Goyder South Hybrid Renewable Energy Facility:

Flora and Fauna Assessment

Goyder South Hybrid Renewable Energy Facility: Flora and Fauna Assessment

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Prepared by EBS Ecology for Neoen

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Cover photograph: Satin Flycatcher (*Myiagra cyanoleuca*) observed in the Project Area during the April 2019 survey.

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

GLOSSARY AND ABBREVIATION OF TERMS

ALA	Atlas of Living Australia
BAM	Bushland Assessment Methodology
BDBSA	Biological Database of South Australia (managed by DEW)
CEC	Clean Energy Council
CP	Conservation Park
COEMP	Construction and Operational Environmental Management Plan
DA	Development Application
DAWE	Department of Agriculture, Water and Environment (formerly DotEE)
DEW	Department for Environment and Water
DEWNR	Department of Environment, Water and Natural Resources (now DEW)
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (now DotEE)
DotEE	Department of the Environment and Energy (now DAWE)
EBS	Environmental and Biodiversity Services trading as EBS Ecology
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPZ	Ecological Protection Zone
FRWL	Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*)
Goyder South	Goyder South Hybrid Renewable Energy Facility
GRZ	Goyder Renewables Zone
ha	hectare(s)
IBRA	Interim Biogeographical Regionalisation of Australia
INTG	Iron-grass Natural Temperate Grassland
km	kilometres
kV	Kilovolt
LGA	Local Government Area
m	metre(s)
mm	millimetres
MNES	Matters of National Environmental Significance
Mt	Mount
MW	Megawatts

MWh	Megawatt hour
Neoen	Neoen Australia Pty Ltd
NPW Act	*National Parks and Wildlife Act 1972*
NRM	Natural Resource Management
NRM Act	*Natural Resources Management Act 2004*
NV Act	*Native Vegetation Act 1991*
NVC	Native Vegetation Council
NVIS	Native Vegetation Information System
OMP	Offset Management Plan
PBTL	Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*)
PMST	Protected Matters Search Tool
Project Area/ Project	Goyder South Hybrid Renewable Energy Facility
PV	Photovoltaic
SA	South Australia/South Australian
SEB	Significant Environmental Benefit
SHNW	Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*)
sp.	Species
ssp.	Sub-species
spp.	Species (plural)
TEC	Threatened Ecological Community
VA	Vegetation Association(s)

EXECUTIVE SUMMARY

Neoen is undertaking feasibility studies for the Goyder Renewables Zone (GRZ) development, which has been separated into two projects that will be developed and constructed separately. The first project, the Goyder South Hybrid Renewable Energy Facility (Goyder South), will be located 5 kilometres (km) south of Burra in South Australia and will comprise up to 1,200 Megawatts (MW) of wind, up to 600 MW of solar and up to 900 MW of battery storage.

EBS Ecology (EBS) has been engaged by Neoen to identify and undertake initial ecological assessments of the potential ecological impacts of the proposed Goyder South Project ('the Project Area') and to propose options and recommendations for mitigation where potential impacts have been identified.

A desktop assessment was conducted to determine the potential for any threatened and protected species (both Commonwealth and State listed) to occur within the Project Area. This was achieved by undertaking database searches using a 20 km buffer from a central point within the Project Area – thereby capturing the entire Project Area and immediate surrounding land.

DESKTOP RESULTS

Threatened flora

Three nationally Threatened Ecological Communities (TECs) were identified by the Protected Matters Search Tool (PMST) report as likely to occur within 20 km of the Project Area:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (Endangered) – this community is not considered likely to occur within the Project Area;
- Iron-grass Natural Temperate Grassland of South Australia (Critically Endangered) – known to occur within the western section of the Project Area; and
- Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia (Critically Endangered) – known to occur within the western section of the Project Area.

Thirteen flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified in the PMST as potentially occurring or having suitable habitat within 20 km of the Project Area. Two nationally vulnerable flora species were determined as likely to occur within the Project Area: *Dodonaea procumbens* (Trailing Hop-bush) and *Olearia pannosa subsp. pannosa* (Silver Daisy-bush), both of which have been recorded by EBS during previous survey work at the proposed Stony Gap Wind Farm (which is now incorporated into the Project Area which is the subject of this study).

Fifty-four (54) State threatened flora species were identified by the Biological Database of South Australia (BDBSA) as having records within 20 km of the Project Area. Fifteen (15) species were determined as likely to occur with the Project Area, based on recent records, previous survey work by EBS and potential habitat for these species: *Acacia spilleriana (*Spiller's Wattle), *Austrostipa breviglumis* (Cane Spear-grass), *Austrostipa gibbosa* (Swollen Spear-grass), *Austrostipa pilata* (Prickle Spear-grass), *Bothriochloa macra* (Red-leg Grass), *Dodonaea procumbens* (Trailing Hop-bush), *Echinopogon ovatus* (Rough-beard Grass), *Eryngium ovinum* (Blue Devil), *Eucalyptus cajuputea* (Green Mallee), *Lachnagrostis robusta* (Tall Blown-grass), *Logania saxatilis* (Rock Logania), *Maireana rohrlachii* (Rohrlach's Bluebush), *Mentha satureioides*

(Native Pennyroyal), *Olearia pannosa subsp. pannosa* (Silver Daisy-bush) and *Ptilotus erubescens* (Hairy-tails).

Threatened fauna

Twenty-two (22) fauna species listed under the EPBC Act were identified in the PMST as potentially occurring or having suitable habitat within 20 km of the Project Area. This included two fish, 17 birds, one mammal and two reptile species. Two reptile species were determined as likely to occur within the Project Area: the nationally endangered Pygmy Blue-tongue Lizard (PBTL) (*Tiliqua adelaidensis*) and the nationally vulnerable Flinders Ranges Worm-lizard (FRWL) (*Aprasia pseudopulchella*).

Twelve (12) migratory listed fauna species were identified in the PMST as potentially occurring or having suitable habitat within 20 km of the Project Area. Five species were determined as possibly occurring within the Project Area, four of which were largely due to the proximity of Porter Lagoon, which is situated approximately 2 km to the west of the Project Area and can provide refuge for waterbirds when filled with water. These were the Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*), Pectoral Sandpiper (*Calidris melanotis*) and Common Greenshank (*Tringa nebularia*). The Fork-tailed Swift (*Apus pacificus*) was also identified as possibly occurring within the Project Area.

Twenty-five (24) State threatened fauna species were identified by the BDBSA as having records within 20 km of the Project Area. This included 21 bird species, one mammal and two reptile species. Eight species (six bird and two reptile) were determined as likely to occur with the Project Area, based on recent records and potential habitat for these species: White-winged Chough (*Corcorax melanorhamphos*); Peregrine Falcon (*Falco peregrinus*); Hooded Robin (*Melanodryas cucullata cucullata*); Restless Flycatcher (*Myiagra inquieta*); Elegant Parrot (*Neophema elegans*); Diamond Firetail (*Stagonopleura guttata*); Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*) and Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*).

Protected areas

There were several protected areas that were identified by the desktop assessment as being relevant to the Project Area. The Hopkins Creek Conservation Park (CP) is situated just outside of the Project Area, towards the southern extent. It conserves important riparian and flood plain habitats for Hopkins and Reed creeks. Two other conservation parks, Mimbara CP and Red Banks CP, are located approximately 4 km and 5 km east of the southern and northern extents of the Project Area, respectfully.

Burra Creek Gorge Reserve and World's End Gorge are situated just outside the Project Area; however Burra Creek runs through the Project Area in two main locations. Burra Creek Gorge Reserve holds ecological significance for the local area; River Red Gums (*Eucalyptus camaldulensis*) feature along the Burra Creek and provide important habitat for birds and other wildlife. World's End Gorge is an area rich in biodiversity, with mallee scrubland, peppermint grassy woodland and tussock grassland communities present within the Gorge.

Eight Heritage Agreements have been listed as part of the PMST results; out of the eight agreements, four are summarised as part of this desktop assessment report, based on their proximity to the Project Area. None are situated within the Project Area.

There are five Significant Environmental Benefit (SEB) areas located within close proximity to the Project Area; one SEB area is situated inside the Project Area, SEB2013_2024.

FIELD SURVEY METHODS

Ecological assessments throughout the Project Area were undertaken between 25 March and 11 April (autumn) 2019 and 2 and 5 September (spring) 2019. These surveys were undertaken predominantly to assess:

- Pockets of native vegetation, targeting Iron-grass (*Lomandra* sp.) and Peppermint Box (*Eucalyptus odorata*) to determine whether both species qualified as a TEC;
- Presence of PBTL including mapping any individuals recorded as well as potential habitat; and
- Presence of targeted avifauna such as birds and bats. General fauna was also recorded during the surveys including mapping Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*) sightings and burrows.

The additional spring survey was undertaken to:

- Collect additional information about migratory bird species;
- Determine if any of the Wedge-tailed Eagle (*Aquila audax*) nests recorded in autumn were active; and
- Assess additional areas where access was previously not permitted.

Flora

During both autumn and spring 2019 surveys, Vegetation Associations (VAs) were broadly mapped over the Project Area, according to the dominant overstorey species present. The dominant flora species within each vegetation stratum (overstorey, midstorey and understorey) were recorded as well as the presence of threatened species and declared or significant weed species. Flora species within the Project Area were recorded as part of the vegetation association mapping methodology.

Fauna

All native and exotic fauna species encountered (directly observed, or tracks, scats, burrows, nests and other signs of presence) during both the autumn and spring 2019 surveys were recorded.

The habitats present within the Project Area were assessed for suitability for the PBTL during both the autumn and spring 2019 surveys. Vertical spider holes were inspected for the presence of PBTLs along 41 transects using a videoscope, with data collected on the depth and condition of the spider hole and a GPS location recorded at each hole inspected.

Targeted bird surveys were conducted using point counts. A total of 25 point count sites were established during the autumn and spring 2019 surveys. The 5 hectare/30-minute point count methodology was used, whereby, an observer records all birds heard or observed within a 30-minute period in a 5 hectare (ha) search area. An additional opportunistic bird survey was conducted at Porter's Lagoon (approximately 2 km from the western boundary of the Project Area), which was inundated during spring, to check for migratory wader species that were identified in the desktop assessment and could potentially be impacted by the proposed development.

Woodland areas were assessed for potential nesting locations of the State rare Peregrine Falcon (*Falco peregrinus*) and at-risk species Wedge-tailed Eagle (WTE) during both the autumn and spring 2019 surveys. The spring 2019 survey also revisited known WTE nest locations to determine their breeding status.

A passive bat survey was conducted during both autumn and spring 2019 surveys using AnaBat units to record bat ultrasonic echolocation calls in areas thought to be of suitable habitat for bats or that bats may frequent when feeding. AnaBat detectors were set up at four sites for two nights and sound data was analysed to assess the presence of species.

FIELD SURVEY RESULTS

Threatened Ecological Communities (TEC)

Two TECs were identified in the desktop as likely to occur within the Project Area; Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia. At the time of the autumn and spring 2019 surveys, both were not classed as TECs, due to poor conditions, likely caused by drought conditions and grazing pressure.

Vegetation Associations (VAs)

The vegetation attributes of the Project Area can be separated in to eastern and western sectors, which are divided by Burra Creek. Each sector is comprised of two parallel ridges. The western ridges were categorised as an agricultural zone landscape, within which native vegetation consisted of grasslands and tall woodlands of moderate quality. The eastern ridges receive lower rainfall than those in the west, and therefore, pastoral land practices were more widely used than agricultural land practices. Vegetation communities were also reflective of lower rainfall, comprising of native pine and Mallee woodlands, and chenopod shrublands.

Twenty (20) broad VAs were recorded and mapped over the Project Area. Native vegetation covered 26,559.2 ha of the overall Project Area.

The most well represented VAs, spread across the Project Area, were

- VA 8 - *Austrostipa* spp. (Spear Grass) Mixed Grassland;
- VA 5 - *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee) Mixed Open Mallee; and
- VA 1 - *Maireana aphylla* (Cotton-bush) / *Atriplex stipitata* (Bitter Saltbush) Mixed Low Open Chenopod Shrubland.

Flora

Ninety-nine (99) flora species were recorded within the Project Area during the broad vegetation mapping methodology. This included 74 native and 25 exotic species. Approximately 35 individuals of the nationally and State endangered *Dodonaea subglandulifera* (Peep Hill Hop-bush) were observed in the southeast of the Project Area, within a good quality patch of *Eucalyptus porosa* (Mallee Box) Open Woodland (VA 3). No other threatened flora species were observed within the Project Area during broad vegetation mapping, across both survey periods.

Fauna

Ninety-two (92) fauna species were recorded over the Project Area during the field assessments during autumn and spring 2019. The fauna assemblage comprised of 76 bird (from 55 point count and 19 opportunistic observations).

