

APPENDIX 8. INVESTIGATIONS – VEGETATION, FAUNA AND ENVIRONMENTAL



Goolwa North Code Amendment

Flora and Fauna Desktop Assessment

Goolwa North Code Amendment Flora and Fauna Desktop Assessment

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Version 2 – Final

Prepared by EBS Ecology for Future Urban

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EBS Ecology
112 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

Affected Area	the land north of Goolwa, west of Alexandrina Road and north of Byrnes Road (known as the Project Area)
BAM	Bushland Assessment Method
BDBSA	Biological Database of South Australia (maintained by DEW)
CEMP	Construction Environmental Management Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DEW	Department for Environment and Water (South Australia)
EBS	Environment and Biodiversity Services Pty Ltd (trading as EBS Ecology)
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
ha	hectares
IBRA	Interim Biogeographical Regionalisation of Australia
km	Kilometre(s)
LSA Act	<i>Landscape South Australia Act 2019</i>
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	<i>National Parks and Wildlife Act 1972</i>
NV Act	<i>Native Vegetation Act 1991</i>
NVF	Native Vegetation Fund
NVIS	National Vegetation Information System
PDI Act	<i>Planning, Development and Infrastructure Act 2016</i>
PMST	Protected Matters Search Tool (under the EPBC Act; maintained by DCCEEW)
Project	A desktop assessment in relation to a Code Amendment in Goolwa North
Project Area	the affected area of land north of Goolwa, west of Alexandrina Road and north of Byrnes Road
RMS	Roadside Marker System
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
spp.	Species (plural)
SSCC	SA Seed Conservation Centre
ssp.	Sub-species
TEC	Threatened Ecological Communities
the Code	South Australian Planning and Design Code

EXECUTIVE SUMMARY

EBS Ecology (EBS) has been engaged by Future Urban to undertake a desktop assessment in preparation for proposed changes to the South Australian Planning and Design Code (the Code) via a Code Amendment for land north of Goolwa (the Project). The area of land currently under investigation, known as the affected area (Project Area) was included in a broader assessment undertaken by EBS Ecology for the Goolwa North Growth Area Development Plan Amendment in 2016. The current Project Area comprises land that was within the area initially assessed in 2016.

The objective of this report is to undertake a desktop flora and fauna assessment to identify potential ecological constraints relevant to the Code Amendment of the Project Area. Multiple previous surveys of roadside vegetation in the Project Area have been undertaken previously. A vegetation assessment undertaken by EBS in 2016 has been used in this report as this contains the most recent and comprehensive data from the Project Area. The 2016 field assessment undertook ground-truthing of previous data and assessed gaps in information from previous surveys.

The desktop study has identified that the following constraints, in relation to TEC, flora and fauna including threatened flora and fauna species and their habitat in the Project Area:

- Nine sections of vegetation that were previously surveyed are relevant to the current Project Area. There is one section that should not be disturbed (section 1299) and two sections where disturbance should be avoided wherever possible (sections 1296 and 1298).
- One patch of Peppermint Box (*Eucalyptus odorata*) Woodland was identified within the Project Area based on previous survey effort. This patch would need to be assessed against the Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia (PBGW) listing criteria (Turner 2012) via additional field assessment to determine if it is the PBGW TEC.
- One EPBC Act threatened flora species is likely to occur in the Project Area. *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) has been previously recorded in close proximity to the Project Area boundary and overlaps with the PBGW TEC.
- One EPBC Act threatened fauna species is likely to occur in the Project Area. The Hooded Robin (*Melanodryas cucullata cucullata*) has been previously recorded in the Search Area and prefers dry Eucalypt and Acacia woodlands and shrublands which occur in patches in the Project Area.
- No EPBC Act listed migratory species were assessed as potentially occurring in the Project Area.
- A total of 11 NPW Act listed flora species are likely to occur in the Project Area. All these species have been recorded within 5km of the Project Area within the last 30 years.
- A total of 13 NPW Act listed fauna species are likely to occur in the Project Area. All these species have been recorded within 5km of the Project Area within the last 20 years.
- Sections of vegetation within the Project Area provide habitat for many species including threatened fauna and other native fauna. When mature *Eucalyptus* spp. are in flower, they provide a foraging resource for nectarivorous species.

- Several scattered trees in the Project Area may contain hollows suitable for use by native fauna including threatened fauna for nesting and breeding.

Based upon the vegetation that was identified by EBS in 2016, a priority assessment was undertaken, and three levels of priority were identified and are still relevant. The current Project Area contains vegetation in all three priority levels:

1. Highlight baseline non-negotiable high value habitat reserve zones and observe existing linking corridors with open space buffers.
2. Connect high value habitat reserve zones with other intact remnant patches within or external to urban growth zone.
3. Enhance connectivity using planning and natural land features such as creeks to link patches wherever possible.

The following broad recommendations and considerations should be taken into account to minimise any future proposed impacts to TEC, flora and fauna including impacts to threatened flora and fauna species and their habitat as a result of the Project.

Any future proposed development as a result of the Code Amendment should:

- Aim to retain high value vegetation where possible, particularly sections 1296, 1298 and 1299 which were previously identified as sections that either should not be disturbed or where disturbance should be avoided wherever possible. Project design that avoids this constraint should be considered.
- Ensure that the design and construction methods minimise impacts to vegetation, as much as possible, particularly sections 1296, 1298 and 1299.
- Consider areas that are already heavily disturbed with introduced flora species or areas already used for agriculture and/or cropping in order to minimise any impact to native flora and fauna.
- Consider pruning vegetation instead of removing it, where possible.
- Document vegetation management and mitigation measures in a project specific Construction Environmental Management Plan (CEMP).
- Ensure a weed management plan is established prior to any construction to prevent weed spread into neighbouring land.

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1 INTRODUCTION

1.1 Project understanding

EBS Ecology (EBS) has been engaged by Future Urban to undertake a desktop assessment in preparation for proposed changes to the South Australian Planning and Design Code (the Code) via a Code Amendment for land north of Goolwa (the Project).

1.1.1 Objectives and scope

The objective of this report is to undertake a desktop flora and fauna assessment to identify potential ecological constraints relevant to the Code Amendment of the Project Area.

The desktop assessment will;

- Review previous ecological reports for the area, including the vegetation assessment undertaken by EBS in 2016;
- Consider flora and fauna relevant to the Project Area as identified in a Protected Matters Search Tool (PMST) report and Biological Database of South Australia (BDBSA) search;
- Review vegetation mapping and EBS 2016 survey data to identify potential Threatened Ecological Communities (TEC) in the Project Area; and
- Review any known areas of ecological significance in or within close proximity to the Project Area.

1.2 Project Area

The area of land currently under investigation, known as the affected area (Project Area) was included in a broader assessment undertaken by EBS Ecology for the Goolwa North Growth Area Development Plan Amendment in 2016 (EBS 2016). The current Project Area comprises land that was within the area initially assessed in 2016 (Figure 1).

1.3 Administrative boundaries

Administrative boundaries present in the Project Area are summarised in Table 1.

Table 1. Administrative boundaries present in the Project Area.

Administration	Region
State (SA) Government Region	Fleurieu and Kangaroo Island
Local Government Area	Alexandrina Council
Hundreds	Goolwa
Landscape Management Region	Hills and Fleurieu
Soil Conservation District	Southern Hills



Figure 1. Current Project Area (2023) and previous Project Area (2016).

2 COMPLIANCE AND LEGISLATIVE SUMMARY

Impacts to biodiversity, including clearing of native vegetation and impact to threatened species and ecological communities, are subject to Commonwealth and State legislation. A summary of the legislation relevant to the Project Area is provided in Table 2 and described further in the following sections.

Table 2. Summary of legislative requirements.

Jurisdiction	Legislation
Commonwealth	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
South Australia	<i>Native Vegetation Act 1991</i>
	<i>National Parks and Wildlife Act 1972</i>
	<i>Landscape South Australia Act 2019</i>
	<i>Planning, Development and Infrastructure Act 2016</i>

2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act and the *Environment Protection and Biodiversity Conservation Regulations 2000* provide 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). The nine MNES protected under the Act are:

1. World Heritage properties.
2. National Heritage places.
3. Wetlands of international importance (listed under the Ramsar Convention).
4. Listed threatened species and ecological communities.
5. Migratory species protected under international agreements.
6. Commonwealth marine areas.
7. The Great Barrier Reef Marine Park.
8. Nuclear actions (including uranium mines).
9. A water resource, in relation to coal seam gas development and large coal mining development.

Any action that has, will have, or is likely to have a significant impact on MNES requires referral under the EPBC Act. Substantial penalties apply for undertaking an action that has, will have, or is likely to have a significant impact on a MNES without approval.

The *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DOE 2013a) provide overarching guidance to help determine whether an action is likely to have a significant impact on a MNES.

2.2 Native Vegetation Act 1991

Native vegetation within the Project Area is protected under the *Native Vegetation Act 1991* (NV Act). This legislation is principally in place to provide incentives and assistance for the preservation and enhancement of native vegetation and to control the clearance of native vegetation.

Native vegetation refers to any naturally occurring local plant species that is indigenous to South Australia (SA), from small ground covers and native grasses to large trees and aquatic plants including marine vegetation. It also includes naturally occurring regrowth and in certain circumstances, dead trees (Department for Environment and Water, 2023).

Any proposed clearance of native vegetation in South Australia (unless exempt under the regulations) is to be assessed against the Principles of Clearance under the Act and requires approval from the Native Vegetation Council (NVC). Approval is generally conditional on achievement of a Significant Environmental Benefit (SEB) either through development of an approved SEB offset or through payment into the Native Vegetation Fund (NVF).

2.3 National Parks and Wildlife Act 1972

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. Threatened plant and animal species are listed in Schedules 7 (Endangered species), 8 (Vulnerable species) and 9 (Rare species) of the Act. Persons must not:

- Take a native plant on a reserve, wilderness protection area, wilderness protection zone, land reserved for public purposes, a forest reserve, or any other Crown land;
- Take a native plant of a prescribed species on private land;
- Take a native plant on private land without the consent of the owner (such plants may also be covered by the *Native Vegetation Act 1991*);
- Take a protected animal or the eggs of a protected animal without approval;
- Keep protected animals unless authorised to do so; and
- Use poison to kill a protected animal without approval.

Conservation rated flora and fauna species listed on Schedules 7, 8, or 9 of the NPW Act may occur within the Project Area. Persons must comply with the conditions imposed upon permits and approvals.

2.4 Landscape South Australia Act 2019

The *Landscape South Australia Act 2019* (LSA Act) replaced the *Natural Resources Management Act 2004*. Under the LSA Act, new regional landscape boards have been established. The aim is to deliver Natural Resources Management related services to regional communities, including effective water management, pest plant and animal control, soil and land management and support for broader sustainable primary production programs. Under the LSA Act, landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.

2.5 Planning, Development and Infrastructure Act 2016

The *Planning, Development and Infrastructure Act 2016* (PDI Act) repealed the *Development Act 1993*. The PDI Act, along with the *Planning, Development and Infrastructure (General) Regulations 2017* and *Planning and Design Code*, provide the legislative framework for carrying out planning and development

works within the state. The *Planning and Design Code* is the cornerstone of the new system and has replaced all council development plans to become the single source of planning policy for assessing development applications. No development can be undertaken without an appropriate Development Approval being obtained from the relevant authority after an application and assessment process.

3 DESKTOP ASSESSMENT METHODS

3.1 Database searches

A desktop assessment was conducted to assess the potential for any threatened and Migratory species (both nationally and State listed) to occur within the Project Area. This was achieved by undertaking database searches using a 5 km buffer of the Project Area (Search Area).

3.1.1 *Protected Matters Search Tool*

A Protected Matters Search Tool (PMST) report was generated on 20 June 2023 to identify MNES under the EPBC Act (DCCEEW 2023b). The PMST is maintained by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and was used to identify flora and fauna species or ecological communities of national environmental significance that may occur or have suitable habitat within the Project Area. Species and TECs identified in the PMST report that are known, likely or may occur within the Search Area were assessed for their likelihood of occurrence within the Project Area. All species considered exclusively marine (including whales, sharks, fish, dolphins, marine turtles, and marine birds) were not assessed in this desktop assessment report as the Project Area is terrestrial. No species listed as marine by the PMST report have been included as the Project Area is not within a marine protected area.

3.1.2 *Biological Database of South Australia*

A BDBSA search was obtained from the Department of Environment and Water (DEW) on 21 June 2023 (Recordset number: DEWNRBDBSA230621-2) to identify threatened flora and fauna species previously recorded within 5 km of the Project Area (DEW 2023b). Only records with a spatial reliability of less than 1 km were included in the desktop assessment.

The BDBSA is comprised of an integrated collection of corporate databases which meet DEW standards for data quality, integrity, and maintenance. In addition to DEW 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).

3.1.3 *Literature review*

Existing information and literature relevant to the Project Area was reviewed, including:

- Previous ecological reports for the area, including the vegetation assessment undertaken by EBS in 2016;
- Historic and current aerial imagery;
- Spatial datasets, e.g., DEW biological survey sites, IBRA, vegetation cover, protected areas, vegetation floristic mapping, surface and ground water and roadside significant sites from NatureMaps (DEW 2023a); and
- Reports, design drawings, plans and web-based information, including:

- SA Planning and Property Atlas; and
- EPBC Act species profiles, conservation advice and recovery plans.

The aforementioned information was used to assess:

- Potential vegetation associations present (including threatened ecological communities); and
- Flora and fauna species of conservation significance known or likely to occur within the area.

3.2 Assessment of the likelihood of occurrence

The likelihood of each threatened flora and fauna species potentially occurring within the Project Area was assessed. A likelihood of occurrence rating (Highly Likely / Known, Likely, Possible, Unlikely) was assigned to each threatened species identified in the desktop database searches. The ratings take the following criteria into consideration:

Each threatened species has been rated as either highly likely/known, likely, possible, or unlikely to occur in the Project Area with guidance from the criteria listed in Table 3.

Table 3. Criteria for the likelihood of occurrence of threatened species.

Likelihood	Criteria
Highly Likely / Known	<ul style="list-style-type: none"> • The species was recorded in the Project Area during the field assessment; or • Recorded in the Search Area in last 10 years, the species has specific habitat requirements, and that habitat occurs, or may occur, in the Project Area; or • Recorded in the Search Area in last 10 years, the species does not have specific habitat requirements and there is intact native vegetation in the Project Area.
Likely	<ul style="list-style-type: none"> • Recorded in the Project or Search Area between 11 and 20 years ago, the species has specific habitat requirements, and that habitat occurs, or may occur, in the Project Area; or • Recorded in the Project or Search Area between 11 and 20 years ago, the species does not have specific habitat requirements and there is intact native vegetation in the Project Area. • Recorded in the Search or Project Area in the last 21 – 40 years, the species does not have specific habitat requirements and there is intact native vegetation in the Project Area; or • Recorded in the Search or Project Area in the last 21 – 40 years, the species has specific habitat requirements, and that habitat occurs, or may occur, in the Project Area.
Possible	<ul style="list-style-type: none"> • Recorded in the Search Area in last 10 or 20 years, the species has specific habitat requirements, but that habitat does not occur in the Project Area; or • Recorded in the Search Area in last 10 or 20 years, the species does not have specific habitat requirements, but there is no intact native vegetation in the Project Area; or • Recorded in the Search or Project Area between 21 and 40 years ago, but there is no intact native vegetation in the Project Area; or • Recorded in the Search or Project Area in the last 21 – 40 years, the species has specific habitat requirements, but that habitat does not occur in the Project Area; or • Records of the species in the Project or Search Area are more than 40 years old, survey effort is not considered adequate, suitable habitat for the species occurs, or may occur, in the Project Area, the species is difficult to detect, and species of similar habitat needs have been recorded; or • There are no historical records of the species in the Search or Project Areas, survey effort is not considered adequate suitable habitat for the species occurs, or may occur, in the Project Area, the species is difficult to detect, and species of similar habitat needs have been recorded.
Unlikely	<ul style="list-style-type: none"> • Records of the species in the Project or Search Area are more than 40 years old and survey effort is considered adequate to detect the species; or • Records of the species in the Project or Search Area are more than 40 years old, survey effort is not considered adequate, but suitable habitat for the species does not occur in the Project Area; or

Likelihood	Criteria
	<ul style="list-style-type: none"> There are no historical records of the species in the Search or Project Areas and survey effort is considered adequate to detect the species; or There are no historical records of the species in the Search or Project Areas survey effort is not considered adequate, but suitable habitat for the species does not occur in the Project Area; or There are no historical records of the species in the Search or Project Areas survey effort is not considered adequate, suitable habitat for the species occurs, or may occur, in the Project Area, but the species is not difficult to detect and no species that require similar habitat needs have been recorded.

3.3 Limitations

Desktop assessment

The desktop assessment was based on existing datasets and references from a range of sources. EBS has not attempted to verify the accuracy of any such information. The findings and conclusions expressed by EBS are based solely upon information in existence at the time of the assessment.

Flora and fauna records were sourced from the PMST and BDBSA. The BDBSA only includes verified 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.

The EPBC Act protected matters report and BDBSA flora and fauna records were limited to a 5 km buffer around the Project Area. Fauna species, in particular birds can traverse distances in excess of 20 km. It is also acknowledged that the presence of species may not be adequately represented by database records. Hence the EPBC and BDBSA results may not highlight all potential threatened flora and fauna species that may occur in the area, within a 5 km radius. A precautionary approach has therefore been adopted, with reference to existing EPBC and BDBSA records. The combination of database records and background research have provided a solid baseline foundation for determining the fauna that may, are likely to, or are known to, occur within the Project Area.

Mapping and spatial data

Mapping may be inaccurate and not reflect the vegetation on site. Some types of native vegetation based on interpretation of imagery are difficult to observe and distinguish (e.g., native grasslands and low shrublands). Hence these types of vegetation may be under-represented.

All spatial data has been captured in or converted to the following coordinate reference system:

Datum: Geocentric Datum of Australia 2020 (GDA2020).

Projection: Map Grid of Australia (MGA), Zone 54H.

All location coordinates listed in this report are expressed using this system. Spatial data converted from other coordinate reference systems may have accuracy limitations.

4 DESKTOP RESULTS

4.1 Environmental setting

4.1.1 Current land use

Most of the land in and surrounding the Project Area is used for agricultural production with intensive cropping. Native vegetation is comprised of small roadside corridors or remnant patches surrounded by pasture.

4.1.2 Climate

Climate data recorded at Goolwa (Hindmarsh Island Marina), approximately 5 km to the southeast, indicates that the Project Area experiences cool winters and warm dry summers (Figure 2). July is the coolest and wettest month, with a mean maximum temperature of 15°C and mean rainfall of 60 millimetres (mm) (BOM 2023). The area is generally warm and dry from November to March, the warmest and driest month being February, with an average maximum temperature of 25 °C and mean maximum rainfall of 6 mm.

