Native Vegetation Clearance

Princes Highway Site One Overtaking Lane

Data Report

Clearance under the *Native Vegetation Regulations 2017*

19 January 2022

Prepared by H. Merigot – EBS Ecology (NVC Accredited Consultant)

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Version 2

Prepared by EBS Ecology for WSP Pty Ltd

Document Control					
Revision No.	**Date issued**	**Authors**	**Reviewed by**	**Date Reviewed**	**Revision type**
1	7/12/2021	H. Merigot (NVC Accredited Consultant)	Dr M. Louter	7/12/2021	Draft
2	19/01/2022	H. Merigot	-	-	Final

Distribution of Copies			
Revision No.	**Date issued**	**Media**	**Issued to**
1	08/12/2021	Electronic	Rebecca Wenzel, WSP Pty Ltd
2	19/01/2022	Electronic	Rebecca Wenzel, WSP Pty Ltd

EBS Ecology Project Number: EX200503B

Vegetation Survey number VS 2021/82

CITATION: EBS Ecology (2022) Native Vegetation Clearance Princes Highway Site One Overtaking Lane Data Report. Report to WSP Pty Ltd. EBS Ecology, Adelaide.

Cover photograph: Princes Highway roadside Vegetation

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Glossary and abbreviations

BAM	Bushland Assessment Method
BDBSA	Biological Database of South Australia (maintained by DEW)
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DEW	Department for Environment and Water (South Australia)
EBS	Environment and Biodiversity Services Pty Ltd (trading as EBS Ecology)
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ha	Hectare(s)
IBRA	Interim Biogeographical Regionalisation of Australia
km	Kilometre(s)
MM	Maintenance Marker
NatureMaps	Initiative of DEW that provides a common access point to maps and geographic information about South Australia's natural resources in an interactive online mapping format
NPW Act	*National Parks and Wildlife Act 1972*
NV Act	*Native Vegetation Act 1991*
NVC	Native Vegetation Council
PMST	Protected Matters Search Tool (under the EPBC Act; maintained by DAWE)
Project	Proposed overtaking lane along Princes Highway near Meningie.
Project Area	Location of the proposed overtaking lanes at Site 1 - Meningie
SA	South Australia(n)
Search Area	5 km buffer of the Project Area considered in the desktop assessment database searches
SEB	Significant Environmental Benefit
sp.	Species
ssp.	Sub-species
TEC	Threatened Ecological Community
var.	Variety (a taxonomic rank below that of species and subspecies, but above that of form)
VA	Vegetation Association(s)
WSP	WSP Pty Ltd (the Client)

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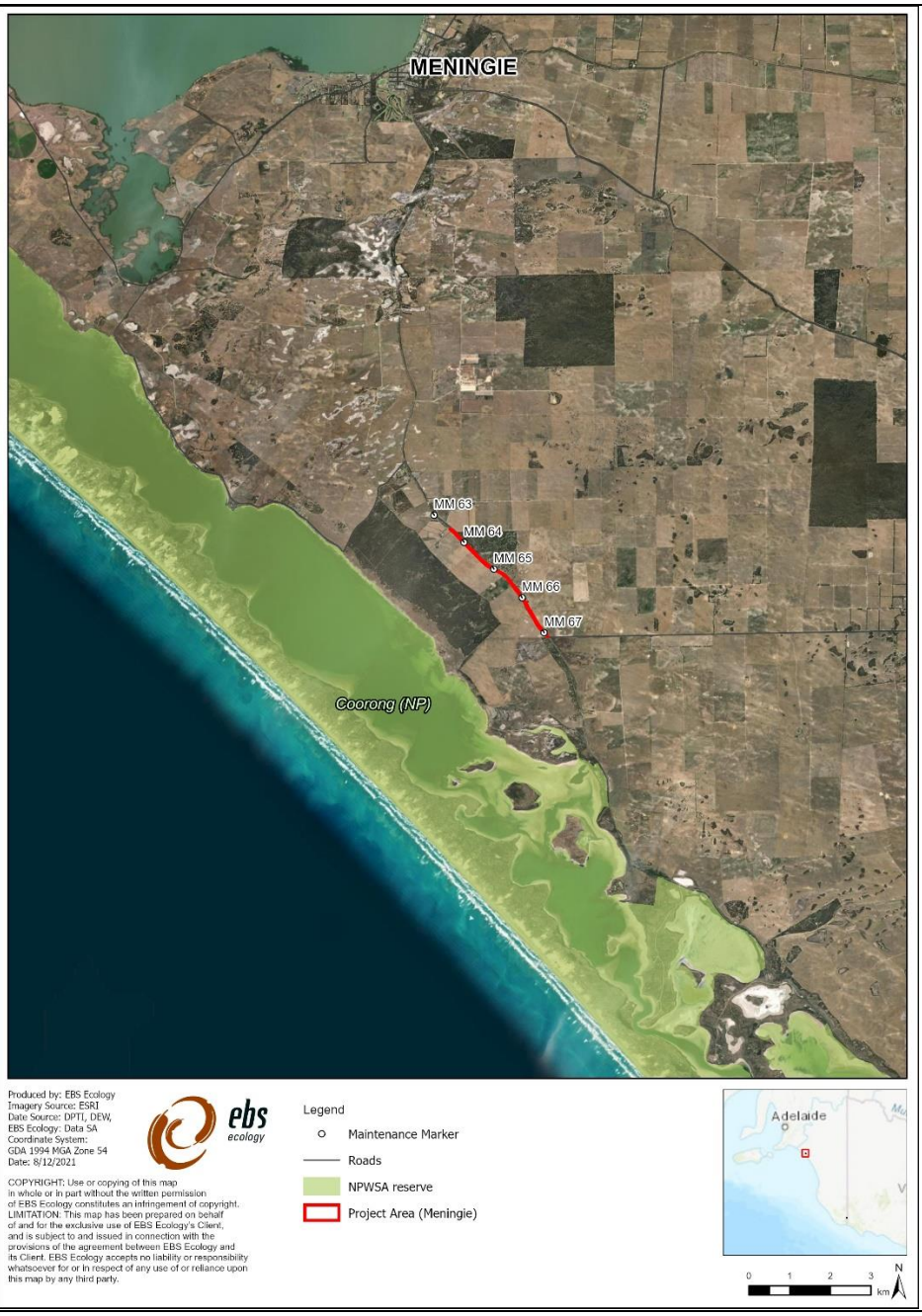
1. Application information

Table 1. Application details.

Applicant:	WSP Pty Ltd		
Key contact:	**Bill Zhang** [redacted]		
Landowner:	Department for Infrastructure and Transport		
Site Address:	1.7 km southbound (**Site 1a** - MM65.5 to MM67.2) + 1.5 km northbound (**Site 1b** - Maintenance Markers (MM) 63.6 to 65.1)		
Local Government Area:	Coorong District Council	**Hundred:**	Bonney
Title ID:	Road Reserve	**Parcel ID**	Road Reserve

Table 2. Summary of the proposed clearance.

Purpose of clearance:	Clearance is required to establish new overtaking lanes along Princes Highway.
Native Vegetation Regulation:	Regulation 12, Schedule 1: Clause 32 – Works on behalf of Commissioner of Highways
Description of the vegetation under application:	**4.478** hectares consisting of the following Vegetation Associations (VAs): Site 1b (Northbound): • **A1:** 1.376 ha of *Eucalyptus diversifolia* and *Eucalyptus incrassata* over *Acacia longifolia +/- Myoporum* sp. and *Olearia* sp. with mixed grassy understorey • **A3:** 0.917 ha of *Melaleuca lanceolata* with *Eucalyptus diversifolia* and *Eucalyptus incrassata* over *Kunzea pomifera* with mixed/exotic grassy understorey Site 1a (Southbound): • **B1a:** 1.183 ha of *Eucalyptus diversifolia* and *Eucalyptus incrassata +/- Eucalyptus leucoxylon* over *Acacia longifolia* with mixed grassy understorey • **B1b:** 0.147 ha of *Acacia longifolia* and *Banksia marginata* over *Kunzea pomifera* and mixed grassy understorey • **B2:** 0.579 ha of Exotic grassland over *Juncus* sp. and *Kunzea pomifera* • **B3:** 0.039 ha of *Myoporum insulare* and *Acacia longifolia* over *Kunzea pomifera* and exotic grasslands • **B4:** 0.176 ha of *Sarcocornia blackiana* and *Tecticornia* sp. samphire low shrubland • **B5:** 0.061 ha of *Myoporum insulare* and *Melaleuca* sp. over mixed chenopod shrubs with mixed grasses
Total proposed clearance – area (ha) and/or number of trees:	4.478 hectares of native vegetation are proposed to be cleared.
Level of clearance:	Level 4
Overlay (Planning and Design Code):	Native Vegetation Overlay

Map of proposed clearance area:	
Mitigation Hierarchy:	***Avoidance*** The risk of vegetation impacts were identified during the early planning stage of the Project. A high level environmental assessment identified high quality remnant vegetation at the site and avoiding high quality vegetation was a key consideration in site selection and planning design. Reducing impacts to vegetation was considered alongside other constraints on this section of road, such as site distances and the presence of curves, existing junctions, width of the road corridor and the need to acquire property. ***Minimization*** The proposed vegetation clearance is confined to the project footprint. As a standard practice during construction, the contractors will be advised to retain vegetation if it does not need to be cleared for the project, to utilise pruning if possible and to use non-invasive excavation techniques when working in the structural root zone of trees to be retained. Additionally, impact to vegetation

	will be minimised by implementing of a Construction Environmental Management Plan (CEMP). Where possible, the footprint of the project has been minimised to the smallest possible, whilst still facilitating the function and safety of the road. This is both to reduce impacts to roadside vegetation and to reduce the need to acquire land. ***Rehabilitation or restoration*** The overtaking lanes are permanent land clearance that is unlikely to be rehabilitated or restored. ***Offset*** The adverse impacts to native vegetation that cannot be avoided or minimised will be offset through the achievement of a SEB that outweighs the proposed impact.
SEB Offset proposal	Payment of **$181,643.01** which includes an administration fee of **$9,469.54** (including GST).