One amphibian species, the Common Froglet (*Crinia signifera*) was opportunistically heard in Burra Creek within the Project Area.

Five reptile species were recorded over the Project Area. The Pygmy Blue-tongue (*Tiliqua adelaidensis*) (24 individuals), Common Dwarf Skink (*Menetia greyii*) (two individuals); and Tessellated Gecko (*Diplodactylus tessellatus*) (two individuals) were recorded.

Ten ground-dwelling mammal species were recorded over the Project Area. The native mammal species recorded were the Southern Hairy-nosed Wombat (SHNW) (*Lasiorhinus latifrons*), Red Kangaroo (*Macropus rufus*), Western Grey Kangaroo (*Macropus fuliginosus*), Euro (*Macropus robustus*) and Short-beaked Echidna (*Tachyglossus aculeatus*). All macropod species (kangaroos and Euro) were abundant and widespread over the Project Area.

Two SHNWs and several active burrow systems (warrens) were observed during the field surveys in autumn and spring 2019. All wombats and warrens were observed in proximity to drainage lines within the Project Area.

Five bat species were identified from the sonograms recorded by AnaBat units over the four sites, surveyed across both autumn and spring survey periods, in the Project Area. The Gould's Wattled Bat (*Chalinolobus gouldii*) and Free-tailed Bats (*Ozimops* sp.) was recorded at all four AnaBat sites. The White-striped Freetail Bat (*Austronomous australis*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*) and Southern Forest Bat (*Vespadelus regulus*) were recorded at three sites. No national or State threatened bat species were recorded in the Project Area during the field assessments in autumn and spring 2019.

Fifty-eight (58) bird species were recorded during point count surveys across the two survey periods, with an additional 19 species recorded opportunistically. The bird families with the greatest representation in the Project Area were Meliphagidae (honeyeaters), Acanthizidae (Australasian warblers) and Psittaculidae (parrots). Six State threatened bird species were recorded within the Project Area.

A total of 586 birds were recorded across the 25 point counts established over the Project Area. The species recorded at the greatest number of point count sites were Little Raven (*Corvus mellori*) Striated Pardalote (*Pardalotus striatus*) and Weebill (*Smicrornis brevirostris*) (all at 14 sites), Galah (*Eolophus roseicapilla*) (13 sites) and Australian Magpie (*Gymnorhina tibicen*) (12 sites).

Wedge-tailed Eagle

A total of six WTE nests were recorded over the Project Area during the autumn and spring field assessment periods. These nests were primarily restricted to mid-slope areas of ridgelines that supported *Eucalyptus odorata* woodland. The condition of nests was variable, with four nests in good condition and two nests in poor condition. WTEs were also observed to be sitting on two nests (both of which were determined as being in 'good' condition), detected during the spring survey. Each of the WTE nests were allocated a 1 km buffer regardless of condition, within which no turbines are to be constructed. WTE pairs are known to reuse nest locations across varying seasons, which is why the buffer was applied to all nests.

Pygmy Blue-tongue Lizards

Due to the timing of the PBTL survey, dry conditions and grazing pressure, most grassland areas had low grass cover and the surveyors had no difficulty locating spider burrows. Across both autumn and spring surveys, a total 1,076 spider burrows were inspected for PBTLs along 41 transects across the Project Area, with 24 PBTLs observed within burrows.

Possible and likely PBTL habitat was mapped across the Project Area based on the observation of PBTLs and the presence of suitable habitat characteristics, which was concentrated to the western side of the Project Area. Overall, 450 ha of possible habitat and 47 ha of likely habitat for PBTLs occurred within the Project Area.

RECOMMENDATIONS

As part of the initial survey work several ecological constraints were identified by EBS, which Neoen has committed to addressing as part of the preliminary project design or, where appropriate, micrositing. In summary, these were identified as:

- Avoid, where possible, areas that have been mapped as patches of Iron-grass (*Lomandra* sp.) and Peppermint Box (*E. odorata*) – where areas cannot be avoided, EBS recommends that targeted surveys need to be undertaken for both Iron-grass and Peppermint Box, to determine if they qualify as TECs, prior to construction taking place. The survey, conditions permitting, should be timed after a good rainfall season. Where areas cannot be avoided, patches containing both Iron-grass and Peppermint Box need to be microsited prior to construction, for the placement of wind turbines and associated infrastructure.
- Avoid, where possible, areas that have been identified as known PBTL records, areas mapped as likely PBTL habitat and potential PBTL habitat. Where areas cannot be avoided, micrositing needs to occur prior to construction, for the placement of wind turbines and associated infrastructure. Neoen have committed to undertaking survey work for micrositing PBTL within the Project Area, when all infrastructure positions are known.
- Avoid, where possible the area marked as containing records of *Dodonaea subglandulifera* (Peep Hill Hop-bush).
- Avoid, where possible, areas mapped as having conservation value which have been identified by EBS as areas of high bird richness habitat or those vegetation associations containing Mallee Woodland, Sedgeland or Shrubland.
- Avoid, where possible, known Wedge-tailed Eagle nests (active and inactive) and implement a 1 km buffer around mapped nests.
- Complete a full assessment for flora and fauna, in areas that were not assessed or properties that weren't able to be accessed (portions of the south-east section of the Project Area), as part of the initial ecological assessment work.

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1 INTRODUCTION

Neoen Australia Pty Ltd (Neoen) is seeking Development Plan Consent for the Goyder South Hybrid Renewable Energy Facility. Neoen has undertaken feasibility studies for the Goyder Renewables Zone (GRZ) development, which has been separated into two projects that will be developed and constructed separately. The first project, Goyder South Hybrid Renewable Energy Facility (Goyder South), will be connected to the existing Robertstown substation, with project construction expected to commence from 2021 onwards.

EBS Ecology (EBS) has been engaged by Neoen to identify and undertake the initial ecological assessments, identify any potential impacts of the Project and to propose options and recommendations for mitigation where potential impacts have been identified.

The initial ecological assessment report is intended to support Federal and State project approval documents such as the Development Application (DA), EPBC Referral and Native Vegetation Clearance Application and comply with Clean Energy Council *Best Practice Guidelines* (Clean Energy Council 2018).

1.1 Objectives

The main objective of the initial flora and fauna assessment report is to contribute to the deliverables required for a DA. This includes:

- Identify, describe and map nationally threatened and State rated flora and fauna, and ecological communities, across the Project Area to enable assessment by Commonwealth (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) and State regulators (*National Parks and Wildlife Act 1972* (NPW Act) and the *Native Vegetation Act 1991*(NV Act);
- Determine the likelihood of presence and status of Commonwealth and State listed flora and fauna species and Threatened Ecological Communities (TECs);
- Estimate the number of Vegetation Associations, determine the habitat value of native vegetation present in the Project Area, and determine subsequent intensity of flora assessments sites required;
- Compose a full list of specific species of interest to search for/target during the field assessments;
- Undertake ecological surveys to ground truth and confirm the findings of the desktop assessment and address any identified gaps in the information; and
- Identify key ecological issues/constraints for the Project Area.

1.2 Project Area

The proposed Goyder South development, herein referred to as the Project Area or Project is 26,559.2 ha in size, begins 5.5 km south of the centre of Burra and extends 27 km south, toward Robertstown in South Australia. This area is located in the eastern portion of the northern Mount Lofty Ranges and wholly located within the Regional Council of Goyder. From a transport and access perspective, the region is serviced by the Barrier Highway, the Burra-Morgan Highway (Goyder Highway) and the Worlds End Highway (Figure 1).

The Project Area is dominated by ridges, plains and undulating hills. The highest ridge is situated along the western edge of the Project Area, spanning the entire length of the site (north to south), with the elevation lowering towards the east of the site.

Land use within the area is predominantly agricultural (e.g. grazing for sheep and cattle). Native vegetation throughout the Project Area is predominately grasslands with small pockets of woody native vegetation. Patches of *Enneapogon avenaceus* grassland comprise most of this area, with small pockets of Iron-grass (*Lomandra* spp.) to the west of the Project Area. Woodland vegetation is generally located to the east and south of the site as elevation becomes lower. These woodlands primarily comprised of *Eucalyptus brachycalyx* / *E. gracilis* mallee woodland. In addition to this, a small pocket of *E. odorata* (Peppermint Box) is situated northwest of the site. The general region contains open, low hills with occasional rocky outcrops that fall away to low foot slopes and drainage channels at regular intervals. Vegetation cover is dominated by grasses and sparse incidents of remnant woodlands.

1.3 Previous surveys conducted

The Project incorporates land which was first developed as the Stony Gap Wind Farm. Several surveys were previously conducted by EBS at the proposed Stony Gap site, which are summarised in Table 1.

Table 1. Previous surveys conducted by EBS.

Project description	Year	Survey Type	Citation	EBS Project No.
Stage 1 - Stony Gap Wind Farm flora survey and fauna habitat assessment	May 2008	Flora survey and fauna habitat assessment	EBS (2008)	E80308A
Stage 1 - Additional Stony Gap Wind Farm flora and fauna survey and Stony Gap Wind Farm bird utilisation study	November 2008	Targeted surveys: habitat for bat species, Pygmy Blue-tongue Lizards (*Tiliqua adelaidensis*) (PBTL) and the Flinders Worm-Lizard (*Aprasia pseudopulchella*)	EBS (2009)	E80308B
Stony Gap Wind Farm and Transmission Line Flora and Fauna - Entura	November & December 2010	Flora and fauna assessment of the revised site and transmission line route, targeted PBTL survey	EBS (2011)	E00903
Stony Gap Stage 2 Flora and Fauna Survey – TRUenergy	January 2012	Flora and fauna assessment – Stage 2	EBS (2012a)	E11102
Stony Gap Proposed Transmission Line Flora and Fauna Survey	February 2012	Vegetation association mapping, vegetation condition, species presence / absence and assessment of wildlife habitat and utilisation	EBS (2012b)	E11102B
Stony Gap Wind Farm Commonwealth Advice – TRUenergy	August 2012	EPBC Referral, Response to Additional Information Request	EBS (2012c)	E11102C
Stony Gap Stage 2 Additional Flora and Fauna Assessments	October & December 2012	Additional flora and fauna assessments of the Proposed Stage 2	EBS (2013a)	E11102D
Stony Gap Stage 1 Additional Flora and Fauna Assessments	October & December 2012	Targeted surveys for flora and fauna species and ecological communities listed under the EPBC Act - Stony Gap Wind Farm –2012 Pygmy Blue-tongue Lizard Construction Environmental Management Plan	EBS (2013b) EBS (2013c)	E11102E

1.4 Proposed Project specifications

The proposed Project will be the largest South Australian energy project ever proposed, and one of the largest in Australia. In summary, Goyder South will comprise of:

- Wind generation of up to 163 turbines with a capacity of up to 1,200 MW.
- Solar generation with a capacity of up to 600 MW.
- Energy storage with a capacity of up to 900 MW/1,800 MWh.
- Three substations, access tracks, underground cabling and overhead transmission lines.
- Permanent operations and maintenance compounds.
- Temporary construction facilities including compounds and laydown areas.
- Several temporary and permanent meteorological masts.

Table 2 on page 6 summarises the Project specifications.

1.4.1 Connection Overview

More specifically, the Project will comprise:

Wind turbine generators: The wind turbines associated with the Project Area will be dispersed across the landscape and it is anticipated they will have a generating capacity of between 4-8 MW per turbine. The turbines will have a maximum tip height of 240 metres (m) (and 200 m for the three turbines closest to Burra to minimise visual impact). However, the final sizing will depend on detailed design and procurement of turbine models and may be shorter than this maximum.

Single-axis tracking, bifacial solar Photovoltaic (PV): The bifacial solar panels will gather light on both faces, with the rear face of the panel harnessing light reflected from the ground. Accordingly, these panels will require greater spacing between rows (up to 10 m) and additional land is required to accommodate this technology. They will be located at two main sites:

a. Worlds End Solar – at the northern end of the World's End Highway, and

b. Bright Solar – at the southern end of the project area; to the north-east of Robertstown.

The solar farm component will have a generating capacity of up to 600 MW, across the two main sites. The land at World's End is largely low-intensity grazing land, sparsely populated and increasingly marginal for agricultural use. The land at Bright has previously been cropped but is currently not used either for cropping or grazing due to ongoing drought and consequent de-vegetation.

Batteries: The battery storage infrastructure for Stage 1 of the Project will be located adjacent to the existing Robertstown substation. The battery component for future stages is likely to be located near the planned, nearby interconnector substation (which is likely to be the point of grid connection for Stages 2+ of Goyder South). This means the battery may be split across two sites. It is also proposed that some battery storage may be included at the proposed collector substation sites should this better support the desired Project and grid support outcomes.