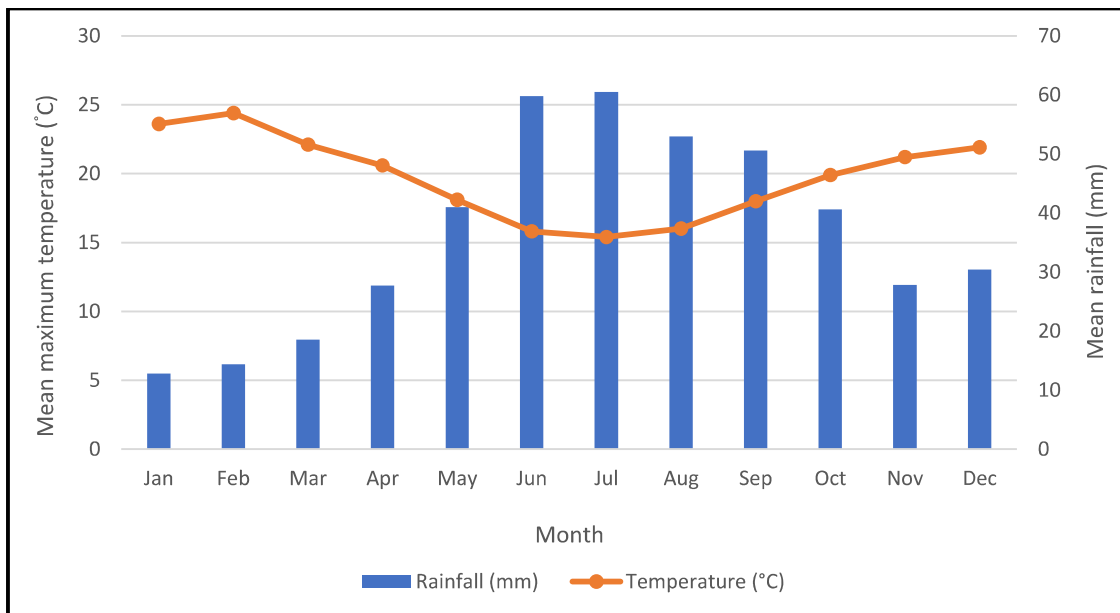


Figure 2. Mean maximum temperature (°C) and mean rainfall (mm) at Goolwa (Hindmarsh Island Marina) (Weather station 023849) (BOM 2023).

4.1.3 Interim Biogeographical Regionalisation of Australia

The Interim Biogeographical Regionalisation of Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation, and species information. The Project Area occurs in the Murray Lakes and Coorong subregion of the Murray Darling Depression IBRA Bioregion. At a local scale the IBRA subregions are further categorised by Environmental Associations, the Project Area falls within the Goolwa Environmental Association (Table 4).

Approximately 14 % (35,644 hectares (ha)) of the Murray Lakes and Coorong IBRA Subregion and approximately 9 % (1009 ha) of the Goolwa IBRA Environmental Association is mapped as remnant vegetation. Of this, 35 % (12,559 ha) and 6 % (59 ha) is formerly conserved and protected, respectively (DCCEEW 2023a).

Table 4. IBRA bioregion, subregion, and environmental association environmental landscape summary.

Murray Darling Depression IBRA bioregion	
An extensive gently undulating sand and clay plain of Tertiary and Quaternary age frequently overlain by aeolian dunes. Vegetation consists of semi-arid woodlands of Black Oak / Belah, Bullock Bush/ Rosewood and <i>Acacia</i> spp., mallee shrublands and heathlands and savanna woodlands.	
Murray Lakes and Coorong IBRA subregion	
This area is dominated by Lakes Alexandrina and Albert which form large depressions in the Murray plain, and the Coorong, an elongated saltwater lagoon separated from the ocean by a narrow peninsula of sand dunes. Small lacustrine plains and swamps with saline cracking clays fringe the lakes and are bordered by undulating calcrete plains covered by extensive sand sheets. Samphire and saltbush shrublands dominate the low-lying plains and swamps whilst the native vegetation on the sandy soils of the higher ground is mainly <i>Allocasuarina verticillata</i> / <i>Melaleuca lanceolata</i> low woodland. Most native vegetation in this area has been subject to clearance and grazing.	
Remnant vegetation	Approximately 14 % (35,644 ha) of the subregion is mapped as remnant native vegetation, of which 35 % (12,559 ha) is formally conserved.
Landform	Very gently undulating, to flat aeolian sand covered depositional plain of the central-southern Murray Basin.
Geology	East-west linear dunes, regularly spaced with cusp-like crests which are consistently steeper on the southern side. Up to four buried paleosols within the dune. Dunes composed of pale to dark reddish-brown calcareous sand with some clay fraction
Soil	Brown calcareous earths and highly calcareous brown loamy earths, Hard setting loamy soils with red clayey subsoils, Cracking clays.
Vegetation	Mallee heath and shrublands.
Conservation significance	133 species of threatened fauna, 77 species of threatened flora. 1 wetlands of national significance.
Goolwa IBRA environmental association	
Remnant vegetation	Approximately 9 % (1009 ha) of the association is mapped as remnant native vegetation, of which 6 % (59 ha) is formally conserved.
Landform	Low undulating plain on calcreted sands with numerous small depressions, bordering Lake Alexandrina.
Geology	Calcrete and clay.

Soil	Red siliceous sands and sandy pedal mottled-yellow duplex soils and grey self-mulching cracking clays.
Vegetation	Grassland.
Conservation significance	82 species of threatened fauna, 28 species of threatened flora. 1 wetlands of national significance.

4.1.4 Wetlands and watercourses

Aerial imagery shows a small ephemeral swale or dam near the southwest corner of the Project Area. Otherwise, there are no natural watercourses in the Project Area. However, the Project Area is adjacent to the catchment for the Coorong and Lakes Alexandrina and Albert wetland (Figure 1).

4.2 Vegetation

Multiple previous surveys of roadside vegetation in the Project Area have been undertaken (Table 5). A vegetation assessment undertaken by EBS in 2016 has been used in this report as this contains the most recent and comprehensive data from the Project Area. This assessment undertook ground-truthing of previous data and assessed gaps in information from previous surveys (EBS 2016).

Table 5. Previous vegetation surveys conducted in the Project Area.

Year	Assessor	Type
1997	Michael Hyde	Survey of developed roads
2002-2004	Marcus Pickett and Nigel Mallen	Survey of undeveloped roads
2013	EBS Ecology	Review of Roadside Marker System (RMS)
2016	EBS Ecology	Vegetation Assessment

The vegetation assessment by EBS in 2016 was undertaken using various methods, as outlined in Table 6. The current approach used for applications for clearance of stands of native vegetation is the Bushland Assessment Method (BAM). As part of a BAM assessment each flora species present in each vegetation association is listed. As the BAM method was not relevant for the 2016 survey, a specific flora species list per vegetation association does not exist. However, dominant overstorey and understorey species were recorded, and threatened flora species observed during the 2016 survey were listed. Native flora species richness is part of the listing criteria for the Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia TEC. Therefore, a detailed flora survey was undertaken in Peppermint Box woodlands during the 2016 survey.

Table 6. Field survey methods used by EBS Ecology in 2016 field assessment.

Method	Vegetation surveyed	Data collected
Picket and Mullen (2002) survey methodology	Vegetation not already assessed in surveys before 2016.	<ul style="list-style-type: none"> • Dominant overstorey • Dominant understorey • Dominant weed species
Guide to Roadside Vegetation Survey Methodology in South Australia (DEH, 2006).	Condition of vegetation not already assessed in surveys before 2016.	<ul style="list-style-type: none"> • Vegetation condition • Representative photo of each patch
Neagle (1995)	Vegetation communities.	<ul style="list-style-type: none"> • Conservation significance scores for vegetation communities


Method	Vegetation surveyed	Data collected
EPBC Act Policy statement 3.7 (DoE, 2007)	All known patches of <i>Eucalyptus odorata</i> grassy woodland on private land with native understorey species present.	<ul style="list-style-type: none"> Species richness




Nine sections of vegetation that were surveyed by EBS in 2016 are relevant to the current Project Area (Table 7). These sections vary in vegetation quality and ecological significance (Table 8). The location of each numbered section and their overall ecological significance in the Project Area is provided in Figure 3.

Table 7. Sections and their ecological significance in the Project Area as assessed by EBS in 2016.

Section	Ecological Significance
1295	May be disturbed
1296	Disturbance should be avoided wherever possible
1297	May be disturbed
1298	Disturbance should be avoided wherever possible
1299	Should not be disturbed
1300	May be disturbed
1301	May be disturbed
1302	May be disturbed
1303	May be disturbed

Table 8. Site description and ecological significance of sections in the Project Area assessed by EBS in 2016.

Section	Site description and ecological significance	Photo
1295	<ul style="list-style-type: none"> May be disturbed - very little or no native vegetation present. Planted native trees effective as wind breaks. Too narrow to be of ecological significance for most fauna species. 	

Section	Site description and ecological significance	Photo
1296	<ul style="list-style-type: none"> Disturbance should be avoided wherever possible - contains degraded significant vegetation or less significant vegetation in moderate condition. Patches of scattered <i>Eucalyptus fasciculosa</i> (Pink Gum). Unimpeded grazing in understorey. Overall condition of community is low. 	
1297	<ul style="list-style-type: none"> May be disturbed - subject to further assessment and planning; contains limited value native vegetation on poor condition. Patches of scattered <i>Eucalyptus fasciculosa</i> (Pink Gum). Unimpeded grazing in understorey. In 2016 contained an active Wedge-tailed Eagle nest. 	
1298	<ul style="list-style-type: none"> Disturbance should be avoided wherever possible - contains degraded significant vegetation or less significant vegetation in moderate condition. Contains scattered <i>Eucalyptus fasciculosa</i> (Pink Gum). Provide a base for connectivity of disjunct patches to the Pink Gum/Broombush community to the east of the Project Area. 	Not available.
1299	<ul style="list-style-type: none"> Should not be disturbed - contains significant vegetation in moderate condition or less significant vegetation in excellent condition. Largely intact stratum. Shows a low level of weed infestation and may provide suitable conditions for orchid species. 	




Section	Site description and ecological significance	Photo
1300	<ul style="list-style-type: none"> May be disturbed – very little or no native vegetation present. Exotic grassland. 	Not available.
1301	<ul style="list-style-type: none"> May be disturbed – very little or no native vegetation present. Exotic grassland. 	
1302	<ul style="list-style-type: none"> May be disturbed – very little or no native vegetation present. Open shrubland over exotic species. Only native species present was <i>Salsola australis</i> (Buckbush), which is typically a pioneer species that occurs in degraded and disturbed areas. 	
1303	<ul style="list-style-type: none"> May be disturbed – subject to further assessment and planning; contains limited value native vegetation in poor condition. Contains <i>Eucalyptus odorata</i> (Peppermint Box) over <i>Eucalyptus incrassata</i> (Ridge Fruited Mallee) and <i>Melaleuca uncinata</i> (Broombush). Understorey dominated by exotic species. 	



Figure 3. Vegetation sections identified by EBS in 2016 and their overall ecological significance in the current Project Area.

4.2.1 Priority assessment

Based upon the vegetation that was identified by EBS in 2016, a priority assessment was undertaken, and three levels of priority were identified:

1. Highlight baseline non-negotiable high value habitat reserve zones and observe existing linking corridors with open space buffers.
2. Connect high value habitat reserve zones with other intact remnant patches within or external to urban growth zone.
3. Enhance connectivity using planning and natural land features such as creeks to link patches wherever possible.

The current Project Area contains vegetation in all three priority levels (Figure 4).

Priority 1 focuses on avoiding high value habitat and existing corridors that connect vegetation in the Project Area. As indicated in the assessment by EBS in 2016, these areas would form the basis for which other planning could work with in. If avoidance is not possible, micro-siting future roads to minimise the impact on high value habitat and to minimise fragmentation should be considered.

Priority 2 focuses on connecting high value habitat within the Project Area and utilising existing road reserves and areas that have been previously revegetated. This encourages connecting patches in the north of the Project Area (such as sections 1296 to 1297 and sections 1296 to 1298 – see Figure 3).

Priority 3 focuses on enhancing connectivity by revegetating and using planning and natural land features such as creeks to link patches where possible.

For more information on the priority levels within the Project Area refer to the vegetation assessment undertaken by EBS in 2016.

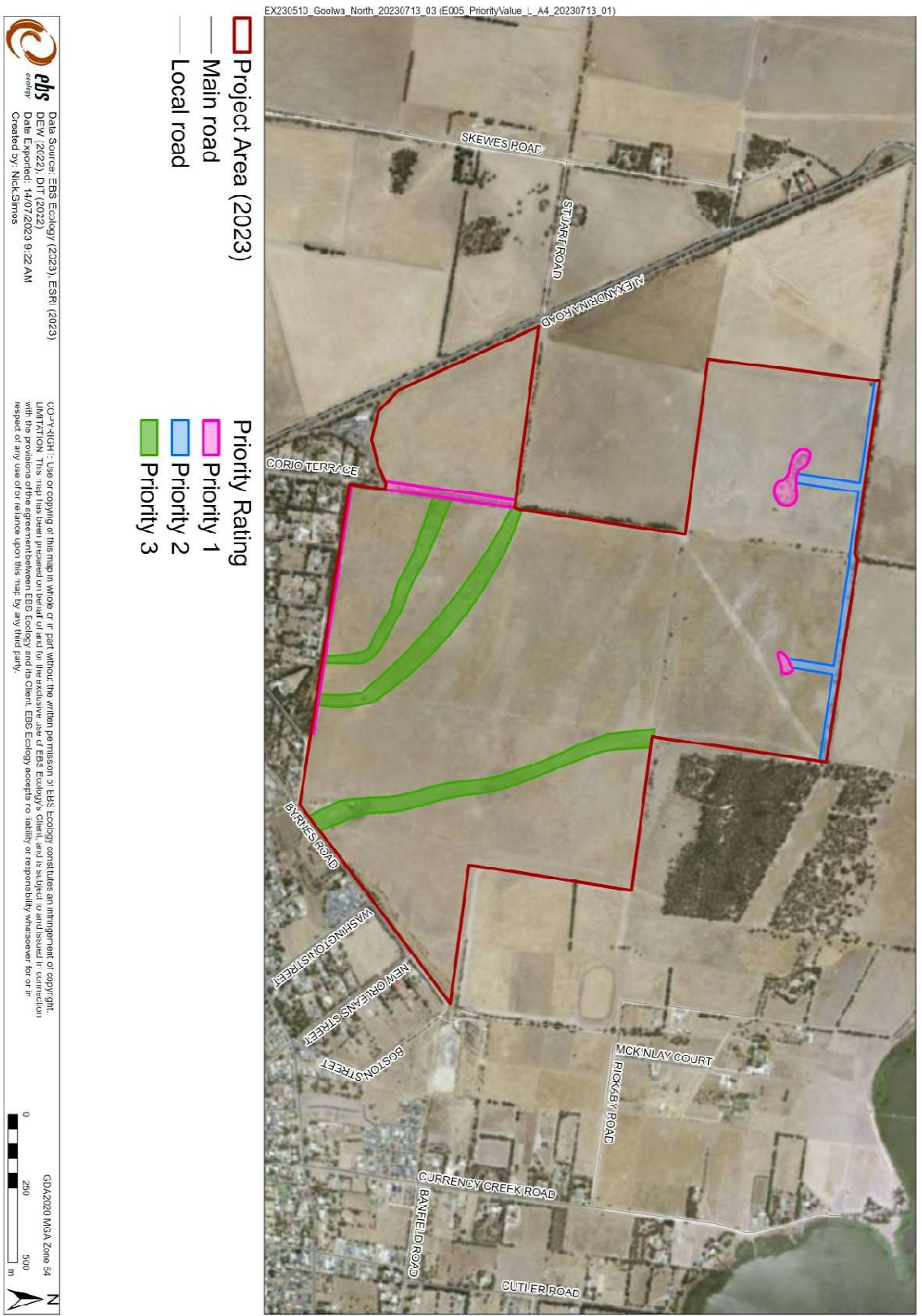


Figure 4. Priority of areas in terms of ecological importance as defined in EBS 2016 in the Project Area. Priority 1 has the highest ecological importance.

4.3 Matters of National Environmental Significance (MNES)

4.3.1 Summary of Matters of National Environmental Significance

The PMST report identified one Wetlands of International Importance, four threatened ecological communities, 78 threatened species (including 19 flora and 59 fauna species) and 58 migratory species protected under the EPBC Act, which may be relevant to the Project Area. Table 9 summarises the results of the PMST report and the relevant MNES are discussed further below.

Migratory Marine fauna species, fish (5 species) and shark (2 species) are not further discussed in the desktop assessment as the Project Area is terrestrial.

Table 9. Summary of the EPBC Act Protected Matters Search Tool results (5 km buffer).

Matters of National Environment Significance under EPBC Act	Identified within the search area
World Heritage Properties	None
National Heritage Properties	None
Wetlands of International Importance	1
Great Barrier Reef Marine Park	None
Commonwealth Marine Areas	None
Listed Threatened Ecological Communities	4
Listed Threatened Species	78 (19 flora and 59 fauna)
Listed Migratory Species	58
State and Territory Reserves	9

4.3.2 Wetlands of International Importance

One Wetland of International Importance was identified by the PMST as potentially occurring within 5 km of the Project Area (Table 10).

Table 10. Wetlands of International Importance identified by the PMST report.

Wetland of International Importance	Proximity/Buffer Status
The Coorong, and Lakes Alexandrina and Albert Wetland	Within Buffer Area

This Wetland of International Importance does not occur within the Project Area itself and is unlikely to be impacted by the Code Amendment.

4.3.3 Threatened Ecological Communities

Four TEC were identified by the PMST as potentially occurring within 5 km of the Project Area (Table 11). One TEC, Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia (PBGW), has been assessed as possibly occurring in the Project Area.

Table 11. Likelihood of occurrence of TEC identified by the PMST report.

