has infrastructure in the vicinity.
CAZ	Construction Activity Zone.
CEMP	Construction Environmental Management Plan.
CRR	Construction Risk Register
DA	Development Application.
EnvMS	ElectraNet's Environmental Management System.
EOR	Environmental Operating Requirements.
EPA	Environment Protection Authority
ESCP	Erosion and Sediment Control Plan.
Greenfield Site	A site not previously disturbed by construction or any other operating activity.
Hazard (Environmental)	An environmental hazard is a factor or source that has the potential to cause environmental harm (e.g. chemicals/oils used on a project; a watercourse on the boundary of a sub-station; noxious weeds on an adjoining property).
HV	High Voltage.
ISO14001	International Standards Organisation standard for environmental management systems.
KPI	Key Performance Indicator.
MAZ	Maintenance Activity Zone.

Term	Description
MSP	Maintenance Service Provider.
Near-miss (Environmental)	A behaviour or event that does not result in an actual incident, but has the potential to do so (e.g. failure to identify a threatened flora species during planning/scouting phases, but this is identified later without resultant harm or disturbance; an oil-water separator that is not properly maintained, but does not discharge contaminated fluid).
Normal Working Hours (South Australia)	Normal working hours for construction activities are between 7:00-19:00 Monday to Saturday. Where practical, no work on Sundays or public holidays. If construction on a Sunday or public holiday is required, then this will be restricted to between 09:00-18:00.
Contractor	Applies to project construction work.
PCA	Potentially Contaminating Activities.
PEMP	Property Environmental Management Plan.
PHC	Project Heritage Consultant: engaged to provide specialist advice to manage potential heritage discoveries.
PMP	Project Management Plan, to which EOR (Construction/Asset Maintenance) requirements are subordinate.
SA	South Australia
SAMEMP	Scope of Asset Maintenance Environmental Management Plan (where supplied by ElectraNet).
SCEMP	Scope of Construction Environmental Management Plan (where supplied by ElectraNet).
SDM	Substation Design Manual.
SDS	Safety Data Sheet.
Sensitive Receptor/s	Assets likely to have heightened sensitivity to adverse environmental impacts (e.g. residential houses, commercial properties, schools).
SF ₆	Sulphur Hexafluoride.

1. Purpose

To outline ElectraNet's minimum Environmental Operating Requirements (EOR) for contractors and subcontractors undertaking construction works and asset maintenance service provision within Australia. They are an integral part of ElectraNet's Environmental Management System (EnvMS), which is accredited to the International Standards Organisation standard for Environmental Management Systems (ISO14001:2004).

1.1 Compliance Requirements

Each EOR has one or more action tables, which outline ElectraNet's minimum requirements. It is the responsibility of the Contractor and/or Maintenance Service Provider (MSP) to identify additional environmental regulatory obligations, and develop plans and procedures to achieve and demonstrate compliance with these. Note these obligations may vary according to project scope/maintenance activity, and applicable jurisdictional context (local/state/Federal).

2. Environmental Management Plans

To effectively manage environmental aspects associated with construction and asset maintenance contractual requirements, Contractors/MSPs must prepare and submit to ElectraNet appropriate EMPs for review and approval. Specific requirements are detailed below.

2.1 Construction Projects

A project specific Construction Environmental Management Plan (CEMP) is required for **each capital works project** (see 2.1.1).

2.1.1 Construction Environmental Management Plan (CEMP)

To effectively manage the environmental impacts and risks associated with **project construction activities**, the Contractor must prepare, submit, implement and maintain a project specific CEMP in accordance with their environmental management system, ElectraNet requirements and regulatory obligations. The CEMP is subordinate to the **Project Management Plan (PMP)**.

The CEMP must be submitted to ElectraNet for review and approval **within 4 weeks of receipt of Letter of Acceptance**, and must be approved by ElectraNet prior to project commencement. The performance of the Contractor in implementing the approved CEMP, and achieving the project scope, will be assessed during the project and upon project completion.

2.1.2 Scope of Construction Environmental Management Plan (SCEMP)

Depending on project specifics, ElectraNet's Environment and Land Management representatives must prepare a SCEMP, which identifies key environmental and cultural heritage aspects for inclusion in the CEMP. Where provided, the SCEMP and the approved footprint will become an addendum to the request for tender (RFT), along with any relevant documentation (consultancy reports, site investigations etc.) (See 3.1.1).

2.2 Asset Maintenance

An **overarching** Asset Maintenance Environmental Management Plan (AMEMP) is to be prepared and implemented by the MSP, which will apply for the **duration of the maintenance service contract**, with an annual review/update. See 2.2.1 below.

2.2.1 Asset Maintenance Environmental Management Plan (AMEMP)

To effectively manage the environmental aspects associated with asset maintenance, the MSP must prepare, submit, implement and maintain an asset maintenance specific AMEMP in accordance with their environmental management system, ElectraNet requirements and regulatory obligations.

An initial AMEMP must be prepared, and the final reviewed and approved version provided to ElectraNet, prior to contract commencement. In subsequent years, an amended AMEMP must be provided to ElectraNet for review and acceptance prior to 1 July on a rolling basis.

2.2.2 Scope of Asset Maintenance Environmental Management Plan (SAMEMP)

The annually amended AMEMP must take into account any specific new environmental and cultural heritage management requirements that may need to be addressed by the service provider in delivering the maintenance works. This may be due to new assets added to the scope of maintenance works during the contract term, and/or changed environmental management requirements for existing assets.

Depending on the scope of any new environmental requirements, ElectraNet will prepare a SAMEMP. When provided this will become an addendum to the Contract, along with any relevant documentation (consultancy reports, site investigations etc.) (See 3.1.2).

2.3 ElectraNet Connect

'ElectraNet Connect' is ElectraNet's stakeholder and property database. Requests for access to, or information from, ElectraNet Connect can be made by contacting **ElectraNet Landholder Liaison Coordinator:**

Ph: +61 8 8404 7653 or manley.david@electranet.com.au

3. Environmental Operating Requirements (EOR)

These EORs represent the **minimum requirements** for Contractors/MSPs engaged by ElectraNet (for construction projects and asset maintenance contracts, as applicable). See 1.1 for additional compliance requirements.

3.1 EOR001: Environmental Management Plan (EMPs)

3.1.1 Construction Environmental Management Plan (CEMP)

The CEMP is the primary document that outlines the Contractor’s procedures to deliver ElectraNet’s environmental operating requirements and other compliance obligations associated with the **construction project**. ElectraNet may specify additional environmental requirements that must be adhered to and implemented by the Contractor. Please refer to 2.1.1 Construction Environmental Management Plan (CEMP) for more information.

See Table 1 below for minimum EOR actions. It is the responsibility of the Contractor to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/Procedures.

Action No.	Action Detail
ElectraNet Actions	
1.	<p>ElectraNet must:</p> <ul style="list-style-type: none"> a. Provide the Contractor with project specific documentation relating to known or potential environmental aspects (hazards) and risks associated with the project. Such documentation may include, but not be limited to: <ul style="list-style-type: none"> i. Development Approvals (DA); ii. Heritage Agreements/Site Information (Indigenous/Non-Indigenous); iii. Information on known or suspected site contamination; iv. The existence of significant flora or fauna; v. Land access agreements; vi. Feedback from external stakeholders that may apply to the project. b. Provide the Contractor with additional project information that may be identified during project implementation, as necessary.
2.	<p>Depending on project specifics, ElectraNet will provide a SCEMP (Scope of Construction Environmental Management Plan (SCEMP)) that further clarifies environmental risks and EORs that apply. These requirements, as a minimum, must be addressed within the CEMP.</p>
Contractor Requirements	

Action No.	Action Detail
3.	<p>The Contractor must:</p> <ol style="list-style-type: none"> a. Undertake a site inspection, prior to construction works, to ground-truth site conditions, and verify that project specific environmental aspects (summarized in the SCEMP) are understood and incorporated into the CEMP; b. Develop a draft CEMP and provide this to ElectraNet for review and assessment within 4 weeks of receipt of the Letter of Acceptance; c. Ensure feedback from ElectraNet is incorporated into the final CEMP prior to project commencement.
<p>Aspect and Impact Register (AIR) / Construction Risk Register (CRR) Development – Contractor Requirements</p>	
4.	<p>The Contractor must develop a project specific AIR/CRR which includes:</p> <ol style="list-style-type: none"> a. Compliance obligations as provided by ElectraNet or through scoping studies undertaken by the Contractor; b. SCEMP obligations, as provided by ElectraNet; c. A risk assessment of these environmental aspects, using objective likelihood/consequence criteria (as endorsed by ElectraNet) d. Applicable EORs and associated actions from respective action tables, from EORs 2-25 within this document; e. Other control measures as instituted by the Contractor. <p>The AIR/CRR is to be incorporated into the CEMP and provided to ElectraNet for review and comment prior to project commencement.</p>

Table 1 EOR001a: Construction Environmental Management Plan (CEMP) Actions

3.1.2 Asset Maintenance Environmental Management Plan (AMEMP)

The AMEMP is the primary document that outlines the MSP’s procedures to deliver ElectraNet’s environmental operating requirements and other compliance obligations associated with **asset maintenance**. ElectraNet may specify additional environmental requirements that must be adhered to and implemented by the MSP. Please refer to 2.2.1 Asset Maintenance Environmental Management Plan (AMEMP) and 2.2.2 Scope of Asset Maintenance Environmental Management Plan (SAMEMP) for additional information.