Collector substations: The Project will include three 'collector' substations located close to the three stages of turbine development. This includes a substation in the western portion of the project area (in the

ranges), one on the eastern side (near Worlds End Highway) and one in the south (near the Bright solar site.) Overhead transmission lines will connect these substations as described below. The footprint of the substations has been developed to accommodate the substation, switchyard, control room and maintenance shed with some additional land included to accommodate battery facilities if required. Additional land near these substations has been included to accommodate temporary construction-phase facilities.

Overhead transmission line: There will be a double-circuit 275 or 330 kiloVolt (kV) overhead transmission line connecting the three substations and then extending from the Goyder South substation to the to the grid substations initially at Robertstown and later to the New South Wales interconnector substation. It is intended that both the Goyder South Project and, later, the Goyder North Project will ultimately share this transmission line corridor and transmission infrastructure, which will avoid the unnecessary additional visual and ecological impact, cost and land use restrictions associated with two separate corridors and transmission lines.

Temporary construction facilities such as a main construction site and laydown areas will also be required.

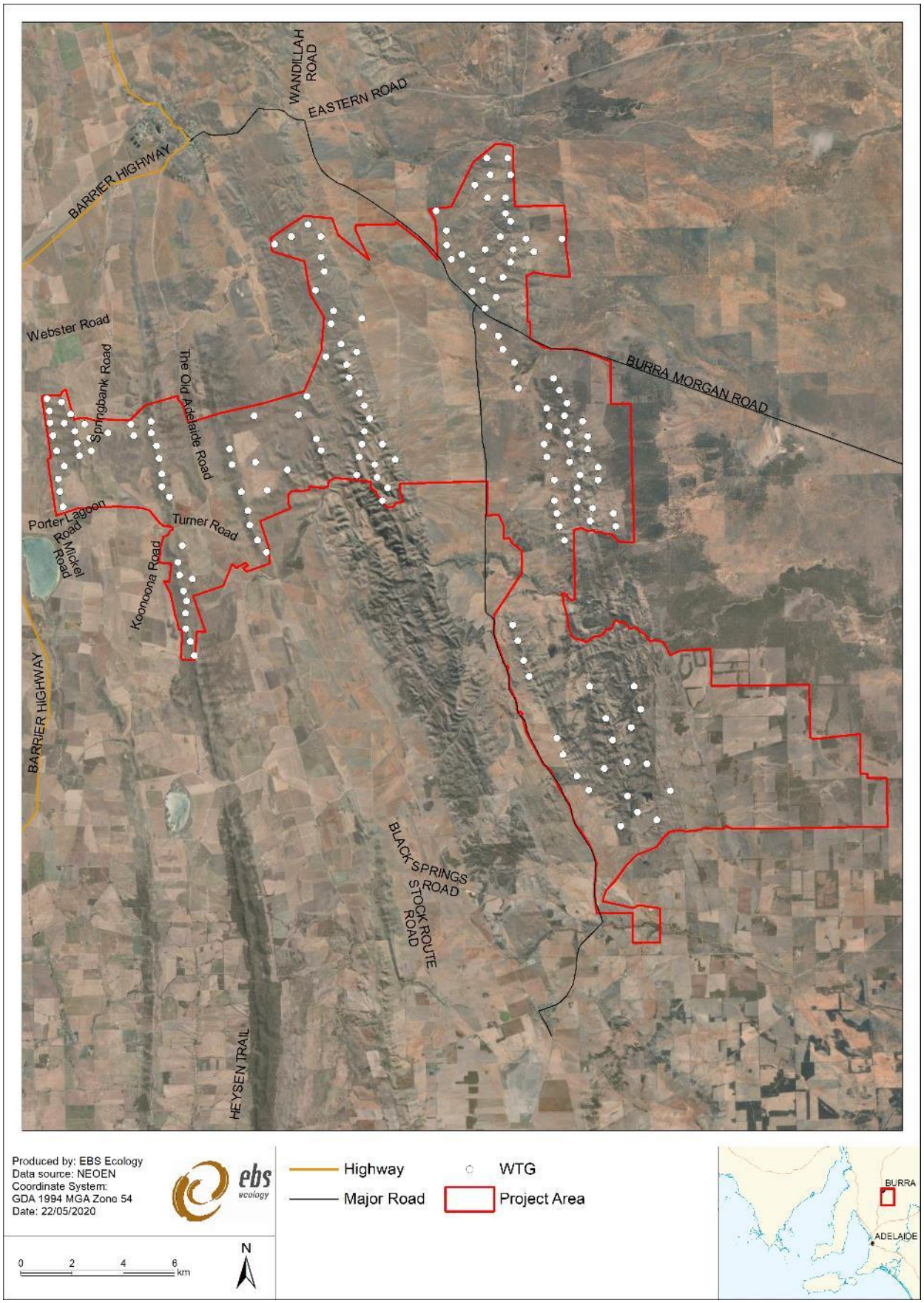


Figure 1. Location of the proposed Goyder South Hybrid Renewable Energy Facility Area.

Table 2. Goyder South project specifications (as of May 2020).

Component	Description
Wind Turbine Generators	Number – max 163 Max Height – max 240m (200m for B017, B010 and B024 near Burra) Blade length –max 80m Rotor diameter – max 165m Hub Height – max 160m Footings may be either a mass concrete footing (raft style), piled type rock anchors or a combination of both and up to 26m in diameter Crane hardstand area of 50m x 30m at base of each turbine
Solar Panels	Bifacial panels of approximately 1m x 2m Single-axis trackers (face north and tilts east to west) Mounted on framework of between 1.5 - 3m height Max tilt height 4m with up to 10m spacing between rows.
Substation - West	A fenced compound of 350 x 420m Including Substation and ancillary equipment and an Operations & Maintenance facility Access from Koonoona Road.
Substation - East	A fenced compound of 350 x 420m Including Substation and ancillary equipment and an Operations & Maintenance facility. Screen planting provided on the north, west and south boundaries. Access from Worlds End Highway.
Substation - South	A fenced compound of 150 x 420 containing the substation and ancillary equipment and another compound of 100 x 420 for the Operations & Maintenance facility. Access from Junction Road via Bright Solar Farm
Operations & Maintenance	Co-located with all three substation sites Comprising buildings (office, staff amenities), car park area, workshop and laydown area. Fenced compound of approximately 420m x 100m.
Bright Solar Farm	Up to 300MW solar (800, 000-1,000,000 panels) well-spaced (up to 10m) and mounted on single-axis trackers (to height of 1.5 – 3m). Located on approximately 1,000ha and within a chain mesh fenced compound. - Approximately 160-200 photovoltaic boxes or skids (inverters and transformers). - Underground cabling and connections (33-66kV) Internal access tracks
Worlds End Solar Farm	Up to 300MW solar (800,000-1,000,000 panels) well-spaced (up to 10m) and mounted on single-axis trackers (at height of 1.5 – 3m). Located on approximately 1,800ha and within a chain mesh fenced compound. - Approximately 160-200 photovoltaic boxes or skids (inverters and transformers). - Underground cabling and connections (33-66kV) Internal access tracks
Battery and Grid Connection (BGC) (Robertstown Substation)	Lithium-ion battery with maximum 900MW power output and energy storage of up to 1,800MWh energy storage. Developed in three stages of approximately 300MW/600MWh each. A 3.5m high fenced compound containing batteries, switchyard and associated equipment, underground cabling and overhead transmission lines. Security CCTV cameras and lighting. O&M compound. Lightning rods of up to 15m.
BGC Operations & Maintenance	Co-located with all three substation sites Comprising buildings (office, staff amenities), car park area, workshop and laydown area. Fenced compound of approximately 420m x 100m.
Transmission Lines	275kV (or 330) overhead transmission lines connecting the substations west and east with the substation south and then to the grid (initially Robertstown and later with interconnector). Transmission line lattice towers of up to 47m height with a footprint of 10m x 10m. Spaced approximately 200-300m apart.
Meteorological Masts	5 existing approved met masts (3 installed for prior Stony Gap project, 2 more approved under Council process). Likely to include additional 8-10 more met masts with a height equivalent to the hub height of the final selected turbine and including appropriate aviation safety markers. The specific locations have yet to be identified as this depends on final micro-siting of turbines.

Component	Description
Access Tracks	Access tracks will be up-to 10m wide to accommodate construction activities and cranes and designed to be of acceptable gradient for CFS vehicles Following construction these tracks will be rehabilitated and reduced to the minimum widths requested by the CFS (7m)
Underground cabling	Underground cabling for transmission (33- 66kV) and communications (fibre). Generally located adjacent access tracks and within the solar and battery facilities. Trench width approx. 500mm per circuit and depth approx. 1.2m (900mm coverage on top). Impact areas of 5m width for single cable plus 1m for additional cable

2 COMPLIANCE AND LEGISLATIVE SUMMARY

A summary of relevant Commonwealth and State environment legislation is provided below, with further detail provided in Table 3.

2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the Act as 'Matters of National Environmental Significance' (MNES).

There are nine MNES protected under the EPBC Act, two of which are of relevance to the Project Area:

- Listed threatened species and TECs; and
- Listed migratory species.

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 significant impact on a MNES without approval.

2.2 Native Vegetation Act 1991

Native vegetation within the Project Area is protected under the *Native Vegetation Act 1991* (NV Act) and *Native Vegetation Regulations 2017*. 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 net environmental benefit.

An assessment against the Native Vegetation Clearance Principles may not be required if the clearance is considered to comply with **Exemption 5(1)(d) Building or provision of infrastructure including infrastructure in the public interest** (see below). Even if this is the case, a clearance application to the NVC is still required.

Regulation 5(1) (d) Building or provision of infrastructure, including infrastructure in the Public Interest

Pursuant to Section 27(1) (b) of the Act, native vegetation may, subject to any other Act or law to the contrary, be cleared if-

(i)

(A) the clearance is incidental to the construction or expansion of a building or infrastructure, and the Minister has, by instrument in writing, declared that he or she is satisfied that the clearance is in the public interest; or

(B) the clearance is required in connection with the provision of infrastructure or services to a building or proposed building, or to any place; and

(ii) any development authorisation required by or under the *Development Act 1993* has been obtained; and

(iii) the NVC is satisfied (on the basis of information provided to the NVC by the person seeking the benefit of this paragraph and such other information as the NVC thinks fit) that, after taking into account the need to preserve biological diversity and the nature and purposes of any proposed building or infrastructure that is yet to be constructed, the proposed site of the building or infrastructure is the most suitable that is available; and

(iv) the NVC is satisfied (on the basis of information provided to the NVC by the person seeking the benefit of this paragraph and such other information as the NVC thinks fit) that there is no other practicable alternative that would involve no clearance or the clearance of less vegetation or the clearance of vegetation that is less significant or (if relevant) the clearance of vegetation that has been degraded to a greater extent than the vegetation proposed to be cleared; and

(v) the clearance is undertaken in accordance with a standard operating procedure determined or approved by the NVC for the purposes of this provision or a management plan that has been approved by the NVC, and either -

(A) there will be a significant environmental benefit on the property where the clearance is being undertaken or within the same region of the State; or

(B) either -the owner of the land (or a person acting on his or her behalf); or person connected with the construction or expansion of the building or infrastructure, or the provision of the infrastructure or services (as the case requires), has, an application to the NVC to proceed with clearing the vegetation in accordance with this provision, made a payment into the Fund of an amount considered by the NVC to be sufficient to achieve a significant environmental benefit in the manner contemplated by section 21(6) of the Act.

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. Conservation rated flora and fauna species listed on Schedules 7, 8, or 9 of the NPW Act are known to or may occur within the Project Area.

2.4 Natural Resources Management Act 2004

Under the *Natural Resources Management Act 2004* (NRM Act) landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.

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

A ‘duty of care’ is a fundamental component of this Act i.e. ensuring one’s environmental and civil obligation by taking reasonable steps to prevent land and water degradation. Persons can be prosecuted if they are considered negligent in meeting their obligations.

Table 3: Summary of relevant Commonwealth and State legislation.