Threatened Ecological Community	EPBC Act Status	PMST Occurrence Category	Key Diagnostic Characteristics	Likelihood of Occurrence within Project Area
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (Buloke Woodland)	EN	May occur	<ul style="list-style-type: none"> The ecological community encompasses a number of closely related woodland communities in which <i>Allocasuarina luehmannii</i> (Buloke) is usually the dominant or co-dominant overstory species (Cheal et al. 2011). In SA, Buloke Woodlands occur in the far south-east of the Murray-Darling Depression bioregion, near Bordertown (Cheal et al. 2011). 	Unlikely. The Buloke Woodland TEC was not identified in the EBS 2016 field assessment. <i>A. luehmannii</i> (Buloke) has not been recorded in or near the Project Area by previous surveys.
Swamps of the Fleurieu Peninsula	CE	May occur	<ul style="list-style-type: none"> Localised wetlands that occur in high rainfall areas. Densely vegetated, typified by reedy or heathy vegetation growing on peat, silt, peat silt, or black clay soils (DOE 2013b). Occur adjacent to waterlogged soils and around low-lying creeks and flats (DOE 2013b). 	Unlikely. Wetland habitat does not exist in the Project Area.
Subtropical and Temperate Coastal Saltmarsh	VU	Likely to occur	<ul style="list-style-type: none"> Occurs on coast with at least some tidal connection, such as estuaries, bays, and low wave energy coastlines (DSEWPC 2013). Consists of dense to patchy areas of characteristic coastal saltmarsh plant species (i.e., salt tolerant herbs, succulent shrubs, or grasses) that may also include bare sediment as part of the mosaic (DSEWPC 2013). 	Unlikely. The Project Area does not have any tidal connection.
Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland of South Australia (PBGW)	CR	Known to occur	<ul style="list-style-type: none"> Most remnants occur between Victor Harbor and Port Augusta. The dominant tree species is <i>E. odorata</i> although other species of Eucalypt may also co-occur (Turner 2012). A grassy understorey is characteristic, although shrubs such as <i>Bursaria spinosa</i> (Sweet Bursaria) and <i>Acacia pycnantha</i> (Golden Wattle) may be present (Turner 2012). A range of parameters including species diversity are utilised to identify PBGW. 	Possible. Multiple stands of peppermint Box Grassy woodland were identified by EBS in the 2016 survey, but these were located outside the current Project Area. A high-quality patch of woodland was identified by EBS in 2016 within the current Project Area. This patch would need to be assessed against the listing condition classes given the last field survey was undertaken in 2016 (Turner 2012).

EPBC Act (*Environment Protection and Biodiversity Conservation Act 1999*). Conservation codes: CR: Critically Endangered. EN: Endangered. VU: Vulnerable.

4.3.4 EPBC Act listed threatened flora species

The PMST report (DCCEEW 2023b) identified 19 flora species listed as threatened under the EPBC Act as potentially occurring within 5 km of the Project Area. Searches of the BDBSA (described below in Section 4.4.1 identified one additional EPBC listed flora species within the Search Area.

Of the 20 nationally listed flora species, one species was assessed as likely to occur within the Project Area, based on previous survey effort, suitable habitat, and recent records (Table 12):

- *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) (EPBC Act: VU, NPW Act: V).

Additionally, three nationally listed threatened flora species were assessed as possible to occur within the Project Area, based on previous survey effort, suitable habitat, and recent records (Table 12):

- *Acacia pinguifolia* (Fat-leaved Wattle) (EPBC Act: EN; NPW Act: E);
- *Pterostylis arenicola* (Sandhill Greenhood Orchid) (EPBC Act: VU, NPW Act: V); and
- *Senecio macrocarpus* (Large-fruit Fireweed) (EPBC Act: VU, NPW Act: V).

These species could occur within the vegetation patches identified in Section 4.2 of this report.

Table 12. Nationally threatened flora species potentially occurring within 5 km of the Project Area (DCCCEEW 2023b; DEW 2023b) (green shading = likely to occur, orange shading = possible to occur).

Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Acacia menzelli</i>	Menzels Wattle	VU	V	1	May	Endemic to South Australia and found in a small area in the Murray region near Monarto and in the Flinders Ranges. Occurs in open scrub, often associated with <i>Eucalyptus socialis</i> and <i>E. incrassata</i> , on grey-brown calcareous loamy soils (SSCC 2018).	Unlikely - no nearby records and not within known range of species.
<i>Acacia pinguifolia</i>	Fat-leaved Wattle	EN	E	1, 2	Likely / 1988	Endemic to South Australia and restricted to southern Eyre Peninsula with a small occurrence in the southern Mount Lofty Ranges near Finnis, growing with <i>Eucalyptus odorata</i> , <i>E. incrassata</i> and <i>Metaleuca uncinata</i> in woodland or open scrub, in mainly sandy or hard alkaline yellow duplex soils (DAWE 2021a).	Possible - recorded within the last 40 years and suitable conditions may exist within patches of native vegetation in the Project Area.
<i>Acacia rhetinocarpa</i>	Neat Wattle	VU	V	1	Known	Endemic to South Australia and found scattered in a few small areas near the east coast of Eyre Peninsula, east coast of Yorke Peninsula, southern Mount Lofty Ranges and in the Murray region, restricted to the Monarto area, growing in open scrub vegetation associated with <i>Eucalyptus gracilis</i> , <i>E. socialis</i> and <i>E. incrassata</i> on calcareous sand and loamy soil (SSCC 2018).	Unlikely - not recorded in the Search area or recorded by EBS in the 2016 survey and not within known range of species.
<i>Caladenia colorata</i>	Coloured Spider-orchid	EN	E	1	Likely	Mostly in native pines or blue gum woodland, in sandy and more fertile soils, also around rock outcrops and in mallee broombush (Niejalke, J. and Bates, R., 2022).	Unlikely - not recorded in Search Area, area has a history of grazing with degraded understorey.
<i>Caladenia conferta</i>	Coast Spider-orchid	EN	E	1	May	Found in fertile shallow loams in mallee broombush or on rocky outcrops (Niejalke, J. and Bates, R., 2022).	Unlikely - not recorded in Search Area, area has a history of grazing with degraded understorey.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Caladenia tensa</i>	Greencomb Spider-orchid	EN		1	Likely	Found in the upper South-east in South Australia, growing in dry woodland and mallee on sandy loams (SSCC 2018).	Unlikely - not recorded in Search Area and not within known range of species. Suitable conditions may exist in the Project Area.
<i>Corybas dentatus</i>	Toothed Helmet-orchid	VU	E	1	Likely	Confirmed in two locations; Sandy Creek Conservation Park and Scott Creek Conservation Park, where it grows in Eucalyptus woodland in damp sandy soils (DEWHA, 2008).	Unlikely - no records in Search Area and the Project Area is outside the species known range.
<i>Dodonaea procumbens</i>	Trailing Hop-bush	VU	V	1	May	Found in the northern Mount Lofty Ranges and lower South-East in South Australia growing in low-lying areas that are seasonally inundated in winter, in grasslands and open woodlands on cracking grey clay and sandy soils (SSCC 2018).	Unlikely - no records in Search Area and suitable conditions unlikely to exist in Project Area.
<i>Euphrasia collina</i> ssp. <i>osbornii</i>	Osborn's Eyebright	EN	E	1	May	Endemic to South Australia and found on Yorke Peninsula, Kangaroo Island, Mount Lofty Ranges and in upper South-east growing in sclerophyllous woodland or forest, with one population in swamp (SSCC 2018).	Unlikely - not recorded in the Search area or recorded by EBS in the 2016 survey. Degraded, grazed understorey occurs across most of the Project Area.
<i>Glycine latrobeana</i>	Clover Glycine	VU	V	1	Likely	Found in the southern Flinders Ranges, southern Mount Lofty Ranges, and the South-east in South Australia, growing in grasslands and grassy woodlands on heavy soils (SSCC 2018).	Unlikely - not recorded in the Search area or recorded by EBS in the 2016 survey. Suitable soil type doesn't occur, and understorey is mostly degraded grazing land.
<i>Hibbertia tenuis</i>		CE	E	1	Likely	Endemic to South Australia and found in the vicinity of Mt Compass, growing in low or open vegetation in permanent wet places (SSCC 2018).	Unlikely - not recorded in the Search area or recorded by EBS in the 2016 survey. No suitable swamp areas occur.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V	1, 2	Known / 2013	Endemic to South Australia and found scattered in the agricultural areas in sandy flat areas and hilly rocky areas in woodland or mallee. Known to overlap with Peppermint Box Grassy Woodland TEC (DOE 2013c).	Likely - recorded in the last decade and suitable conditions exist in the Project Area.
<i>Prasophyllum frenchii</i>	Maroon Leek-Orchid	EN	E	2	1905	In SA, Maroon Leek-orchid is currently known only to occur in the lower South-east. Grows in grassland, heathland, and open forest on well-drained or water-retentive sand or clay loams (SSCC 2018).	Unlikely - most recent record is over 40 years ago may represent a historic population. Preferred native grassland and heathland vegetation does not occur.
<i>Prasophyllum murefii</i>	Fleurieu Leek Orchid	CE	E	1	Likely	Known from two locations on the Fleurieu Peninsula: Mount Compass and Parawa. Found in brown to black wet loam (DEWHA, 2008).	Unlikely - no record in the Search Area and the Project Area is not within the species current known range.
<i>Prasophyllum pallidum</i>	Pale Leek-orchid	VU	R	1	Likely	Endemic to South Australia and found in southern Flinders Ranges and the Mount Lofty Ranges, growing on the more fertile soils of woodland and well-grassed open forests (SSCC 2018).	Unlikely - no records in the Search Area and preferred grassy woodland habitat does not occur in Project Area.
<i>Pterostylis arenicola</i>	Sandhill Greenhood Orchid	VU	V	1	Likely	Occurs in mallee and native pine woodland, generally on gently sloping or undulating sites on sand and sandy loam (DEWHA, 2008).	Possible - no recent records but suitable conditions may exist in Project Area.
<i>Senecio macrocarpus</i>	Large-fruit Fireweed	VU	V	1	May	Occurring in a variety of habitats including grasslands, sedgeland, shrublands and woodlands. Often in depressions that are waterlogged in winter, on sandy loam to heavy clay soils (SSCC 2018).	Possible - not recorded in the Search Area but suitable conditions may occur in the Project Area.
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	E	1	Likely	Found on the bottom of Eyre Peninsula, southern Mount Lofty Ranges, and the South-east in South Australia, growing on fertile loams in open woodland, heath, or grassland (SSCC 2018).	Unlikely - not recorded in the Search Area and woodland understorey is heavily degraded by historical grazing practices.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	VU	E	1	Likely	Found on the Fleurieu Peninsula, the west end of Kangaroo Island and the South-east in South Australia, growing on limestone or in calcareous sands in mallee heathland (SSCC 2018).	Unlikely - not recorded in the Search Area and mallee heathland habitat does not occur in Project Area.
<i>Veronica derwentiana</i> ssp. <i>homalodonta</i>	Mount Lofty Speedwell	CE	E	1	May	Endemic to South Australia. Found in the wetter parts of the Mount Lofty Ranges (SSCC 2018).	Unlikely - not recorded in Search Area and Project Area is outside species known Mount Lofty Ranges distribution.

Conservation status:

Aus: Australia (EPBC Act); SA: South Australia (NPW Act); Conservation Codes: CE: Critically Endangered, EN/E: Endangered, VU/V: Vulnerable, R: Rare.
PMST result: Likelihood of species or species habitat to occur within 5 km of the Project Area.

Source of Information:

1. 1: PMST (DCCCEW 2023b) – 5 km buffer applied to Project Area;
2. 2: BDBSA (DEW 2023b) – 5 km buffer applied to Project Area;

Abbreviations within Distribution and preferred habitat:

EP: Eyre Peninsula; FP: Fleurieu Peninsula; FR: Flinders Ranges; KI: Kangaroo Island; MLR: Mount Lofty Ranges; MU: Murraylands; NL: Northern Lofty; NP: National Park; NSW: New South Wales QLD: Queensland; SL: Southern Lofty; SE: Southeast / South-Eastern; SW: South-Western; Tas: Tasmania; Vic: Victoria; WA: Western Australia; YP: Yorke Peninsula.

4.3.5 EPBC Act listed threatened fauna species

The PMST report identified 59 fauna species (42 birds, seven fish, five mammals, three reptiles, two shark and one frog) listed as threatened under the EPBC Act as potentially occurring within 5 km of the Project Area. Searches of the BDBSA (described below in Section 4.4.2) identified one additional EPBC listed fauna species within the Search Area.

Of the 60 nationally listed fauna species, one bird species was assessed as likely to occur within the Project Area, based on previous survey effort, suitable habitat, and recent records (Table 13):

- Hooded Robin (*Melanodryas cucullata cucullata*) (EPBC Act: EN, NPW Act: R).

Four additional nationally listed bird species were assessed as possible to occur within the Project Area based on survey effort, recent records, and suitable habitat:

- Beautiful Firetail (*Stagonopleura bella samueli*) (EPBC Act: EN, NPW Act: R);
- Blue-winged Parrot (*Neophema chrysostoma*) (EPBC Act: VU, NPW Act: V);
- Diamond Firetail (*Stagonopleura guttata*) (EPBC Act: VU, NPW Act: V); and
- Southern Whiteface (*Aphelocephala leucopsis*) (EPBC Act: VU).

These species could occur within the vegetation patches identified in Section 4.2 of this report.

Table 13. Nationally threatened fauna species potentially occurring within 5 km of the Project Area (DCCEEW 2023b; DEW 2023b) (green shading = likely to occur, orange shading = possible to occur).

Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
AMPHIBIANS							
<i>Litoria raniformis</i>	Growing Grass Frog	VU	V	1	Likely	Usually found among vegetation within or at the edges of permanent water such as slow flowing streams, swamps, lagoons, and lakes. The Mount Lofty Ranges population of Southern Bell Frog was likely a non-endemic population introduced from captive stock and is believed to have died out (Clemann and Gillespie, 2012).	Unlikely - not recorded in the Search Area and Project Area and species is not believed to persist in the area.
BIRDS							
<i>Aphelecephala leucopsis</i>	Southern Whiteface	VU		1	Likely	Occurs in open woodland and shrubland habitat with an understorey of grasses and / or low shrubs. Suitable habitat is usually dominated by <i>Acacia</i> spp. or <i>Eucalyptus</i> spp. on ranges, foothills, lowlands, and plains (DOCCEEW 2023c).	Possible - no records in Search Area but species does not have highly specific habitat requirements and therefore potentially suitable habitat exists in Project Area.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	E	1, 2	Known / 1994	Freshwater wetlands and rarely in estuaries or tidal wetlands, favouring wetlands dominated by sedges, rushes and reeds growing over a muddy or peaty substrate (TSSC 2019).	Unlikely - recent record but suitable habitat does not occur in the Project Area.
<i>Calidris canutus</i>	Red Knot	EN Mi (W)	E	1, 2	Known / 2020	Red Knots mainly inhabit intertidal mudflats, sandflats, and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours (TSSC 2016a).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE Mi (W)	E	1, 2	Known / 2020	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets, and lagoons. They occur in both fresh and brackish waters (DOE 2015a).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Callidris tenuirostris</i>	Great Knot	CE Mi (W)	E	1, 2	Known / 2020	Inhabits tidal mudflats, sandy ocean, and bay shores. Occasionally in shallow saline and freshwater wetlands. (Pizzey and Knight 2021).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU Mi (W)	R	1	Likely	Occupies wide, sandy, or shelly beaches, tidal mudflats, salt marsh; seldom far inland. (Pizzey and Knight 2021).	Unlikely - no recent records and suitable habitat does not occur in the Project Area.
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN Mi (W)	E	1, 2	Known / 2008	Likes tidal mudflats, sand flats and shelly beaches, salt marshes and mangroves (Pizzey and Knight 2021).	Unlikely - recent record but suitable habitat does not occur in the Project Area.
<i>Diomedea antipodensis</i>	Antipodean Albatross	VU Mi (Ma)		1	Likely	N/A – Marine species	N/A Marine species
<i>Diomedea epomophora</i>	Southern Royal Albatross	VU Mi (Ma)	V	1	Likely	N/A – Marine species	N/A Marine species
<i>Diomedea exulans</i>	Wandering Albatross	VU Mi (Ma)	V	1	Likely	N/A – Marine species	N/A Marine species
<i>Diomedea sanfordi</i>	Northern Royal Albatross	EN Mi (Ma)	E	1	Likely	N/A – Marine species	N/A Marine species
<i>Falco hypoleucos</i>	Grey Falcon	VU	R	1	Likely	This species is mainly found where annual rainfall is less than 500 mm and is essentially confined to the arid and semi-arid zones at all times. The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses (Schoenjahn 2018).	Unlikely - not recorded in the Search Area and the species is generally restricted to arid and semi-arid inland areas. Rare vagrant, flyover only.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Grantiella picta</i>	Painted Honeyeater	VU	R	1	Likely	Forest, woodland, dry scrub, often with abundant mistletoe. Dependent on mistletoe berries (DAWE 2021b).	Unlikely - no recent records but not within typical range of species and no record of significant mistletoe population in Project Area.
<i>Halobaena caerulea</i>	Blue Petrel	VU		1, 2	May / 1970	N/A – Marine species	N/A Marine species
<i>Hirundapus caudacutus</i>	White-throated Needletail	VU MI (T)	V	1	May	Almost exclusively aerial in Australia, recorded most commonly above wooded areas (Pizzey and Knight 2021).	Unlikely - no recent records and suitable habitat does not occur in the Project Area.
<i>Hylacola pyrrhopygia parkeri</i>	Chestnut-rumped Heathwren	EN	E	1	May	Inhabits heaths of coastal, mountain and hinterland areas, dense undergrowth of forests and woodlands. Found in South-eastern Australia. In SA occurs in the SE, Adelaide Mount Lofty Ranges and Northern Yorke districts (Wilson and Bignall 2009).	Unlikely - no records in the Search Area and the Project Area is not within the species preferred range. Preferred dense understorey does not occur.
<i>Lathamus discolor</i>	Swift Parrot	CE	E	2	1989	Breeds in Tasmania during summer and migrates to mainland Australia during winter, mostly to Victoria and NSW. Occasionally observed in the southern Mount Lofty Ranges and the Bordertown-Naracoorte area. Non-breeding birds forage in box-ironbark and grassy woodlands, and coastal swamp mahogany and spotted gum woodland when in flower (TSSC 2016b).	Unlikely - recorded in the last 40 years, however the species is a rare migrant and suitable habitat does not occur in the Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Leipoa ocellata</i>	Malleefowl	VU	V	1	Likely	In South Australia, the Malleefowl is distributed from the south-east, north to the Murray-Mallee region and west to Streaky Bay, south of 32°S. The species also occurs west of the Eyre Peninsula. Occupies shrublands and low woodlands that are dominated by mallee vegetation. It also occurs in other habitat types including eucalypt or native pine <i>Callitris</i> woodlands, acacia shrublands, Broombush <i>Melaleuca uncinata</i> vegetation or coastal heathlands (Benshemesh 2007).	Unlikely - no records in the Search Area and the Project Area does not contain suitable habitat.
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	VU	R	1, 2	Known / 2020	Found in coastal habitats including large intertidal sandflats, mudflats, and estuaries. Has also been recorded in salt lakes and brackish or saline wetlands (Marchant and Higgins 1993).	Unlikely - recorded recently but suitable habitat does not occur in the Project Area.
<i>Macronectes giganteus</i>	Southern Giant-Petrel,	EN Mi (Ma)	V	1, 2	May / 1976	N/A – Marine species	N/A Marine species
<i>Macronectes halli</i>	Northern Giant Petrel	VU Mi (Ma)		1	Likely	N/A – Marine species	N/A Marine species
<i>Melanodryas cucullata cucullata</i>	Hooded Robin	EN	R	1, 2	Known / 2013	Prefers dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas, and a complex ground layer. They avoid woodlands with tall trees or dense tree cover but sometimes occur in tall, dense heaths with scattered open areas. Sub-populations in SA are recorded from the Barossa, Monarto, Onkaparinga River, Ashbourne, Port Willunga areas as well as isolated records from elsewhere in the hills and Fleurieu. Requires large remnants (>50 ha) with open areas, young eucalypts, or shrubs for nesting and numerous perches for foraging (DCCCEW 2023d).	Likely - recorded in the Search Area in the last decade and suitable habitat occurs in the Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CE	E	1, 2	Known / 1975	The Orange-bellied Parrot is endemic to south-eastern Australia. Throughout the year Orange-bellied Parrots are found in salt marshes, coastal dunes, pastures, shrub lands, estuaries, and islands (DELWP 2016).	Unlikely - recorded within last 50 years but suitable habitat does not exist in the Project Area. Flyover only.
<i>Neophema chrysostoma</i>	Blue-winged Parrot	VU	V	1, 2	Known / 2014	Blue-winged parrots inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones (DCCCEEW 2023e).	Possible - recent record but suitable habitat does not occur in the Project Area.
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CE Mi (W)	E	1, 2	Known / 2019	Coastal shorebird most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets, and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. (Birdlife Australia, 2023).	Unlikely - recent records in Search Area but suitable habitat does not exist in Project Area.
<i>Pachyptila turtur subantarctica</i>	Fairy Prion	VU		1	Known	Prefers offshore areas and breeds primarily occurs on Macquarie Island and subantarctic islands outside of Australia. (Pizzey and Knight 2021).	Unlikely - not recorded in the Search Area and suitable habitat is not present in the Project Area.
<i>Pedionomus torquatus</i>	Plains-wanderer	CE	E	1	May	Plains-wanderers inhabit sparse, treeless, lowland native grasslands which usually occur on hard red-brown clay soils (DOE 2015b).	Unlikely - not recorded in Search Area and suitable native grassland habitat does not occur in Project Area.
<i>Pezoporus occidentalis</i>	Night Parrot	EN	E	1	May	Occurs in Triodia (Spinifex) grasslands and/or shrubby samphire and chenopod shrublands in the arid and semi-arid zones (TSSC 2016c).	Unlikely - not recorded in the Search Area and Project Area is outside the species known distribution.
<i>Phoebastria fusca</i>	Sooty Albatross	VU Mi (Ma)	E	1	Likely	N/A – Marine species	N/A Marine species