2. Purpose of clearance

2.1. Description

EBS Ecology (EBS) were engaged by WSP Pty Ltd (WSP) on behalf of the Department for Infrastructure and Transport (DIT) to provide a native vegetation assessment for the proposed overtaking lanes along Princes Highway, Site 1 - Meningie (the Project). This forms part of three overtaking lanes being constructed along the Princes Highway. The Project involves the clearance of 4.478 ha of native vegetation along the Princes Highway (Figure 1). The vegetation consists of a mixture of good to poor quality native vegetation of woodland, shrubland, grassland and samphire associations across two separate sites.

The Site 1a (Southbound) overtaking lane occurs for approximately 1.7 km and consists of *Eucalyptus sp*. woodland, and smaller areas of mixed species shrublands, an exotic grassland with *Juncus* sp. and *Kunzea pomifera* and a samphire low shrubland.

The Site 1b (Northbound) overtaking lane occurs for approximately 1.5 kilometres (km) and consists of *Eucalyptus sp*. woodland, *Lomandra effusa* open sedge land and *Melaleuca lanceolata* woodland.

Objectives

EBS were engaged by WSP to undertake a flora and fauna assessment of the Project Area to determine potential key risks to significant flora, fauna and/or communities, including the following project components:

- Undertake a desktop assessment of the likelihood of occurrence and status of threatened flora and fauna protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and State *National Parks and Wildlife Act 1972* (NPW Act);
- Assess native vegetation within the Project Area for clearance using the Native Vegetation Council (NVC) endorsed Bushland Assessment Method (BAM); and
- Calculate the Significant Environmental Benefit (SEB) offset requirements based on the impact footprint.

The report presents findings of the desktop assessment; in addition to results of the BAM required for assessing vegetation proposed for clearance under the *Native Vegetation Regulations 2017*.

2.2. Background

Project Area

The Project Area occurs along the Princes Highway, approximately 12 km south of the town of Meningie (Figure 1). The proposed northbound overtaking lane (Site 1a) occurs over 1.5 km between Maintenance Marker (MM) 63.6 and MM65.1, and the southbound overtaking lane (Site 1b) occurs over 1.7 km between MM65.5 and MM67.2.

Current and surrounding land use

The Project Area consists of a public roadside reserve alongside the Princes Highway. The area directly adjacent to the Project Area consists of pasture and cropping, with irrigated cropping and a reserved area to the south.

Administrative Boundaries

The Project Area occurs within the Coorong District Council area, Murraylands and Riverland Landscape Management Region, Hundred of Bonney and Russell County.

Bioregions

The Interim Biogeographical Regionalisation of Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The bioregions are further refined into subregions and environmental associations. The Project Area is located in the Naracoorte Coastal Plain IBRA bioregion and the Tintinara IBRA subregion. Approximately 19% (136133 hectares (ha)) of the subregion is mapped as remnant native vegetation, of which 63% (85185 ha) is formally conserved.

2.3. General location map

The location of the Site 1 (a and b) overtaking lanes is provided in Figure 1.

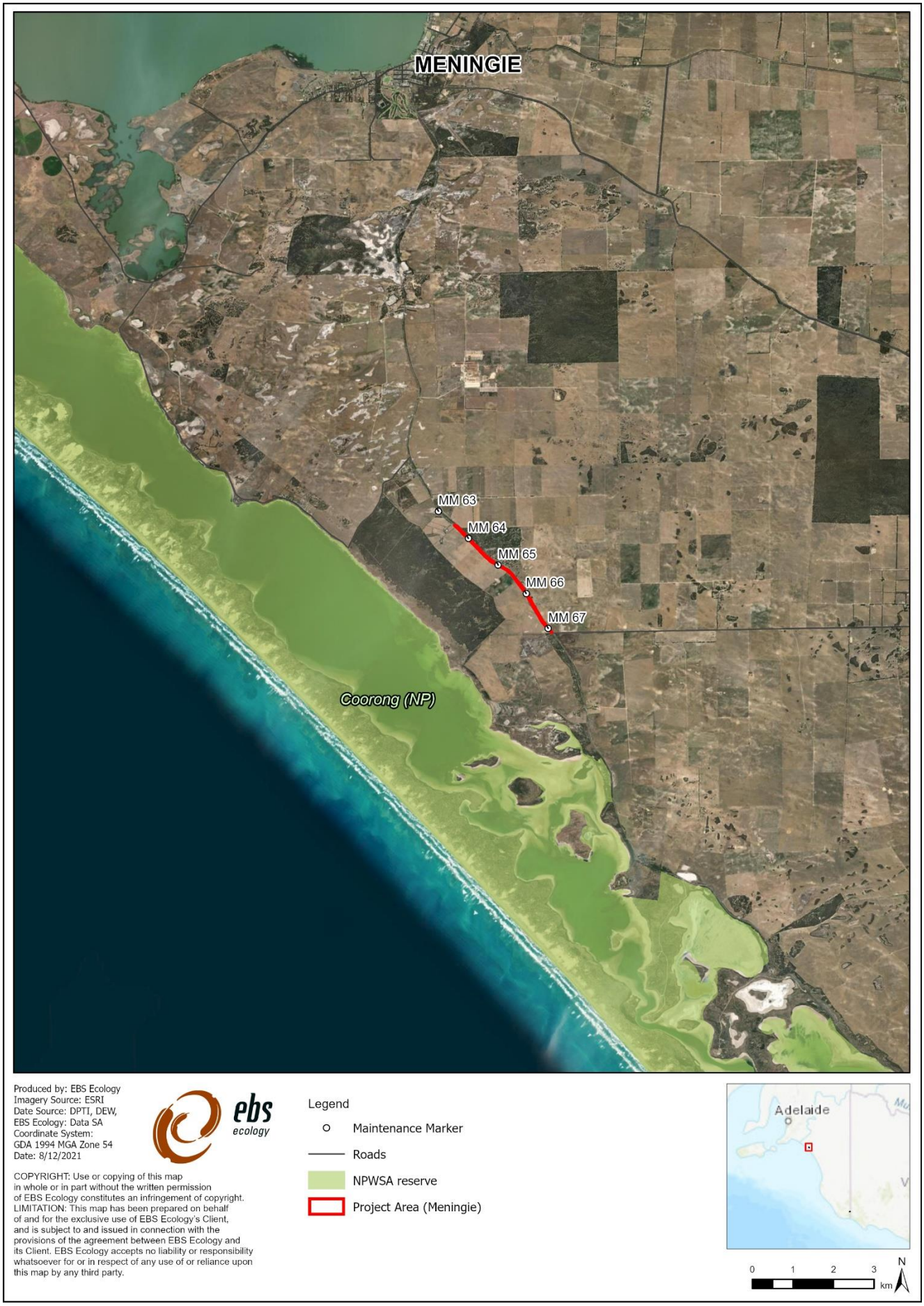


Figure 1. Location of the two overtaking lanes.

2.4. Details of the proposal

The Project Area consists of two sections, described as Northbound (1a) (1.5 km in length) and Southbound (1b) (1.7 km in length). The proposed clearance area for Site 1 of Princes Highway near Meningie includes the removal of 4.478 ha of native vegetation within the roadside corridor.

2.5. Approvals <u>required</u> *or* <u>obtained</u>

Native Vegetation Act 1991 **(NV Act)** – no previous approvals associated with the Project.

Environment Protection and Biodiversity Conservation Act 1999 **(EPBC Act)** – EPBC approval is not required for this for this Project.

Planning, Development and Infrastructure Act 2016 **(DPI Act) –** Development approval is not required for this Project.

National Parks and Wildlife Act 1972 **(NPW Act) –** EBS Ecology has the required flora collection permit (Permit number: K25613-20).

Landscape South Australia Act 1991 – Due to the works occurring within a natural soak, a Water Affecting Permit is not required for this Project. A permit to transport declared weeds on a public road may be required for this Project.

Aboriginal Heritage Act 1988 – Approval will be required if any sites, objects or remains are uncovered during the works.

2.6. Native Vegetation Regulation

The Project is considered to be permitted under the following regulation:

Regulation 12(32)—Works on behalf of Commissioner of Highways

Clearance of vegetation incidental to work being undertaken by or on behalf of the Commissioner of Highways (other than repair or maintenance work of a kind referred to in Part 1 clause 2).

3. Method

3.1. Desktop assessment

To determine the potential for any threatened flora and fauna species and Threatened Ecological Communities (TECs) (both Commonwealth and State listed) to occur within the Project Area, a desktop assessment. This was undertaken using a 5 km buffer in database searches: Protected Matters Search Tool (PMST) and Biological Database of South Australia (BDBSA).

3.1.1. PMST report

A Protected Matters Search Tool (PMST) report was generated on 10th of July 2020 to identify nationally threatened flora and fauna, migratory fauna and TECs under the EPBC Act relevant to the Project Area (DAWE 2021b). Only species and TECs identified in the PMST report that are likely or known to occur within the Search Area were assessed for their likelihood of occurrence within the Project Area.

3.1.2. BDBSA data extract

A data extract from the BDBSA was obtained from NatureMaps to identify flora and fauna species that have been recorded within 5 km of the Project Area (data extracted on 21 July 2021; DEW 2021). The BDBSA is comprised of an integrated collection of species records from the South Australian Museum, conservation organisations, private consultancies, Birds SA, Birdlife Australia and the Australasian Wader Study Group, which meet the Department for Environment and Water's (DEW) standards for data quality, integrity and maintenance. Only species with records since 1995 and a spatial reliability of less than 1 km were assessed for their likelihood of occurrence.

3.1.3. Likelihood of occurrence

The criteria for the likelihood of occurrence of threatened species within the Project Area are described in Table 3.

Table 3. Criteria for the likelihood of occurrence of threatened species within the Project Area.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provide no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

3.2. Flora assessment

The flora assessment was undertaken by NVC Accredited EBS Consultant J. Skewes and Ecologist E. West from 8-11 December 2020 in accordance with the Bushland Assessment Method (BAM) (NVC, 2020).