See Table 2 below for minimum EOR actions. It is the responsibility of the MSP to understand additional local/state requirements for these aspects, and incorporate these into the AMEMP/Procedures.

Action No.	Action Detail
ElectraNet Actions	
1.	<p>ElectraNet must:</p> <ul style="list-style-type: none"> a. Provide the MSP with information relating to known or potential environmental aspects (hazards) and risks associated with substations, telecommunication sites and transmission line easements. Such information may include, but not be limited to: <ul style="list-style-type: none"> i. Information on known or suspected site contamination; ii. The existence of significant flora or fauna; iii. Land access agreements; iv. Land management plans; b. Provide the MSP with additional information that may be identified during contract implementation, as necessary. Note this may include a SAMEMP, where applicable.
Aspect and Impact Register (AIR) / Risk Register Development – MSP Requirements	
2.	<p>The MSP must develop a service delivery specific Aspects and Impacts Register (AIR) / Risk Register which includes:</p> <ul style="list-style-type: none"> a. A risk assessment of these environmental aspects, using objective likelihood/consequence criteria (as endorsed by ElectraNet); b. Applicable EORs and associated actions from respective action tables, from EORs 2-25 within this document; c. Other control measures as instituted by the MSP. <ul style="list-style-type: none"> i. The AIR / Risk Register is to be incorporated into the AMEMP, and provided to ElectraNet for review and comment prior to contract commencement.

Table 2 EOR001b: Asset Maintenance Environmental Management Plan (AMEMP) Actions

3.2 EOR002 Training and Site Induction

The Contractor /MSP will be responsible for undertaking training and induction of all workers.

The Contractor /MSP is responsible for ensuring that all personnel are fully informed of their specific environmental obligations, and are suitably trained and competent to undertake works in accordance with ElectraNet’s own and Contractor /MSP requirements.

See Table 3 for minimum environmental operating requirement actions. It is the responsibility of the Contractor /MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Contractor/MSP Requirements	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Develop and implement a training and site induction program which addresses all general and specific environmental issues associated with the project/maintenance activities; b. Include details of the site induction program in the CEMP/AMEMP (see EOR001: Environmental Management Plan (EMPs)) c. Construction Environmental Management Plan (CEMP); d. Establish and maintain a training register which lists as a minimum: name, contact number, date of training, position/activities etc. Make this available for review upon request.

Table 3 EOR002: Training and Site Induction Actions

3.3 EOR003 Environmental Inspections and Auditing

The Contractor/MSP will be responsible for undertaking project/maintenance service audits and inspections, as well as participating (as required) in those undertaken by ElectraNet. The Contractor/MSP is also responsible for developing appropriate tools (inspection checklists etc.) and developing and implementing an audit schedule that reflects the environmental aspects and risk of the scope of works.

See Table 4 for minimum environmental operating requirement actions. It is the responsibility of the Contractor to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Daily Tasks	
1.	The Contractor/MSP must : <ol style="list-style-type: none"> a. Prior to commencement of daily work activities, undertake an inspection of the work site (see EOR004 Activity Zone Management); b. Note any issues and associated actions and address as appropriate.
Inspections	
2.	The Contractor/MSP must : <ol style="list-style-type: none"> a. Develop an inspection checklist appropriate to the scope of works and environmental aspects (refer to relevant EORs, SCEMP, SAMEMP etc.); b. Undertake regular site environmental inspections (as agreed with ElectraNet) using this checklist, and provide records to ElectraNet upon request; c. Address any non-conformance and/or corrective actions requirements as outlined in EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.
Audits	
3.	The Contractor/MSP must : <ol style="list-style-type: none"> a. Prepare and maintain an audit schedule, and make this available to ElectraNet for review; b. Ensure personnel are trained and competent to undertake environmental inspection audits; c. Fully implement the audit schedule; d. Address any non-conformance and/or corrective actions requirements as outlined in EOR020 Environmental Incidents/Near Misses, Non-conformances and Hazards.

Table 4 EOR003: Environmental Inspection and Audit Actions

3.4 EOR004 Activity Zone Management

3.4.1 Construction Activity Zone (CAZ)

The Contractor will be responsible for establishing and maintaining a CAZ diagram/plan and incorporating this within the project CEMP and applicable procedures. The CAZ will capture information supplied by ElectraNet which includes No Go Zones, heritage sites and other sensitive aspects (where applicable), in addition to those items outlined below.

See Table 5 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Undertake a site inspection, prior to construction works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements, are incorporated into the CEMP and associated procedures.
CAZ Management	
2.	<p>The Contractor must:</p> <ul style="list-style-type: none"> a. Establish GPS logged photo points and capture pre-disturbance photos (located to show the CAZ and protected areas e.g. No Go Zones). Note these will be re visited at project completion to verify satisfactory outcomes); b. Prior to project works delineate the CAZ and No Go Zones etc. using flagging/markers; c. Prepare a diagram/plan which displays the CAZ and all identified No Go Zones and other significant information (as applicable). Include in project CEMP; d. Include details of the CAZ in the auditing checklists for site (refer to EOR003 Environmental Inspections and Auditing); e. Restrict all activities to the approved CAZ unless amended and agreed with ElectraNet (all CAZ amendments to documented and retained in project files); f. Upon project completion, return to pre-disturbance photopoint locations (see 2.a) and take post-construction photographs to verify that no unauthorized disturbance has occurred.
3.	<p>Any breach of the CAZ will be considered a non-conformance and will require corrective actions to be implemented (refer to EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards).</p>

Table 5 EOR004a: Construction Activity Zone Actions

3.4.2 Maintenance Activity Zone (MAZ)

The MSP will be responsible for establishing and maintaining a MAZ diagram/plan and incorporating this within the contract AMEMP and applicable procedures. The MAZ will capture information supplied by ElectraNet which includes No Go Zones, heritage sites and other sensitive aspects (where applicable), in addition to those items outlined below.

See Table 6 below for minimum environmental operating requirement actions. It is the responsibility of the MSP to understand additional local/state requirements for these aspects, and incorporate these into the contract AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific ‘special requirements’; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the AMEMP, the MSP will develop specific environmental controls and update this document.
2.	<p>Transmission Line Maintenance</p> <ul style="list-style-type: none"> a. For the purposes of transmission line maintenance tasks, the MAZ will be defined by the network system provided to the MSP via ElectraNet Connect, with the agreed buffer or clearance envelope for maintenance tasks as agreed with ElectraNet; b. Any No-Go Zones or “special requirements” within the MAZ, where provided by ElectraNet, will need to be protected from disturbance by the MSP in the course of undertaking maintenance tasks.
3.	<p>Property Environmental Management Plan (PEMP): Maintenance Services</p> <ul style="list-style-type: none"> a. Where substations and other assets form part of a wider land parcel, the MAZ will be defined by the property boundary as defined within ElectraNet Connect; b. Note specific environmental audit procedures and checklists will be provided by ElectraNet to ensure PEMP environmental management tasks are undertaken.
4.	<p>Any breach of the MAZ will be considered a non-conformance and will require corrective actions to be implemented (refer to EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards).</p>

Table 6 EOR004b: Maintenance Activity Zone Actions

3.5 EOR005 Flora and Fauna Protection

3.5.1 Flora Protection

The Contractor/MSP will be responsible for minimising disturbance/clearance of native vegetation in accordance with details outlined in the SCEMP, SAMEMP, DA or related environmental approvals (where provided by ElectraNet). Note such approvals **must** be strictly adhered to, and be confirmed with ElectraNet prior to construction/maintenance activity.

Where no project specific approvals are provided, the contractor is responsible for identifying areas where vegetation disturbance/clearance is required, and acquiring subsequent approvals in consultation with ElectraNet.