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Pterodroma mollis</i>	Soft-plumaged Petrel	VU		1	May	N/A – Marine species	N/A Marine species
<i>Rostratula australis</i>	Australian Painted Snipe	EN	E	1, 2	Known / 1993	Generally, inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (DOCCEEW 2022).	Unlikely - recorded in Search Area in last 30 years but suitable habitat does not occur in the Project Area. Flyover only.
<i>Stagonopleura bella samueli</i>	Western Beautiful Firetail	EN	R	1, 2	May / 2019	Occurs in the AMLR/Eyre Peninsula region of SA where it resides in a wide range of Eucalypt dominated vegetation communities that have a grassy understorey, including woodland, forest, and mallee. Only small pockets have been observed near the coast (Birdlife Australia 2023).	Possible - recent record and suitable habitat occurs in the Project Area, however the species appears to be restricted to known populations, with the nearest known population occurring at Cox Creek CP, approximately 20 km northwest of the Project Area.
<i>Stagonopleura guttata</i>	Diamond Firetail	VU	V	1, 2	Likely / 1993	Endemic to Australia, occurring mainly on the inland slopes of the Great Dividing Range and in the AMLR/Eyre Peninsula region of SA. Reside in a wide range of Eucalypt dominated vegetation communities that have a grassy understorey, including woodland, forest, and mallee. Most occur on the inland slopes of the Great Dividing Ranges, with only small pockets near the coast (DOCCEEW 2023f).	Possible - suitable habitat occurs in the Project Area but last recorded in the Search Area 30 years ago.
<i>Sterna nereis nereis</i>	Fairy Tern	VU	E	1, 2	Known / 2019	Occupies coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries, and lagoons (DAWE 2020b).	Unlikely - recorded in the Search Area but suitable habitat does not occur in the Project Area. Flyover only.

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		Aus	SA				
<i>Stipiturus malachurus intermedius</i>	Southern Emu-wren	EN	E	1, 2	Known / 1967	Occurs in dry heath and swamp habitats in the Mount Lofty Ranges and Fleurieu Peninsula (TSSC 2016d).	Unlikely - not recorded in the Search Area within the last 50 years and suitable habitat does not occur in the Project Area.
<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	VU Mi (Ma)	E	1	Likely	N/A – Marine species	N/A Marine species
<i>Thalassarche cauta cauta</i>	Shy Albatross	EN Mi (Ma)	VU	1, 2	Likely / 1970	N/A – Marine species	N/A Marine species
<i>Thalassarche impavida</i>	Campbell Albatross	VU Mi (Ma)	V	1	May	N/A – Marine species	N/A Marine species
<i>Thalassarche melanophrys</i>	Black-browed Albatross	VU Mi (Ma)		1	Likely	N/A – Marine species	N/A Marine species
<i>Thalassarche steadi</i>	White-capped Albatross	VU Mi (Ma)		1	Known	N/A – Marine species	N/A Marine species
<i>Thinornis cucullatus cucullatus</i>	Hooded Plover	VU	V	1, 2	Known / 2008	Sandy beaches of ocean estuaries, coastal lakes, and inland salt lakes. Nesting on beach above high-tide mark (Morcombe 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Zoothera lunulata halmaturina</i>	Bassian Thrush	EN	R	1, 2	May / 2003	Damp, densely forested areas, and gullies are favoured by the Bassian Thrush, usually with a thick canopy overhead and leaf-litter below (DAWE 2022).	Unlikely - recorded in Search Area in last 20 years but suitable habitat does not occur in the Project Area.
FISH							
<i>Craterocephalus fluviatilis</i>	Murray Hardyhead	EN		1, 2	Known / 2011	N/A – Marine species	N/A Marine species
<i>Galaxias rostratus</i>	Flathead Galaxias	CE		1	May	N/A – Marine species	N/A Marine species

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Maccullochella peelii</i>	Murray Cod	VU		1	Known	N/A – Marine species	N/A Marine species
<i>Nannoperca australis</i>	Southern Pygmy Perch	VU		1, 2	Known / 1987	N/A – Marine species	N/A Marine species
<i>Nannoperca obscura</i>	Yarra Pygmy Perch	VU		1, 2	May / 2007	N/A – Marine species	N/A Marine species
<i>Seriola lalandi</i>	Blue Warehou	CD		1	Known	N/A – Marine species	N/A Marine species
<i>Thunnus maccoyii</i>	Southern Bluefin Tuna	CD		1	Likely	N/A – Marine species	N/A Marine species
MAMMALS							
<i>Balaenoptera musculus</i>	Blue Whale	EN Mi (Ma)	E	1	May	N/A – Marine species	N/A Marine species
<i>Eubalaena australis</i>	Southern Right Whale	EN Mi (Ma)	V	1	May	N/A – Marine species	N/A Marine species
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot	EN	V	1	May	This species prefers dense ground cover, tall grass, and low shrubbery. They live near swamps and rivers as well as in thick scrub in drier areas. They make their nests on the ground and in logs. The nests consist of sticks, leaves, grass, and soil (TSSC 2016e).	Unlikely - not recorded in Search Area and Project Area does not contain suitable habitat.
<i>Neophoca cinerea</i>	Australian Sea-lion, Australian Sea Lion	EN	V	1	May	N/A – Marine species	N/A Marine species
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	R	1	May	Grey-headed Flying-foxes forage up to 40 km from their roost at Botanic Park each night. Food plants are typically planted trees, both native and exotic, that provide fruit or a rich source of nectar (DAWE 2021c).	Unlikely - no nearby records and the Project Area is likely to be outside of its typical foraging range.
REPTILES							
<i>Caretta caretta</i>	Loggerhead Turtle	EN	E	1	Known	N/A – Marine species	N/A Marine species

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Chelonia mydas</i>	Green Turtle	VU	V	1	May	N/A – Marine species	N/A Marine species
<i>Dermochelys coriacea</i>	Leatherback Turtle	EN	V	1, 2	Known / 1987	N/A – Marine species	N/A Marine species
SHARK							
<i>Carcharodon carcharias</i>	White Shark	VU		1	Known	N/A – Marine species	N/A Marine species
<i>Galeorhinus galeus</i>	School Shark	CD		1	May	N/A – Marine species	N/A Marine species

Conservation status:

Aus: Australia (EPBC Act); SA: South Australia (NPW Act); Conservation Codes: CD: Conservation Dependant; CE: Critically Endangered; EN/E: Endangered; VU/V: Vulnerable; R: Rare; .
Mi (T): listed as a Migratory Terrestrial species under the EPBC Act. Mi (W): listed as a Migratory Wetland species under the EPBC Act. Mi (Ma): listed as a Migratory Marine species under the EPBC Act.

PMST result: Likelihood of species or species habitat to occur within 5 km of the Project Area.

Source of Information:

1. 1: PMST (DOCCEW 2023b) – 5 km buffer applied to Project Area;
2. 2: BDBSA (DEW 2023b) – 5 km buffer applied to Project Area;

Abbreviations within Distribution and preferred habitat:

EP: Eyre Peninsula; FP: Fleurieu Peninsula; FR: Flinders Ranges; KI: Kangaroo Island; MLR: Mount Lofty Ranges; MU: Murraylands; NL: Northern Lofty; NP: National Park; NSW: New South Wales QLD: Queensland; SL: Southern Lofty; SE: Southeast / South-Eastern; SW: South-Western; Tas: Tasmania; Vic: Victoria; WA: Western Australia; YP: Yorke Peninsula.

4.3.6 EPBC Act listed migratory species

Excluding species also listed as threatened, the PMST report (DCCEEW 2023b) identified 32 species (26 birds and six mammals) listed as migratory under the EPBC Act that might occur within 5 km of the Project Area. These species are provided in Appendix 1. Of these, 18 migratory species have been identified by the PMST report as known to occur within the Search Area. Searches of the BDBSA indicate that historical records of 20 species occur within the Search Area. All species were assessed as unlikely to occur in the Project Area.

4.3.7 Protected areas

No Conservation Parks, Significant Environmental Benefit (SEB) areas, Significant Roadside Sites, or Heritage Agreements (HA) were identified within the Project Area itself. Nine State and Territory Reserves were identified within 5 km of the Project Area (Table 14). None of these will be impacted by the proposed Project.

Table 14. State and Territory Reserves located within 5 km of the Project Area.

Protected Area Type	Name / Identification
Game Reserve	Currency Creek
Heritage Agreement	HA1330
Heritage Agreement	HA27
Heritage Agreement	HA39
Heritage Agreement	HA1586
Heritage Agreement	HA1618
Heritage Agreement	HA1533
Marine Park	Encounter
National Park	Coorong

4.4 Matters of State significance

4.4.1 NPW Act listed flora threatened species

A BDBSA search identified 26 additional State listed flora species that have records within 5 km of the Project Area, which did not appear on the PMST (DEW 2023b) (Table 15).

A total of 11 species were assessed as likely to occur within the Project Area based on survey effort, recent records, and suitable habitat (Table 15):

- *Acacia dodonaeifolia* (Hop-bush Wattle) (NPW Act: R);
- *Acacia iteaphylla* (Flinders Ranges Wattle) (NPW Act: R);
- *Austrostipa breviglumis* (Cane Spear-grass) (NPW Act: R);
- *Austrostipa echinata* (Spiny Spear-grass) (NPW Act: R);
- *Billardiera scandens* var. *scandens* (Eastern Apple-berry) (NPW Act: R);
- *Correa alba* var. *pannosa* (White Correa) (NPW Act: R);
- *Eucalyptus fasciculosa* (Pink Gum) (NPW Act: R);
- *Eucalyptus phenax* ssp. *compressa* (Kangaroo Island Mallee) (NPW Act: R);
- *Leptorhynchus scaber* (Annual Buttons) (NPW Act: R);
- *Myoporum parvifolium* (Creeping Boobialla) (NPW Act: R); and
- *Senecio pinnatifolius* var. *pinnatifolius* (NPW Act: R).

Six additional State listed flora species were assessed as possible to occur within the Project Area based on survey effort, recent records, and suitable habitat (Table 15).

Maps of BDBSA flora record located within 5 km of the Project Area are provided in Figure 5 to Figure 7.

Table 15. State threatened flora species potentially occurring within 5 km of the Project Area (DEW 2023b) (green shading = likely to occur, orange shading = possible to occur).

Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R	2	2020	Endemic to South Australia and found mainly on southern Eyre Peninsula and southern Mt Lofty Ranges. Grows in woodland and open forest vegetation in hard acidic, yellow duplex, red shallow porous loamy, sandy alkaline yellow duplex soils (SSCC 2018).	Likely - recent record and suitable habitat occurs in Project Area. Recorded by EBS outside the current Project Area in the 2016 survey.
<i>Acacia iteaphylla</i>	Flinders Ranges Wattle		R	2	2013	Endemic to South Australia and found on northern Eyre Peninsula eastward to the Flinders Ranges and northern Mount Lofty Ranges growing on hillsides amongst rocky outcrops or in valleys along rocky creek banks. Widely planted and naturalised elsewhere and widespread in the Mt Lofty Ranges region (SSCC 2018).	Likely - recent record and suitable habitat occurs in Project Area. Recorded by EBS outside the current Project Area in the 2016 survey.
<i>Acacia montana</i>	Mallee Wattle		R	2	2000	Found on eastern Eyre Peninsula, southern Flinders Ranges, northern Mount Lofty Ranges, and the lower Murray region in South Australia, growing in open scrub on hard alkaline red duplex and grey-brown calcareous loamy soils (SSCC 2018).	Unlikely - recorded within last 40 years, however record is isolated and likely planted. Natural range of species is considerably further north of the species towards Murray Bridge.
<i>Acacia simmonsiana</i>	Hall's Wattle		R	2	1967	Found on Kangaroo Island, southern Mount Lofty Ranges, lower Murray to the upper South-east in South Australia, growing in seasonally wet, shallow depressions in undulating country, on red-brown loam over limestone or ironstone (SSCC 2018).	Unlikely - no recent records and limited areas of suitable habitat occur in the Project Area. Not detected on previous surveys.
<i>Austrostipa breviglumis</i>	Cane Spear-grass		R	2	1999	Found in the Flinders Ranges and the Mount Lofty Ranges in South Australia growing in hills and ridges on sandy loam soils (SSCC 2018).	Likely - recorded in Search Area within last 40 years and recorded by EBS in the 2016 survey.
<i>Austrostipa echinata</i>	Spiny Spear-grass		R	2	2010	Endemic to South Australia and found on the Eyre Peninsula, southern York Peninsula, southern Mount Lofty Ranges, Murraylands and the upper South-east in South Australia growing on sand with limestone, in mallee and open scrub (SSCC 2018).	Likely - recorded within last 20 years and suitable conditions may exist in the Project Area. Unidentified <i>Austrostipa</i> species were observed by EBS in 2016 field survey.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Austrostipa tenuifolia</i>			R	2	1998	Found on the Eyre Peninsula, Mount Lofty Ranges, the Murray, and the upper South-east in South Australia, growing sandy soils in grassland or grassy woodland associated with <i>Callitris</i> or <i>Allocasuarina</i> (SSCC 2018).	Possible - recorded within the last 40 years and suitable conditions may exist in the Project Area. Unidentified <i>Austrostipa</i> species were observed by EBS in 2016 field survey.
<i>Billardiera scandens</i> var. <i>scandens</i>	Eastern Apple-berry		R	2	2013	Found in the lower South-east in South Australia in <i>Eucalyptus</i> woodland (SSCC 2018).	Likely - recorded within the last decade and suitable conditions may exist in the Project Area. An identified <i>Billardiera</i> species was observed by EBS in the 2016 survey.
<i>Correa alba</i> var. <i>pannosa</i>	White Correa		R	2	2014	Found in coastal areas from the Fleurieu Peninsula to Kingston in South Australia, growing on calcareous substrates (SSCC 2018).	Likely - recorded in Search Area within last 40 years and suitable conditions may exist in Project Area.
<i>Corybas expansus</i>	Dune Helmet-orchid		V	2	1997	Grows near the coast in sandy soils (R. Bates pers. comm. in DEH, 2008). Recorded in sandy loam in cool and shady areas (DEH, 2008).	Possible - recorded within last 40 years and suitable conditions may exist in Project Area.
<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R	2	1996	Found on southern Eyre Peninsula, southern Mount Lofty Ranges, with a record near Bordertown in the South-East, growing in mallee scrublands and woodlands on dry stony or sandy soils (SSCC 2018).	Possible - recorded within last 40 years and suitable conditions may exist in Project Area.
<i>Diuris behnii</i>	Behr's Cowslip Orchid		V	2	2011	Found in the southern Flinders Ranges and the Mount Lofty Ranges with a few records from Eyre Peninsula growing in native grassland, open woodland, and grassy forest; grows on more fertile soils, especially amongst Kangaroo Grass and <i>Tridolia</i> on gentle slopes and flats (SSCC 2018).	Possible - recent records, however no preferred habitat in Project Area.
<i>Eucalyptus fasciculosa</i>	Pink Gum		R	2	2020	Mainly found in South Australia, on Kangaroo Island, southern Mount Lofty Ranges, and the South-east, growing on well-drained sandy soils of low fertility (SSCC 2018).	Likely - recorded in Search Area within last decade. Recorded by EBS in 2016 outside of current Project Area.
<i>Eucalyptus phenax</i> ssp. <i>compressa</i>	Kangaroo Island Mallee		R	2	1995	Endemic to South Australia and found on the eastern side of Kangaroo Island and on the Fleurieu Peninsula growing in mallee vegetation on gravelly clay to loams (SSCC 2018).	Likely - recorded in Search Area within last 40 years. Recorded by EBS in 2016 outside the current Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Eucalyptus wimmerensis</i>	Wimmera Mallee Box		R	2	1991	Found around Bordertown in the South-east in South Australia growing on sands or gravelly loams in mallee vegetation or mixed mallee woodland (SSCC 2018).	Unlikely - recorded in Search Area within last 40 years however not within known range of species.
<i>Lachnagrostis robusta</i>	Tall Blown-grass		R	2	1950	Saline swamps (Agriculture Victoria, 2020).	Unlikely - not recorded in the Search Area within the last 70 years and suitable conditions do not exist in the Project Area.
<i>Leptorhynchus scaber</i>	Annual Buttons		R	2	2013	Found on Eyre and Yorke Peninsulas, southern Flinders and Mount Lofty Ranges and the lower South-east of SA, growing on coastal limestone & dunes and grassy woodland. (SSCC 2018).	Likely - recorded in the Search Area within the last decade and suitable grassy woodland habitat occurs in the Project Area.
<i>Lobelia concolor</i>	Poison Pratia		R	2	1990	Found along the Murray River and around Bordertown in South Australia, growing on heavy soil in moist depressions or sometimes associated with irrigated pastures (SSCC 2018).	Unlikely - recorded in the Search Area in the last 30 years, however suitable damp soils do not occur in the Project Area.
<i>Lycopodiella serpentina</i>	Bog Clubmoss		E	2	1988	Grows in wet peaty soils of lowland heaths (Royal Botanic Gardens Victoria, 2023).	Unlikely - recorded in the Search Area in the last 40 years however, suitable damp soils and lowland heath vegetation does not occur.
<i>Myoporum parvifolium</i>	Creeping Boobialla		R	2	2015	Occurs in sandy coastal areas, Red Gum woodlands, <i>Melaleuca halmaturum</i> (Swamp Teatree) Very Low Open Forests and dune swales (SSCC 2018).	Likely - recorded in the Search Area within the last decade. Co-occurring species <i>Eucalyptus camaldulensis</i> and <i>Melaleuca halmaturum</i> were recorded by EBS in the 2016 survey.
<i>Myriophyllum amphibium</i>	Broad Milfoil		R	2	1996	Grows in moist to waterlogged soil along boggy edges of watercourses, in semi shade (Yarra Ranges Council, 2023).	Unlikely - recorded in the Search Area in the last 40 years, however, suitable waterlogged soils do not occur in the Project Area.
<i>Olearia passerinoides</i> ssp. <i>glutescens</i>	Sticky Daisy-bush		R	2	1998	Found in the wetter parts of South Australia, on the tip of Yorke Peninsula, southern Mount Lofty Ranges and in the Murray (SSCC 2018).	Possible - not recorded for over 25 years and habitat in the Project Area is not preferred.
<i>Picris squarrosa</i>	Squat Picris		R	2	1998	On coastal dunes, alluvium along rivers, and disturbed ground elsewhere (SSCC 2018).	Possible - suitable disturbed ground may occur in the Project Area, however recent records are over 25 years old.
<i>Prostanthera chlorantha</i>	Green Mintbush		R	2	1979	Grows on sand and loamy soils, commonly associated with Banksia, Daviesia, and Leptospermum shrubland (DEH, 2023).	Unlikely - no recent records and preferred associations do not occur in Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Pterostylis curta</i>	Blunt Greenhood		R	2	1997	Grows in sclerophyll forest from the coast to inland ranges (PlantNET, 2023).	Unlikely - recorded in the last 30 years however sclerophyll forest does not occur in Project Area.
<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>			R	2	2012	Highly variable species which occurs in arid to semi-arid areas on the south coast of SA (PlantNET, 2023)	Likely - recorded in the Search Area within the last decade and suitable conditions exist in Project Area.