3.2.1. Bushland Assessment Method

The BAM is derived from the Nature Conservation Society of South Australia's Bushland Condition Monitoring methodology (Croft *et al.* 2009). The BAM used to assess areas of native vegetation requiring clearance and calculate the SEB requirements.

Details of site selection/stratification and assessment protocols, and the biodiversity value components assessed and the factors that influence these components are outlined in the *Bushland Assessment Manual* (NVC 2020).

The Conservation Significance Scores were calculated from direct observations of flora and direct and historical observations of fauna species of conservation significance. All fauna identified as known to occur in the PMST, and fauna with BDBSA records since 1995 and with a spatial reliability of less than 1 km, within 5 km of the Project Area, were included in the BAM scoresheets. Species determined as unlikely to occur within the Project Area will be removed by the Native Vegetation Branch if the finding is supported. Marine and/or wetland species were omitted from the scoresheets given the Project Area is terrestrial.

3.3. Fauna assessment

Fauna surveys were conducted in conjunction with the flora assessments along the site. All native and exotic fauna species opportunistically encountered (directly observed, or tracks, scats, burrows, nests and other signs of presence) during the native vegetation assessment were recorded. Potential fauna refuge sites, such as hollows, were noted as an indication of availability of suitable habitat. Particular attention was paid to identifying habitat for threatened species. For each opportunistic fauna observation, the species, number of individuals, GPS location, detection methodology (sight, sound or sign) and habitat were recorded.

4. Assessment outcomes

4.1. Vegetation assessment

4.1.1. General description of the vegetation, the site and matters of significance

The vegetation of Site 1 occurs across two sites which overlap (Figure 2, Figure 3 & Figure 4). The Project Area consists of a gently undulating plain of highly calcareous sandy loam on calcrete or limestone, calcareous loam on rock and a small section of saline loamy sand (378 m) overlying 'wet soils'. The vegetation across the Project Area consisted predominantly of woodland with varying dominant species of *Eucalyptus* (*E. diversifolia*, *E. incrassata*, and *E. leucoxylon*). Understorey exhibited considerable diversity in species composition with native grasses, sedges and shrubs present. There were 101 native and 47 exotic plant species recorded across the Project Area in total (see Appendix 3).

Vegetation Associations occurring in the Project Area are as follows:

Site 1a Northbound:

- **A1:** *Eucalyptus diversifolia* and *Eucalyptus incrassata* over *Acacia longifolia +/- Myoporum* sp. and *Olearia* sp. with mixed grassy understorey;
- **A3:** *Melaleuca lanceolata* with *Eucalyptus diversifolia* and *Eucalyptus incrassata* over *Kunzea pomifera* with mixed/exotic grassy understorey.

Site 1b Southbound:

- **B1:** *Eucalyptus diversifolia* and *Eucalyptus incrassata +/- Eucalyptus leucoxylon* over *Acacia longifolia* with mixed grassy understorey;
- **B1a:** *Acacia longifolia* and *Banksia marginata* over *Kunzea pomifera* and mixed grassy understorey;
- **B2:** Exotic grassland over *Juncus* sp. and *Kunzea pomifera;*
- **B3:** *Myoporum insulare* and *Acacia longifolia* over *Kunzea pomifera* and exotic grasslands;
- **B4:** *Sarcocornia blackiana* and *Tecticornia* sp. samphire low shrubland;
- **B5:** *Myoporum insulare* and *Melaleuca* sp. over mixed chenopod shrubs with mixed grasses.

4.1.2. Details of the vegetation associates/scattered trees proposed to be impacted

A comprehensive description of each Vegetation Association (VA) is provided below, with VA descriptions in the Site 1a provided in Table 4 - Table 5 and those in the Site 1b area provided in Table 6 - Table 11.

Table 4. Summary of VA A1.

Vegetation Association	**VA A1:** *Eucalyptus diversifolia* and *Eucalyptus incrassata* over *Acacia longifolia +/- Myoporum* sp. and *Olearia* sp. with mixed grassy understorey.				
					
General description	Dominant species are *Eucalyptus diversifolia* and *Eucalyptus incrassata* over **Acacia longifolia +/- Myoporum* sp. and *Olearia* sp. with mixed grassy understorey. Grasses included *Rytidosperma caespitosum*, *Austrostipa* sp. and exotics included *Phalaris aquatica*, **Lycium ferocissimum* and *Limonium companyonis*. This was the predominant VA and was located on the eastern and western sides in good condition. It exhibits a WoNS (**L. ferocissimum*).				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.11	**Vegetation Condition Score**	56.95	**Conservation significance score**	1.10
Unit biodiversity Score	69.54	**Area (ha)**	1.376	**Total biodiversity Score**	95.69

Table 5. Summary of VA A3.

Vegetation Association	**VA A3:** *Melaleuca lanceolata* with *Eucalyptus diversifolia* and *Eucalyptus incrassata* over *Kunzea pomifera* with mixed/exotic grassy understorey.				
					
General description	The dominant species is *Melaleuca lanceolata* with *Eucalyptus diversifolia* and *Eucalyptus incrassata* over *Kunzea pomifera* with mixed/exotic grassy understorey. Native grasses include *Austrostipa* sp., *Rytidosperma* sp. and exotics include **Lagurus ovatus*, **Phalaris aquatica* and **Avena barbata*. This association was located on both sides of the highway in good condition.				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.13	**Vegetation Condition Score**	45.30	**Conservation significance score**	1.10
Unit biodiversity Score	56.31	**Area (ha)**	0.917	**Total biodiversity Score**	51.64

Table 6. Summary of VA B1.

Vegetation Association	**B1:** *Eucalyptus diversifolia* and *Eucalyptus incrassata +/- Eucalyptus leucoxylon* over *Acacia longifolia* with mixed grassy understorey.				
					
General description	Dominant species were *Eucalyptus diversifolia* and *Eucalyptus incrassata +/- Eucalyptus leucoxylon* over *Acacia longifolia* with mixed grassy understorey (i.e.: *Rytidosperma caespitosum*, *Austrostipa* sp., *Lomandra juncea*). Occurred on both sides of the highway and consisted of the largest area covered by an association.				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.13	**Vegetation Condition Score**	55.69	**Conservation significance score**	1.10
Unit biodiversity Score	69.23	**Area (ha)**	1.183	**Total biodiversity Score**	81.90

Table 7. Summary of VA B1a.

Vegetation Association	**B1a:** *Acacia longifolia* and *Banksia marginata* over *Kunzea pomifera* and mixed grassy understorey.				
					
General description	Dominant species were **Acacia longifolia* and *Banksia marginata* over *Kunzea pomifera* and mixed grassy understorey (i.e.: *Adriana* sp., *Dianella brevicaulis*, *Leucopogon parviflorus*). This was confined to a small turn-in track on the eastern side.				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.13	**Vegetation Condition Score**	38.36	**Conservation significance score**	1.10
Unit biodiversity Score	47.68	**Area (ha)**	0.149	**Total biodiversity Score**	7.11

Table 8. Summary of VA B2.

Vegetation Association	**B2:** Exotic grassland with *Juncus* sp. *Kunzea pomifera*				
					
General description	Dominant species were exotic (i.e.: *Euphorbia terracina*, *Scabiosa atropurpurea*, *Lagurus ovatus, Asphodelux fistulosus, Echium plantagineum, Piptatherum miliaceum, Lolium perenne*, and *Medicago* sp.) with native *Juncus* sp. and *Kunzea pomifera*. Other native understorey species included *Chrysocephalum* sp., *Rhagodia candolleana* ssp., *Dianella brevicaulis*, *Chloris truncata* and *Microseris lanceolata*. This association occurred in two small areas on the eastern side of the highway and was in poor condition.				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.13	**Vegetation Condition Score**	17.10	**Conservation significance score**	1.10
Unit biodiversity Score	21.26	**Area (ha)**	0.579	**Total biodiversity Score**	12.31

Table 9. Summary of VA B3.

Vegetation Association	B3: *Myoporum insulare* and **Acacia longifolia* over *Kunzea pomifera* and exotic grasslands				
					
General description	Dominant species were *Myoporum insulare* and **Acacia longifolia* which occurred over *Kunzea pomifera* and exotic grasslands. Understorey species included *Myoporum insulare*, *Leucopogon parviflorus*, *Olearia axillaris*, *Dianella brevicaulis* and exotics such as **Lagurus ovatus*, **Piptatherum miliaceum*, **Euphorbia* sp., and **Lycium ferocissimum*. This association occurred in a small area on the eastern side of the highway in average condition. It contained one Weed of National Significance (WoNS) (*L. ferocissimum*).				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.13	**Vegetation Condition Score**	37.59	**Conservation significance score**	1.10
Unit biodiversity Score	46.72	**Area (ha)**	0.039	**Total biodiversity Score**	1.82

Table 10. Summary of VA B4.

Vegetation Association	**B4:** *Sarcocornia blackiana* and *Tecticornia sp.* samphire low shrubland				
					
General description	Dominant species were *Sarcocornia blackiana* and *Tecticornia* sp. in a samphire low shrubland community with *Myoporum insulare*, *Frankenia* sp., *Suaeda australis*, *Gahnia* sp., *Samolus repens*, *Melaleuca halmaturorum*, *Sporobolus virginicus*. Exotics included **Lycium ferocissimum, *Hordeum marinum*, and **Puccinellia fasciculata*. The association occurred in two small areas on the eastern and western sides of the highway in high condition. It exhibits a WoNS (*L. ferocissimum*).				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.13	**Vegetation Condition Score**	61.84	**Conservation significance score**	1.10
Unit biodiversity Score	76.87	**Area (ha)**	0.176	**Total biodiversity Score**	13.53

Table 11. Summary of VA B5.

Vegetation Association	**B5:** *Myoporum insulare* and *Melaleuca* sp. over mixed chenopod shrubs and mixed grasses.				
					