Legislation	Summary	Relevance
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999	To protect 'matters of national environmental significance': Any action that has, will have or is likely to have a significant impact on a matter of national environmental significance requires Referral and approval under the EPBC Act. To determine whether an action is likely to have a significant impact on a matter of national environmental significance, refer to the Significant Impact Guidelines (Commonwealth of Australia 2013).	Where an activity may trigger requirements of the EPBC Act, this legislation must be taken into account. Significant penalties apply. The EPBC Act Significant Impact Guidelines provide overarching guidance on determining whether an action is likely to have a significant impact on a matter of national environmental significance. In terms of nationally threatened species, the guidelines define an action as likely to have a significant impact if there is a real chance or possibility that it will: • lead to a long term decrease in the population • reduce the area of occupancy of the species • fragment an existing population • adversely affect critical habitat • disrupt breeding cycles • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • result in the establishment of invasive species that are harmful to the species • introduce disease that may cause the species to decline • interfere with the recovery of the species.
State		
National Parks and Wildlife Act 1972	Allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters); provides for the protection of native flora and fauna; identifies flora and fauna species considered to be of conservation significance (under Schedules 7, 8, and 9 of the Act); and provides for the use of approved wildlife through a system of permits allowing certain actions, i.e. keeping and selling (s.58), harvesting (s.60G), farming (s.60C), hunting (s.68A), releasing (s.55) and undertaking scientific research (s.53) on/of native fauna species, and for the taking of plants (s.49).	A person must not "take" a native plant, protected animal or the eggs of a protected animal without approval (s.48A). To take a protected animal means to remove, hunt, catch, restrain, kill or injure an animal, or attempt to do so. Taking a native plant or protected animal, or the eggs of an animal carries a maximum penalty of $10 000. Potential impacts on native plants and animals should be avoided where possible, particularly conservation significant flora and fauna species listed in Schedules 7. 8 or 9 of the Act.
Native Vegetation Act 1991	An Act to preserve, enhance and manage the State's native vegetation; provide a regulatory framework to control clearance of vegetation; and provide incentives and assistance to landowners to encourage them to preserve and enhance native vegetation. The Act protects all native vegetation that naturally occurs, i.e. vegetation which has not been planted. This includes all naturally occurring local native plants, from small ground covers and native grasses to mallee scrub and tall trees. It does not cover planted trees. Under the Act, clearance is defined as: • the killing or destruction of native vegetation • the removal of native vegetation	Any clearance of native vegetation in South Australia (unless under exemption) needs approval from the Native Vegetation Council (NVC). The NVC considers applications to clear native vegetation under ten principles. Native vegetation should not be cleared if it is significantly at odds with these principles: • it contains a high level of diversity of plant species • it is an important wildlife habitat • it includes rare, vulnerable or endangered plant species • the vegetation comprises a plant community that is rare, vulnerable or endangered • it is a remnant of vegetation in an area which has been extensively cleared • it is growing in, or association with, a wetland environment • it contributes to the amenity of the area • the clearance of vegetation is likely to contribute to soil erosion, salinity, or flooding

Legislation	Summary	Relevance
	• the severing of branches, limbs, stems or trunks of native vegetation • the burning, poisoning and slashing of native vegetation • any other substantial damage to native vegetation including activities such as the draining for the reclamation of wetlands or flooding of land • grazing land where stock has been excluded for more than ten years. The Act also provides the opportunity for landholders to enter into voluntary "Heritage Agreement(s)" to ensure vegetation on private land is protected for perpetuity (s.23).	• the clearance of vegetation is likely to cause deterioration in the quality of surface or underground water • after clearance, the land is to be used for a purpose which is unsustainable. The NVC will take into account the impacts of the proposed clearance and may grant consent, refuse consent or grant consent subject to certain conditions (s.29). A net environment benefit is generally conditional on an approval being granted. Significant penalties apply if a person clears native vegetation without the permission of the NVC (s.26). The NVC can also take civil enforcement proceedings in the District Court for an order that the native vegetation be re-instated (s.31).
Natural Resources Management Act 2004	To promote and facilitate integrated and sustainable management of all natural resources (water, soil, biodiversity etc.); and to provide for arrangements to involve the community in the development and implementation of regional initiatives to improve the management of the natural resources. Key components include the establishment of regional Natural Resource Management (NRM) Boards and development of regional NRM Plans; the ability to control water use through prescription, allocations and restrictions; requirement to control pest plants and animals, and activities that might result in land degradation. A 'duty of care' is a fundamental element of this Act, i.e. ensuring one's environmental and civil obligation by taking reasonable steps to prevent land and water degradation. Persons can be prosecuted if they are considered negligent in meeting their obligations. The Project Area falls within the South Australian Murray-Darling Basin Natural Resources Management Board. Section 188(5) of the Act requires that the NRM Board must take into account any relevant provision of the regional NRM plan.	The NRM Board may appoint authorised officers to administer and enforce the Act. Authorised officers possess powers of entry, powers to give directions, powers to collect evidence and seize and remove animals and plants. An authorised officer may issue a protection order for the purpose of securing compliance with specified provisions of the Act: • breach of the general statutory duty; • breach of the duty not to damage watercourses or lakes; • failure to take action to destroy or control certain animals or plants; • failure to comply with the terms of a management agreement entered into under the Act; and • any other requirement imposed by the NRM Act or a repealed Act and which has been specified in the NRM Regulations. An owner of land who is, or is likely to be, in breach of the general statutory duty under the Act resulting or likely to result in land degradation may be required to prepare an action plan. Failure to comply with a notice requiring preparation of an action plan is an offence. An NRM authority or a State authorised officer may issue a reparation order in certain circumstances where a person has caused harm to a natural resource and repair is necessary. Enforcement action in the Environment, Resources and Development (ERD) Court can be taken if necessary.

3 BACKGROUND INFORMATION

3.1 Environmental setting

3.1.1 Interim Biographical Regionalisation of Australia (IBRA)

The Project Area is located within the Interim Biogeographical Regionalisation of Australia (IBRA) Associations of Burra Hill, Fllorieton, Hansen and Sutherlands. IBRA is a landscape-based approach to classifying the land surface across a range of environmental attributes, which is used to assess and plan for the protection of biodiversity. The Project Area also falls within the Flinders Lofty Block IBRA and Murray Darling Depression bioregion and Broughton, South Olary Plain and Murray Mallee subregions.

Woodland of South Australia (SA), Blue Gum and Peppermint Box are the dominant vegetation types of the Burra Hill IBRA Association. Other IBRA Association vegetation descriptions include:

- Low open woodland of false sandalwood and Bullock bush, chenopod shrubland of bluebush, saltbush or nitrebush, low open woodland of black oak or false sandalwood and tall woodland or River Red Gum;
- Low shrubland of samphire; and
- Open scrub of beaked red mallee and low open woodland of false sandalwood and black oak.

Landscape and remnancy descriptions are summarised in Table 4.

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

Flinders Lofty Block IBRA bioregion	
Temperate to arid Proterozoic ranges, alluvial fans and plains, and some outcropping volcanics, with the semi-arid to arid north supporting native cypress, Black Oak (belah) and mallee open woodlands, *Eremophila* and *Acacia* shrublands, and bluebush/saltbush chenopod shrublands on shallow, well-drained loams and moderately-deep, well-drained red duplex soils. The increase in rainfall to the south corresponds with an increase in low open woodlands of *Eucalyptus obliqua* and *E. baxteri* on deep lateritic soils, and *E. fasciculosa* and *E. cosmophylla* on shallower or sandy soils.	
Broughton IBRA subregion	
This subregion is characterised by a series of wide undulating intramontane basins with red duplex soils, separated by low but distinct northerly trending strike ridges. In the north the region leads into the Southern Flinders Ranges with no sharply defined landform boundary but a land use boundary marking the northern extremity of wheat cultivation. Due to widespread clearing for farming the only significant remnant of native vegetation is found in the Mount (Mt) Remarkable area, where an open forest dominated by *Eucalyptus cladocalyx* or by *E. goniocalyx* and *E. leucoxylon* on reddish dense loams remains. Degraded remnants of *E. leucoxylon* and *E. odorata* woodlands can still be found on stony crests and steep slopes.	
Remnant vegetation	Approximately 106330 ha of the subregion is mapped as remnant native vegetation, of which 3064 ha is formally conserved.
Landform	Hills and valleys; alternating subparallel hilly ridges and valleys with a general N-S trend in north. In south, hilly dissected tableland.
Geology	Dissected lateritized surface in south.
Soil	Hard setting loams with red clayey subsoils, highly calcareous loamy earths, hard setting loams with mottled yellow clayey subsoil, coherent sandy soils, cracking clays.

Vegetation	Assumed native vegetation cover.
Conservation significance	55 species of threatened fauna, 113 species of threatened flora. 0 wetlands of national significance.
Burra Hill IBRA environmental association	
Remnant vegetation	Approximately 32624 ha of the association is mapped as remnant native vegetation, of which 1786 ha is formally conserved.
Landform	Steep strike ridge on metasediments with dissected footslopes.
Geology	Metasediments and alluvium.
Soil	Reddish powdery calcareous loams, hard pedal red duplex soils and reddish calcareous earths.
Vegetation	Woodland of SA Blue Gum and Peppermint Box and woodland of SA Blue Gum.
Conservation significance	20 species of threatened fauna, 54 species of threatened flora. 0 wetlands of national significance.
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 Acacia spp., mallee shrublands and heathlands and savanna woodlands.	
Murray Mallee IBRA subregion	
Extensive calcreted plains overlain by a series of sand dunes. The calcreted ridges which form the undulating plain have a distinct west-north-westerly trend. The soils are shallow reddish sands on the plains and deep yellowish sands on the dunes. Fans bordering the Mt Lofty Ranges with low isolated hills rising above them have red duplex soils and calcareous earths subject to sheet erosion. Mallee is the dominant vegetation of the subregion. Its species composition reflects the diminishing coastal influence towards the north, especially in the understorey: broombush gives way here to saltbush and bluebush (*Atriplex* and *Maireana* spp.) and hummock grass (*Triodia irritans*). Blue Gum (*E. leucoxylon*) and Peppermint Box (*E. odorata*) are characteristic species in the west of the region. Although tracts of mallee still occur, most of the original vegetation has been cleared for agriculture.	
Remnant vegetation	Approximately 444401 ha of the subregion is mapped as remnant native vegetation, of which 76180 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	101 species of threatened fauna, 136 species of threatened flora. 9 wetlands of national significance.
Sutherlands IBRA environmental association	
Remnant vegetation	Approximately 32682 ha of the association is mapped as remnant native vegetation, of which 159 ha is formally conserved.
Landform	Undulating plain comprising easterly sloping fans and pediments, dissected by streams rising in the Mt Lofty Ranges.

Geology	Colluvium, siltstone, sandstone and alluvium.
Soil	Red calcareous earths and brown siliceous sands.
Vegetation	Open scrub of Beaked Red Mallee and low open woodland of False Sandalwood and Black Oak.
Conservation significance	18 species of threatened fauna, 5 species of threatened flora. 0 wetlands of national significance.

3.1.2 Administrative boundaries

The Project Area is distributed within the Goyder Local Government Area (LGA) boundaries, the Hundreds of Kooringa, Apoinga, Baldina and Bright, and the South Australian Murray-Darling Basin and Northern and Yorke NRM Regions.

3.1.3 Climate

Climate data was sourced from the Eudunda Weather Station (site number: 024511), located approximately 40 km south of the southern boundary of the Project Area. The area surrounding Burra reaches relatively hot maximum temperatures in summer, with mean maximum temperatures highest in January (29.4 degrees) and February (29.1 degrees). The wettest months are August (55.6 millimetres (mm)), June (51.8 mm) and July (51.2 mm) (Commonwealth of Australia 2019) (Figure 2).

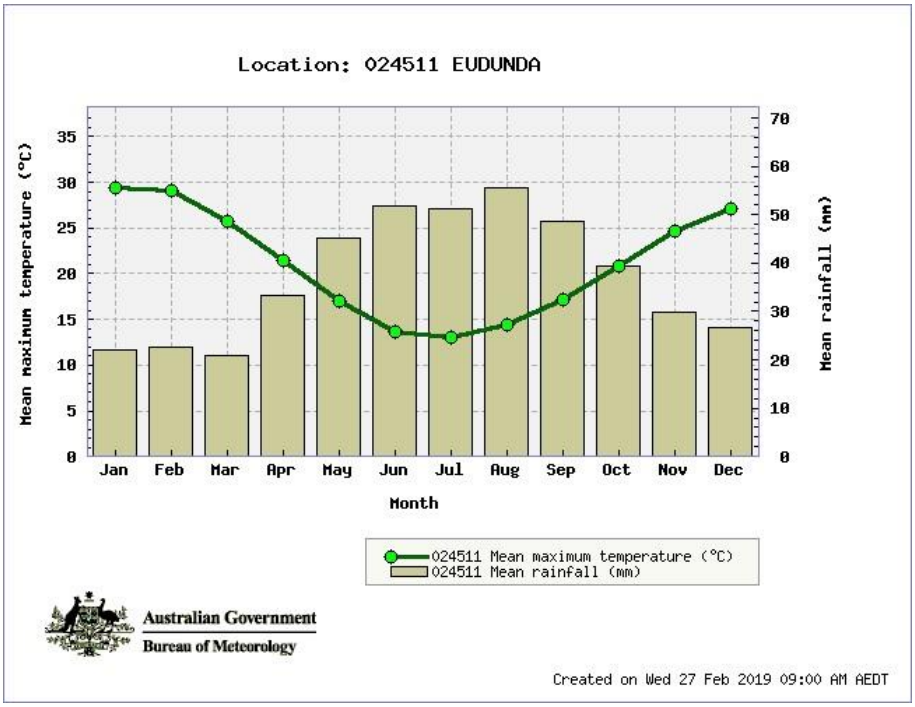


Figure 2. Mean maximum monthly temperatures and mean monthly rainfall recorded at Eudunda Weather Station (site number: 024511) from 1965 to 2019.