See Table 7 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Verify if any sites of known or potential heritage significance are associated with the project/site via ElectraNet. This may result from desk-top research and or site surveys. Note such information may be confidential and require restricted communication / distribution; <p>Construction specific requirement/s:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures;
Protection of Retained Vegetation	

Action No.	Action Detail
<p>2.</p>	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> Ensure No Go Zones are clearly flagged/demarcated. No vegetation disturbance/clearance must be undertaken in these areas; Where practicable, not use other areas of retained native vegetation (outside of No Go Zones), for equipment laydown etc.; Where practicable, avoid storage of equipment/materials in the drip-line of trees. <div style="text-align: center;"> <p>Figure 1.</p> </div> <p><i>Vegetation “drip-line” – avoid locating equipment, chemicals or fuels within this area where practicable.</i></p>
<p>Approved Vegetation Clearance</p>	
<p>3.</p>	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> Ensure vegetation that has been approved for disturbance/clearance is clearly identified to prevent unauthorised disturbance. Note that trimming of branches may occur once approval has been obtained from ElectraNet; When undertaking vegetation management associated with HV Line maintenance, ensure agreed buffer or vegetation clearance corridors are adhered to (see Maintenance Activity Zone (MAZ)); Ensure clearance of significant[#] vegetation is undertaken by a certified vegetation management contractor under the supervision of an accredited vegetation consultant (unless agreed otherwise with ElectraNet). Note this may apply to the trimming of branches – liaise with ElectraNet as required; Liaise with ElectraNet with respect to any changes in project scope that require additional vegetation disturbance: This must be approved by ElectraNet prior to clearance; Disposal of the cleared vegetation matter must be addressed in the CEMP/AMEMP, and approved by ElectraNet. <p>[#] <i>Significant native vegetation includes any species, community or habitat identified by local, state or Federal legislation (e.g. Environmental Protection and Biodiversity Conservation Act). Other vegetation considered significant by ElectraNet may also be included.</i></p>
<p>CAZ/MAZ Rehabilitation</p>	

Action No.	Action Detail
4.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> Upon project/maintenance completion, ensure all work areas (compound sites, winch and brake sites, stockpile areas and access roads etc.) are restored to a state as close as practicable to their original condition, noting any specific conditions that may be associated with significant vegetation/habitat disturbance; Provide records (photographs etc.) to ElectraNet upon request (see EOR004 Activity Zone Management).
5.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.

Table 7 EOR005 (a): Vegetation Clearance and Rehabilitation Actions

3.5.2 Fauna Protection

The Contractor/MSP will be responsible for minimising impacts on fauna (both native and introduced) during project construction or maintenance activities.

See Table 8 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Fauna Management	
1.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> Maintain contact lists for local/regional fauna rescue organisations at all times; Avoid leaving trenches/excavations open overnight: backfill/cover to prevent fauna ingress; Where b. is impracticable, undertake pre-start inspections of any open trenches/excavations to identify impacted fauna, with specialist assistance sought for safe release as required; Maintain records of inspections as per Table 4 EOR003: Environmental Inspection and Audit Actions are to be provided to ElectraNet upon request.
2.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> Where livestock (sheep, cattle, etc.) are adjacent the CAZ/MAZ, ensure suitable exclusion fencing is present; Where livestock stray onto the CAZ/MAZ, notify ElectraNet immediately, who will coordinate communication with the owners, and prompt relocation; Report any fauna injury or death associated with project or maintenance activity to ElectraNet, logging incidents/near misses via EOR020 Environmental Incidents/Near Misses, Non-conformances and Hazards.

Table 8 EOR005 (b): Fauna Protection Actions

3.6 EOR006 Cultural and Heritage Site Management

ElectraNet is responsible for the identification of potential/actual cultural and heritage sites before project/maintenance services commence. Where identified, ElectraNet will provide a report to the Contractor/MSP, who is then responsible for the management of these sites, unless otherwise agreed with ElectraNet.

Note that where cultural and heritage sites/artefacts are not identified and captured in CEMP/AMEMP documentation, the Contractor/MSP assumes responsibility to identify and manage **subsequent** discoveries during construction and maintenance works, and notify ElectraNet immediately. **Note this applies to both Indigenous and Non-Indigenous heritage, on both greenfield and brownfield sites.**

See Table 9 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Verify if any sites of known or potential heritage significance are associated with the project/site via ElectraNet. This may result from desk-top research and or site surveys. Note such information may be confidential and require restricted communication / distribution; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Cultural and Heritage Site Protection	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Ensure known sites are recorded as No Go Zone/s on the CAZ/MAZ and appropriately identified with flagging/markers; Embed information regarding these sites in the Contractor's/MSP's training and site induction packages; c. Inspect/Audit these sites to ensure that disturbance does not occur as a result of project/maintenance activities; d. Report any near-misses/incidents via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards procedures.
Cultural and Heritage Site Discovery	

Action No.	Action Detail
3.	<p>In the event of identifying a potential site the Contractor/MSP must:</p> <ol style="list-style-type: none"> a. Cease all work and establish an appropriate protective buffer around the potential site with flagging/markers etc.; b. Contact ElectraNet immediately, and provide details of the potential discovery; c. In consultation with ElectraNet, engage a suitably qualified heritage expert to assess the potential site[#]. Cooperate fully with any recommendations, and incorporate into project schedules as necessary (see Appendix A: Indigenous and Non-Indigenous Heritage Reporting); d. Where approved by ElectraNet, works may continue outside any buffer zone established around the potential site; e. Report any near-misses/incidents via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards. <p><i>[#] Should a site be confirmed, it is the responsibility of the Contractor/MSP to update the CEMP/AMEMP, CAZ/MAZ and site inductions etc. to ensure that protection measures are understood and implemented.</i></p>

Table 9 EOR006: Cultural and Heritage Site Management Actions

3.7 EOR007 General Weed and Pest Control

The Contractor/MSP is responsible for preparing declared plant / weed and pest control management activities for inclusion in the CEMP/AMEMP (refer to 2 Environmental Management Plans). The requirements must specifically address control requirements for declared plants / weeds and pests identified as relevant for the project or maintenance activity, and be fully implemented.

See Table 10 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Obtain information on project/site specific declared plant / weed and pest threats through the following sources (as a minimum): <ul style="list-style-type: none"> i. Project/site specific approvals/documentation supplied by ElectraNet; ii. Publicly available information on declared plant / weed and pest threats relevant to the project area/site; iii. Species information obtained during pre-construction inspections and workplace audits. d. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures. <p>Construction specific requirement:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Pest and Weed Management Plans	

Action No.	Action Detail
2.	<p>The Contractor/MSP must develop a Pest and Declared Plant / Weed Management Plan as part of the CEMP/AMEMP. As a minimum this must include:</p> <ul style="list-style-type: none"> a. Establishment of single entry and egress points to the work site as negotiated in Property Access Plans (where applicable). No additional access points to the site are to be established; b. Providing sealed bins to discourage scavenging by fauna/pests; c. Prohibition of the importation of weeds/seeds/propagules or weed infested topsoil material by the Contractor/MSP into the work site, or transferred between landholder properties. Maintain records to verify sources; d. Ensuring all vehicles, plant and earthmoving equipment are clear of significant soil/vegetative matter etc. prior to site mobilisation. Capture as a minimum in pre-start inspections and maintain registers of relevant assets. Note the Contractor/MSP must comply with local/state requirements, which may stipulate additional controls/procedures. Maintain records; e. Where elevated risks of declared plant / weed and pest occurrence are confirmed in 1a-c, ensure vehicles, plant and earthmoving equipment are clear of significant soil/vegetative matter etc. prior to moving from one property to the next; f. Where CAZ/MAZ weed controls are implemented, ensure declared plants / weeds with viable seeds are securely bagged to prevent dispersal. Place in suitable bins for safe disposal. Document on waste registers as necessary; g. Where new declared plant / weed infestations on adjacent properties are identified, and potentially result from project/maintenance activities, notify ElectraNet immediately; h. Results of investigations may require the Contractor/MSP to prepare and implement a declared plant / weed eradication plan in accordance with local/state requirements; Maintain records to verify that CEMP/AMEMP actions have been implemented.
3.	<p>Report any incidents/near misses with regard to these aspects via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.</p>

Table 10 EOR007: General Weed and Pest Control Actions

3.8 EOR008 Phytophthora Management

Phytophthora is a soil and water borne mould which can have significant, irreversible impacts on susceptible native vegetation and their associated communities. There are around 25 species, with *Phytophthora cinnamomni* more common in South Australia. The likelihood of occurrence increases where:

- Average annual rainfall exceeds 400mm/year;
- Warm, moist conditions occur;
- Poor drainage is present, and;
- Susceptible plants are present.

Where ElectraNet identifies *Phytophthora* as an environmental aspect for project/maintenance activities, the Contractor/MSP is responsible for ensuring that appropriate hygiene practices are included in the CEMP/AMEMP and associated procedures.

See Table 11 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures. <p>Construction specific requirement ONLY:</p> <ol style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by the ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Exposure Management	

2.	<p>Where Phytophthora is identified as an environmental aspect (confirmed or suspected) the Contractor/MSP must:</p> <ol style="list-style-type: none"> a. Ensure all vehicles, plant, and earthmoving equipment are inspected and clear of significant soil/vegetative matter prior to commencing work. Capture in pre-start inspections (see EOR003 Environmental Inspections and Auditing); b. Travel only on designated tracks; c. Work in un-infested areas first, to prevent spread of contaminated soil/vegetative matter to “clean” areas; d. Work in infested areas last (where practicable): do not remove soil/vegetative matter and water from such areas; e. Not source soil/rubble etc. from areas of infestation – ensure these are sourced from “clean” areas; f. Have suitable wash-down facilities and procedures available on site; g. Thoroughly clean vehicles, plant, and earthmoving equipment of all significant soil/vegetative matter when activities are completed within the impacted area (to prevent spread of impacted materials and potential dispersal to “clean” locations); h. Ensure records, inclusive of photos, are maintained and available to ElectraNet.
3.	<p>Where Phytophthora is not considered a significant environmental aspect, implement weed and pest management requirements outlined in EOR007 General Weed and Pest Control.</p>
4.	<p>Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.</p>

Table 11 EOR008: Phytophthora Management Actions

3.9 EOR009 Water Quality Protection/Erosion and Sediment Control

The Contractor/MSP is responsible for the identification and implementation of appropriate water quality protection and erosion and sediment controls during project/maintenance activities.