Conservation status:

Aus: Australia (EPBC Act); SA: South Australia (NPW Act); Conservation Codes: CE: Critically Endangered, EN/E: Endangered, VU/V: Vulnerable, R: Rare.

PMST result: Likelihood of species or species habitat to occur within 5 km of the Project Area.

Source of Information:

1. 1: PMST (DCCCEW 2023b) – 5 km buffer applied to Project Area;
2. 2: BDBSA (DEW 2023b) – 5 km buffer applied to Project Area;

Abbreviations within Distribution and preferred habitat:

EP: Eyre Peninsula; FP: Fleurieu Peninsula; FR: Flinders Ranges; KI: Kangaroo Island; MLR: Mount Lofty Ranges; MU: Murraylands; NL: Northern Lofty; NP: National Park; NSW: New South Wales QLD: Queensland; SL: Southern Lofty; SE: Southeast / South-Eastern; SW: South-Western; Tas: Tasmania; Vic: Victoria; WA: Western Australia; YP: Yorke Peninsula.

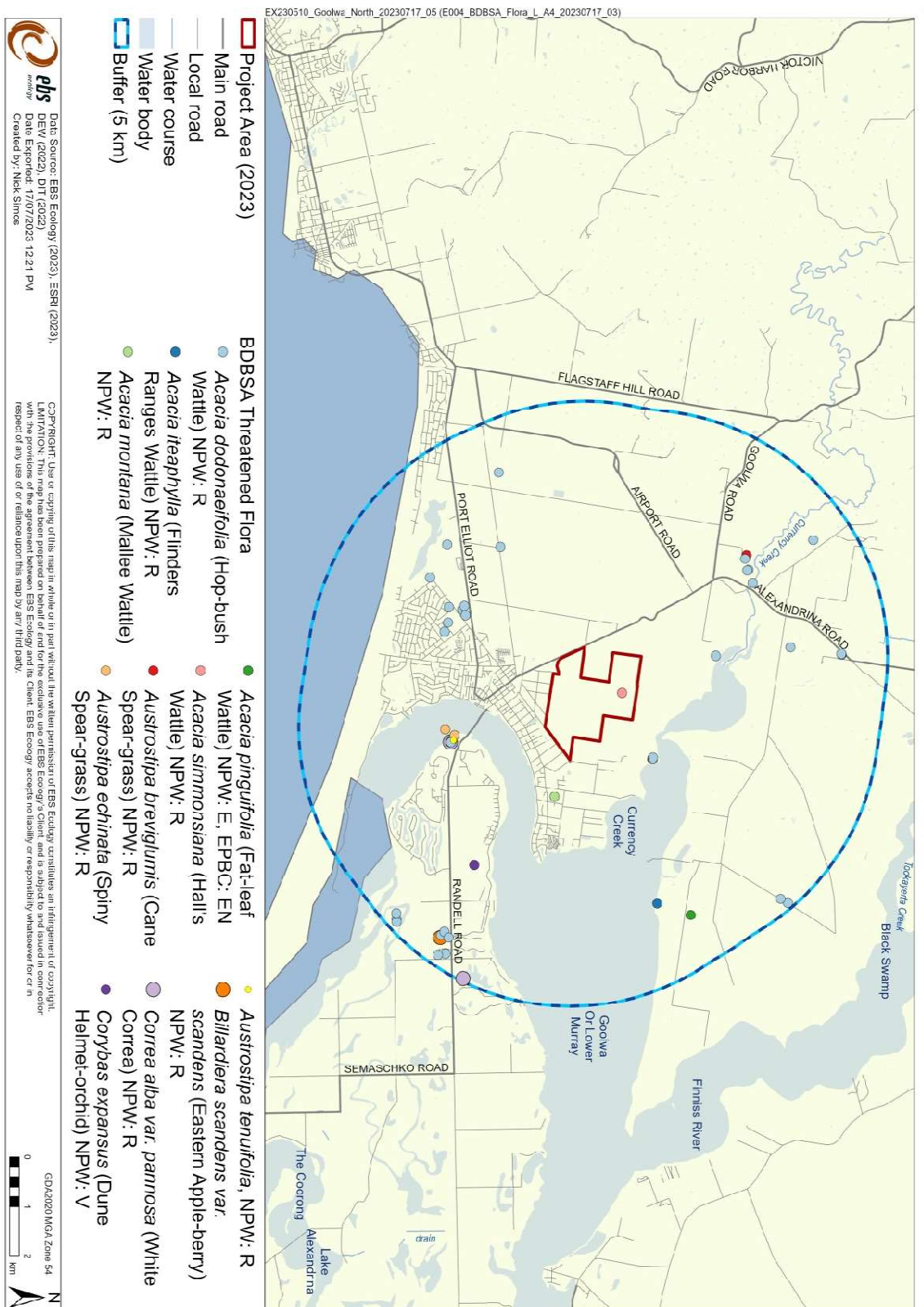


Figure 5. BDBSA records of threatened flora within the Project Area and Search Area (map 1 of 3).

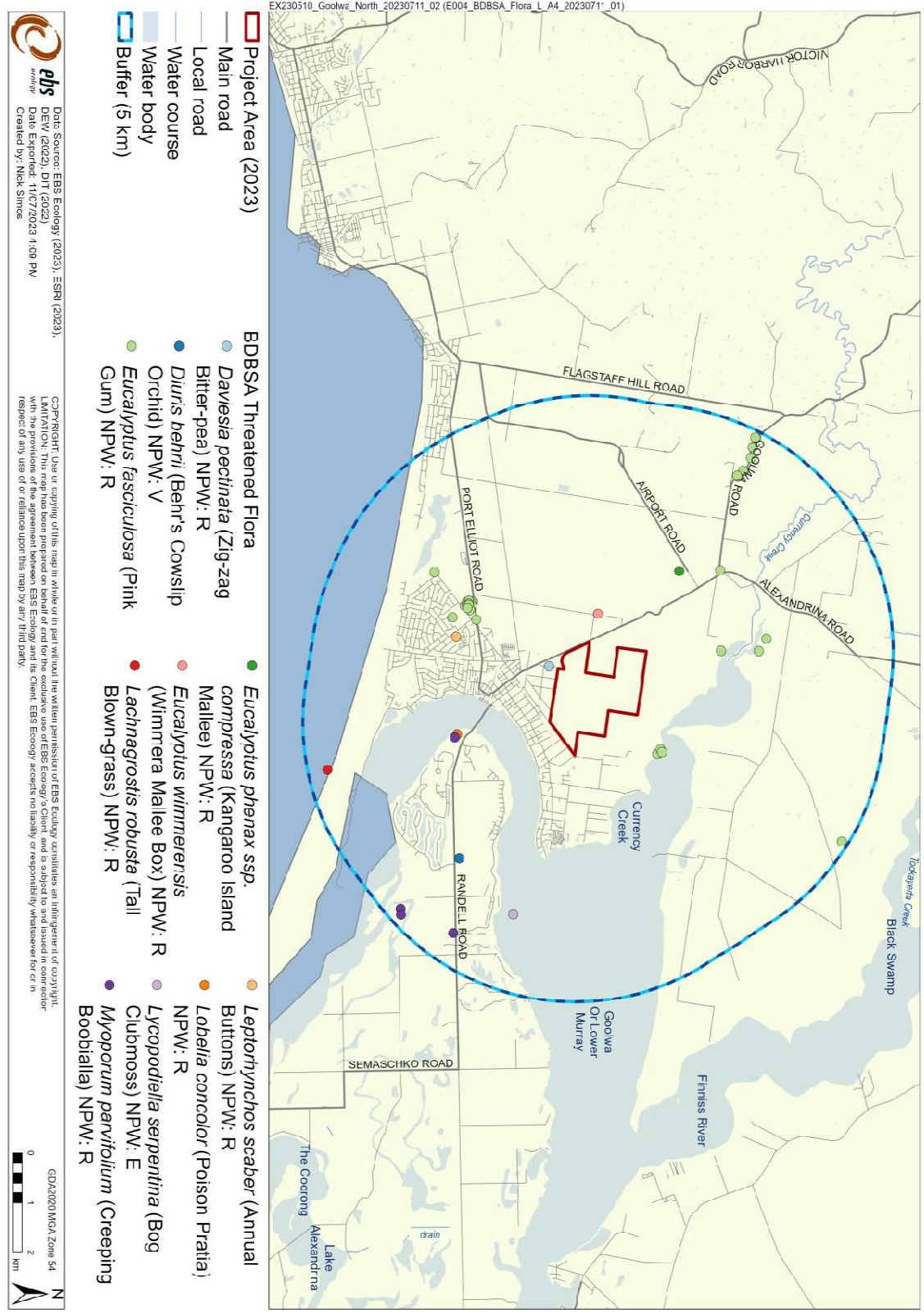


Figure 6. BDBSA records of threatened flora within the Project Area and Search Area (map 2 of 3).

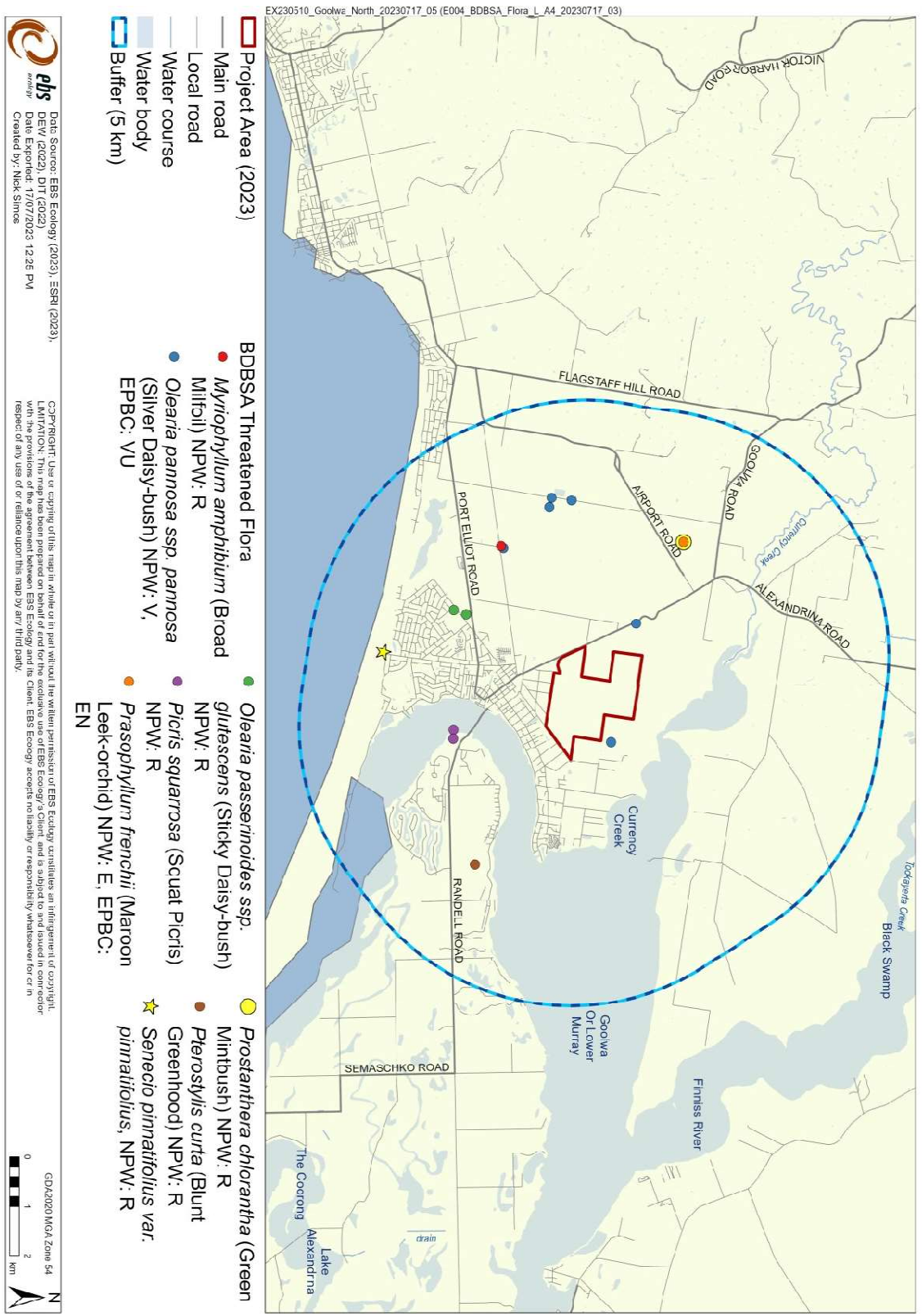


Figure 7. BDBSA records of threatened flora within the Project Area and Search Area (map 3 of 3).

4.4.2 NPW Act listed fauna threatened species

The database searches indicate that, excluding species also listed under the EPBC Act, 42 fauna species listed as threatened under the NPW Act have been recorded previously in the Search Area, consisting of 40 birds, one mammal and one reptile (Table 16).

A total of 13 fauna species (11 birds, one mammal, one reptile) were assessed as likely to occur within the Project Area based on survey effort, recent records, and suitable habitat:

- Black Falcon (*Falco subniger*) (NPW Act: R);
- Brown Quail (*Coturnix ypsilophora australis*) (NPW Act: V);
- Cape Barren Goose (*Cereopsis novaehollandiae novaehollandiae*) (NPW Act: R);
- Common Brushtail Possum (*Trichosurus vulpecula*) (NPW Act: R);
- Eastern Shriketit (*Falcunculus frontatus frontatus*) (NPW Act: R);
- Elegant Parrot (*Neophema elegans elegans*) (NPW Act: R);
- Heath Goanna (*Varanus rosenbergi*) (NPW Act: V);
- Jacky Winter (*Microeca fascinans fascinans*) (NPW Act: R);
- Little Eagle (*Hieraaetus morphnoides*) (NPW Act: V);
- Olive-backed Oriole (*Oriolus sagittatus sagittatus*) (NPW Act: R);
- Peregrine Falcon (*Falco peregrinus macropus*) (NPW Act: R);
- Purple-gaped Honeyeater (*Lichenostomus cratitius*) (NPW Act: R); and
- Yellow-tailed Black Cockatoo (*Zanda funerea whiteae*) (NPW Act: V).

Seven additional State listed fauna species were assessed as possible to occur within the Project Area based on survey effort, recent records, and suitable habitat (Table 16).

Maps of BDBSA fauna record located within 5 km of the Project Area are provided Figure 8 to Figure 14.

Table 16. State threatened fauna species potentially occurring within 5 km of the Project Area (DEW 2023b) (green shading = likely to occur, orange shading = possible to occur).

Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
AVES (BIRDS)							
<i>Anhinga novaehollandiae novaehollandiae</i>	Australasian Darter		R	2	2020	Prefers lakes, rivers, swamps, reservoirs, and tidal inlets; rarely coastal (Pizzey and Knight 2021).	Unlikely - recent record but suitable habitat does not occur in the Project Area. Flyover only.
<i>Anseranas semipalmata</i>	Maggie Goose		E	2	2014	A breeding colony exists at Bool Lagoon, south of Naracoorte. Occasional records occur throughout SA. Habitat includes swamps and grasslands in floodplains (BirdsSA, 2023).	Unlikely - recent record but suitable habitat does not occur in the Project Area. Flyover only.
<i>Ardea intermedia plumifera</i>	Plumed Egret		R	2	2015	Frequents freshwater wetlands, pastures, croplands and tidal mudflats and floodplains (Pizzey and Knight 2021).	Unlikely - recent record but suitable habitat does not occur in the Project Area. Flyover only.
<i>Biziura lobata menziesi</i>	Musk Duck		R	2	2020	Lakes, reservoirs, and wetlands including well-vegetated swamps and fresh and brackish habitats (Pizzey and Knight 2021).	Unlikely - recent record but suitable deep water habitat does not occur in the Project Area. Flyover only.
<i>Bubulcus ibis coromandus</i>	Eastern Cattle Egret		R	2	2020	The Cattle Egret occurs in shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They are often found in open paddocks, pastures, croplands, and drains (Pizzey and Knight 2021).	Possible - recent record but suitable habitat does not occur in the Project Area.
<i>Calidris subminuta</i>	Long-toed Stint		R	2	2006	Likes tussock dominated, reed margins of shallow wetlands, tidelines, and tidal mudflats (Pizzey and Knight 2021).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R	2	2020	Mostly inhabits small, windswept, and generally uninhabited offshore islands, but ventures to adjacent mainland farming areas in search of food in summer (Birdlife Australia 2023).	Likely - recent record and suitable habitat occurs in Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V	2	2018	Endemic to Australia, mainly in the south and inland. Found mainly in saline and hypersaline (very salty) waters of the inland and coast, typically large, open, and shallow (Birds in Backyards 2023).	Unlikely - recent record but suitable habitat does not occur in the Project Area.
<i>Coturnix ypsilophora australis</i>	Brown Quail		V	2	2020	Prefers dense grasslands, often on the edges of open forests, and bracken (Birdlife Australia 2023).	Likely - recorded in Search Area and suitable habitat exists in the Project Area.
<i>Dasymotis broadbenti broadbenti</i>	Rufous Bristlebird		R	2	2013	Coastal scrubs and thickets, gullies with rank growth of sword-grass, undergrowth in gullies in temperate rainforest (Pizzey and Knight 2021).	Unlikely - recorded in the last decade but suitable habitat does not occur in the Project Area.
<i>Egretta garzetta nigripes</i>	Little Egret		R	2	2020	Prefers beaches, rocky shores, tidal rivers and inlets, mangroves, and exposed coral reefs (Pizzey and Knight 2021).	Unlikely - recorded recently but suitable habitat does not occur in the Project Area.
<i>Elanus scriptus</i>	Letter-winged Kite		V	2	1980	Found in northern SA. An irruptive species that dispersed to the coast when food is plentiful, during rat and mouse plagues (Birds in Backyards 2023).	Possible - not recorded in the last 40 years but suitable habitat may occur in Project Area during dispersive events.
<i>Falco peregrinus macropus</i>	Peregrine Falcon		R	2	2020	Found everywhere from woodlands to open grasslands and coastal cliffs – though less frequently in desert regions. This species prefers open habitats such as grasslands, tundra and meadows and nests on cliff faces and in crevices (Pizzey and Knight 2021).	Likely - recent record and suitable habitat occurs in the Project Area.
<i>Falco subniger</i>	Black Falcon		R	2	2020	Occurs on plains, grasslands, foothills, timbered watercourses, and crops (Pizzey and Knight 2021).	Likely - recent record and suitable habitat occurs in the Project Area.
<i>Falcunculus frontatus frontatus</i>	Eastern Shrikebill		R	2	2020	Eucalyptus woodlands and forest, within a wide range of woodland/forest communities. Prefers dense grasslands, often on the edges of open forests, and bracken (Birdlife Australia 2023).	Likely - recent record and suitable habitat occurs in the Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Haematopus fuliginosus fuliginosus</i>	Sooty Oystercatcher		R	2	2020	The Sooty Oystercatcher is strictly coastal, usually within 50 m of the ocean. It prefers rocky shores but will be seen on coral reefs or sandy beaches near mudflats. (Pizzey and Knight 2021).	Unlikely - recorded recently but suitable habitat does not occur in the Project Area.
<i>Haematopus longirostris</i>	Pied Oystercatcher		R	2	2022	Prefers sandy, shellgrit or pebble beaches, tidal mudflats, and coastal islands (Pizzey and Knight 2021).	Unlikely - recorded recently but suitable habitat does not occur in the Project Area.
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E	2	2010	Prefers tress and saplings in open forests and woodlands, lightly timbered hills, and scrub regrowth. Sometimes found in trees along watercourses (Pizzey and Knight 2021).	Possible - may occur as a flyover only.
<i>Hieraaetus morphnoides</i>	Little Eagle		V	2	2014	Widespread over diverse habitats: forest, woodland, open scrub, tree-lined watercourses of interior Australia such as the Murray River. Prefers areas where open country intermixes with wooded or forested hills, as in farmland, irrigated land (Morcombe, 2021).	Likely - recorded in the Search Area in the last decade and suitable habitat occurs in the Project Area.
<i>Larus dominicanus dominicanus</i>	Kelp Gull		R	2	2020	Often found on the coast, bays, on beaches or on reefs or islands, seldom inland unless flying through (Pizzey and Knight 2021).	Unlikely - recorded recently but suitable habitat does not occur in the Project Area. Flyover only.
<i>Lewin pectoralis pectoralis</i>	Lewin's Rail		V	2	2020	Swamp woodlands: rushes, reeds, rank grass in swamps, creeks paddocks; wet heaths, tree ferns; samphire in saltmarsh (Pizzey and Knight 2021).	Unlikely - recent record but suitable habitat does not occur in the Project Area.
<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater		R	2	2016	Inhabits mallee heathlands and occasionally mallee with an open understory (such as Spinifex associations). Sometimes occurs along Red Gum lined waterways (OEH, 2023).	Likely - recorded within the last decade and suitable habitat occurs in the Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Melithreptus gularis</i>	Black-chinned Honeyeater		V	2	2006	The Black-chinned Honeyeater is found in the upper levels of open eucalypt forests and woodlands dominated by box and ironbark eucalypts. It is often found along waterways and is occasionally seen in gardens and street trees (Birdlife Australia 2023).	Possible - recorded in the last 20 years but no waterways in Project Area.
<i>Microeca fascians</i>	Jacky Winter		R	2	2013	Widely distributed throughout mainland Australia. Prefer open woodland (Eucalypt and mallee) with an open shrub layer and bare ground. Often seen in farmland and parks (Morcombe, 2021).	Likely - recorded within the last decade and suitable habitat exists in the Project Area.
<i>Myiagra inquieta</i>	Restless Flycatcher		R	2	2002	Found throughout northern and eastern mainland Australia, as well as in south-western Australia. The Restless Flycatcher is found in open forests and woodlands and is frequently seen in farmland (Birdlife Australia 2023).	Possible - recorded in Search Area within the last 30 years and suitable habitat occurs in the Project Area.
<i>Neophema elegans</i>	Elegant Parrot		R	2	2020	Wide variety of habitats, including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh, and farmland (Pizzey and Knight 2021).	Likely - recent records and suitable habitat occurs in the Project Area.
<i>Neophema petrophila zietzi</i>	Rock Parrot		R	2	2014	Found along coastlines, often in windswept coastal dunes, mangroves, saline swamps, and rocky islets. It is seldom seen more than a few hundred metres from the ocean (Birds in Backyards 2023).	Possible - recent record but suitable habitat does not occur in the Project Area.
<i>Numenius phaeopus variegatus</i>	Whimbrel		R	2	2008	Most commonly found in estuaries, mangroves, tidal mudflats and flooded paddocks or sewage ponds (Pizzey and Knight 2021).	Unlikely - recent records in Search Area but suitable habitat does not exist in Project Area.
<i>Oriolus sagittatus sagittatus</i>	Olive-backed Oriole		R	2	2005	Occurs in coastal regions, in forests, woodlands, well-treed urban areas, parks, and golf courses (Birdlife Australia, 2023).	Likely - recorded in last 20 years and suitable habitat occurs in the Project Area.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Oxyura australis</i>	Blue-billed Duck		R	2	2018	Prefers large dams and lakes and well-vegetated freshwater swamps (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but suitable habitat is not present in the Project Area.
<i>Petroica phoenicea</i>	Flame Robin		V	2	1998	Endemic to south-eastern Australia, and ranges from near the Queensland border to southeast South Australia and also in Tasmania. Breeds in eucalypt forests and woodlands, with access to open areas, such as subalpine woodland, recently burnt forest, recently logged forest, and pine plantations (OEH 2023).	Possible - recorded in Search Area within last 30 years and however suitable habitat is limited and fragmented in the Project Area.
<i>Plegadis falcinellus</i>	Glossy Ibis		R	2	2012	Generally located on Eyre Peninsula in South Australia. Preferred habitat for foraging and breeding are freshwater marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation (Marchant and Higgins 1990).	Unlikely - despite recent records in Search Area, suitable habitat does not occur in the Project Area. Flyover only.
<i>Podiceps cristatus australis</i>	Great Crested Grebe		R	2	2019	Found almost exclusively on lakes, larger lagoons and swamps, reservoirs and bays or inlets (Pizzey and Knight 2021).	Unlikely - recent record within Search Area but suitable habitat does not occur in the Project Area.
<i>Spatula rhynchosotis</i>	Australasian Shoveler		R	2	2020	Prefers fresh and saline lakes and well-vegetated freshwater wetlands. Also occurs in coastal inlets, floodwaters, and sewage ponds (Morcombe 2021).	Unlikely - recent record but suitable habitat does not occur in the Project Area. Flyover only.
<i>Sterna hirundo longipennis</i>	Common Tern		R	2	1999	Prefers offshore waters, beaches, reefs, bays, estuaries, sandflats, salt fields and sewage ponds (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but suitable habitat does not occur in the Project Area. Flyover only.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Stictonetta naevosa</i>	Freckled Duck		V	2	2019	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds (Birds in Backyards 2023).	Unlikely - recorded in the Search Area but suitable habitat does not occur in the Project Area. Flyover only.
<i>Tringa brevipes</i>	Grey-tailed Tattler		R	2	2018	Inhabits estuaries, tidal mudflats, mangroves, and shallow river margins both coastal and inland (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Turnix varius varius</i>	Painted Buttonquail		R	2	1999	Temperate and eastern tropical forests and woodlands form the habitats of this species. They appear to prefer closed canopies with some understorey and deep leaf litter on the ground (Birds in Backyards 2023).	Unlikely - recorded in the Search Area over 20 years ago, but suitable woodland habitat with closed canopies does not exist in the Project Area.
<i>Zanda funerea whiteae</i>	Yellow-tailed Black Cockatoo		V	2	2020	This species inhabits a variety of habitat types but prefer coastal heath, woodland, and forest. They are increasingly found in pine plantations and patches of pine trees in urban and rural areas (Birdlife Australia 2023).	Likely - recent record and suitable habitat occurs in the Project Area.
<i>Zapornia tabuensis</i>	Spotless Crane		R	2	2020	Mostly found in well vegetated freshwater wetlands with rushes and reeds. Will also frequent muddy areas, reedbeds or wetlands (Wilson and Bignall 2009).	Unlikely - recent record but suitable habitat does not occur in the Project Area.
MAMMALIA (MAMMALS)							
<i>Trichosurus vulpecula</i>	Common Brush-tail Possum		R	2	2013	Utilises various woodland habitats and suburban environs. Feeds on flowers, fruit, buds, and leaves of native vegetation. Requires hollows (within dead or alive tree) or on ground for daytime nesting (Strahan & van Dyck 2008).	Likely - recorded within the last decade and suitable habitat occurs in the Project Area.
REPTILIA (REPTILES)							

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Varanus rosenbergi</i>	Heath Goanna		V	2	2022	Habitat across southern Australia includes coastal heaths, humid woodlands, and wet and dry sclerophyll forests. Forms nests in termite mounds and require large areas of intact habitat (Cogger 2014).	Likely - very recent record in the Search Area and suitable habitat may exist in the Project Area.

Conservation status:

Aus: Australia (EPBC Act), SA: South Australia (NPW Act), Conservation Codes: CE: Critically Endangered, EN/E: Endangered, VU/V: Vulnerable, R: Rare.

PMST result: Likelihood of species or species habitat to occur within 5 km of the Project Area.

Source of Information:

1. 1: PMST (DOCCEW 2023b) – 5 km buffer applied to Project Area;
2. 2: BDBSA (DEW 2023b) – 5 km buffer applied to Project Area;

Abbreviations within Distribution and preferred habitat:

EP: Eyre Peninsula; FP: Fleurieu Peninsula; FR: Flinders Ranges; KI: Kangaroo Island; MLR: Mount Lofty Ranges; MU: Murraylands; NL: Northern Lofty; NP: National Park; NSW: New South Wales QLD: Queensland; SL: Southern Lofty; SE: Southeast / South-Eastern; SW: South-Western; Tas: Tasmania; Vic: Victoria; WA: Western Australia; YP: Yorke Peninsula.



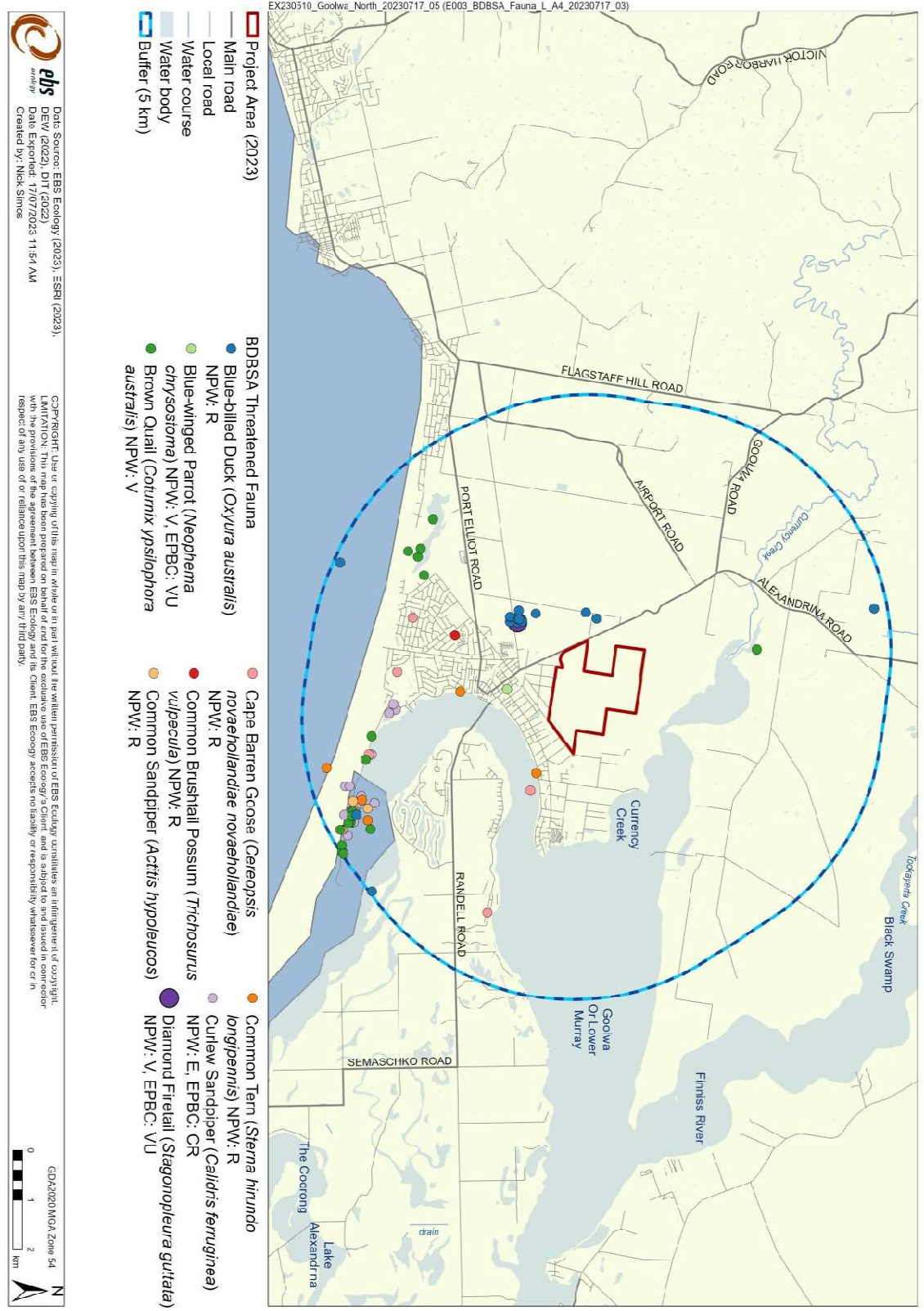


Figure 9. BDBSA records of threatened fauna within the Project Area and Search Area (map 2 of 7).