3.1.4 DEW Vegetation Mapping

Remnant vegetation has been mapped by the Department for Environment and Water (DEW) as part of the Native Vegetation Information System (NVIS) floristic analysis and mapping project. The NVIS mapping is based on interpretation of aerial photography or Landsat imagery and floristic data derived from Biological Survey of SA vegetation sites or field trips. Given the NVIS mapping is largely derived from remote assessment, it can be inaccurate. As part of the initial ecological assessment field work, EBS has verified previously mapped vegetation data.

NatureMaps was used to determine the broad vegetation types that had previously been mapped within the Project Area (DEW 2019). A total of 21 broad vegetation types were mapped within the Project Area (Table 5 and Figure 3):

- *Eucalyptus* mallee forest and mallee woodland (plains, hills, sand to clay loam) - dominant vegetation type within the Project Area;
- Rushland / Sedgeland (hill footslopes, crests) - significant coverage within the Project Area;
- Tussock grassland (varied) – significant coverage within the Project Area;
- Shrubland <1 m - small coverage across the Project Area; and
- *Callitris* forest and woodland (plains and hillslope) - small coverage across the Project Area.

The environmental description, dominant plant species, and hectares ha)for each vegetation type are detailed within Table 5. It should be noted that the broad vegetation types previously mapped by DEW (2019), do not equal the total number of hectares estimated for the Project Area, as not all of the Project Area has been previously mapped (Figure 3).

Table 5. Vegetation types, previously mapped by DEW, within the Project Area.

Vegetation type	Environmental description	Vegetation description	Area (ha) within Project Area
Eucalyptus mallee forest and mallee woodland	Plains, Hills, Dunes and Swales; Sand to Clay loam; Loamy	*Eucalyptus brachycalyx, +/- Eucalyptus oleosa ssp. ampliata, +/- Eucalyptus gracilis* mid mallee woodland over *Enchylaena tomentosa var. tomentosa, Atriplex vesicaria ssp., Sclerolaena diacantha, Maireana pyramidata* shrubs	3514.9
Rushland/ sedgeland	Hill footslope/ crest/slope and Ridge; Sandy loam to Clay; Clayey	*Lomandra multiflora ssp. dura, Austrostipa blackii, Aristida behriana, Austrodanthonia caespitosa, Austrostipa nitida* low open tussock grassland over *Vittadinia gracilis, Vittadinia cuneata var. cuneata forma cuneata, Maireana enchylaenoides*	2557.4
Tussock grassland	Varied	Emergent +/- *Alectryon oleifolius ssp. canescens, +/- Myoporum platycarpum ssp.* low open woodland over emergent +/- *Maireana pyramidata over Enneapogon avenaceus, Carrichtera annua, Sclerolaena obliquicuspis, Sclerolaena diacantha, Enneapogon intermedius*	1521.5
Chenopod shrubland	Stream channels and Valleys; Alluvial flood plains; along water courses	Emergent *Acacia victoriae ssp.* mid sparse shrubland over *Maireana pyramidata, Rhagodia spinescens, Atriplex vesicaria ssp., Maireana astrotricha* low open shrubland over *Tetragonia eremaea/tetragonoides, Enneapogon avenaceus, Calotis hispidula*	800.4
Eucalyptus mallee forest and mallee woodland	Swales and Sand plain; Loam	*Eucalyptus gracilis, Eucalyptus oleosa ssp. oleosa, Eucalyptus socialis ssp., +/- Eucalyptus dumosa* mid mallee woodland over *Enchylaena tomentosa var.,*	763.6

Vegetation type	Environmental description	Vegetation description	Area (ha) within Project Area
		Senna artemisioides ssp., Senna artemisioides ssp. petiolaris (NC), Grevillea huegelii, Olearia muelleri	
Eucalyptus forest and woodland	Hill footslope/ slope and Plain; Sand to Clay; Loamy	*Eucalyptus odorata*, +/- *Eucalyptus leucoxylon ssp.*, +/- *Callitris glaucophylla* low woodland over *Austrodanthonia caespitosa*, *Austrostipa scabra ssp., Austrostipa nitida, Elymus scaber var. scaber*, +/- *Austrostipa eremophila* tussock grasses	599.9
Allocasuarina forest and woodland	Ridge and Hill slope; Sandy loam to Sandy clay loam; Loamy	*Allocasuarina verticillata* low open woodland over +/- *Xanthorrhoea quadrangulata, +/-Bursaria spinosa ssp. spinosa, +/- Acacia pycnantha* shrubs over *Lomandra densiflora, Astroloma humifusum, Dianella revoluta var., Pultenaea largiflorens, Hibbertia exutiacies*	449.6
Chenopod shrubland	Hill footslopes Stony rises with shales and ironstone	*Maireana sedifolia*, *Maireana pyramidata* low open shrubland over *Sclerolaena obliquicuspis*, *Eriochiton sclerolaenoides*, *Carrichtera annua, Austrostipa scabra ssp., Rhodanthe pygmaea*	381.0
Eucalyptus forest and woodland	Hill slope/footslope /crest and Plain; Sandy loam to Clay loam; Loamy	*Eucalyptus leucoxylon ssp., +/- Eucalyptus odorata, +/- Amyema miquelii* mid woodland over *Acacia pycnantha, Acacia paradoxa* shrubs over *Acaena echinata* forbs	257.6
Rushland/ sedgeland	Unknown	*Lomandra multiflora ssp. dura, Lomandra effusa* low sedgeland	151.1
Tussock grassland	Unknown	*Themeda triandra, +/- Lomandra effusa, +/- Lomandra multiflora ssp., +/- Austrostipa blackii* low tussock grassland	118.8
Eucalyptus mallee forest and mallee woodland	Plains, Hills and Dunes; Sand to Clay; Loamy	*+/- Eucalyptus gracilis, Eucalyptus socialis ssp.* mid mallee woodland over *Pittosporum angustifolium* shrubs over *Enchylaena tomentosa var. tomentosa, Rhagodia parabolica, Austrostipa nitida, +/- Austrostipa eremophila* shrubs	74.8
Rushland/ sedgeland	Stream channel and Swamp; Loamy sand to Clay; Loamy and Clayey; Watercourse and swamps	Emergent *Eucalyptus camaldulensis var.* trees over *Juncus kraussii, Cyperus gymnocaulos, Phragmites australis, Typha domingensis* tall sedgeland over *Samolus repens*	43.7
Eucalyptus mallee forest and mallee woodland	Ridges and Hill slopes	*Eucalyptus porosa* mid mallee woodland over *Cassinia laevis, Rhagodia parabolica, Olearia decurrens, Enchylaena tomentosa var.* low open shrubland over *Chrysocephalum semipapposum, Solanum petrophilum, Atriplex stipitata*	41.1
Eucalyptus forest and woodland	Stream channels; Along major watercourses	*Eucalyptus camaldulensis var., +/- Eucalyptus largiflorens* low woodland over *Acacia victoriae ssp.* mid sparse shrubland over *Maireana pyramidata, Rhagodia spinescens, Enchylaena tomentosa var.* low sparse shrubland over *Brassica tournefortii*	40.2
Rushland/ sedgeland	Unknown	*Lomandra sp.* low sedgeland	11.4
Shrubland <1m	Unknown	*Acrotriche patula* low open shrubland	9.3
Tussock grassland	Unknown	*+/- Themeda triandra, +/- Danthonia sp., +/- Lomandra sp., +/- Poa sp., +/-Austrostipa sp.* mid closed tussock grassland	9.3
Callitris forest and woodland	Plains and Hill slope; Sand to Clay loam; Sandy and Loamy soils	*Callitris gracilis* low open woodland over *Austrostipa sp., Enchylaena tomentosa var. tomentosa, Senecio pinnatifolius, Einadia nutans ssp., +/- Danthonia sp.* tussock grasses	4.0
Tussock grassland	Hill crest/slope; Sandy loam to Clay loam; Loamy	Emergent *Bursaria spinosa ssp. spinosa, Allocasuarina verticillata* shrubs over *Lepidosperma viscidum, Austrostipa blackii, Cryptandra sp. Long*	3.1

Vegetation type	Environmental description	Vegetation description	Area (ha) within Project Area
		hypanthium (C.R. Alcock 10626), Lomandra multiflora ssp. low tussock grassland	
Eucalyptus forest and woodland	Plains, Flats, Depressions, Gully and Hill slopes; Sand to Clay loam; Loamy; Drainage depressions	*Eucalyptus camaldulensis var., +/- Callitris glaucophylla* mid woodland over *Lycium ferocissimum, Bursaria spinosa ssp. spinosa* shrubs over *Cyperus vaginatus, Marrubium vulgare, Lomandra multiflora ssp.* dura forbs	2.2
		TOTAL	**11,354.9**

3.1.5 Protected areas

The Hopkins Creek Conservation Park (CP) which is 514.7985 ha in size, is situated just outside of the Project Area, towards the southern extent (Figure 4). It conserves important riparian and flood plain habitats for Hopkins and Reed creeks. Habitats within the park include River Red Gum with various springs along the creeks, Native Pine woodland, Red Mallee and Drooping Sheoak open woodland as well as hummock grassland with scattered shrubs (DEWNR 2011).

Two other conservation parks, Mimbara CP and Red Banks CP, border the south-eastern and northern corners (respectively) of the Project Area (Figure 4).

Burra Creek Gorge Reserve holds ecological significance for the local area; River Red Gums (*Eucalyptus camaldulensis*) feature along the Burra Creek and provide important habitat for birds and other wildlife. This location is also the middle section of the Heysen Trail. World's End Gorge is an area rich in biodiversity, with mallee scrubland, peppermint grassy woodland and tussock grassland communities present within the Gorge. Both gorges are shown in Figure 4. Neoen has committed to implementing a 3 km buffer from Burra Creek Gorge campground to the nearest proposed wind turbine.

Heritage Agreements

Eight Heritage Agreements have been listed as part of the Protected Matters Search Tool results – summarised under States and Reserves (see Section 4.1.1 below). Out of the eight agreements, four are listed below, based on their proximity to the Project Area (Table 6, Figure 4).

A Heritage Agreement is a conservation area on private land, which is established by agreement (or contract) between a landholder and the Minister for Sustainability, Environment and Conservation, under the *Native Vegetation Act 1991.* Agreements are ongoing or perpetual and are binding on future landholders. Even if the property is sold or ownership is transferred, the conservation status of the land under agreement will continue. Native plants and animals within the specified Heritage Agreement area must be protected from the time the agreement is made. It is the responsibility of the landholder to conduct weed and feral animal control and they must abide by relevant legislation such as the NRM Act. If an activity could adversely impact native flora and/or fauna in a Heritage Agreement area, then the Minister will need to grant approval before it can be performed. Furthermore, the planting of vegetation, regardless of whether it is native or exotic, requires Ministerial approval. The Minister is likely to grant approval if an activity is to provide a net benefit for the conservation of the area.

Table 6. Heritage Agreements relevant to the Project Area.

Heritage Agreement ID #	DEW File Number	Date	Area (ha)	Location within Project Area
HA 1294	2003/1047	24/09/2004	415.49	Far southern extent
HA 1520	2009/1015	3/05/2012	482.96	Southern extent (three polygons)
HA 1221	1999/1006	6/06/2001	16.87	Far northern extent
HA 958	1992/1137	25/11/1993	67.63	Far southern extent

Source: NatureMaps *Heritage Agreements* layer (DEW 2019).

Significant Environmental Benefit areas

There are five Significant Environmental Benefit (SEB) areas located within close proximity to the Project Area, and one which is located within the Project Area. These are summarised in Table 7 and shown in Figure 4. An SEB is an action that results in a positive impact on the environment that is over and above the negative impact of the clearance of native vegetation and can be achieved through the establishment (revegetation), management and/or protection of an area of native vegetation (DEWNR 2016). Achieving an SEB is a condition of approval or consent for the clearance of native vegetation.

Table 7. Significant Environmental Benefit areas surrounding the Project Area.