Focusing on erosion protection is always favourable to sediment control, also ensuring that separation distances between the CAZ/MAZ and watercourses and drainage lines are **maximised**.

Unless approved in writing by ElectraNet, no watercourse can be diverted or impeded, and site runoff is to be managed to minimise sediment loss and meet applicable local/state/federal water quality thresholds.

See Table 12 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures. <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Risk Assessment	
2.	<p>Within the AIR / CRR the Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Undertake a risk assessment of the site's susceptibility to erosion and sediment loss that considers, as a minimum: <ul style="list-style-type: none"> i. Slope/gradient; ii. Soil type; iii. Areas devoid of vegetation/cover; iv. Proximity to watercourses and other sensitive features; b. Ensure that the final risk rating reflects the site's susceptibility to erosion and sediment loss; c. Develop and implement an Erosion and Sediment Control Plan (ESCP) where a medium or higher risk is determined (see Section 3 below).
Erosion and Sediment Control Plan (ESCP)	

Action No.	Action Detail
3.	<p>Where an ESCP is required, the Contractor/MSP is responsible for its development and implementation. The ESCP is to be consistent with local/state specific requirements, and at a scale appropriate to the project/maintenance scope and environmental risk.</p> <p>The ESCP must as a minimum include:</p> <ol style="list-style-type: none"> a. A Site Layout Plan: capturing the location of project/maintenance specific requirements (topsoil stockpiles, excavations etc.) overlaid with environmental features (watercourses, drainage lines, gradients etc.). This may be incorporated with the CAZ/MAZ, or as a separate document; b. The location and type of project erosion and sediment controls, the effectiveness of which is assessed via EOR003 Environmental Inspections and Auditing procedures; c. A maintenance and inspection schedule, which ensures the frequency of ESCP control inspection increases when intense rainfall/adverse climatic conditions are present/forecast (greater than 10mm rain is forecast with a 24 hour period). The Contractor/MSP is responsible for ensuring any defects are resolved; d. Unless directed otherwise by ElectraNet, temporary control measures must be removed by the Contractor/MSP upon project completion. e. All materials must be removed from site and disposed of by the Contractor/MSP.
4.	Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.

Table 12 EOR009: Water Quality Protection/Erosion and Sediment Control Actions

3.10 EOR010 Dust Suppression and Air Quality

The Contractor/MSP is responsible for the identification and implementation of appropriate dust minimisation and air quality protection control measures for the project/maintenance.

See Table 13 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Ensure the proximity to residences/sensitive receptors is captured, and incorporate into CEMP/AMEMP/Procedures. d. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures. <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
CEMP/AMEMP Requirements	
2.	<p>Plant/Equipment Aspects</p> <p>Project /maintenance specific controls to manage these aspects, must as a minimum include:</p> <ul style="list-style-type: none"> a. Monitor climatic conditions, and incorporate into project/maintenance planning; b. Avoid or minimise dust-generating activities during dry and windy conditions (i.e. when dust is observed becoming airborne); c. Remain on approved tracks/roads at all times; d. Manage heavy plant usage/speeds to minimise dust generation; e. Ensure plant is maintained according to manufacturer's specifications (to minimise exhaust emissions).

Action No.	Action Detail
3.	<p>Sediment/Materials Management</p> <p>Controls to manage these aspects must as a minimum include:</p> <ul style="list-style-type: none"> a. Minimise the extent of exposed and stripped surface areas within the CAZ/MAZ, as applicable; b. Assess stockpiled materials and implement stabilisation measures where left for extended durations, or required by local/state regulations; c. Where available, utilise water carts for dust suppression.
4.	<p>Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.</p>

Table 13 EOR010: Dust Suppression and Air Quality Actions

3.11 EOR011 Hydrocarbon, PCB and Chemical Storage and Handling

The Contractor/MSP is responsible for ensuring the transportation, storage, usage and disposal of all hydrocarbons, PCBs and chemicals is effectively managed during construction/maintenance activities. **Note this includes any containers containing residues**, which must be managed as per EOR013 Waste Management requirements.

See Table 14 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Prior to undertaking construction/maintenance works, identify all hydrocarbons and chemicals considered likely to be used during project activities and stored on site (inclusive of any information on PCBs or SF₆ supplied by ElectraNet); d. Develop and maintain an up to date, hard-copy Safety Data Sheet (SDS) register with a hard-copy SDS for all chemicals used or stored on site. As a minimum, this register and all SDSs must be available near the site chemical storage area. Note access to electronic registers alone is not acceptable (see Action 3.e below); <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Transportation	
2.	Ensure fuel and chemical transportation complies with relevant obligations (Dangerous Goods placarding, appropriately licensed contractors etc.).
Storage	
3.	<p>Storage facilities must:</p> <ul style="list-style-type: none"> a. Not be located within 5m of No Go Zones within the CAZ/MAZ; b. Be bunded in accordance with Australian Standard AS1940; c. Prevent stormwater/rainwater ingress; d. Have a fit-for-purpose spill kit available in case of spills (see EOR018 Emergency Management for more information); e. Include a current hard-copy SDS register at the site storage area/s; f. Be captured on workplace inspection checklists to identify and resolve defects/issues, (see EOR003 Environmental Inspections and Auditing).
Handling	

Action No.	Action Detail
4.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Ensure all safety related requirements are understood and fully implemented; b. Where practicable, ensure fuel/chemical containers are stored on drip trays/temporary bunds when not within the site chemical store/cupboard.
Disposal	
5.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Treat fuel and chemicals containers with residues as a regulated waste: segregate from other waste streams and manage according to local/state regulations (e.g. in SA these require current versions of waste tracking forms); b. Ensure electronic copies of waste tracking/disposal forms are supplied to ElectraNet, who will ensure these are loaded into SAP (for each asset); c. Where fuel or chemical spills occur on site, implement spill response procedures, and segregate recovered product and soil etc. for appropriate disposal (see EOR018 Emergency Management for more information).
6.	Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.

Table 14 EOR011: Hydrocarbon, PCB and Chemical Storage and Handling Actions

3.12 EOR012 Noise and Visual Amenity

The Contractor/MSP is responsible for ensuring that construction/maintenance activities are managed to minimise noise generation and visual impacts, and the risk of associated incidents.

See Table 15 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into applicable CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Ensure the proximity to residences/sensitive receptors is captured, and incorporate into CEMP/AMEMP/Procedures; d. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Noise Management	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Ensure all vehicles, plant and equipment have appropriate noise attenuation measures fitted, and are effectively maintained to minimise noise generation; b. Notify ElectraNet and nearby (potentially) affected landholders, at least 3 days prior to commencement of activities outside normal working hours; c. Where activities are to be undertaken outside normal working hours, ensure noisy activities do not occur; d. Schedule noisy operations in the middle of the day where practicable, where the likelihood of temperature inversion is minimised.
Visual Amenity	
3.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Where residential facilities/sensitive receptors are within line-of-sight of the CAZ/MAZ, minimise impacts associated with lighting by use of barriers, light placement, etc.; b. Maintain high housekeeping standards on the CAZ/MAZ area; c. Minimise the generation of nuisance dust associated with vehicle movements and construction/maintenance activities.

Action No.	Action Detail
4.	Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.

Table 15 EOR012: Noise and Visual Amenity Actions

3.13 EOR013 Waste Management

The Contractor/MSP is responsible for ensuring that construction/maintenance activities are managed to minimise waste generation, maximise recycling/recovery and comply with statutory obligations (as applicable).

Note that onsite co-mingling of combustible wastes for energy recovery, where managed within a recognised regulatory framework, is an acceptable method for achieving improved waste management outcomes.

See Table 16 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific ‘special requirements’; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Waste Inventory / Management	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Conduct an inventory of all solid and liquid wastes likely to be generated during the project or full contract/activity lifecycle. Note this includes hazardous/regulated wastes (e.g. septic tank liquids) etc.; b. Identify the statutory requirements for each waste stream identified in a. in terms of segregation, energy recovery, disposal and tracking; c. Ensure sewage and associated wastewater is managed to prevent environmental impact, and to meet regulatory requirements. As a minimum, verify using inspection checklists; d. Outline procedures for each waste stream within the CEMP/AMEMP.