General description	Dominant species were *Myoporum insulare* and *Melaleuca* sp. over mixed chenopod shrubs (*Suaeda australis*, *Rhagodia crassifolia and Enchylaena tomentosa*) and mixed grasses (*Austrostipa* sp., *Distichlis distichophylla*, and exotic species (i.e.: **Limonium companyonis*, **Asparagus asparagoides*, **Hordeum glaucum*, **Euphorbia terracina*, **Melaleuca armillaris* ssp. *armillaris*.). This association occurred in two areas on the western side of Princes Highway in good condition.				
Threatened species or community	A desktop survey found the following State listed fauna species which are likely to have preferred habitat within the Project Area: **EPBC Act** *Pterostylis arenicola* (Sandhill Greenhood) - Nationally Vulnerable, State Endangered. *Thelymitra epipactoides* (Metallic Sun-orchid) - Nationally Endangered, State Endangered. *Neophema chrysogaster* (Orange-bellied Parrot) - Nationally Endangered, State Endangered. *Leipoa ocellata* (Malleefowl) – Nationally Vulnerable, State Vulnerable. *Pteropus Poliocephalus* (Grey-headed Flying-fox) – Nationally Vulnerable, State Rare. **NPW Act** *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) - State Rare. *Lichenostomus cratitius occidentalis* (Purple-gaped Honeyeater (mainland SA)) - State Rare. *Neophema chrysostoma* (Blue-winged Parrot) – State Vulnerable. *Neophema elegans elegans* (Elegant Parrot) – State Rare. *Stagonopleura guttata* (Diamond Firetail) – State Vulnerable. *Stipiturus malachurus polionotum* (Southern Emu-wren (South East)) – State Rare. No threatened species or communities were recorded during the survey.				
Landscape context score	1.10	**Vegetation Condition Score**	45.61	**Conservation significance score**	1.10
Unit biodiversity Score	55.19	**Area (ha)**	0.061	**Total biodiversity Score**	3.37

4.1.3. Site map showing areas of proposed impact

The proposed impact area is illustrated in Figure 2 to Figure 10.

Figure 2. Vegetation Associations within the Project Area (Map 1 of 9).

Figure 3. Vegetation Associations within the Project Area (Map 2 of 9).

Figure 4. Vegetation Associations within the Project Area (Map 3 of 9).

Figure 5. Vegetation Associations within the Project Area (Map 4 of 9).

Figure 6. Vegetation Associations within the Project Area (Map 5 of 9).

Figure 7. Vegetation Associations within the Project Area (Map 6 of 9).

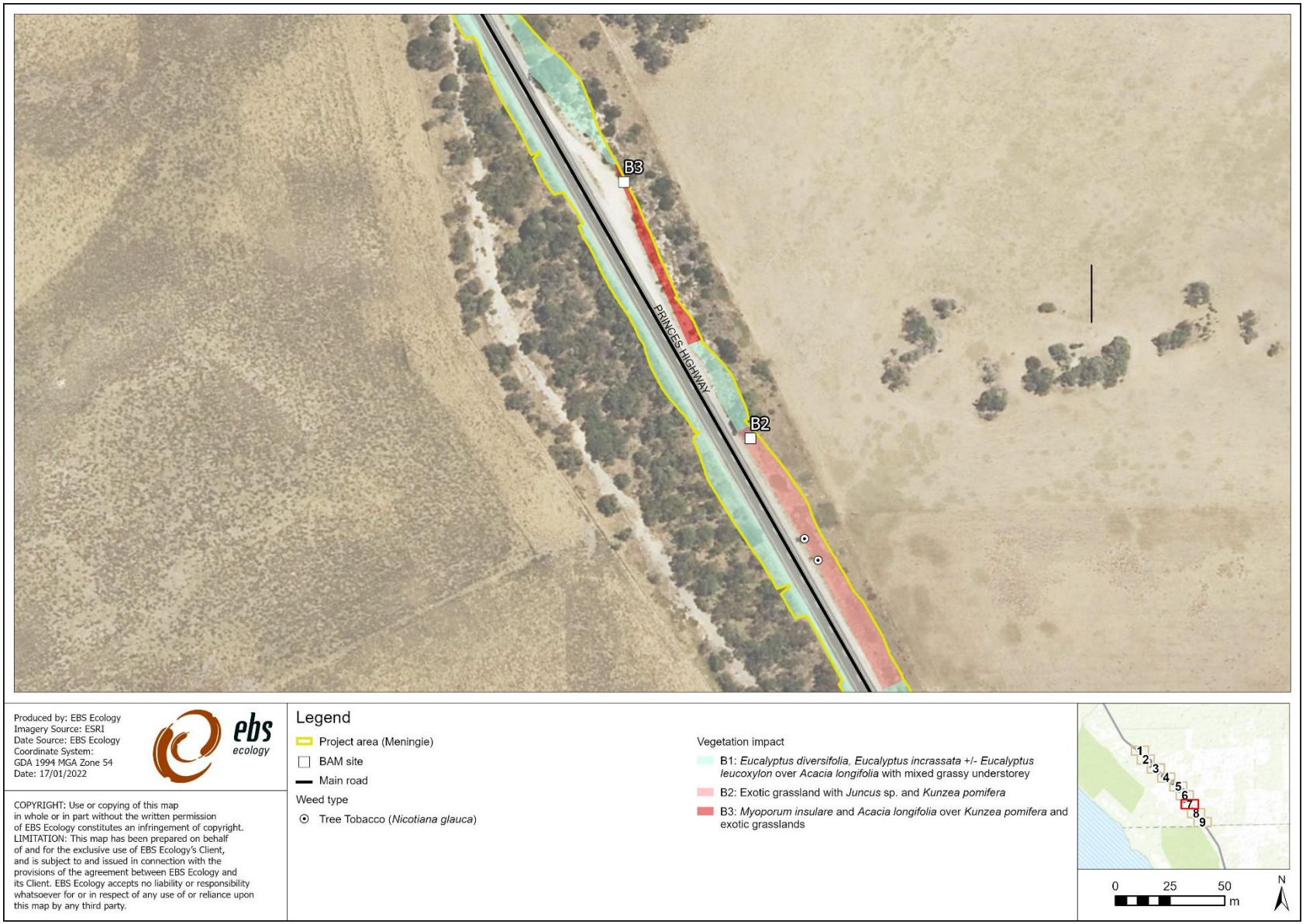


Figure 8. Vegetation Associations within the Project Area (Map 7 of 9).

Figure 9. Vegetation Associations within the Project Area (Map 8 of 9).

Figure 10. Vegetation Associations within the Project Area (Map 9 of 9).

4.2. Threatened species assessment

There are four MNES relevant to the Project Area consisting of three listed Threatened Ecological Communities (TEC) and one Wetland of International Significance (Table 12). None of the possible TEC's are present within the Project Area.

Table 12. Threatened Ecological Communities identified by the PMST as possibly occurring within 5 km of the Project Area.

Threatened Ecological Community	Status	Likelihood
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	**Unlikely** Vegetation not present within the Project Area.
River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea	Approval Disallowed	**N/A**
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	**Unlikely** Saltmarshes in Project Area are the result of soaks and not tidal, therefore not TEC.
Wetland of International Significance		
The Coorong and Lakes Alexandrina and Albert Wetland	RAMSAR listed	**Unlikely** Project Area occurs outside of the boundary

4.2.1. Threatened flora

EPBC Act

The PMST identified eight flora species listed as threatened under the EPBC Act as potentially occurring within 5 km of the Project Area (Table 13). Seven of these are also listed under the NPW Act. Of these, two have been assessed as potentially occurring within the Project Area:

- *Pterostylis arenicola* (Sandhill Greenhood) – AUS: VU, SA:V;
    - This species is found in mallee and native pine woodlands, often dominated by *E. diversifolia, A. pycnantha, E. porosa, A. verticillata (*Landscape South Australia, 2015). There is appropriate habitat for this species within the Project Area and known populations of this species occur around Lake Alexandrina and Potter's Scrub (approximately 20 km from the Site 1a overtaking lane). BDBSA records indicate that there are no records of this species within 5 km of the Project Area (*Recordset number DEWNRBDBSA210707-1)* and the understorey vegetation within the Project Area shows signs of disturbance (weed incursion), therefore, there is a low possibility of this species occurring in the Project Area.
- *Thelymitra epipactoides* (Metallic Sun-orchid) – AUS: EN, SA: E.
    - This species is known to flower between September and November but can emerge as early as August, and occurs in open woodland, drier heathlands or mallee with heathy understorey, (Threatened Species Scientific Committee 2016a). There is vegetation within the Project Area that may be suitable for this species. Known populations of this species currently occur within National Parks, Council reserves or in

areas under Heritage agreement around Meningie and Coorong National Parks, but there are no known records within 5 km according to BDBSA records (*Recordset number DEWNRBDBSA210707-1)*. Surveys were conducted outside of the flowering season for this species and so would not have been observed if present. The roadside vegetation that is to be impacted shows signs of disturbance (weed incursion), decreasing the likelihood that this species will occur in the area.

Based on habitat requirements, *Thelymitra epipactoides* and *Pterostylis arenicola* have both been assessed as possibly occurring in the Project Area. The habitat in the Project Area has been assessed as being unsuitable for the other six identified Nationally threatened flora species (Table 13).

NPW Act

The BDBSA data downloaded from NatureMaps identified an additional seven NPW Act listed threatened flora species recorded within 5 km of the Project Area since 1995, with a spatial reliability within 1 km. Two State listed species have been identified as possibly occurring in the Project Area; *Eucalyptus fasciculosa* (Pink Gum) and *Austrostipa echinata* (Spiny Spear-grass), although neither were observed during the field survey. The habitat in the Project Area has been assessed as not being suitable for the five remaining State listed threatened flora species (Table 13).

Table 13. Likelihood of occurrence of threatened flora species identified under the EPBC Act and NPW Acts with data source and threat level described in the table footer.