SEB Reference Number	Area (ha)
2008_3088	6.3312
2007_3069	0.4553
2013_2024	2.6188
2014_3052	116.9599
2013_2016	4.3844
1997_2140	2.2636

Source: NatureMaps *Significant Environment Benefit Areas* layer (DEW 2019).

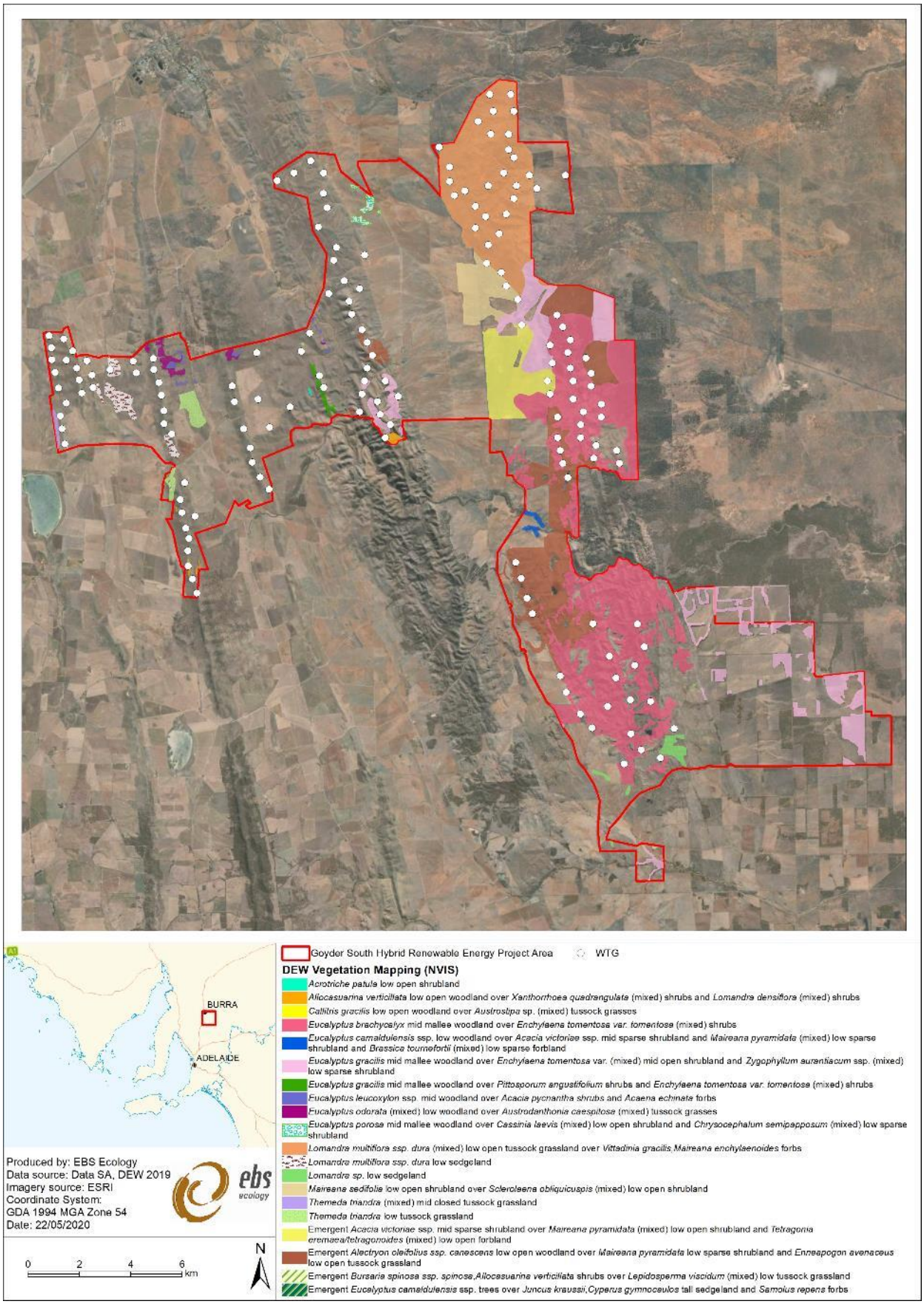


Figure 3. Remnant vegetation mapped by the Department for Environment and Water (DEW) within the Project Area.

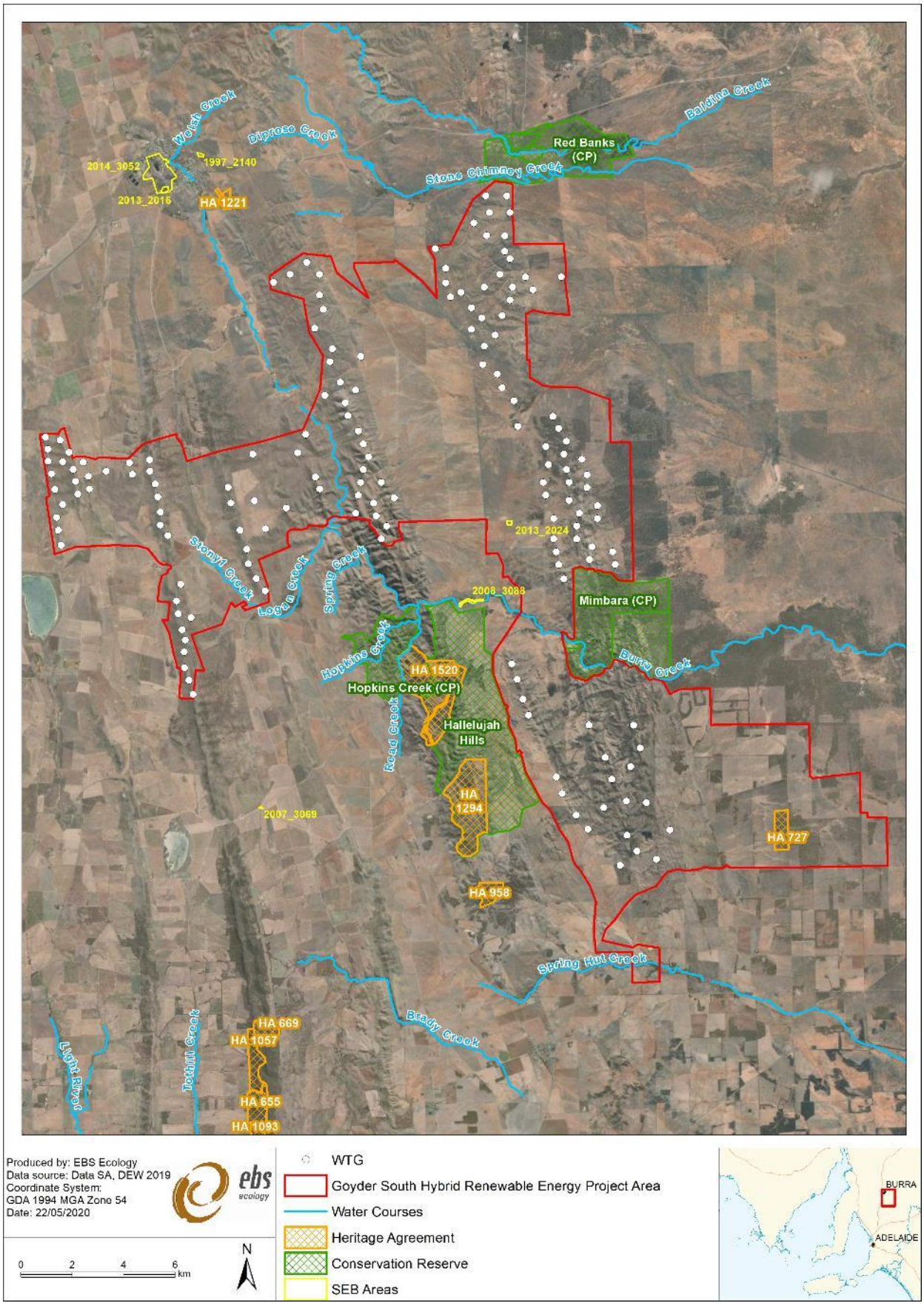


Figure 4. Protected areas, Heritage Agreements, SEB areas and watercourses highlighted within the Project Area.

4 METHODS

4.1 Desktop assessment

A desktop assessment was conducted to determine the potential for any threatened and protected species (both Commonwealth and State listed) to occur within the Project Area. This was achieved by undertaking database searches using a 20 km buffer from the centre point of the Project Area (Figure 9, Figure 10 and Figure 11).

4.1.1 Protected Matters Search Tool (PMST) EPBC Act

A Protected Matters Search Tool (PMST) report was generated on 10 January 2019 to identify matters of national environmental significance under the EPBC Act relevant to the Project Area (DotEE 2019). The PMST is maintained by the Department of Agriculture, Water and Environment (DAWE) 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.

4.1.2 Biological Database of South Australia (BDBSA) NPW Act

An extraction from the BDBSA was obtained to identify flora and fauna species that have been recorded within 20 km of the Project Area (DEW 2019) (accessed 21/01/2019, record set number *DEWNRBDBSA190121-1*). The BDBSA is comprised of an integrated collection of species records from the South Australian Museum, conservation organisations, private consultancy companies, Birds SA, Birdlife Australia and the Australasian Wader Study Group, which meet DEW standards for data quality, integrity and maintenance.

Threatened species (both Commonwealth and State listed), highlighted within 20 km of the Project Area, are summarised within Section 5. The complete BDBSA search results for both flora and fauna are summarised in Appendix 1 and Appendix 2 and include all species recorded within the region (threatened and common), to the buffer of 20 km.

4.1.3 Assessment of the likelihood of occurrence

An assessment to determine the likelihood of occurrence for threatened species and ecosystems within the Project Area was conducted. Each of the threatened species and ecosystems identified by the BDBSA data extract were assigned a rating (highly likely, likely, possible and unlikely), which described their likelihood of occurrence with the Project Area. The following criteria were considered when assigned a likelihood rating:

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

- Knowledge of the species; habitat preferences, causes of its decline, the conspicuousness of the species and local population trends.

A summary of the likelihood criteria is shown below in Table 8.

Table 8. Likelihood rating and criteria for the presence of threatened species.

Likelihood	Criteria
Highly Likely/Known	• Records in the last 10 years, the species does not have highly specific niche requirements, the habitat is largely intact and falls within the known range of the species distribution. • The species was recorded as part of project surveys.
Likely	• Records within the previous 20 years, the area falls within the known distribution of the species and the area provides species habitat which is largely intact.
Possible	• Records within the previous 20 years, the area falls inside the known distribution of the species, but the area does not provide species habitat which is largely intact. • Records within 20 -40 years, survey effort is considered adequate, habitat is present and intact, and species of similar habitat needs have been recorded in the area.
Unlikely	• Records within 20 -40 years, however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. • No records within the previous 40 years despite suitable habitat being known to occur in the area. • No records despite adequate survey effort.

4.1.4 Limitations

Flora and fauna records were sourced from the BDBSA. The BDBSA only includes verified flora and fauna records submitted to DEW or partner organisations. It is recognised that knowledge is poorly captured, and it is possible that threatened species occur that are not reflected by database records. Although much of the BDBSA data have been through a variety of validation processes, the lists may contain errors and should be used with caution. DEW gives no warranty that the data are accurate or fit for any particular purpose of the user or any person to whom the user discloses the information.

BDBSA flora and fauna records were limited to a 20 km buffer around the Project Area. The reliability of the BDBSA data ranges from 100 m to over 100 km. Fauna species, in particular birds, can traverse distances more than the 20 km search buffer, and therefore, additional species may occur. It is also acknowledged that the presence of species may not be adequately represented by database records. Hence, the BDBSA results that have been clipped to a 20 km buffer of the Project Area may not highlight all potential threatened flora and fauna species that may occur in the Project Area.

The findings and conclusions expressed by EBS are based solely upon information in existence at the time of the assessment.

4.2 Field survey

Field surveys were undertaken between 25 March and 11 April (autumn), and 2 and 5 September (spring), 2019. The initial field work in autumn was aimed at surveying for the following:

- Pockets of native vegetation, targeting *Lomandra* sp. (Iron-grass) Grassland and *Eucalyptus odorata* (Peppermint Box) Woodland to determine whether both associations qualified as a TEC;
- Presence of threatened flora and fauna species;

- Presence of PBTL including mapping any individuals recorded as well as potential habitat; and
- Presence of targeted avifauna such as birds and bats. General fauna was also recorded during the autumn survey including mapping Southern Hairy-nosed Wombat sightings and burrows.

The spring survey targeted all the above but was also undertaken to conduct bird surveys at a selection of point count sites established during the autumn survey to detect migratory and hard-to-detect species at these sites. Additional point count sites were also established in spring where access was previously not permitted. Spring surveys also helped to confirm if any of the WTE nests recorded in autumn were active.