Action No.	Action Detail
Waste Segregation	
3.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. As a minimum, segregate hazardous/regulated wastes from other waste streams, and ensure statutory requirements (e.g. tracking forms) are met. Examples include waste chemicals, associated containers with residues, spent fuel/oil filters etc. Ensure tracking forms/documentation are maintained via the CEMP/AMEMP; b. Where non-hazardous/regulated waste streams are used for energy recovery, these may be co-mingled on site: Note this must be documented within the CEMP/AMEMP; c. Where segregation on site is required (e.g. where used for separate plastic, cardboard, paper recycling) co-mingling of recyclable wastes must not occur. Provide suitable receptacles and document within the CEMP/AMEMP/ Procedures; d. Ensure all receptacles/bins containing food wastes or wastes able to become windblown, have lids/covers.
Waste Performance/Key Performance Indicators (KPIs)	
4.	<p>The Contractor/MSP must track waste management performance on a project/contract level (in tonnes), and provide the following to ElectraNet upon request:</p> <ul style="list-style-type: none"> a. % of total wastes sent to landfill (mass); b. % of total wastes recycled/recovered (segregated for reuse/energy recovery etc.); c. Records of hazardous/regulated waste tracking documentation.
5.	<p>Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.</p>

Table 16 EOR013: Waste Management Actions

3.14 EOR014 Site Access / Easement Management

The Contractor/MSP is responsible for ensuring that all site access/easement management protocols for project/maintenance activities are identified and adhered to. All Contractor/MSPs **must** be aware that the effective management of such obligations, and landholder relationships, is of critical importance and must be incorporated into the CEMP/AMEMP.

See Table 17 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Landholder Notifications/Management	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Contact landholders within prescribed notification periods to communicate key information (commencement date, project/maintenance scope, expected completion date etc.); b. Generate and record notifications from and within ElectraNet Connect; c. Comply with applicable Acts and Regulations (note jurisdictional obligations may vary); d. Adhere to applicable, negotiated site access agreements at all times when on site, and document within the CEMP/AMEMP/Procedures; e. Where alternative site access arrangements have been negotiated between the Contractor/MSP and landholder, these must be communicated to ElectraNet.
3.	<p>Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.</p>

Table 17 EOR014: Site Access/Easement Management Actions

3.15 EOR015 Water Management

The Contractor/MSP is responsible for implementing practices to ensure water management associated with construction and maintenance activities is efficient, and meets relevant compliance obligations. **Therefore it is a requirement that the Contractor/MSP develop basic metrics on water use efficiency to demonstrate performance.**

See Table 18 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Confirm that stated water sources are available and sufficient for all project/maintenance requirements; d. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Water Sources/Usage	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Document in the project CEMP/AMEMP the source(s) of all non-mains water required to deliver project/maintenance outcomes (inclusive of dust control); b. Where mains water is not available, obtain and manage all necessary approvals/permits/licenses to extract groundwater/surfacewater prior to site mobilisation; c. Under no circumstances obtain or extract surface or groundwater without consent/approval from ElectraNet. d. Where volumetric/other limits apply, monitor usage and coordinate reporting to demonstrate compliance; e. Maintain copies of all approvals/permits/licenses and reporting within the CEMP/AMEMP, and make these available to ElectraNet upon request.
Water Use Efficiency/Reporting	

Action No.	Action Detail
3.	The Contractor/MSP must capture and report to ElectraNet the following KPIs that relate to water use efficiency: <ul style="list-style-type: none"> a. Total water usage in Kilolitres (KL) for the following: <ul style="list-style-type: none"> i. Construction: upon project completion; ii. Asset Maintenance: on an annual AMEMP performance report; b. The % of total water usage from recycled water sources (e.g. from site rainwater/stormwater harvesting or other sources); c. Initiatives to improve water use efficiency on a project/contract level (e.g. rainwater tanks, high efficiency showerheads).
4.	Ensure audits of water management are included in site auditing checklists (refer to Table 4 EOR003: Environmental Inspection and Audit Actions).
5.	Report any incidents/non-conformances or hazards via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.

Table 18 EOR015: Water Management Actions

3.16 EOR016 Concrete Plant and Equipment Wash Down

The Contractor/MSP is responsible for implementing practices to ensure the management of concreting activities prevents adverse environmental impacts and meets compliance obligations.

See Table 19 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Contractor/MSP Requirements	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Identify appropriate site/s[#] for concrete washdown pits within the CAZ/MAZ, avoiding No Go Zones, drainage corridors etc.; b. Construct washdown pits with liners to minimise seepage: incorporate any local/state/federal specifications that may apply; c. Only use washdown pits for concrete waste streams: no other wastes are permitted to be placed within them; d. Include washdown pit management in site inspection/auditing checklists (refer to EOR003 Environmental Inspections and Auditing); e. At project completion, decommission all facilities and excavate materials (inclusive of liner/s) for appropriate disposal; f. Report any near misses/incidents via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards. <p><i># When working on easements etc. it may be necessary to establish multiple washdown pit locations (to minimise plant and equipment movements). Ensure all sites are approved by ElectraNet and in accordance with landholder agreements and approval requirements (as applicable).</i></p>

Table 19 EOR016: Concrete Plant and Equipment Wash-down Actions

3.17 EOR017 Equipment Maintenance Activities

The Contractor/MSP is responsible for implementing practices to ensure equipment maintenance activities do not cause adverse environmental impact, and comply with relevant legislative requirements.

See Table 20 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Contractor/MSP Requirements	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Ensure all scheduled maintenance tasks/repairs occur off-site where practicable; b. Where impracticable, ensure these activities occur in a nominated section of the CAZ/MAZ that will prevent environmental impact (away from drainage corridors, No Go Zones etc.); c. Refuel plant and equipment off-site where possible: where not feasible ensure containment controls are used (spill trays etc.); d. Ensure hazardous/regulated wastes are managed appropriately (e.g. filters, waste oil). Document within the CEMP/AMEMP; e. Report any near misses/incidents via EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards.

Table 20 EOR017: Equipment Maintenance Actions

3.18 EOR018 Emergency Management

The Contractor/MSP is responsible for ensuring appropriate emergency management measures for project/maintenance activities are understood and implemented.

See Table 21 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Contractor/MSP Requirements	
2.	<p>The Contractor/MSP must capture the following minimum information and incorporate into the CEMP/AMEMP and Training and Site Induction Plan:</p> <ul style="list-style-type: none"> 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.
Incident Response – Environmental Incidents	
3.	<p>In the event of a spill or emergency incident, the Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Implement approved emergency response procedures, ensuring safety of all persons is the highest priority; b. Verbally notify ElectraNet within 1 hour of incident occurrence; c. Lodge the incident into the electronic Incident Management System (IMS) within 24 hours of incident occurrence[#] (see EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards); d. Prepare a detailed incident report within a timeframe agreed with ElectraNet where applicable. <p><i># Note where the on-line system is unavailable, ensure a hard copy form is provided to ElectraNet within 24 hours</i></p>

Table 21 EOR018: Emergency Management Actions

3.19 EOR019 External Complaints Management

The Contractor/MSP is responsible for ensuring appropriate responses to complaints associated with project/maintenance activities are understood and implemented.

Complaint related feedback from external stakeholders can be highly significant and requires strict management. Therefore please ensure external complaints are lodged into the electronic **Incident Management System (IMS)**.

See Table 21 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Note in particular the proximity of residential properties and other sensitive receptors, and incorporate into relevant site procedures; d. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Sensitive Receptors	
2.	<p>The Contractor/MSP must capture the following minimum information, and incorporate into the CEMP/AMEMP and Training and Site Induction Plan:</p> <ul style="list-style-type: none"> a. Record the separation distance between the CAZ/MAZ and the nearest residential property/sensitive receptor in the CEMP/AMEMP and related documentation; b. Capture this information in the Training and Site Induction Plan to ensure awareness of all workers; c. As necessary, modify site procedures to minimise the potential for complaints to occur (e.g. use of water-carts/speed reductions to suppress dust generation).
Responding to Complaints	

Action No.	Action Detail
3.	<p>In the event of an external complaint, the Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Notify the Landholder Liaison Coordinator; b. Respond positively and respectfully at all times, and refer the complainant to ElectraNet; c. Verbally notify ElectraNet within 1 hour of receiving the complaint, or awareness of occurrence, outlining factual information; d. Implement corrective actions to resolve the cause where possible; <ul style="list-style-type: none"> i. Obtain/compile factual information, and lodge the incident into the electronic system within 24 hours of incident occurrence[#]. (see EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards). Include the following details: Name, address and contact details of complainant; ii. Details (complaint details, time, other factual information); iii. Corrective action taken; iv. CEMP/AMEMP amendments; f. Prepare a detailed incident report to ElectraNet within an agreed timeframe; g. Note where external reporting is required, this will be coordinated by ElectraNet; h. Maintain records (including ‘communications’ within ElectraNet Connect) and provide to ElectraNet upon request. e. <i># Note where the on-line system is unavailable, ensure a hard copy form is provided to ElectraNet within 24 hours</i>

Table 22 EOR019: External Complaint Management Actions

3.20 EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards

The Contractor/MSP is responsible for implementing procedures to identify, manage and report **environmental incidents/near-misses**, audit related **non-conformance** and corrective action requirements, and **hazards** associated with construction/maintenance activities.