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within Project Area
		Aus.	SA				
Acacia pinguifolia	Fat-leaved Wattle	EN	E	1	May occur	Sandy or hard alkaline yellow duplex soils in mallee, open woodland, open scrub, shrubland or heath (DAWE, 2021).	**Unlikely** Mallee vegetation present, but was not observed on site.
Austrostipa echinata	Spiny Spear-grass		R	2	1998	Occurs on sand associated with limestone in coastal and near coastal areas in mallee and open scrub (DEH 2008a).	**Possible** May be suitable habitat in Project Area, records from within 5 km, but more than 20 years ago at Hindmarsh Island, not observed in Project Area.
Baloskion tetraphyllum ssp. tetraphyllum	Tassel Cord-rush		V	2	2006	Grows in swampy areas and on river banks (PlantNet, ND).	**Unlikely** Unlikely to be suitable habitat in Project Area, but recent records present.
Caladenia colorata	Coloured Spider-orchid	EN	E	1	Likely	Grows on sand over loam with *E. leucoxylon/E. fasciculosa, Allocasuarina stricta* and *Callitris gracilis* woodland over scattered shrubs, sedges and grasses. Heathy woodland (DEH 2008b).	**Unlikely** No species or species habitat in Project Area, no recent records within 5 km.
Caladenia conferta	Coast Spider-orchid	EN	E	1	May occur	Mallee woodlands or Broombush (*Melaleuca uncinata*), scrubs in terra-rosa soils over limestone, in sedgelands on sandy soils, or on fertile red-brown soils among granite outcrops (DEWHA 2008)	**Unlikely** No suitable habitat exists in Project Area, no recent records within 5 km.
Caladenia tensa	Greencomb Spider-orchid	EN		1	Likely	Red-brown sandy loams on rises in open Yellow Gum woodland (Threatened Species Scientific Committee, 2016b)	**Unlikely** No species or species habitat in Project Area. No recent records within 5 km.
Eucalyptus fasciculosa	Pink Gum		R	2	2015	Kangaroo Island, Mount Lofty Ranges, Fleurieu Peninsula, south-east of SA, into western Victoria.	**Unlikely** Recent record within 5 km however, none identified within Project Area.
Isolepis producta	Nutty Club-rush		V	2	2015	Recorded Immersed aquatic in water to 3 m deep (Plantnet, ND).	**Unlikely** No suitable habitat in Project Area.

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within Project Area
		Aus.	SA				
Leucopogon clelandii	Cleland's Beard-heath		R	2	2014	Confined to sandy heath land and mallee scrub (Bonney 1995)	**Unlikely** Suitable habitat on site, but no individuals observed during field survey.
Lythrum salicaria	Purple Loosestrife		R	2	2015	Grows in wet places (PlantNet, ND).	**Unlikely** Unsuitable habitat in Project Area.
Pterostylis arenicola	Sandhill Greenhood Orchid	VU	V	1	Likely	Found in mallee and native pine woodlands, often dominated by *E. diversifolia, A. pycnantha, E. porosa, A. verticillata (*Landscape South Australia, 2015)	**Possible** Suitable habitat within Project Area. Known locations in nearby reserve.
Pterostylis sp. Rock ledges	Rock-ledge rufoushood		E	2	1996	Rocky soils.	**Unlikely** No suitable habitat present in Project Area.
Senecio macrocarpus	Large-fruit Groundsel	VU	V	1	Likely	Perennial plant. Grassland, sedgeland, woodland and shrubland on heavy soils (Department of Sustainability and Environment, 2009).	**Unlikely** Possible habitat exists within Project Area. Was not observed during field survey.
Thelymitra epipactoides	Metallic Sun-orchid	EN	E	1	Known	Open woodland or mallee with heathy understorey, including *E. diversifolia* dominant mallee with *Kunzea pomifera* and *Lepidosperma carphoides* (Threatened Species Scientific Committee 2016a).	**Possible** Suitable habitat exists within Project Area.
Thelymitra matthewsii	Spiral Sun-orchid	VU	E	1	Likely	Open forests and woodlands in well-drained sand and clay loams. Previously found on road verges (DAWE, 2021b).	**Unlikely** No suitable habitat in Project Area.

Conservation status

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. ssp.: the conservation status applies at the sub-species level.

Source of Information

1. **EPBC Act Protected Matters Report (DAWE, 2021) – 5 km buffer applied to project area.**
2. **NatureMaps data extract (NatureMaps, 2021) - 5 km buffer applied to project area.**

4.2.2. Threatened fauna

EPBC Act

The PMST search identified 13 EPBC Act listed threatened species and 22 terrestrial and wetland Migratory species that are known or likely to occur within the 5 km buffer from the Project Area (Table 14). Only one of these fauna species are considered as potentially occurring within the Project Area itself:

- Grey-headed Flying-fox (*Pteropus Poliocephalus*) Aus.: VU, SA: R.

All other EPBC Act listed threatened or Migratory fauna species have been assessed as unlikely to occur in the Project Area due to the absence of suitable habitat. Pelagic species were excluded as the Project Area is terrestrial only.

Grey-headed Flying-fox (*Pteropus Poliocephalus*) (Aus.: VU, SA: R)

The Grey-headed Flying-fox (GHFF) has been assessed as possibly occurring within the Project Area. GHFFs are known to occupy forests, woodlands, coastal lowlands, and tablelands of south-eastern Australia. The likelihood that Grey-headed Flying Foxes will use resources provided by a food tree is influenced by distance from the colony's roost and tree cover (McDonald-Madden *et al.* 2005). Although there is suitable habitat within the Project Area, as it is located approximately 200 km from the nearest GHFF camp (near Warrnambool, Victoria), the trees present within the Project Area are unlikely to be considered important habitat for GHFF and therefore, the vegetation clearance for this Project is highly unlikely to impact of the population of GHFFs.

NPW Act

An additional 9 fauna species listed as threatened under the NPW Act have been recently recorded within 5km of the Project Area. Five of which have been assessed as potentially occurring within the Project Area (Table 14):

- Purple-gaped Honeyeater (mainland SA) (*Lichenostomus cratitius occidentalis*) – SA:R
- Blue-winged Parrot (*Neophema chrysostoma*) – SA: V
- Elegant Parrot (*Neophema elegans elegans*) – SA: R
- Diamond Firetail (*Stagonopleura guttata*) – SA:V
- Southern Emu-wren (South East) (*Stipiturus malachurus polionotum*) – SA: R

The Southern Emu-wren was confirmed to occur in the Project Area during the field assessment.

Purple-gaped Honeyeater (mainland SA) (*Lichenostomus cratitius occidentalis*) (SA:R)

This species occurs in mallee, open woodland and heath vegetation types. These are present within the Project Area, therefore, this species may use habitat proposed to be cleared.

Blue-winged Parrot (*Neophema chrysostoma*) (SA: V)

This species prefers grasslands and grassy woodlands but will inhabit a range of habitats from coastal, sub-coastal and inland areas, right through to semi-arid zones. There is suitable habitat within the Project Area and this species is often sighted near roadsides. As a result, it may use vegetation within the Project Area.

Elegant Parrot (*Neophema elegans elegans*) (SA: R)

Elegant parrots inhabit woodlands, lightly timbered grassland, partly cleared farmland, margins of clearings in heavy forest, tree-lined watercourses, mallee, and mulga vegetation types (Morcombe, 2011). Some of these habitats are present within the Project Area, therefore, this species may use habitat proposed to be cleared.

Diamond Firetail (*Stagonopleura guttata*) (SA:V)

Diamond Firetails occur in areas with grassy groundcover underneath open forest; woodland, mallee, acacia scrub and timber belts along watercourses and roadsides (Morcombe, 2011). Suitable vegetation does occur within the Project Area, however, the stronghold for this species is on the eastern scarp of the Mount Lofty Ranges with occasional sightings along the Princes Highway south-east of Meningie. Therefore, this species may occur within the Project Area, but the area is unlikely to be considered important habitat.

Southern Emu-wren (South East) (*Stipiturus malachurus polionotum*) (SA: R)

This species occurs in coastal heaths, swamps, dense cover. This vegetation type occurs within the Project Area and this species was observed during the field survey. The proposed clearance will have some impact on suitable habitat for this species.

Table 14. Likelihood of occurrence of threatened flora species identified under the EPBC Act and NPW Acts with data source and threat level described in the table footer.

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within project area
		Aus.	SA				
Amphibia	**Amphibians**						
Litoria raniformis	Growling Grass Frog	VU		1	Species or species habitat likely to occur within area	Mostly amongst emergent vegetation, including *Typha sp.* (bullrush), *Phragmites sp.* (reeds) and *Eleocharis sp.*(sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams.	**Unlikely** There is unlikely to be suitable habitat in the Project Area as there is no pools of water in Project Area.
Aves	**Birds**						
Accipiter novaehollandiae	Grey Goshawk		E	2	2015	Prefer dense forest/rainforest habitat such including tall eucalypt forest.	**Unlikely** No dense forest habitat in Project Area.
Actitis hypoleucos	Common Sandpiper	Mi		1	Species or species habitat known to occur within area	Varied coastal and interior wetlands: narrow muddy edges of billabongs, river pools, mangroves, among rocks reefs and rocky beaches (Morcombe 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Arenaria interpres interpres	Ruddy Turnstone	Mi	R	1, 2	Foraging, feeding or related behaviour known to occur within area / 2009	Coastal regions with exposed rock coast lines or coral reefs (DAWE, 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Biziura lobata menziesi	Musk Duck		R	2	2007	Lakes and deep swamps with reeds and open water (Morcombe 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Botaurus poiciloptilus	Australasian Bittern	EN		1	Species or species habitat likely to occur within area	Freshwater wetlands and rarely in estuaries or tidal wetlands, favouring wetlands dominated by sedges, rushes and reeds growing over a muddy or peaty substrate	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Calidris acuminata	Sharp-tailed Sandpiper	Mi		1	Foraging, feeding or related behaviour known to occur within area	Fresh or salt wetlands, muddy edges of lagoons, swamps, lakes, dams, soaks, sewage farms, temporary floodwaters (Morcombe 2021)	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Calidris alba	Sanderling	Mi		1	Foraging, feeding or related behaviour	Open sandy beaches washed by ocean swells (Morcombe 2021).	**Unlikely**