4.2.1 Flora

The flora surveys undertaken within the Project Area were undertaken in line with the Clean Energy Council (CEC) *Best Practice Guidelines* (CEC 2018). Flora studies should be used to document the flora species that occur on site and identify significant species, in conjunction with vegetation mapping (which is best done in spring when most flowering plants are in flower). According to the CEC guidelines, vegetation mapping will record all flora species from within representative plots for each stratum, their height and cover, which is used to identify dominant species within the vegetation community which can then be related to a vegetation mapping unit (CEC 2018).

Threatened ecological community survey

Targeted surveys were undertaken in areas of *Eucalyptus odorata* (Peppermint Box) and *Lomandra* sp. (Iron-grass) to determine if the areas qualified as threatened ecological communities under the EPBC Act.

In areas where both species may qualify as TEC, surveys typically follow the criteria outlined in the *EPBC Act Policy Statement 3.7: Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia* (DEWR 2007).

Species diversity totals are typically obtained using a 50 x 50 m quadrat for each representative area, to measure the extent of Lomandra grassland patches and Peppermint Box Woodland. All species observed within the quadrats are then typically recorded with totals compared against the benchmark criteria outlined in the EPBC Act Policy Statement (DEWR 2007).

Areas of Condition Class A are considered the highest quality representation of the community. Condition Class B areas are also of high quality, but do not have the native species diversity of Condition Class A. Classes A and B are indicative of the listed ecological community. Condition Class C areas are typically significantly degraded (low condition), are not included as the listed ecological community and therefore do not trigger the 'significant test' of the EPBC Act. Condition Class C areas are still considered to be amenable to rehabilitation through measures such as weed control, natural regeneration and protection from grazing.

Vegetation survey

The general vegetation survey focused on validating and building on from the broad DEWNR floristic mapping, to obtain a greater understanding of the vegetation communities within the Project Area. This involved surveying all areas of native vegetation and recording the following:

- Location of vegetation associations;

- Species list for each vegetation association;
- Location and extent of declared and serious environmental weed species;
- Flora species of conservation significance; and
- Ecological communities of conservation significance.

During both autumn and spring 2019 surveys, VAs were broadly mapped over the Project Area, according to the dominant overstorey species present. The dominant flora species within each vegetation stratum (overstorey, midstorey and understorey) were recorded as well as the presence of threatened species and declared or significant weed species.

Given the size of the Project Area, the scope to broadly map vegetation associations, and the need for detailed vegetation assessments in the future, not all flora species within the Project Area were recorded. Once the design layout is final including wind turbine placement and associated infrastructure, a specific vegetation assessment based on the Bushland Assessment Methodology (BAM) (NVC 2017) will need to be undertaken across the Project Area. The BAM is endorsed by the Native Vegetation Council and used to assess areas of native vegetation requiring clearance and calculate the SEB requirements for the Project.

During this future detailed vegetation assessment, areas that were not previously surveyed by EBS (Figure 12), largely due to land acquisition constraints, will also be assessed.

4.2.2 Fauna

The fauna surveys undertaken within the Project Area were undertaken in line with CEC *Best Practice Guidelines* (CEC 2018). According to the guidelines, the aim of the fauna habitat survey should be aimed at identifying important habitat components that are on site including:

- Vegetation communities that support a particular suite of fauna e.g. native grassland species and specific fauna species e.g. PBTL;
- Trees with hollows which provide shelter sites for arboreal mammals, nest sites for birds and roost/maternity sites for bats; and
- Lakes, dams, ponds and streams that may provide habitat for waterbirds and frogs.

General fauna

All native and exotic fauna species encountered (directly observed, or tracks, scats, burrows, nests and other signs of presence) during both the autumn and spring 2019 surveys were recorded. Potential fauna refuge sites, such as hollows, rock crevices and creeklines were noted as an indication of availability of suitable habitat. Particular attention was paid to identifying habitat for threatened species. For each fauna opportunistic observation, the species, number of individuals, GPS location, detection methodology (sight, sound or sign) and habitat were recorded.

Pygmy Blue-tongue Lizards

The habitats present within the Project Area were assessed for suitability for the Nationally Endangered PBTL. PBTL surveys were undertaken to assess and categorise suitable habitat as likely, possible or

unlikely PBTL habitat. The habitat assessment was based on the habitat attributes outlined in Table 9 and direct observations of PBTLs made during both the autumn and spring 2019 surveys. Rocky, very steep and cropping areas, and areas lacking spider burrows were considered unlikely to contain PBTLs as these are unsuitable PBTL habitat attributes (Table 9).

Table 9. Suitable and unsuitable PBTL habitat attributes.

Suitable PBTL habitat attributes	Spider burrows within native grasslands with or without an exotic component. PBTLs have also been detected in highly modified treeless grasslands.
	Soil of heavy sandy loam (red-brown earth).
	Footslopes of hills.
	Sheltered areas of footslopes.
Unsuitable PBTL habitat attributes	Areas that been previously cropped.
	Areas lacking spider burrows.
	Areas containing dense ground cover vegetation.
	Steep terrain and exposed ridgelines.
	Overly rocky areas.

Given the large amount of potential PBTL habitat i.e. native grassland areas (with or without an exotic plant component) with hard packed soils (Milne 1999) within the Project Area, two EBS staff inspected spider holes along 59 transects within potential habitat throughout the Project Area (Figure 5). Out of the 59 transects, 52 were recorded in autumn 2019 and seven during the spring 2019 survey (Figure 6).

Vertical spider holes were inspected using a videoscope (Figure 7), which has an illuminated articulating insertion probe approximately 8 mm in diameter, and a digital video display screen (Yateks M-Series). The survey method was consistent with the *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DSEWPC 2011).

Birds

The bird surveys undertaken within the Project Area were undertaken in line with the CEC *Best Practice Guidelines* (CEC 2018). As part of the guidelines, bird utilisation surveys should aim to identify the avian species on site, the numbers present, and the height that birds fly, and describe utilisation across the site (CEC 2018). The surveys should be conducted during relevant seasons (for the species being studied and the location of the site) and should be aimed at sampling different relevant habitats on site.

Targeted bird surveys were conducted using point counts. A total of 25 point count sites were visited across the autumn and spring 2019 surveys (Figure 8). Ten sites were surveyed only in autumn 2019, ten sites were surveyed only in spring 2019 and five sites were surveyed across both survey periods.

The site selection process for point counts aimed to ensure an even spread across the Project Area and within the different vegetation associations, while also expending greater search effort within areas with a higher potential for threatened species to occur. The 5 ha/30-minute point count methodology was used,

whereby, an observer records all birds heard or observed within a 30-minute period in a 5 ha search area. Surveys were not conducted if weather conditions were windy or rainy.

Data collected for each point count observation were as follows:

- Species observed;
- Number of individuals;
- Height above ground (m) (minimum and maximum);
- Distance from observed (m);
- Behaviour:
    - Flying in a single direction – FLM;
    - Flying (hovering or circling) over or around a single point – FLH;
    - Foraging (feeding) on ground – FOG;
    - Perching/resting/walking on ground – ROG;
    - Perching/resting/climbing on trees or shrubs – ROT; and
- Direction of flight where possible.

If birds were heard or observed outside the search area, they were recorded as opportunistic observations. Bird activity (e.g. flying overhead, flying over circling, resting or foraging on tree/shrub/ground), number of individuals and any other notable observations were recorded. An additional survey was conducted at Porter's Lagoon (approximately 2 km west of the Project Area), which was inundated during spring, to check for migratory wader species that were identified in the desktop assessment and which could potentially be impacted by the proposed development.

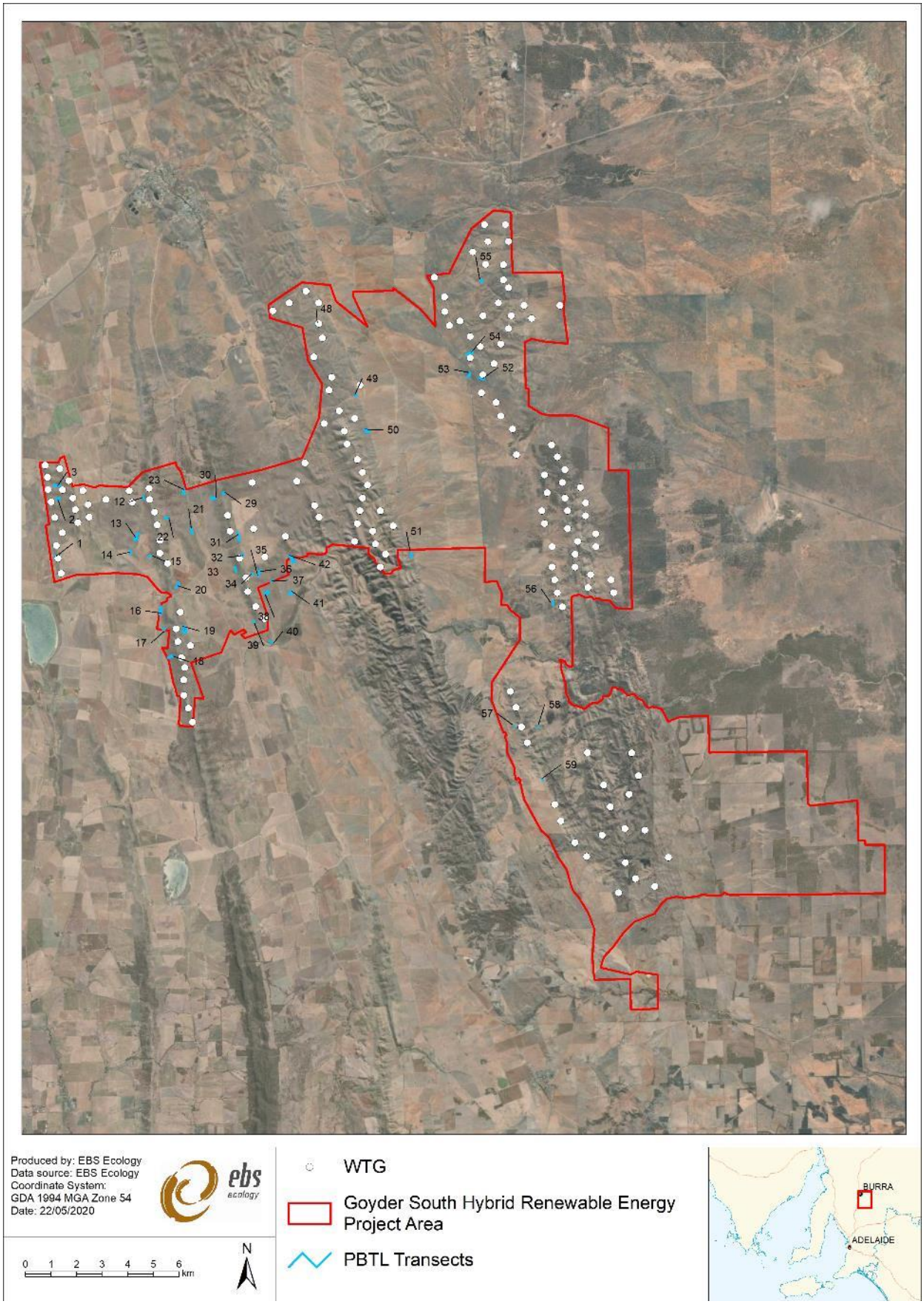


Figure 5. Locations of the PBTL transects over the Project Area (transect numbers are not sequential as the Project boundary has changed since survey work was completed).

Figure 6. Individual PBTL recorded within the Project Area.

Figure 7. Vertical spider holes inspected using videoscope.