3.20.1 Environmental Incidents/Near Misses

ElectraNet has developed an online Incident Management System (IMS) to facilitate effective reporting of **actual** incidents and **near misses** (see Glossary). Contractors/MSPs **must** use IMS where access has been enabled: alternatively an interim hard copy form is available where technical issues restrict access.

See Table 23 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional Local/State/Federal requirements for these aspects, and incorporate these into project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP/AMEMP and associated procedures.
Environmental Incidents	

Action No.	Action Detail
2.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> a. Liaise with ElectraNet to facilitate access to the online IMS[#] system before project/maintenance activities commence; b. Appoint a representative/s to enter environmental incidents and near misses; c. Verbally report Environmental incidents/near misses to ElectraNet within 1hr of occurrence, or awareness of occurrence, outlining factual information; d. Obtain/compile factual information, and lodge the incident/near miss into the IMS within 24 hours of incident/near miss occurrence[#]. Include the following details: <ol style="list-style-type: none"> i. Whether an ElectraNet, contractor or public incident/near miss; ii. Incident/near miss type; iii. Incident/near miss sub-type (e.g. water related, chemical /hydrocarbon spill etc.) via checkboxes. Note multiple boxes can be selected; iv. Details (witness, are watercourses involved, spill volume etc.); v. Corrective action taken (immediate/other). e. Submit a detailed incident report, which may include an estimate of approximate clean-up costs, to ElectraNet within an agreed timeframe (where applicable): Note where external reporting is required, this will be coordinated by ElectraNet; f. Incorporate reporting of environmental incidents and near-misses into EOR003 Environmental Inspections and Auditing procedures; g. Capture this information in the CEMP/AMEMP and Training and Site Induction Plan to ensure awareness of all workers; h. Maintain records and provide to ElectraNet upon request. <p>[#] Note where online access is not enabled or unavailable, use of the hard copy form is an acceptable interim solution. This form is available via the ElectraNet Extranet. Complete and submit to ElectraNet.</p>

Table 23 EOR020 (a): Environmental Incident/Near Miss Management

3.20.2 Environmental Non-conformance/Corrective Action Management

The Contractor/MSP is responsible for **addressing non-conformances and corrective actions raised by ElectraNet within agreed timeframes**. This is managed via ElectraNet’s online tool for these requirements.

See Table 24 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state/Federal requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific ‘special requirements’; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP/AMEMP and associated procedures.
Non-conformance/Corrective Action Management	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Liaise with ElectraNet to facilitate access to the online auditing system before project/maintenance activities commence; b. Appoint a representative/s to coordinate Contractor/MSP actions within ElectraNet’s online auditing system: arrange training as required to fulfil obligations; c. Incorporate EOR003 Environmental Inspections and Auditing procedures with project/activity non-conformance/corrective actions; d. Verbally report environmental non-conformances to ElectraNet within 1hr of identification, outlining factual information; e. Ensure non-conformances are reported in the on-line tool within 24hrs; f. Address actions within timeframes agreed with ElectraNet, and undertake investigations as required; g. Capture this information in the CEMP/AMEMP and Training and Site Induction Plan to ensure awareness of all workers; h. Maintain records and provide to ElectraNet upon request.

Table 24 EOR020 (b): Non-conformance and Corrective Action Management

3.20.3 Environmental Hazard Management

The Contractor/MSP must ensure that environmental hazards (see Glossary) identified during project/maintenance activities are recorded, reported and managed effectively.

The process is managed via ElectraNet’s SAP system, which is accessible via the Grazer interface tool.

See Table 25 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state/Federal requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific ‘special requirements’; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP/AMEMP and associated procedures.
Environmental Hazards	

Action No.	Action Detail
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Liaise with ElectraNet to facilitate access to the SAP system before project/maintenance activities commence; b. Appoint a representative/s to enter environmental hazards: request training as required from ElectraNet; c. Verbally report environmental hazards to ElectraNet within 1hr of identification, outlining factual information; d. Obtain/compile factual information, and enter the hazard into the SAP system via the Grazer interface tool, within 24 hours [#]. Include the following details: <ul style="list-style-type: none"> i. ElectraNet asset/s details; ii. Date/time etc.; iii. Hazard sub-type (water related, chemical/hydrocarbon spill etc.) via the online form; iv. Corrective action taken (immediate/other); v. Other data fields as required. e. Incorporate reporting of environmental hazards into EOR003 Environmental Inspections and Auditing procedures; f. Capture this information in the CEMP/AMEMP and Training and Site Induction Plan to ensure awareness of all workers; g. Maintain records and provide to ElectraNet upon request.

Table 25 EOR020 (c): Environmental Hazard Management

3.21 EOR021 Fire Management

The Contractor/MSP is responsible for implementing practices to manage fire related hazards associated with project/maintenance activities, and complying with relevant legislative requirements.

See Table 26 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state/Federal requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP/AMEMP and associated procedures.
Scheduling/Notifications	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Liaise with fire management authorities and provide notification of the planned commencement date of project/maintenance activities; b. Provide a schedule identifying locations of proposed activities (more relevant for projects/maintenance involving activities along transmission lines) to ElectraNet; c. Develop protocols relating to vehicle and machinery use and site access restrictions during times of increased fire risk (e.g. in SA refer to CFS website www.cfs.org.au for fact sheets); d. Provide and maintain emergency services contact details in the CEMP/AMEMP and all on site vehicles and facilities (e.g. site huts); e. Capture this information in the CEMP/AMEMP and Training and Site Induction Plan to ensure awareness of all workers.
Risk Management	
3.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Ensure all vehicles/plant powered by internal combustion engines have spark arresters fitted to exhaust pipes; b. Consider usage of diesel powered vehicles and plant (to mitigate ignition risks); c. Ensure risk assessments include project/maintenance specific aspects (climate/seasonal factors; fuel load conditions; ignition sources such as grinding, welding, smoking etc.); d. Ensure all vehicles/trucks are fitted with first response firefighting equipment (fire extinguisher(s), water spray/knapsack etc.), and personnel are trained and competent; e. Ensure access to larger portable firefighting equipment and water storage if site and/or weather risk dictates; f. Maintain records and provide to ElectraNet upon request.

Table 26 EOR021: Fire Management Actions

3.22 EOR022 Vibration Management

The Contractor/MSP is responsible for implementing practices to manage potential vibration impacts associated with project/maintenance activities, and complying with relevant legislative requirements.

See Table 27 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional Local/State/Federal requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Note in particular the proximity of residential properties and other sensitive receptors, and incorporate into relevant site procedures; d. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Planning	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. consider the following factors when developing mitigation and control measures for vibration impacts: <ul style="list-style-type: none"> i. Frequency of activities; ii. Intensity; iii. Time of day and duration; iv. The combination of contributing sources; v. The location of affected sensitive receptors; vi. Proximity of habitats known to contain threatened fauna. b. Where practicable, schedule works to avoid vibration operations outside normal construction hours in accordance with regulatory requirements; c. Where works are proposed to be undertaken outside of normal construction hours, the Contractor/MSP must notify ElectraNet and nearby (potentially) affected landholders at least 3 days prior to commencement of works; d. Capture this information in the CEMP/AMEMP and Training and Site Induction Plan to ensure awareness of all workers.

Action No.	Action Detail
Risk Management	
3.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Where at risk buildings/structures within the potential zone of influence are identified in consultation with ElectraNet, these must be surveyed: <ul style="list-style-type: none"> i. Prior to the start of construction/maintenance activities; ii. Upon completion of construction/maintenance activities; iii. Maintain records and provide to ElectraNet upon request.

Table 27 EOR022: Vibration Management Actions

3.23 EOR023 Soil Contamination

It is the responsibility of ElectraNet to identify potential soil contamination before project commencement. Where identified/suspected, ElectraNet will manage the initial sampling and testing phase, and communicate this information to the Contractor/MSP prior to construction/maintenance activities commencing. The Contractor/MSP is then responsible for the management of the soil contamination, including stockpiling, disposal and remediation (unless otherwise agreed with ElectraNet).

See Table 28 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state/Federal requirements for these aspects, and incorporate these into the CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Note: All Substations are classified as Potentially Contaminating Activities (PCAs) under the SA Environment Protection Authority (EPA) Regulations. Therefore no soil must be relocated or removed from an ElectraNet substation without an appropriate waste classification having been undertaken, which determines the disposal pathway. This is a legal requirement.</p> <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Contaminated Soil Management	

Action No.	Action Detail
2.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> a. Incorporate confirmed, existing soil contamination information (as supplied by ElectraNet) into site activities (to reduce disturbance, removal etc.); b. Where potential contaminated soil is identified, assume responsibility for investigation, sampling and testing in consultation with ElectraNet; c. Where a spill or related project/maintenance incident that threatens soil contamination occurs, implement the incident and/or hazard reporting procedures outlined in EOR020 Environmental Incidents/Near Misses, Non-conformance and Hazards; d. Provide Waste Tracking Certificates for all contaminated soil that is sourced from substations and or project sites; e. Ensure fit for purpose spill kits and procedures are available, and that personnel are trained and competent in their use; f. Capture this information in the CEMP/AMEMP and Training and Site Induction Plan, to facilitate awareness/implementation of all workers.