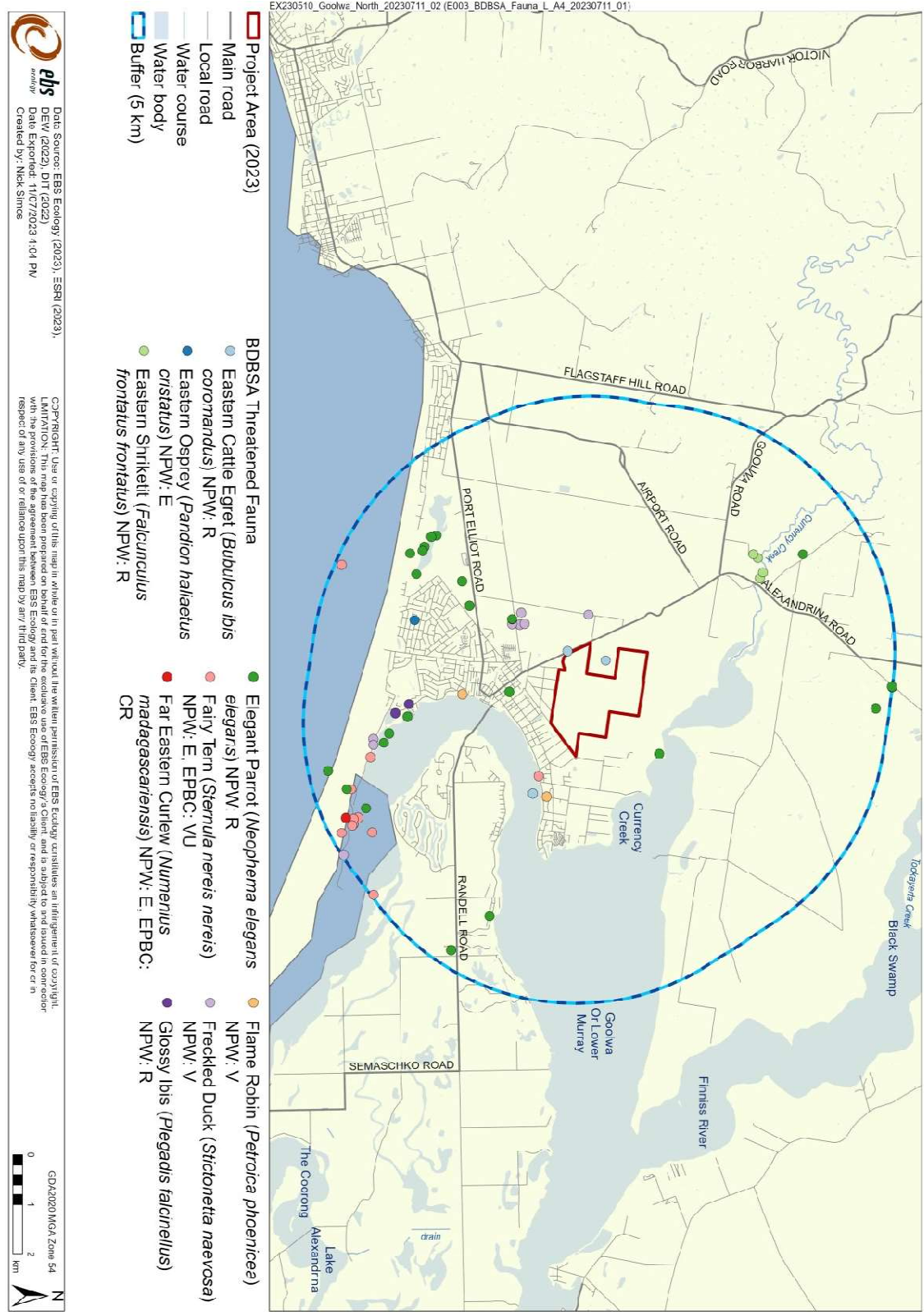


Figure 10. BDBSA records of threatened fauna within the Project Area and Search Area (map 3 of 7).

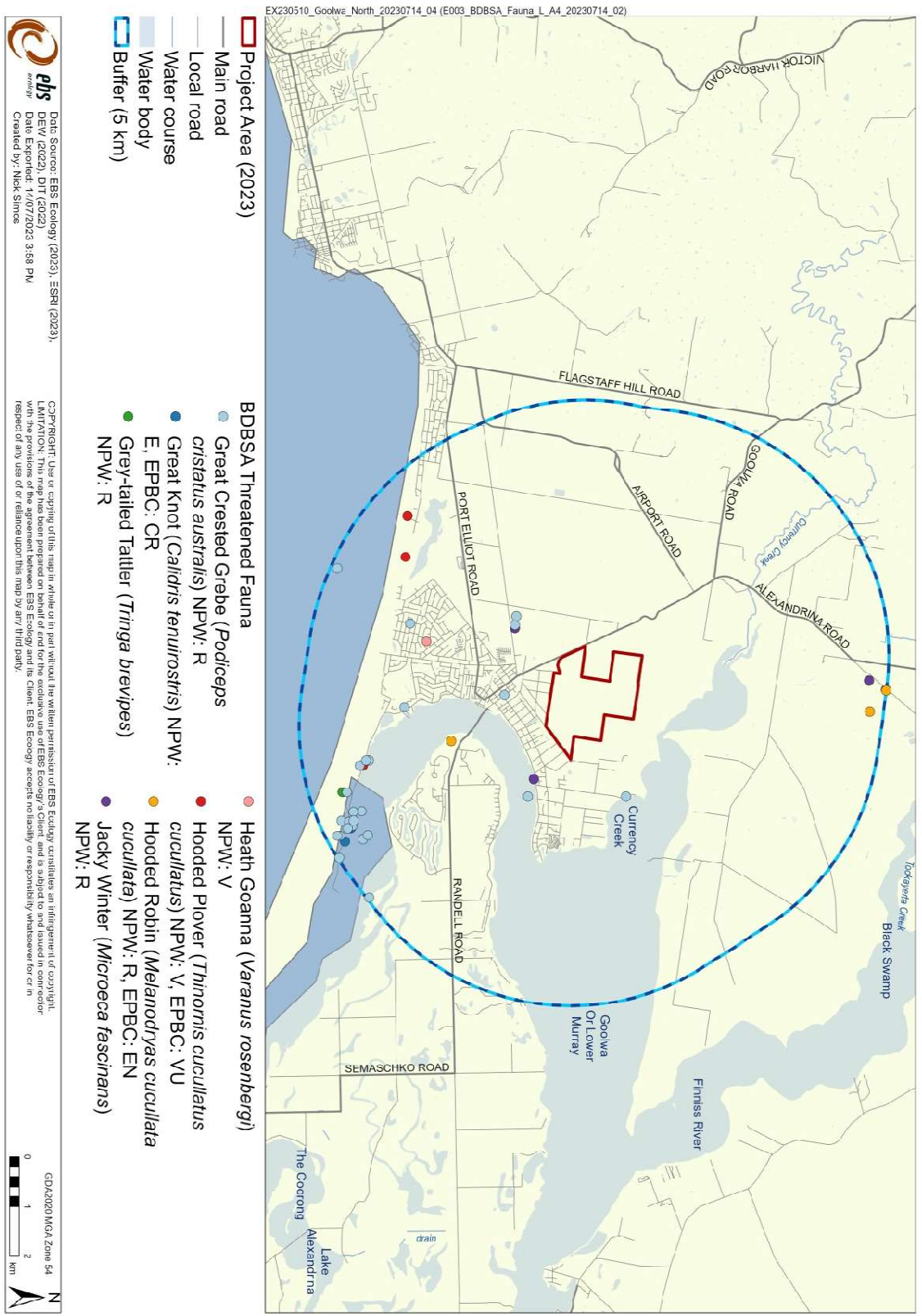


Figure 11. BDBSA records of threatened fauna within the Project Area and Search Area (map 4 of 7).

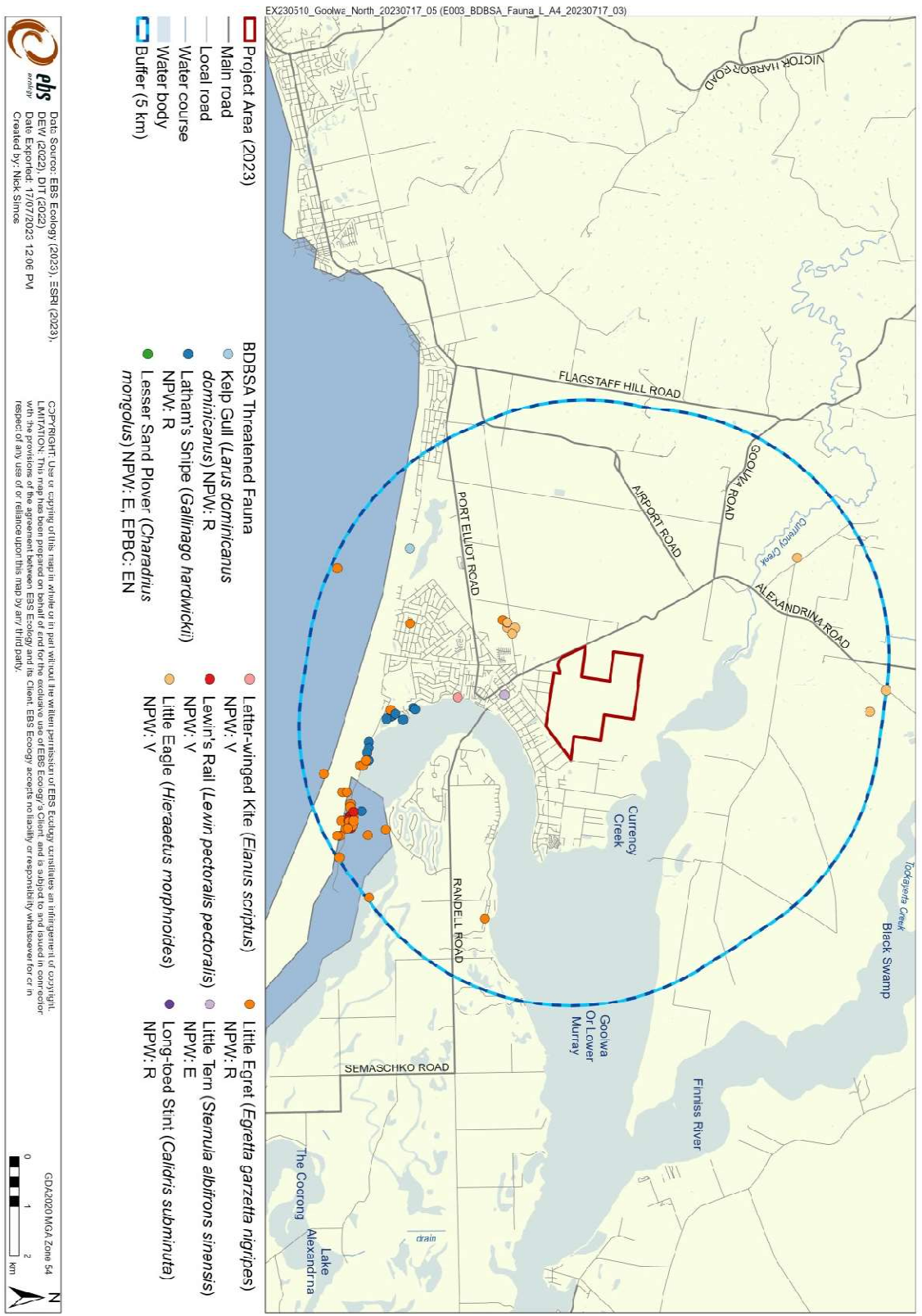


Figure 12. BDBSA records of threatened fauna within the Project Area and Search Area (map 5 of 7).

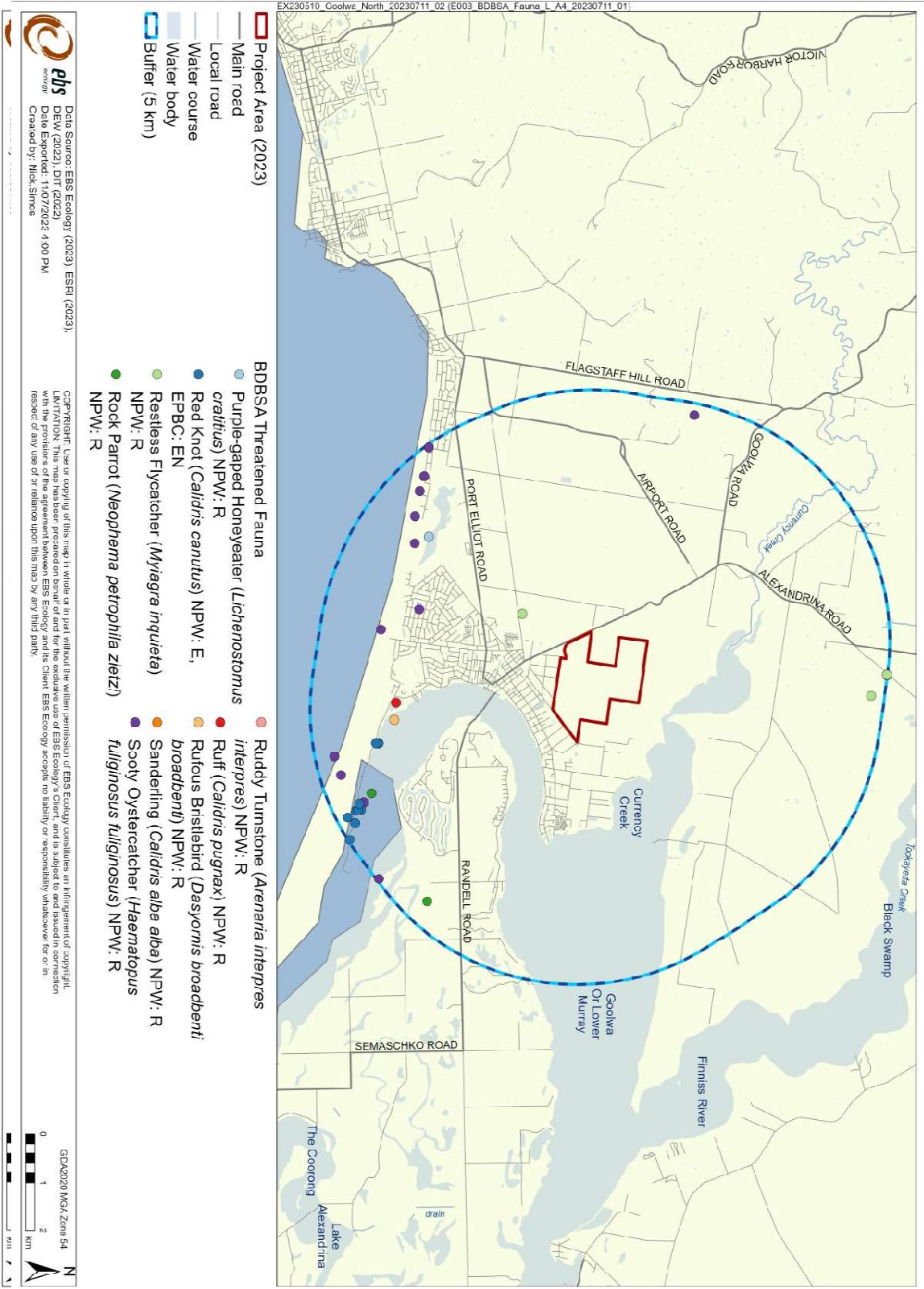


Figure 13. BDBSA records of threatened fauna within the Project Area and Search Area (map 6 of 7).

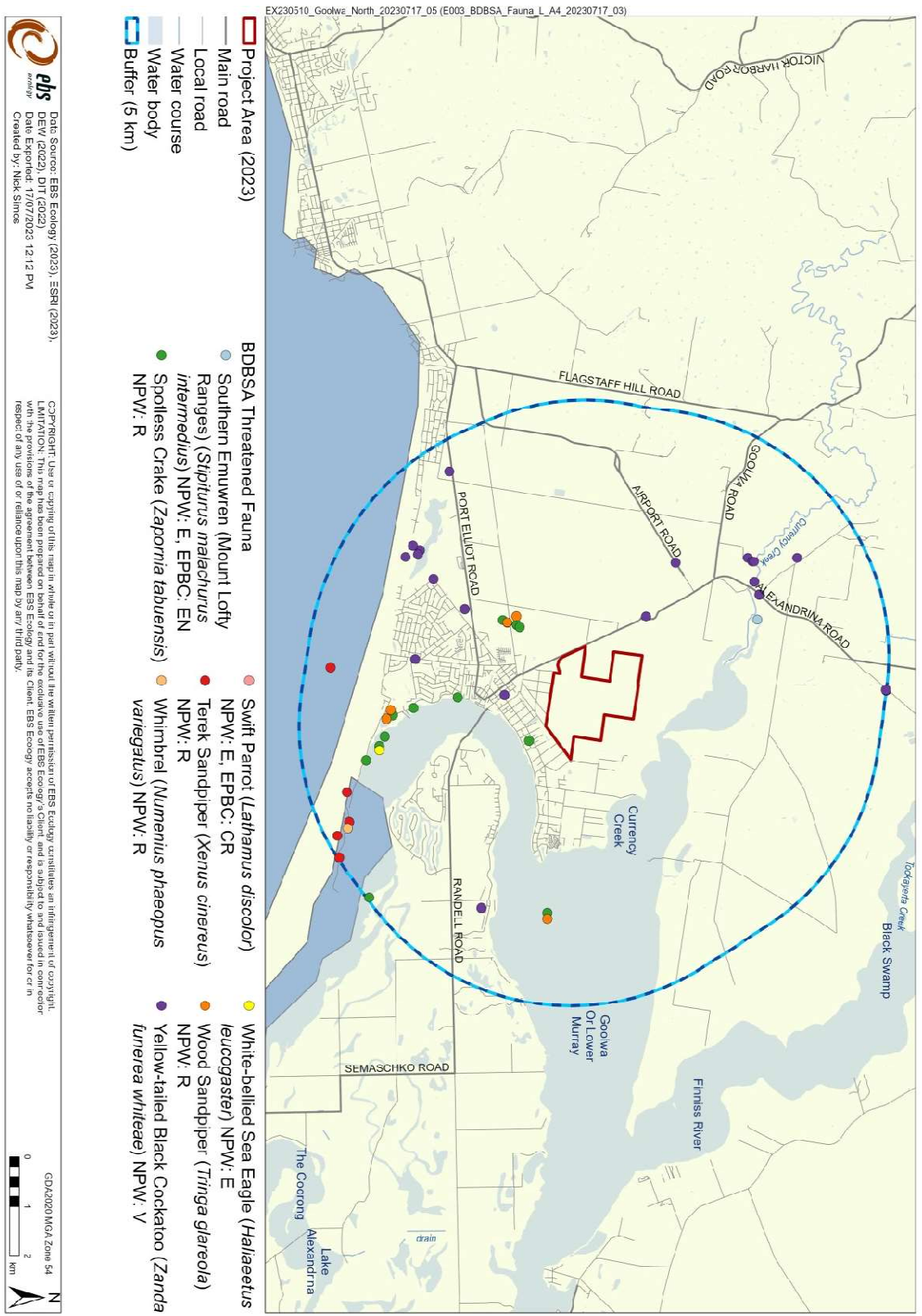


Figure 14. BDBSA records of threatened fauna within the Project Area and Search Area (map 7 of 7).

4.5 Introduced weed species

A BDBSA search identified 28 Declared flora species under the LSA Act, that have records within 5 km of the Project Area. Of these, nine are Weeds of National Significance (WoNS). A summary of these species and the latest sighting (year) is provided in Table 17.

Table 17. Declared weeds identified within 5 km of the Project Area (DEW 2023b).