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within project area
		Aus.	SA				
					known to occur within area		Suitable habitat for this species is unlikely to occur in the Project Area.
Calidris canutus	Red Knot	EN, Mi		1	Species or species habitat known to occur within area	Inhabits tidal mud flats, sand flats and sandy beaches in estuaries, bays, inlets and lagoons (DEW 2020f).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Calidris ferruginea	Curlew Sandpiper	CR, Mi	E	1,2	2010	Wetlands. Widespread in coastal and subcoastal areas east of Streaky Bay. Important sites include ICI and Price Salt fields, and The Coorong. Occasionally they occur in inland areas south of the Murray River and elsewhere (DEW 2020e).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Calidris melanotos	Pectoral Sandpiper	Mi		1	Species or species habitat known to occur within area	Shallow fresh water wetlands with low grass and other herbage (Pizzey & Knight, 2007)	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Calidris ruficollis	Red-necked Stint	Mi		1	Foraging, feeding or related behaviour likely to occur within area	Diverse habitats, tidal and inland, mudflats, slat marshes, beaches, saltfields, temporary floodwaters (Morcombe 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Calidris tenuirostris	Great Knot	CE, Mi		1	Foraging, feeding or related behaviour likely to occur within area	Inter-tidal flats; also utilises sheltered coastal mudflats of estuaries, inlets, harbours, lagoons, mangrove swamps, salt lakes and lagoons (Morcombe, 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Cereopsis novaehollandiae novaehollandiae	Cape Barren Goose		R	2	2015	Ocean beaches, headlands, margins of wetland and pastures.	**Unlikely** Suitable habitat may be present adjacent to Project Area, but no suitable habitat at Site 1.
Charadrius bicinctus	Double-banded Plover	Mi		1	Foraging, feeding or related behaviour likely to occur within area	Tidal mudflats, beaches, exposed reefs, saltmarshes, freshwater wetlands, inland salt lakes, short grass of golf courses and airfields (Morcombe, 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Charadrius mongolus	Lesser Sand Plover	EN, Mi		1	Foraging, feeding or related behaviour	Intertidal sandflats and mudflats, beaches, estuary mudflats and sandbars, reef flats. (Morcombe, 2021).	**Unlikely**

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within project area
		Aus.	SA				
					likely to occur within area		Suitable habitat for this species is unlikely to occur in the Project Area.
Charadrius veredus	Oriental Plover	Mi		1	Foraging, feeding or related behaviour likely to occur within area	Open grassland, claypans or gibberstone plains. Occasionally tidal mudflats. Known to utilise recently burnt dense spinifex vegetation or heath habitat (Morcombe, 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Cladorhynchus leucocephalus	Banded Stilt		V	2	2012	Ocean beaches, salt lakes of coast and inland. Also uses temporary flooded saltpan lakes, marine beaches of estuaries and intertidal flats (Morcombe, 2021)	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Egretta garzetta nigripes	Little Egret		R	2	2009	Shallow open waters of swamps, billabongs, floodplain pools, mudflats and mangrove channels (Morcombe, 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Gallinago hardwickii	Latham's Snipe	Mi		1	Foraging, feeding or related behaviour likely to occur within area	Shallow water with tussocks and other green or dead growth. Also samphire and saltmarshes, irrigated areas and wet paddocks (Morcombe, 2021)	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Gallinago megala	Swinhoe's Snipe	Mi		1	Foraging, feeding or related behaviour likely to occur within area	The edges of wetlands, such as wet paddy fields, swamps and freshwater streams (DAWE, 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Gallinago stenura	Pin-tailed Snipe	Mi		1	Foraging, feeding or related behaviour likely to occur within area	In or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation - not normally in saline or inter-tidal wetlands (DAWE, 2021).	**Unlikely** Suitable habitat for this species is unlikely to occur in the Project Area.
Haematopus longirostris	Pied Oystercatcher		R	2	2012	Coastal: beaches and mudflats of inlets, bays, ocean beaches and offshore islets. Less often on rocky coasts and headlands (Morcombe, 2021)	**Unlikely** Unsuitable habitat in the Project Area.
Haliaeetus leucogaster	White-bellied Sea Eagle		E	2	2009	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. (DAWE, 2020)	**Unlikely** Suitable habitat for this species does not occur in the Project Area, may be observed flying over.

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within project area
		Aus.	SA				
Leipoa ocellata	Malleefowl	VU	V	1	Species or species habitat likely to occur within area	Scrubland and woodland dominated by mallee and wattle species (DAWE, 2021). Malleefowl build nests comprised of a large mound of soil that can span up to 5 m in diameter and 1 m in height.	**Unlikely** Suitable habitat for this species occurs in the Project Area, but no Malleefowl nests observed within the Project Area.
Lichenostomus cratitius occidentalis	Purple-gaped Honeyeater (mainland SA)		R	2	2015	Mallee, open woodland, heath (Morcombe, 2021).	**Likely** Suitable habitat for this species may occur in the Project Area.
Limosa limosa	Black-tailed Godwit	Mi		1	Foraging, feeding or related behaviour known to occur within area	Coastal, including estuaries, sheltered bays, lagoons, shores and islets of large ephemeral inland lakes (Morcombe 2021)	**Unlikely** Unsuitable habitat in the Project Area.
Neophema chrysogaster	Orange-bellied Parrot	CR	E	1,2	Species or species habitat known to occur within area/ 1998	Tidal flats, salt marsh, heath, islets and pasture close to shore (Morcombe, 2021). 2021 sightings occur on Hindmarsh Island, prior sighting occurred in 2013.	**Unlikely** Poor quality habitat may occur in the Project Area. Occurrences in SA are well documented, sightings not near Project Area.
Neophema chrysostoma	Blue-winged Parrot		V	2	2017	Prefers grasslands and grassy woodlands but will inhabit a range of habitats from coastal, sub-coastal and inland areas, right through to semi-arid zones (Birdlife Australia, ND).	**Possible** Suitable habitat may occur in the Project Area.
Neophema elegans elegans	Elegant Parrot		R	2	2017	Woodland, lightly timbered grassland, partly cleared farmland, margins of clearings in heavy forest, tree-lined watercourses, mallee, mulga (Morcombe, 2021).	**Possible** Suitable habitat for this species may occur in the Project Area.
Numenius madagascariensis	Far Eastern Curlew	CE, Mi		1	Species or species habitat known to occur within area	Tidal mudflats, sand spits of estuaries, mangroves, lake shores, occasionally ocean beaches (Morcombe, 2021)	**Unlikely** Unsuitable habitat in the Project Area.
Numenius minutus	Little Curlew	Mi		1	Foraging, feeding or related behaviour known to occur within area	This species congregates around pools, river beds and water-filled tidal channels, and shallow water at edges of billabongs (DAWE, 2021).	**Unlikely** Unsuitable habitat in the Project Area.
Pandion haliaetus	Osprey	Mi		1	Species or species habitat known to occur within area	Coastal waters and estuaries, follows major rivers far inland from the coast. Nests high on coastal headlands and clifftops (Morcombe 2021)	**Unlikely** Suitable habitat for this species does not occur in the Project Area.

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within project area
		Aus.	SA				
Phalaropus lobatus	Red-necked Phalarope	Mi		1	Foraging, feeding or related behaviour known to occur within area	Infrequently comes to land, sometimes sheltering on coastal wetlands. Occasionally utilises inland brackish, saline or fresh pools and lagoons and their muddy margins.	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Philomachus pugnax	Ruff	Mi		1	Foraging, feeding or related behaviour known to occur within area	Mud flats and sedges around fresh or saline lakes, estuaries, tidal pools.	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Pluvialis fulva	Pacific Golden Plover	Mi		1	Foraging, feeding or related behaviour known to occur within area	Coastal habitats, estuaries, intertidal mudflats, beaches, reefs, saltmarshes, offshore islands.	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Pluvialis squatarola	Grey Plover	Mi		1	Foraging, feeding or related behaviour known to occur within area	Coastal, usually marine shores of estuaries or lagoons on broad, open mudflats, sandy bars or beaches, rock platforms and reef flats. Inland near the coast on margins of salt lakes and swamps.	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Podiceps cristatus australis	Great Crested Grebe		R	2	2012	A specialist aquatic species (Morcombe, 2021).	**Unlikely** No aquatic habitat in Project Area.
Rostratula australis	Australian Painted Snipe	EN		1	Species or species habitat likely to occur within area	Dense vegetation of swamps, surrounds and shallows of well vegetated wetlands (Morcombe 2021).	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Stagonopleura guttata	Diamond Firetail		V	2	2013	Grassy groundcover underneath open forest; woodland, mallee, acacia scrub and timber belts along watercourses and roadsides (Morcombe, 2021)	**Possible** Suitable habitat for this species may occur in the Project Area.
Sternula nereis nereis	Fairy Tern	VU	E	1,2	2020	Marine: sheltered coasts, bays, inlets, estuaries, coastal lagoons, ocean beaches. Also wetland near the coast including slat ponds, lakes (Morcombe, 2021).	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Stipiturus malachurus polionotum	Southern Emu-wren (South East)		R	2	2015, 2020	Habitat is coastal heaths, swamps, dense cover (Birds in Backyards, ND).	**Known** Suitable habitat for this species occurs in the Project Area. Observed in Project Area.