Table 28 EOR023: Soil Contamination Management Actions

3.24 EOR024 Asbestos Management

It is the responsibility of ElectraNet to provide (where applicable) the Contractor/MSP with the asset asbestos register prior to construction/maintenance works commencing. Following this, the Contractor/MSP assumes responsibility for managing asbestos related matters (see ACM/ASD in the Glossary) during project/maintenance activities.

See Table 29 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state/Federal requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific 'special requirements'; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> d. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet) and other environmental operating requirements are incorporated into the CEMP and associated procedures.
Contractor/MSP Requirements – Asbestos Management	
2.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Incorporate confirmed, existing asbestos containing materials (as supplied by ElectraNet) into site activities (to reduce disturbance, worker exposure, removal, non-compliant disposal etc.); b. Where potential asbestos materials are identified, assume responsibility for investigation, sampling and testing in consultation with ElectraNet; c. Where new asbestos containing materials are confirmed, ensure this information is supplied to ElectraNet who will update the site asbestos register. Report as required; d. Where asbestos containing materials are to be removed and disposed, ensure tracking/disposal documentation is supplied to ElectraNet; e. Capture this information in the CEMP/AMEMP/Training and Site Induction Plan to allow implementation/awareness of all workers.

Table 29 EOR024: Asbestos Management Actions

3.25 EOR025 SF6 Management

The Contractor/MSP is responsible for implementing practices to effectively manage the storage, handling, use, re-use and (where applicable), the disposal of Sulphur Hexafluoride (SF₆) gas and associated waste products, according to applicable regulatory and ElectraNet requirements.

Given the harmful greenhouse gas properties of SF₆, ElectraNet is committed to reducing the loss of this constituent associated with its assets. Accurate and timely reporting of confirmed SF₆ losses, and associated recharge and maintenance requirements, contribute to ElectraNet’s commitment to reducing the environmental impact of its activities.

See Table 30 below for minimum environmental operating requirement actions. It is the responsibility of the Contractor/MSP to understand additional local/state/Federal requirements for these aspects, and incorporate these into the project CEMP/AMEMP/Procedures.

Action No.	Action Detail
Planning	
1.	<p>The Contractor/MSP must:</p> <ul style="list-style-type: none"> a. Prior to undertaking any site visit, check ElectraNet Connect for any property specific ‘special requirements’; b. Prior to undertaking any site visit, check ElectraNet SAP for any property/site specific active environmental notification; c. Incorporate the latest SDM considerations as supplied by ElectraNet; d. Where site/property conditions are outside the scope of the CEMP/AMEMP, the Contractor/MSP will develop specific environmental controls and update documentation/procedures; <p>Construction specific requirement ONLY:</p> <ul style="list-style-type: none"> e. Undertake a construction site inspection, prior to site works, to ground-truth site conditions and verify project specific approval conditions (where provided by ElectraNet and other environmental operating requirements are incorporated into the CEMP/AMEMP and associated procedures.
Contractor/MSP Requirements – SF₆ Management	

Action No.	Action Detail
2.	<p>The Contractor/MSP must:</p> <ol style="list-style-type: none"> a. Conduct a risk assessment of the project/maintenance scope of works, and identify and document appropriate control strategies and procedures to manage these risks; b. Ensure that a current hard-copy SDS is available in the site SDS Register, and personnel are aware of its location and content; c. Ensure that SF₆ is stored, transported and handled according to applicable standards; d. Ensure that losses of SF₆ resulting from asset installation / maintenance are recorded and submitted to ElectraNet for inclusion in NGER accounting; e. Where practicable, recycling of SF₆ is preferable to disposal: consider recycling as an option and document status; Where SF₆ is to be disposed, ensure waste tracking/disposal documentation is supplied to ElectraNet; f. Capture this information in the CEMP/AMEMP/Training and Site Induction Plan to facilitate awareness/implementation.

Table 30 EOR025: SF₆ Management Actions

4. Contractor/MSP Management

Assurance of environmental protection relevant to contractor works, including subcontractors, is considered essential to the effectiveness of the CEMP/AMEMP, and overall environmental management remains the responsibility of the Contractor/MSP. The Contractor/MSP must document and maintain detailed records of the inspections undertaken and administration and implementation of the CEMP/AMEMP, and provide this to ElectraNet at project/contract completion or upon request.

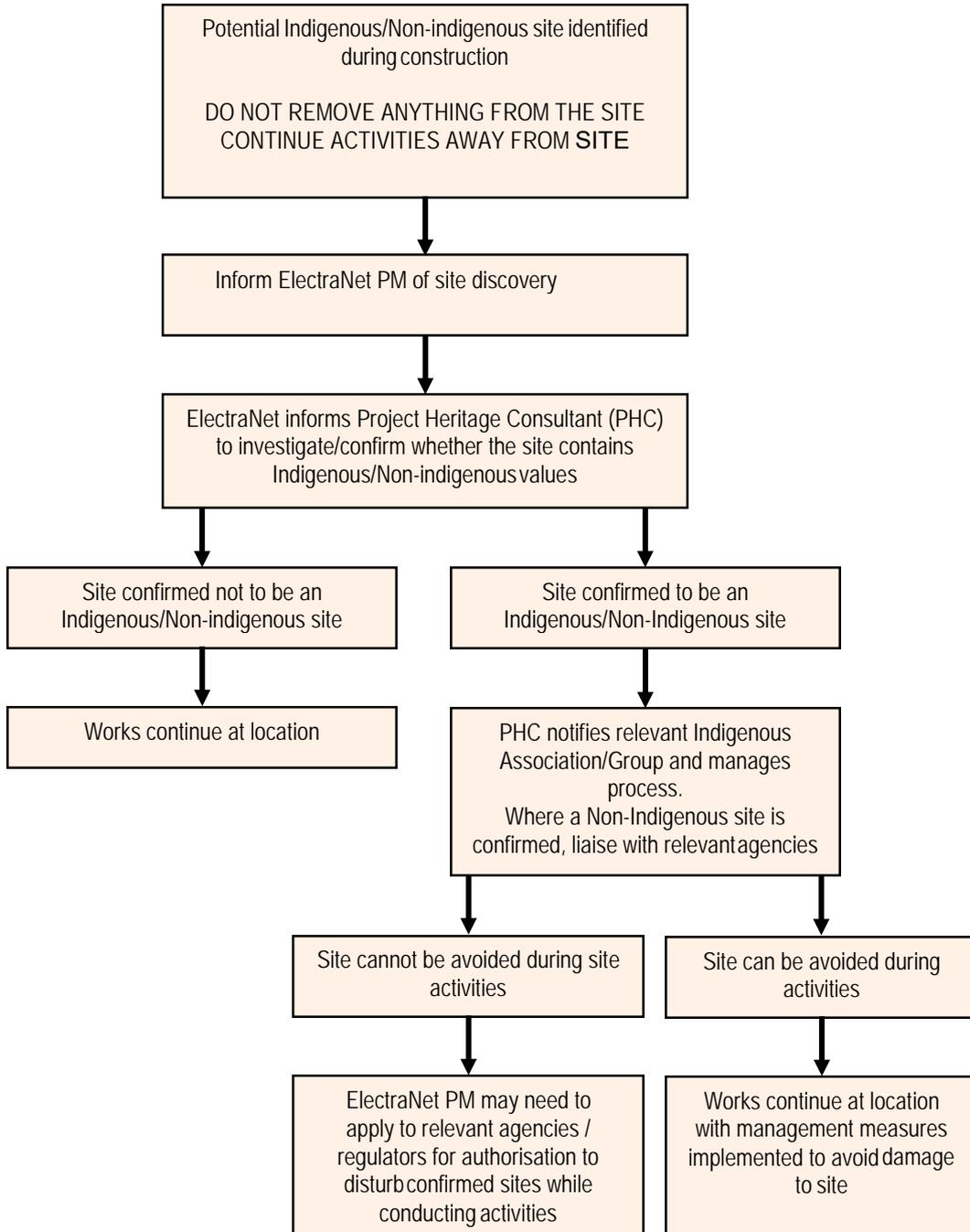
The Contractor/MSP and their subcontractors have a responsibility to be aware of, and maintain compliance with, all relevant Legislation (see Compliance Requirements).

5. Cost of Compliance

The Contractor/MSP must comply with ElectraNet's EORs and relevant legislation, and Tenderers must make allowance for this in their Tender submission/proposal. The total Tender price will be deemed to include allowance for complying with ElectraNet's Environmental Operating Requirements and all relevant legislation, including codes of practice, standards and guidelines, specific to the jurisdiction/s within which the project/maintenance contract activities are conducted.