Scientific Name	Common Name	Weeds of National Significance (WoNS)	Latest sighting (year)
<i>Asparagus asparagoides f.</i>	Bridal Creeper	Yes	2020
<i>Asparagus declinatus</i>		Yes	2011
<i>Casuarina glauca</i>	Grey Bul oak		2011
<i>Chondrilla juncea</i>	Skeleton Weed		2012
<i>Chrysanthemoides monilifera ssp. monilifera</i>	Boneseed	Yes	2020
<i>Coprosma repens</i>	New Zealand Mirror-bush		2020
<i>Echium plantagineum</i>	Salvation Jane		2020
<i>Eragrostis curvula</i>	African Love-grass		2011
<i>Euphorbia terracina</i>	False Caper		2020
<i>Gazania linearis</i>	Gazania		2020
<i>Genista monspessulana</i>	Montpellier Broom	Yes	2005
<i>Hyparrhenia hirta</i>	Tambookie Grass		2012
<i>Juncus acutus</i>	Sharp Rush		2011
<i>Leptospermum laevigatum</i>	Coast Tea-tree		2020
<i>Lycium ferocissimum</i>	African Boxthorn	Yes	2020
<i>Marrubium vulgare</i>	Horehound		2014
<i>Moraea flaccida</i>	One-leaf Cape Tulip		2011
<i>Opuntia sp.</i>		Yes	2013
<i>Pinus halepensis</i>	Aleppo Pine		2020
<i>Polygala myrtifolia</i>	Myrtle-leaf Milkwort		2019
<i>Retama raetam</i>	White Weeping Broom		2012
<i>Rhamnus alaternus</i>	Blowfly Bush		2020
<i>Rosa canina</i>	Dog Rose		2015
<i>Rubus fruticosus aggregate</i>	Blackberry	Yes	2011
<i>Tamarix aphylla</i>	Athel Pine	Yes	2011
<i>Tamarix ramosissima</i>			2011
<i>Ulex europaeus</i>	Gorse	Yes	2007

Latest sighting (year): Historical records within 5 km of the Project Area, obtained from the BDBSA Database.

Given the large number of Declared weeds recorded within 5 km of the Project Area, there is a risk of these species and other environmental weeds becoming established within the Project Area and in the surrounding areas due to the proposed Project. Implementation of correct transportation of Declared Weeds and associated permits to transport these weeds on a public road for any future proposed impacts in the Project Area as a result of the Code Amendment may be required.

5 DISCUSSION

5.1 Summary of constraints

The desktop study has identified that the following constraints, in relation to TEC, flora and fauna including threatened flora and fauna species and their habitat in the Project Area:

- Nine sections of vegetation that were previously surveyed are relevant to the current Project Area. There is one section that should not be disturbed (section 1299) and two sections where disturbance should be avoided wherever possible (sections 1296 and 1298). Large areas of the Project Area are used for agriculture and/or cropping.
- One patch of Peppermint Box (*Eucalyptus odorata*) Woodland was identified within the Project Area based on previous survey effort. This patch would need to be assessed against the Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia (PBGW) listing criteria (Turner 2012) via additional field assessment to determine if it is the PBGW TEC.
- One EPBC Act threatened flora species is likely to occur in the Project Area. *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) has been previously recorded in close proximity to the Project Area boundary and overlaps with the PBGW TEC.
- One EPBC Act threatened fauna species is likely to occur in the Project Area. The Hooded Robin (*Melanodryas cucullata cucullata*) has been previously recorded in the Search Area and prefers dry Eucalypt and Acacia woodlands and shrublands which occur in patches in the Project Area.
- No EPBC Act listed migratory species were assessed as potentially occurring in the Project Area.
- A total of 11 NPW Act listed flora species are likely to occur in the Project Area. All these species have been recorded within 5km of the Project Area within the last 30 years.
- A total of 13 NPW Act listed fauna species are likely to occur in the Project Area. All these species have been recorded within 5km of the Project Area within the last 20 years.
- Sections of vegetation within the Project Area provide habitat for many species including threatened fauna and other native fauna. When mature *Eucalyptus* spp. are in flower, they provide a foraging resource for nectarivorous species.
- Several scattered trees in the Project Area may contain hollows suitable for use by native fauna including threatened fauna for nesting and breeding.

5.2 Potential impacts

5.2.1 Vegetation

Nine sections of vegetation that were surveyed by EBS in 2016 are relevant to the current Project Area. These sections vary in vegetation quality and ecological significance. There is one section that should not be disturbed (section 1299) and two sections where disturbance should be avoided wherever possible (sections 1296 and 1298).

Section 1299 is a patch of vegetation where each flora stratum is relatively intact. It was noted that this patch had a low level of weed infestation and may be suitable for orchid species.

Section 1296 contains patches of scattered *Eucalyptus fasciculosa* (Pink Gum) and while the overall condition of this area was noted to be low, scattered trees such as these could provide habitat for scattered tree using fauna.

Section 1298 also contains patches of scattered *Eucalyptus fasciculosa* (Pink Gum). This area, albeit disjunct, facilitates a wildlife corridor between the Pink Gum/Broombush community that is east of the Project Area.

It is recommended that any future proposed development as a result of the Code Amendment avoids all sections of vegetation in particular the above three sections of vegetation which have a higher ecological value in the Project Area. There are large areas of the Project Area that are currently used for agriculture and/or cropping where development (if approved) should be focused.

5.2.2 Matters of National Environmental significance

Multiple stands of the PBGW TEC were identified by EBS in 2016 with the majority located outside the updated Project Area. One high quality patch of PBGW was identified within the updated Project Area boundaries but would need to be assessed against the listing criteria (Turner 2012) via additional field assessment to determine if it is the PBGW TEC. It is recommended that any future proposed development as a result of the Code Amendment avoids any stands of PBGW.

Olearia pannosa ssp. *pannosa* (Silver Daisy-bush) was assessed as likely to occur in the Project Area. This species has been previously recorded in close proximity to the Project Area boundary and is endemic to South Australia. It occurs in sandy, flat areas and in hilly, rocky areas in woodland or mallee and its distribution overlaps with the PBGW TEC, which was assessed as possible to occur in the Project Area (DOE 2013c). Fragmentation is listed as one of the main threats to *Olearia pannosa* ssp. *pannosa* (DOE 2013c, Pobke 2007) which could occur as a result of future development due to the proposed Code Amendment. Given its scattered population numbers, impacts to any individuals as a result of any future proposed development due to the Code Amendment should be avoided.

The Hooded Robin (*Melanodryas cucullata cucullata*) was assessed as likely to occur within the Project Area. This species has been previously recorded in the Search Area in 2013 and prefers dry Eucalypt and Acacia woodlands and shrublands with an open or grassy understorey. This habitat does occur in the Project Area. They generally avoid woodlands with tall trees or dense tree cover and prefer patches greater than 10 ha in agricultural landscapes (DCCEEW 2023d; Watson et al. 2000). In order to avoid impacts to the Hooded Robin, any future proposed development as a result of the Code Amendment should avoid more intact patches of vegetation, particularly sections 1296, 1298 and 1299.

The presence of these species in the Project Area cannot be assessed by desktop alone. Additional field assessment focusing on these species would be required to determine their presence (if any).

5.2.3 *Matters of State significance*

Any impacts to the nine previously identified sections of vegetation in the Project Area may impact on species additional to the above mentioned in Section 5.2.2 listed as threatened under the NPW Act. A total of 11 flora and 13 fauna listed as threatened under the NPW Act were assessed as likely to occur in the Project Area. Given the Project Area is largely agricultural and/or used for cropping, habitat is not likely to represent critical habitat for these species, that is essential for the survival of any species.

However, The presence of these species in the Project Area cannot be assessed by desktop alone. Additional field assessment focusing on these species would be required to determine their presence (if any). Follow up field assessment may also result in some species being reassessed as unlikely to occur.

5.2.4 *Fauna habitat*

All nine sections of vegetation within the Project Area vary in ecological significance but all provide habitat for many species including threatened fauna and other native fauna such as honeyeaters. When mature *Eucalyptus* spp. are in flower in the Project Area, they provide a foraging resource for nectarivorous species such as the State Rare, Purple-gaped Honeyeater (*Lichenostomus cratitius*). Where possible, sections of higher ecological significance (sections 1296, 1298 and 1299) should be retained in any future proposed development. There are also several scattered trees in the Project Area that may contain hollows suitable for use by native fauna including threatened fauna such as the State Rare, Common Brushtail Possum (*Trichosurus vulpecula*) for nesting and breeding. Any trees identified to contain hollows should be retained where applicable in any future proposed development. All nine sections of vegetation and scattered trees in the Project Area should be avoided in any future proposed development as a result of the Code Amendment.

5.3 Minimizing impact recommendations

A priority assessment was undertaken by EBS in 2016 based upon the vegetation identified. Recommendations as a part of that report are still relevant and are highlighted in Section 4.2.1.

The following broad recommendations and considerations should be taken into account to minimise any future proposed impacts to TEC, flora and fauna including impacts to threatened flora and fauna species and their habitat as a result of the Project.

Any future proposed development as a result of the Code Amendment should:

- Aim to retain all nine previously identified section of vegetation with a focus on high value vegetation, particularly sections 1296, 1298 and 1299 which were previously identified as sections that either should not be disturbed or where disturbance should be avoided wherever possible. Project design that avoids this constraint should be considered.
- Ensure that the design and construction methods minimise impacts to all vegetation, as much as possible, particularly sections 1296, 1298 and 1299.
- Where possible, retain, hollow bearing trees and consider Project design that avoids this constraint.

- Consider areas that are already heavily disturbed with introduced flora species or areas already used for agriculture and/or cropping in order to minimise any impact to native flora and fauna.
- Consider pruning vegetation instead of removing it, where possible.
- Document vegetation management and mitigation measures in a project specific Construction Environmental Management Plan (CEMP).
- Ensure a weed management plan is established prior to any construction to prevent weed spread into neighbouring land.

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7 APPENDICES

7.1 Appendix 1. Assessment of likelihood of nationally listed migratory species identified by the PMST (DCCCEW 2023a) to occur in the Project Area

Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
AVES (BIRDS)							
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi (W)	R	1, 2	Known / 2020	Varied coastal and interior wetlands: narrow muddy edges of billabongs, river pools, mangroves, among rocks reefs and rocky beaches (Morcombe 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Anous stolidus</i>	Common Noddy	Mi (Ma)		1	Likely	Generally confined to the open sea, cays, reefs, buoys and piles (Pizzey and Knight 2021).	Unlikely - no recent records and suitable habitat does not occur in the Project Area.
<i>Apus pacificus</i>	Fork-tailed Swift	Mi (Ma)		1, 2	Likely / 2019	Widespread but almost exclusively aerial. Mostly occur over inland plains and dry or open habitats (Morcombe 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Ardenna carneipes</i> *	Flesh-footed Shearwater	Mi (Ma)	R	1, 2	Likely / 1970	Mostly confined to offshore islands and the open sea near continental shelves. Breeds on islands off the coast including Smith island off the coast of the EP (TSSC 2014).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Ardenna grisea</i> *	Sooty Shearwater	Mi (Ma)		1	May	Very little of the global population migrates to Australia. Those that do are confined to offshore islands and the open sea, particularly off of NSW and TAS (Marchant and Higgins 1990).	Unlikely - no recent records and suitable habitat does not occur in the Project Area.
<i>Arenaria interpres</i>	Ruddy Turnstone	Mi (W)	R	1, 2	Known / 2015	Mainly found in coastal regions, with occasional records of inland populations. Prefers rocky shores or beaches where there are large deposits of rotting seaweed. (Higgins and Davies 1996).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi (W)		1, 2	Known / 2020	Prefers tidal mudflats, saltmarshes and shallow, fresh or saline inland wetlands (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Calidris alba</i>	Sanderling	Mi (W)	R	1, 2	Known / 2020	Sanderling mainly inhabit intertidal mudflats, sandflats, and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours (TSSC 2016a).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi (W)	R	1, 2	Known / 2014	Inhabits shallow fresh waters often associated with low grass and other vegetation. Occasionally seen in salt marshes and tidal areas. (Pizzey and Knight 2021).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Calidris ruficollis</i>	Red-necked Stint	Mi (W)		1, 2	Known / 2020	Occurs on tidal mudflats, salt marshes and sandy or shelly beaches and salt fields. (Pizzey and Knight 2021).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Charadrius bicinctus</i>	Double-banded Plover	Mi (W)		1, 2	Known / 2010	Frequents wide beaches, tidal mudflats, salt marshes and sparsely vegetated wetlands and paddocks (Pizzey and Knight 2021).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Charadrius veredus</i>	Oriental Plover	Mi (W)		1	Known	Inhabits open plains, often far from water, muddy or sandy wastes near tidal mudflats and swamps (Pizzey and Knight 2021).	Unlikely - no recent records and suitable habitat does not occur in the Project Area.
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi (W)	R	1, 2	Known / 2020	This is a wetland species that occurs on shallow water with tussocks and other green or dead growth (Pizzey and Knight 2021).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Limosa limosa melanuroides</i>	Black-tailed Godwit	Mi (W)	R	1, 2	Known / 2020	The species is commonly found in sheltered bays, estuaries, lagoons with large intertidal mudflats or sandflats, rocky coasts, sparsely vegetated, sewage farms, and saltworks (Higgins & Davies 1996).	Unlikely - recorded recently but suitable habitat does not occur in the Project Area.
<i>Motacilla cinerea</i>	Grey Wagtail	Mi (T)		1	May	European and Asian species. Migrates south in winter, usually to Indonesia and NG. Rarely reaches Australia, but when it does, favours habitat near freshwater streams, also mown grass, ploughed land or near sewage ponds (Morecombe 2021).	Unlikely - no recent records and suitable habitat does not occur in the Project Area.
<i>Motacilla flava</i>	Yellow Wagtail	Mi (T)		1	May	Open country near swamps, salt marshes, sewage ponds, grassed surrounds to airfields, bare ground. Occasionally on drier inland plans. Rare but regular visitor around Aust coast especially the NW coast Broome	Unlikely - no recent records and suitable habitat does not occur in the Project Area.

Goolwa North Code Amendment Flora and Fauna Desktop Assessment

Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Pandion haliaetus cristatus</i>	Osprey	Mi (W)	E	1, 2	Likely / 1995	to Darwin. Recent sighting near St Kilda Beach (Pizzey and Knight 2021). Prefers coastal and terrestrial wetlands and require a range of habitats from coastal cliffs, estuaries, mangroves, and large lakes for foraging (DAWE 2020a).	Unlikely - recorded within last 30 years but suitable habitat does not exist in the Project Area. Flyover only.
<i>Phalaropus lobatus</i>	Red-necked Phalarope	Mi (W)		1	Known	Prefers shallow pools, salt fields and tidal mudflats, beaches, and salt marshes (Pizzey and Knight 2021).	Unlikely - no recent records and suitable habitat does not occur in the Project Area.
<i>Philomachus pugnax</i>	Ruff	Mi (W)		1, 2	Known / 2010	Inhabits fresh, brackish, and saline wetlands, tidal mudflats, salt fields and sewage farms (Pizzey and Knight 2021).	Unlikely - records in Search Area, however the Project Area does not contain suitable habitat.
<i>Pluvialis fulva</i>	Pacific Golden Plover	Mi (W)	R	1, 2	Known / 2014	Occurs in a variety of habitats from estuaries to mudflats, saltmarshes and on the margins of shallow open inland swamps and paddocks (Pizzey and Knight 2021).	Unlikely - recorded in Search Area in last 20 years but suitable habitat does not occur in the Project Area. Flyover only.
<i>Pluvialis squatarola</i>	Grey Plover	Mi (W)		1, 2	Known / 2010	Frequents mudflats, salt marshes, tidal reefs and estuaries and is rarely found inland (Pizzey and Knight 2021).	Unlikely - recorded in Search Area in last 20 years but suitable habitat does not occur in the Project Area. Flyover only.
<i>Sternula albifrons sinensis</i>	Little Tern	Mi (Ma)	E	1	May / 2004	Found in coastal waters, bays, inlets, saline or brackish lakes, salt fields and sewage ponds near the coast (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but suitable habitat does not occur in the Project Area. Flyover only.
<i>Tringa glareola</i>	Wood Sandpiper	Mi (W)	R	1, 2	Known / 2020	Prefers the muddy margins of wetlands, tidal mudflats, and salt marshes (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Tringa nebularia</i>	Common Greenshank	Mi (W)		1, 2	Known / 2020	Found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves, or seagrass (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Mi (W)		1, 2	Known / 2019	Inhabits salt, brackish, or freshwater wetlands, sewage ponds, salt fields or tidal mudflats and estuaries (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.

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Scientific name	Common name	Conservation status		Source	PMST result / Latest sighting (Year)	Distribution and habitat preferences	Likelihood of occurrence within the Project Area
		Aus	SA				
<i>Xenus cinereus</i>	Terek Sandpiper	Mi (W)	R	1, 2	Known / 2009	Occurs on tidal mudflats, estuaries, coastal swamps, and salt fields (Pizzey and Knight 2021).	Unlikely - recorded in the Search Area but no suitable habitat in the Project Area. Flyover only.
<i>Balaenoptera edeni</i>	Bryde's Whale	Mi (Ma)	R	1	May	N/A – Marine species	N/A Marine species
<i>Caperea marginata</i>	Pygmy Right Whale	Mi (Ma)	R	1	May	N/A – Marine species	N/A Marine species
<i>Lagenorhynchus obscurus</i>	Dusky Dolphin	Mi (Ma)		1	May	N/A – Marine species	N/A Marine species
<i>Megaptera novaeangliae</i>	Humpback Whale	Mi (Ma)	V	1	Likely	N/A – Marine species	N/A Marine species
<i>Orcinus orca</i>	Killer Whale	Mi (Ma)	R	1	May	N/A – Marine species	N/A Marine species
<i>Lamna nasus</i>	Porbeagle	Mi (Ma)		1	Likely	N/A – Marine species	N/A Marine species

Conservation status:

Aus: Australia (EPBC Act), SA: South Australia (NPW Act), Conservation Codes: CE: Critically Endangered, EN/E: Endangered, VU/V: Vulnerable, R: Rare, Mi (T): listed as a Migratory Terrestrial species under the EPBC Act, Mi (W): listed as a Migratory Wetland species under the EPBC Act, Mi (Ma): listed as a Migratory Marine species under the EPBC Act.

PMST result: Likelihood of species or species habitat to occur within 5 km of the Project Area.

Source of Information:

1. 1: PMST (DOCCEW 2023b) – 5 km buffer applied to Project Area;
2. 2: BDBSA (DEW 2023b) – 5 km buffer applied to Project Area;

Abbreviations within Distribution and preferred habitat:

EP: Eyre Peninsula; FP: Fleurieu Peninsula; FR: Flinders Ranges; KI: Kangaroo Island; MLR: Mount Lofty Ranges; MU: Murraylands; NL: Northern Lofty; NP: National Park; NSW: New South Wales QLD: Queensland; SL: Southern Lofty; SE: Southeast / South-Eastern; SW: South-Western; Tas: Tasmania; Vic: Victoria; WA: Western Australia; YP: Yorke Peninsula.



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