Scientific name	Common name	Conservation status		Source of record	PMST category/ NatureMaps Sighting Date	Habitat	Likelihood of occurrence within project area
		Aus.	SA				
Thinornis cucullatus cucullatus	Hooded Plover (eastern)	VU	V	1	Species or species habitat known to occur within area	Sandy beaches of ocean estuaries, coastal lakes and inland salt lakes. Nesting on beach above high-tide mark (Morcombe 2021).	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Tringa glareola	Wood Sandpiper	Mi		1	Foraging, feeding or related behaviour known to occur within area	Freshwater swamps, lakes, flooded pasture. Less frequently, brackish waters, occasionally mangroves (Morcombe, 2021).	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Tringa nebularia	Common Greenshank	Mi		1	Species or species habitat known to occur within area	Diverse inland and coastal including permanent and temporary wetlands – billabongs, swamps, lakes, floodplains, sewage farms, saltworks ponds, flooded irrigated crops, estuaries and bays, mudflats and mangroves (Morcombe 2021).	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Tringa stagnatilis	Marsh Sandpiper	Mi		1	Foraging, feeding or related behaviour known to occur within area	Coastal and inland wetlands, salt or fresh, typically estuarine and mangrove mudflats, beaches, shallows of swamps, lakes, billabongs, temporary flood waters, sewage farms and saltworks ponds (Morcombe 2021)	**Unlikely** Suitable habitat for this species is does not occur in the Project Area.
Xenus cinereus	Terek Sandpiper	Mi		1	Foraging, feeding or related behaviour known to occur within area	Coastal mudflats in sheltered estuaries and lagoons as well as sandbars, reefs, coastal swamps and salt-fields (Morcombe 2021).	**Unlikely** Suitable habitat for this species does not occur in the Project Area.
Mammalia	**Mammals**						
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R	2	2019	Occupies forests, woodlands, coastal lowlands, tablelands of south-eastern Australia. Also known to utilise urban areas for feeding and roosting.	**Possible** Suitable habitat for this species may occur in the Project Area.

Conservation status

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. Further details are available from the Vascular Plant Metadata document on the DEWNR website.

Source of Information

1. **EPBC Act Protected Matters Report (DAWE 2021) – 5 km buffer applied to Project Area.**
2. **2. NatureMaps data extract (NatureMaps, 2021) - 5 km buffer applied to Project Area.**

4.3. Cumulative impacts

Direct impacts of the proposal include removal of 4.478 hectares of native vegetation, which contains fair to good quality native vegetation.

The potential indirect impacts of the Project include:

- Dust generation during construction, which may impact surrounding vegetation; and
- Noise generation, both during construction and from traffic, which may impact fauna species in the area.

The health of the surrounding vegetation should not be impacted by the overtaking lane construction if mitigation measures are put in place (for example in a Construction Environmental Management Plan (CEMP)).

DIT has a number of safety upgrades proposed for the Princes Highway including new overtaking lanes, overtaking lane extensions, intersection upgrades, rest area upgrades and road rehabilitation. Clearance will be required for a number of these projects, however, given the relatively small amount of clearance spread across the >300 km stretch of road, there is unlikely to be a substantial cumulative impact.

4.4. Addressing the Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation

The risk of vegetation impacts were identified during the early planning stage of the Project. A high level environmental assessment identified high quality remnant vegetation at the site and avoiding high quality vegetation was a key consideration in site selection and planning design. Reducing impacts to vegetation was considered alongside other constraints on this section of road, such as site distances and the presence of curves, existing junctions, width of the road corridor and the need to acquire property.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent.

The proposed vegetation clearance is confined to the project footprint. As a standard practice during construction, the contractors will be advised to retain vegetation if it does not need to be cleared for the project, to utilise pruning if possible and to use non-invasive excavation techniques when working in the structural root zone of trees to be retained. Additionally, impact to vegetation will be minimised by implementing of a Construction Environmental Management Plan (CEMP).

Where possible, the footprint of the project has been minimised to the smallest possible, whilst still facilitating the function and safety of the road. This is both to reduce impacts to roadside vegetation and to reduce the need to acquire land.

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.

The overtaking lanes are permanent land clearance which will not be rehabilitated or restored.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.

The adverse impacts to native vegetation that cannot be avoided or minimised will be offset through the achievement of a SEB that outweighs the proposed impact.

4.5. Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the Principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

The below table summarises the proposed impact of the clearance of 4.478 ha of vegetation.

Table 15. Assessment against the Principles of Clearance.

Principle of clearance	Relevant information	Assessment against the principles	Moderating factors that may be considered by the NVC
Principle 1(b) – significance as a habitat for wildlife	A total of 14 native bird species. One of which was a threatened fauna species was observed on site, Southern Emu-wren. There was one EPBC listed threatened fauna species identified as potentially occurring within the Project Area, Grey-headed Flying Fox. There were 5 additional State listed threatened species identified as potentially occurring within the Project Area. These were the Purple-gaped Honeyeater, Blue-winged Parrot, Elegant Parrot, Diamond Firetail and the known to occur Southern Emu-wren. The threatened fauna score for each patch is provided below: **Threatened fauna score:** All Vas: 0.1 **Unit biodiversity score**: Northbound: A1: 69.54 A2: 40.22 A3: 56.31	<u>Seriously at Variance</u> - All	The habitat removal required for the overtaking lanes are unlikely to provide important breeding, feeding, perching habitat, refuge or a corridor for the threatened species historically recorded within 5 km that possibly occur. The Project Area is small and already disturbed by the existing roads, therefore the Project should be moderated to At Variance.

Principle of clearance	Relevant information	Assessment against the principles	Moderating factors that may be considered by the NVC
	Southbound: B1a: 69.23 B1b: 47.68 B2: 21.26 B3: 46.72 B4: 76.87 B5: 55.19		
Principle 1(c) – plants of a rare, vulnerable or endangered species	Two EPBC listed orchid species were assessed as possibly occurring within the Project Area: • *Pterostylis arenicola* (Sandhill Greenhood) – AUS: VU, SA:V – considered possible. • *Thelymitra epipactoides* (Metallic Sun-orchid) – AUS: EN, SA: E – considered possible. Surveys were conducted during the Summer when these species are typically dormant. No targeted surveys for the orchid species has been conducted since this time, however, there are no known records for these species within 5 km and the understorey has been disturbed, therefore there is a low likelihood that these species will occur within the Project Area. The State listed Rare *Eucalyptus fasciculosa* (Pink Gum) is considered unlikely as it was not observed during the field survey. The Threatened Flora Score for Site 1 is: All sites - 0	Not at Variance	N/A
Principle 1(d) – the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or Endangered	No threatened communities under the EPBC Act or threatened ecosystems under the DEW Provisional list of threatened ecosystems are considered present within the clearance area. Threatened Community Score – 1	No at Variance	N/A

4.6. Risk assessment

The level of risk associated with the application

Table 16. Summary of the level of risk associated with the application.

Total clearance	No. of trees	-
	Area (ha)	4.478
	Total biodiversity Score	207.37
Seriously at variance with principle 1(b), 1(c) or 1 (d)		1(b)
Risk assessment outcome		Level 4

5. Clearance summary

Clearance Area(s) Summary table

Block	Site	Species diversity score	TEC Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
A	1	30	1	0	0.1	69.54	1.376	95.69	1			100.47	61,622.41	3,389.23
A	3	26	1	0	0.1	56.31	0.917	51.64	1			54.22	33,254.90	1,829.02
B	1a	30	1	0	0.1	69.23	1.183	81.90	1			85.99	52,741.12	2,900.76
B	1b	24	1	0	0.1	47.68	0.147	7.11	1			7.46	4,575.63	251.66
B	2	24	1	0	0.1	21.26	0.579	12.31	1			12.92	7,925.61	435.91
B	3	24	1	0	0.1	46.72	0.039	1.82	1			1.91	1,173.45	64.54
B	4	30	1	0	0.1	76.87	0.176	13.53	1			14.20	8,712.36	479.18
B	5	30	1	0	0.1	61.86	0.061	3.37	1			3.53	2,167.99	119.24
						Total	**4.478**	**207.37**				**280.7**	**$172,173.47**	**$9,469.54**

Totals summary table

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	207.37	280.7	$172,173.47	$9,469.54	$181,643.01

Economies of Scale Factor	0.5
Rainfall (mm)	465

6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

☐ Establish a new SEB Area on land owned by the proponent.

☐ Use SEB Credit that the proponent has established.

☐ Apply to have SEB Credit assigned from another person or body.

☐ Apply to have an SEB to be delivered by a Third Party.

☒ Pay into the Native Vegetation Fund.

PAYMENT SEB

The applicant proposes to achieve the SEB by paying into the Native Vegetation Fund. The total SEB payment required for the clearance of clearance of 4.478 ha of native vegetation with a Total Biodiversity Score of 207.37 is **$181,643.01** which includes an administration fee of **$9,469.54** (including GST).

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8. Appendices

Appendix 1. Fauna Species recorded over the Project Area, including those recorded in BAM sites.

Species name	Common name	Conservation status		Site A1	Site A2	Site A3	Site B1	Site B1a	Site B2	Site B3	Site B4	Site B5
		Aus	SA									
Anthochaera carunculata	Red Wattlebird			✓	✓	✓	✓	✓	✓	✓	✓	✓
Phylidonyris novaehollandiae	New Holland Honeyeater						✓	✓	✓	✓	✓	✓
Ptilotula penicillata	White-plumed Honeyeater						✓	✓	✓	✓	✓	✓
Colluricincla harmonica	Grey Shrikethrush						✓	✓	✓	✓	✓	✓
Acanthagenys rufogularis	Spiny-cheeked Honeyeater						✓	✓	✓	✓	✓	✓
Gavicalis virescens	Singing Honeyeater			✓	✓	✓	✓	✓	✓	✓	✓	✓
Haliastur sphenurus	Whistling Kite			✓	✓	✓	✓	✓	✓	✓	✓	✓
Malurus cyaneus	Superb Fairywren						✓	✓	✓	✓	✓	✓
Rhipidura leucophrys	Willie Wagtail						✓	✓	✓	✓	✓	✓
Gymnorhina tibicen	Australian Magpie						✓	✓	✓	✓	✓	✓
Stipiturus malachurus polionotum	Southern Emu-wren		R									✓
Trichoglossus haematodus	Rainbow Lorikeet						✓	✓	✓	✓	✓	✓
Rhipidura albiscapa	Grey Fantail						✓	✓	✓	✓	✓	✓
Smicromis brevirostris	Weebill			✓	✓	✓						
Oryctolagus cuniculus	*Rabbit (European Rabbit)			✓	✓	✓						
Vulpes vulpes	*Fox (Red Fox)			✓	✓	✓						

Appendix 2. Bushland Assessment Scoresheets associated with the proposed clearance (submitted in Excel format)

Appendix 3. Flora Species recorded over the Project Area, including those recorded in BAM sites.