6. Appendices

6.1 Appendix A: Indigenous and Non-Indigenous Heritage Reporting



6.2 Appendix B: Environmental Incident Reporting Form

ElectraNet				
Environmental Incident Notification Form				
1. Incident Details				
Date:		Time: am/pm		
Incident Associated With/Reported By: <input type="checkbox"/> Contractor <input type="checkbox"/> ElectraNet Employee <input type="checkbox"/> General Public				
Incident Type? <input type="checkbox"/> Actual <input type="checkbox"/> Near Miss ¹ (,e.g. cracked bund; faulty/unmaintained wastewater pump; trench/void left open overnight or un-checked (pre-start))				
Incident Sub Type:				
<input type="checkbox"/> Water related: (Erosion; sedimentation; stormwater management)	<input type="checkbox"/> Chemical / hydrocarbon spill	<input type="checkbox"/> Complaint (e.g. stakeholder complaint relating to environmental matter)	<input type="checkbox"/> Environmental licence / authorisation breach	<input type="checkbox"/> Uncontrolled air emission (e.g. SF ₆ , significant dust generation)
<input type="checkbox"/> Fire/explosion	<input type="checkbox"/> Protected/native vegetation clearance or damage	<input type="checkbox"/> Damage to cultural heritage items/area	<input type="checkbox"/> Excessive Noise	<input type="checkbox"/> Fauna Injury
<input type="checkbox"/> Noxious/weed identification or spread	<input type="checkbox"/> Soil contamination	<input type="checkbox"/> Unapproved land disturbance	<input type="checkbox"/> Crop damage	<input type="checkbox"/> Other ² (please specify)
Watercourse Impact ³ ?		<input type="checkbox"/> Yes <input type="checkbox"/> No (³ any watercourse, whether flowing/dry)		
Volume Spilled/Area Impacted?		<input type="checkbox"/> N/A or	<input type="text"/> Litres (l) and	<input type="text"/> Area Impacted (m ²) as applicable
Risk Rating (refer to Risk Matrix on next page)		<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low		
High Potential Incident?		<input type="checkbox"/> Yes <input type="checkbox"/> No		
Externally Notifiable Incident? ⁴ (e.g. EPA)		<input type="checkbox"/> Yes <input type="checkbox"/> No (⁴ external notification by ElectraNet SQE Manager or delegate only)		
2. Additional Incident Details				
Incident Location:		Project Number:		
Describe what happened and how ²				
3. Details of Reporter/Witness				
Name:		Phone: (H) (W)		
Address:				
4. Immediate Action Taken				
Action Taken:				
Action Taken By:				
5. Contact Details (internal communication)				
Send to: SQE Manager		From:		
Address: Level 2 300 Pirie Street Adelaide		Company:		
Fax: 08 84047946		Telephone No:		
Email: environment.enet@electranet.com.au		Email:		
<small>Security Classification: Internal Distribution: All Workers Date: 4 May 2018</small>		<small>6-FR01-P03-F-003 Version 2.0 Page 1 of 2</small>		

6.3 Appendix C: ElectraNet's Corporate Risk Management Tables

Consequence Criteria

A consequence level should be chosen on the basis of the expected impact on ElectraNet and its Stakeholders taking into account current controls and their effectiveness. The highest of the relevant consequence types should be used to give the level that represents the risk.

Likelihood Criteria

A likelihood category should be chosen on the basis of the chance that ElectraNet or its stakeholders could be affected at the chosen level of consequence.

Level	Safety	Financial (EBITDA)	Management impact	Environment	Network availability	Reputation	Legal
6	More than one fatality	> \$100M loss or gain	Long term significant impact on the business that requires considerable Executive Management time to handle over years.	Very serious, long-term environmental impairment of ecosystem or damage to a species. Complete loss of trust by affected community leading to long term social unrest and outrage. Prolonged community outrage. Impacts viability of the business.	> 2 systems hours. Network Projects – prolonged, widespread outages	Prominent international media coverage over several days. Shareholders disassociate themselves from ElectraNet. Changes to Executive Management	Major litigation or prosecution with damages/fines of >\$50M+ plus significant costs. Custodial sentence for an Executive. Major breach of regulatory obligations. Loss of transmission licence.
5	Fatality or multiple permanently disabled people.	>\$10M, <\$50M loss or gain	Disruptive event or with significant impact on the business that requires considerable Senior Management time to handle over many months.	Serious medium term environmental effects.	20 system minutes to 2 system hours. Network Projects - Major widespread outage.	National media coverage over several days. Government involvement. Shareholders and Board take control. Class action.	Major litigation or prosecution with damages or fines of >\$5M+ plus significant costs. Custodial sentence for a Manager
4	Permanent Disability (>20% loss key function).	>\$1M, <\$5M loss or gain	Will require the involvement of Executive Management and will take up all the time of Senior Managers for several weeks.	Moderate, short-term effects but not affecting ecosystem function. Long term community irritant leading to disruptive actions and requiring continual Management attention.	2 to 20 system minutes. Network Projects - Multiple unplanned outages.	State media coverage over several days. Involvement by Regulator and Shareholders. Persistent community complaints.	Litigation or prosecution costing >\$1M-\$5M. Investigation by regulatory body
3	Permanent Disability (<20% loss key function). Lost Time injury, >5 days to return to work.	>\$100K, <\$1M loss or gain	Could be managed with the careful attention of Management. Will involve Managers for several weeks.	Minor effects on biological or physical environment. Short term community outrage or longer term unrest and dissention.	0.5 to 2 system minutes. Network Projects - 1 project related unplanned outage.	State media coverage. Involvement of Regulator.	Major breach of regulation with punitive fine. Litigation involving weeks of Senior Management time.
2	Lost Time injury, <5 days to return to work.	>\$10K, <\$100K loss or gain	Will require some Management attention over several days.	Limited damage to minimal area of low significance. One off community protest requiring intervention and Management attention.	0.1 to 0.5 system minute. Network Projects - No unplanned outages with multiple approved planned outages used.	Local media coverage. One or two community complaints.	Breach of regulation with investigation or report to authority with prosecution and moderate fine
1	First Aid injury – return to work.	<\$10K loss or gain	Impact of event absorbed in normal Management activity.	Small impact. One complaint.	< 0.1 system minute. Network Projects - No unplanned outage but planned approved outages utilized.	Kept on site. No media or community interest	Minor legal issues, non-compliance and breaches of regulation.

Risk Matrix

The matrix should be used to determine the priority of attention to the risk.

Likelihood	F	Medium	Medium	High	Very High	Very High	Very High
	E	Low	Medium	High	High	Very High	Very High
	D	Low	Medium	Medium	High	Very High	Very High
	C	Low	Low	Medium	High	High	Very High
	B	Low	Low	Medium	Medium	High	Very High
	A	Low	Low	Low	Medium	High	High
		1	2	3	4	5	6
		Consequences					

Priority for Attention

Priority of attention and seniority of management sign-off for continued toleration of risks will be as shown below.

Priority	Suggested action	Suggested timing	Authority for continued toleration of residual risk
Very High	Where CE not as high as 'fully effective', take action to reduce residual risk to "high" or below	Short term. Normally within 1 month.	CEO and Board
High	Plan to deal with in keeping with the business plan.	Medium term. Normally within 3 months.	Executives
Medium	Plan in keeping with all other priorities.	Normally within 1 year	Senior managers
Low	Attend to when there is an opportunity to.	Ongoing control as part of a management system.	All staff

Level	Criteria
F	<ul style="list-style-type: none"> >95% probability, or Impact is occurring now, or could occur within days to weeks
E	<ul style="list-style-type: none"> 50-95% probability, or probably will occur, or could occur within weeks to months
D	<ul style="list-style-type: none"> 20-50% probability, or may occur shortly but a distinct probability it won't, or could occur within months to years
C	<ul style="list-style-type: none"> 10-20% probability, or may occur but unlikely or could occur within the next few years
B	<ul style="list-style-type: none"> 1-10% probability, or may occur but very unlikely could occur within decades
A	<ul style="list-style-type: none"> <1% probability occurrence requires exceptional circumstances and is unlikely, even in the long term only occurs as a "100 year event"

Control Effectiveness (CE)

The relative assessment of actual level of control that is currently present and effective compared with that reasonably achievable for that particular risk. CE will therefore be an indicator as to whether ElectraNet is doing all that it could or should to manage the risk.

Descriptor	Guide
Fully Effective	Nothing more to be done except review and monitor the existing controls. Controls are well designed for the risk, address the root causes and Management believes that they are effective and reliable at all times.
Substantially Effective	Most controls are designed correctly and are in place and effective. Some more work to be done to improve operating effectiveness or Management has doubts about operational effectiveness and reliability.
Partially Effective	While the design of controls may be largely correct in that they treat most of the root causes of the risk, they are not currently very effective. or Some of the controls do not seem correctly designed in that they do not treat root causes, those that are correctly designed are operating effectively.
Largely Ineffective	Significant control gaps. Either controls do not treat root causes or they do not operate at all effectively.
None or Totally Ineffective	Virtually no credible control. Management has no confidence that any degree of control is being achieved due to poor control design and/or very limited operational effectiveness.

Approved by:

Effective: June 2013