Species name	Common name	Conservation status		Site A1	Site A2	Site A3	Site B1	Site B1a	Site B2	Site B3	Site B4	Site B5
		Aus	SA									
Acacia cupularis	Cup Wattle			✓	✓	✓						✓
Acacia longifolia ssp. longifolia	*Sallow Wattle					✓	✓	✓		✓	✓	✓
Acacia pycnantha	Golden Wattle				✓		✓					
Acrotriche cordata	Blunt-leaf Ground-berry				✓							
Adriana sp.	Bitter-bush						✓	✓				
Alyxia buxifolia	Sea Box			✓								
Amyema melaleucae	Tea-tree Mistletoe					✓						✓
Asparagus asparagoides f.	*Bridal Creeper			✓		✓	✓					✓
Asphodelus fistulosus	*Onion Weed			✓		✓	✓	✓	✓			
Astroloma humifusum	Cranberry Heath						✓					
Austrostipa sp.	Spear-grass			✓		✓	✓	✓	✓	✓		✓
Austrostipa stipoides	Coast Spear-grass									✓		
Avena barbata	*Bearded Oat			✓	✓	✓		✓	✓	✓		✓
Banksia marginata	Silver Banksia			✓		✓	✓	✓				
Baumea juncea	Bare Twig-rush				✓							✓
Billardiera cymosa ssp. cymosa	Sweet Apple-berry			✓					✓	✓		✓
Billardiera versicolor	Yellow-flower Apple-berry			✓	✓	✓	✓	✓				
Bromus sp.	Brome								✓			
Bursaria spinosa ssp. spinosa	Sweet Bursaria									✓		
Carpobrotus rossii	Native Pigface			✓	✓					✓		
Cassytha glabella	Slender Dodder-laurel			✓				✓				
Cenchrus clandestinus	*Kikuyu							✓				
Centaurea calcitrapa	*Star Thistle											
Centaurium tenuiflorum	Branched Centaury									✓		
Chloris truncata	Windmill Grass								✓			
Choretrum sp.	Sour-bush						✓					

Species name	Common name	Conservation status		Site A1	Site A2	Site A3	Site B1	Site B1a	Site B2	Site B3	Site B4	Site B5
		Aus	SA									
Chrysocephalum apiculatum	Common Everlasting			✓								
Chrysocephalum sp.	Everlasting					✓	✓	✓	✓	✓	✓	✓
Cirsium vulgare	Spear Thistle											✓
Clematis microphylla	Old Man's Beard					✓			✓			✓
Comesperma volubile	Love Creeper				✓							
Correa reflexa	Common Correa			✓		✓	✓					
Cynodon dactylon var.	Couch								✓		✓	✓
Dampiera rosmarinifolia	Rosemary Dampiera			✓			✓					
Dianella brevicaulis	Short-stem Flax-lily			✓			✓	✓	✓	✓		✓
Dianella revoluta var. revoluta	Black-anther Flax-lily			✓		✓	✓	✓		✓		✓
Distichlis distichophylla	Emu-grass											✓
Echium plantagineum	*Salvation Jane								✓			
Elymus sp.	Wheat-grass						✓					✓
Enchylaena tomentosa	Ruby Saltbush			✓		✓	✓					✓
Erigeron sp.	Fleabane						✓				✓	✓
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee			✓		✓	✓	✓				✓
Eucalyptus incrassata	Ridge-fruited Mallee			✓		✓	✓					✓
Eucalyptus leucoxylon ssp. leucoxylon	South Australian Blue Gum			✓		✓	✓					✓
Euphorbia sp.	Spurge								✓	✓		
Euphorbia terracina	*False Caper					✓		✓	✓			✓
Exocarpos aphyllus	Leafless Cherry			✓								
Exocarpos sp.	Native Cherry				✓					✓		
Exocarpos sparteus	Slender Cherry			✓								
Exocarpos syrticola	Coast Cherry			✓								
Ficinia nodosa	Knobby Club-rush			✓				✓	✓			
Foeniculum vulgare	*Fennel			✓								
Frankenia pauciflora var.	Southern Sea-heath											✓
Frankenia sp.	Sea-heath										✓	✓
Gahnia sp.	Saw-sedge					✓					✓	
Galium sp.	*Bedstraw						✓		✓			
Gazania sp.	*Gazania						✓					

Species name	Common name	Conservation status		Site A1	Site A2	Site A3	Site B1	Site B1a	Site B2	Site B3	Site B4	Site B5
		Aus	SA									
Hakea vittata	Limestone Needlebush						✓					
Heliotropium amplexicaule	Blue Heliotrope			✓								
Heliotropium sp.	Heliotrope						✓					
Hibbertia australis	Stalked Guinea-flower			✓	✓	✓	✓			✓		
Hordeum distichon	*										✓	
Hordeum glaucum	*Blue Barley-grass											✓
Hypochaeris radicata	Rough Cat's Ear								✓			
Juncus acutus	Sharp Rush											✓
Juncus sp.	Rush							✓	✓			
Kennedia prostrata	Scarlet Runner									✓		
Kunzea pomifera	Muntries			✓	✓	✓	✓	✓	✓	✓		
Lagurus ovatus	*Hare's Tail Grass			✓	✓	✓	✓	✓	✓	✓		✓
Lasiopetalum baueri	Slender Velvet Bush					✓	✓					
Lepidosperma carphoides	Black Rapier-sedge				✓							
Lepidosperma concavum	Spreading Sword-sedge				✓							
Lepidosperma sp.	Sword-sedge			✓		✓	✓					
Leptospermum laevigatum	*Coast Tea-tree						✓					
Leucopogon parviflorus	Coast Beard-heath			✓	✓	✓	✓	✓		✓		✓
Limonium companyonis	*Sea-lavender			✓			✓					✓
Limonium sp.	*Sea-lavender							✓	✓			
Lolium perenne	*Perennial Ryegrass			✓			✓		✓		✓	✓
Lolium sp.	*Ryegrass							✓				
Lomandra collina	Sand Mat-rush			✓	✓							
Lomandra effusa	Scented Mat-rush			✓	✓		✓					
Lomandra juncea	Desert Mat-rush			✓			✓					
Lomandra sp.	Mat-rush			✓								
Lycium ferocissimum	*African Boxthorn			✓			✓	✓		✓	✓	
Maireana sedifolia	Bluebush										✓	
Malva nicaeensis	*Mallow of Nice								✓			
Medicago sp.	*Medic			✓		✓	✓		✓	✓	✓	

Species name	Common name	Conservation status		Site A1	Site A2	Site A3	Site B1	Site B1a	Site B2	Site B3	Site B4	Site B5
		Aus	SA									
Melaleuca arnillaris ssp. armillaris	*Bracelet Honey-myrtle											✓
Melaleuca halmatuorum	Swamp Paper-bark											✓
Melaleuca lanceolata	Dryland Teatree						✓					✓
Melaleuca sp.	Tea-tree			✓			✓					
Microseris lanceolata	Yam Daisy						✓		✓			
Microtis sp.	Onion-orchid					✓						
Moraea setifolia	*Thread Iris					✓						✓
Muehlenbeckia adpressa	Climbing Lignum			✓			✓					
Muehlenbeckia gunnii	Coastal Climbing Lignum			✓		✓	✓			✓		✓
Myoporum insulare	Common Boobialla			✓		✓				✓	✓	✓
Neatostema apulum	Hairy Sheepweed			✓								
Nicotiana glauca	*Tree Tobacco						✓	✓				
Olearia axillaris	Coast Daisy-bush			✓	✓	✓	✓			✓		
Paspalum sp.	*											
Phalaris aquatica	*Phalaris			✓								
Pimelea glauca	Smooth Riceflower				✓							
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			✓		✓	✓					
Piptatherum miliaceum	*Rice Millet			✓			✓	✓	✓	✓		
Plantago coronopus spp.	*Bucks-horn Plantain						✓	✓		✓		✓
Polypogon monspeliensis	*Annual Beard-grass										✓	
Puccinellia fasciculate	Borrer's Saltmarsh-grass										✓	
Pultenaea sp.	Bush-pea							✓				
Pultenaea prostrata	Silky Bush-pea				✓							
Reichardia tingitana	*False Sowthistle											
Rhagodia candolleana	Sea-berry Saltbush			✓		✓			✓			
Rhagodia crassifolia	Fleshy Saltbush						✓	✓				✓
Rostraria cristata	*Annual Cat's-tail							✓				
Rytidosperma caespitosum	Common Wallaby-grass			✓			✓					

Species name	Common name	Conservation status		Site A1	Site A2	Site A3	Site B1	Site B1a	Site B2	Site B3	Site B4	Site B5
		Aus	SA									
Rytidosperma sp.	Wallaby-grass				✓	✓		✓		✓		
Salicornia blackiana	Thick-head Samphire										✓	
Salvia verbenaca var. verbenaca	*Wild Sage			✓								
Samolus repens	Creeping Brookweed										✓	✓
Santalum acuminatum	Quandong					✓						
Scabiosa atropurpurea	*Pincushions			✓	✓	✓		✓	✓	✓		
Schoenus sp.	Bog-rush				✓				✓			
Senecio pterophorus	*African Daisy						✓					
Sonchus oleraceus	*Common Sow-thistle			✓			✓				✓	
Sonchus sp.	Sow-thistle							✓				✓
Sporobolus sp.										✓		
Sporobolus virginicus	Salt Couch										✓	✓
Suaeda australis	Austral Seablite										✓	✓
Taraxacum khatoonae	*Dandelion			✓								
Tecticornia sp.	Samphire										✓	
Tetragonia implexicoma	Bower Spinach			✓		✓	✓					✓
Trifolium fragiferum var.	*Strawberry Clover								✓			
Trifolium sp.	*Clover			✓			✓					
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy			✓								
Xanthorrhoea caespitosa	Sand-heath Yacca			✓		✓	✓					

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