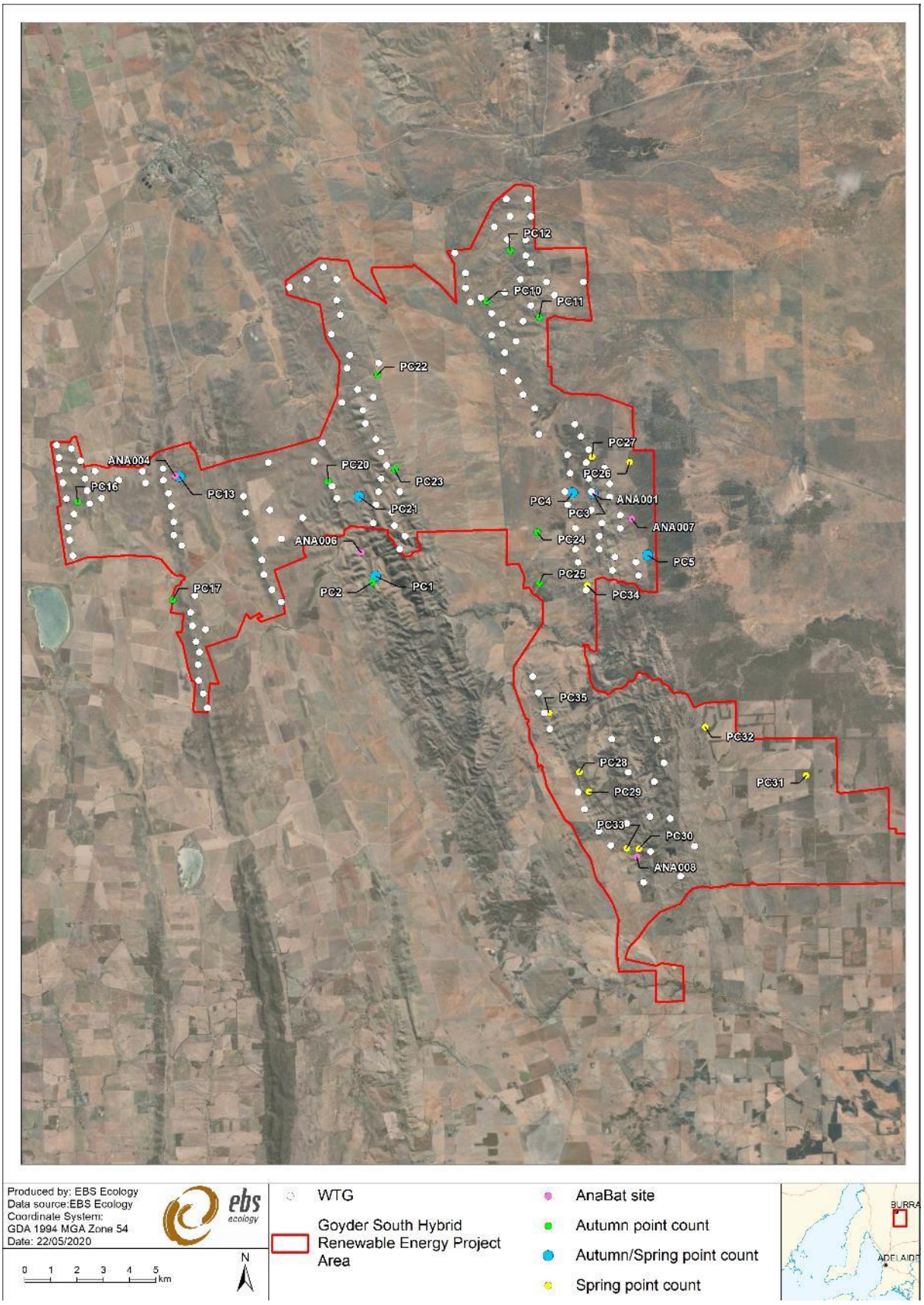


Figure 8. Location of point count sites (bird survey) and AnaBat sites (bat survey) across the Project Area (bird and bat survey sites are not sequential as the Project boundary has changed since survey was completed).

Raptor nests

Woodland areas were assessed for potential nesting locations of the State rare Peregrine Falcon (*Falco peregrinus*) and at-risk species WTE during both the autumn and spring 2019 surveys. The spring 2019 survey also revisited known WTE nest locations to determine their breeding status. To determine the condition and activity of each nest, the following data was recorded:

- Location (gully, slope, hill crest, plain);
- Nest height (measured in m, from the ground to the bottom of the nest);
- Nest depth (measured in cm, from the bottom of the nest to the rim of the nest);
- Nest diameter (measured in m, distance around the outer rim of the nest);
- Size of nest:
    - Small (<60 cm depth, <1.2 m diameter);
    - Medium (60 - 100 cm deep, 1.2 m – 1.5 m diameter);
    - Large (>1 m deep, >1.5 m diameter);
- Whether the nest was intact or dilapidated;
- Activity (not active, possible, in-active);
- Whether whitewash (areas covered in droppings) and nesting material (e.g. fresh branches and/or leaves) was present or absent;
- Nest condition (visually determined to be either poor, moderate or good); and
- Species of raptor on or located near the nest.

Bats

The bat surveys undertaken within the Project Area were undertaken in line with CEC *Best Practice Guidelines* (CEC 2018). Field surveys can determine which bat species use the site and includes those species that breed and roost on the site and those that do not live on the site but forage and/or move across the site. Bat detection systems can be used to record and analyse the echolocation calls of bats. Bat utilisation data cannot be obtained using this technique, as it is only useful for species identification and to gain an appreciation of populations (CEC 2018).

AnaBat units (Titley Electronics, Ballina New South Wales) were used to record bat ultrasonic echolocation calls. AnaBat detectors were set up at four sites for four nights across the survey periods (Figure 8). Since the initial field assessment work was completed, the Project boundary has changed and out of the original eight sites that were visited, five remain current.

The AnaBats were placed in areas thought to be of suitable habitat for bats or that bats may frequent when feeding. Woodland areas seen to contain hollows for roosting and ‘fly-way’ tunnels through the canopy, as well as a wetland area, were targeted for bat call activity.

Recorded bat echolocation calls were viewed as sonograms and analysed using AnalookW software. The unique pulse rates and frequency characteristics of bat calls were viewed and compared with reference

calls of known species to identify the calls to species level where possible. Species identifications were only made if certain of the call identification.

4.3 Limitations

The findings and conclusions expressed by EBS are based solely upon information in existence at the time of the assessment.

Due to the large size and landform of the Project Area, not all vegetation patches could be searched; instead, a representative sample was surveyed. As such, additional threatened plants may be present and potential turbine areas will need to be searched in detail for the presence of threatened flora species.

Field data collected during the autumn and spring 2019 surveys, combined with the desktop assessment results, is considered to provide a detailed assessment of the species that occur and are likely to occur within the Project Area. However, some plant species may have gone undetected e.g. if they were dormant, inconspicuous or lacked distinguishable features such as flowers or seed at the time of the survey.

Although fauna surveys were conducted during both autumn and spring 2019, it is possible that species additional to those recorded during the field survey periods may occur within the Project Area. For example, reptile and frog species may be present that would only be detected through targeted surveys. Additional bird species may utilise the area including seasonal migrants and vagrants.

Apart from records collected during targeted bird, bat and PBTL surveys, all other fauna records were limited to opportunistic observations, including tracks and traces. The presence of habitat suitable for threatened fauna species indicates that additional targeted surveys may be required when the location of infrastructure is finalised.

The survey effort for PBTLs was based on the experience and skills of the EBS team who have previously undertaken various PBTL surveys. Whilst not every spider hole was inspected within each area that was assessed, the additional data collected (including the presence of a PBTL, spider, other fauna or debris, as well as the depth and condition of the hole) was used to assist in decisions on the likelihood of PBTL occupation and to assist with the preliminary design of the proposed wind farm layout. Given the broad PBTL assessment, PBTLs could occur in areas outside of those mapped as possible or likely habitat. Therefore, pre-construction PBTL surveys are required in all grassland areas within the proposed construction footprint.

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

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

every call for each detector night. Often only a low proportion of all calls recorded may be of enough quality to allow identification.

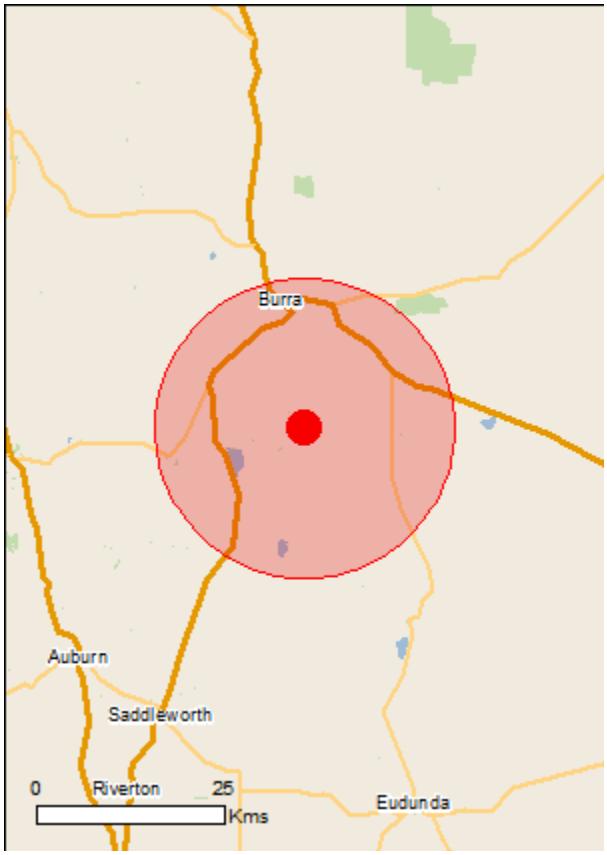
5 DESKTOP ASSESSMENT RESULTS

5.1 Matters of National Environmental Significance

The results of the PMST report (with a buffer of 20 km from the centre point of the Project Area) are summarised in Table 10 (DotEE 2019). The relevant matters of national environmental significance, other matters protected under the EPBC Act, and threatened species listed under the NPW Act are discussed in detail below.

EBS has also used the results from previous surveys completed at Stony Gap (See Table 1, page 2), as a means of determining whether species are likely or known to occur within the Project Area. Species listed as marine under the EPBC Act were excluded since the protection afforded to these species is restricted to within Commonwealth marine areas.

Table 10. Summary of the results from the Protected Matters Search.

Search area (20 km buffer)	Matters of National Environmental Significance	Number
	World Heritage Properties	None
	National Heritage Places	1
	Wetlands of International Importance	1
	Great Barrier Reef Marine Park	None
	Commonwealth Marine Areas	None
	Listed Threatened Ecological Communities	3
	Listed Threatened Species	25
	Listed Migratory Species	12
	Listed Marine Species	18
	Whales and Other Cetaceans	None
	Other Matters Protected by the EPBC Act	
	Commonwealth Heritage Places	None
	Critical Habitats	None
	Commonwealth Land	None
	Commonwealth Reserves Terrestrial	None
	Commonwealth Reserves Marine	None
	Extra Information	
	State and Territory Reserves	12
	Regional Forest Agreements	None
	Invasive Species	35
	Nationally Important Wetlands	None
	Key Ecological Features (Marine)	None

5.1.1 Threatened ecological communities

Three TECs were identified by the PMST report as likely to occur within 20 km of the Project Area:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (Endangered) – this community is not considered likely to occur within the Project Area;

- Iron-grass Natural Temperate Grassland (INTG) of South Australia (Critically Endangered) – known to occur within the Project Area; and
- Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia (Critically Endangered) – known to occur within the Project Area.

Figure 3 maps Iron-grass (*Lomandra multiflora ssp. dura*) largely in the north and west sections of the Project Area, with some small areas to the east and south. Figure 48 (page 97) also shows that Iron-grass Natural Temperate Grassland TEC has been previously assessed and recorded during previous EBS surveys (see Table 1).

Figure 3 maps a small patch of Peppermint Box (*Eucalyptus odorata*) within the western section of the Project Area. Figure 48 (page 97) also shows that *Eucalyptus odorata* has been previously assessed and recorded during previous EBS surveys (see Table 1).

Both Iron-grass Natural Temperate Grassland and Peppermint Box Grassy Woodland TECs are discussed in more detail in Section 7.1. The Project Area was ground-truthed as part of the initial field assessments, to determine the presence of both TECs.

5.1.2 Nationally threatened flora

Thirteen flora species listed under the EPBC Act were identified in the PMST as potentially occurring or having suitable habitat within 20 km of the Project Area (Table 11). Three nationally Vulnerable flora species were determined as likely to occur within the Project Area: *Acacia spilleriana* (Spiller's Wattle), *Dodonaea procumbens* (Trailing Hop-bush) and *Olearia pannosa subsp. pannosa* (Silver Daisy-bush), all three of which have previously been recorded by EBS (Figure 48). These species are discussed in more detail in Section 7.2.

Nationally threatened species that share a State conservation rating and have a BDBSA record, are show in Figure 9.

Table 11. Threatened flora species identified in the PMST report (1) and BDBSA (2) as potentially occurring within 20 km of the Project Area.

Scientific name	Common name	Conservation status		Source	Last BDBSA record (year)	Likelihood of occurrence within Project Area	EBS Record Y/N
		Aus	SA				
Acacia genistifolia	Broom Wattle		E	2	1990	Unlikely	
Acacia glandulicarpa	Hairy-pod Wattle	VU		1, 2	2008	Possible	
Acacia iteaphlla	Flinders Ranges Wattle		R	2	2004	Possible	
Acacia menzelii	Menzel's Wattle	VU		1		Unlikely	
Acacia montana	Mallee Wattle		R	2	1997	Unlikely	
Acacia spilleriana	Spiller's Wattle	EN	E	1, 2	2012	Likely	Y
Asperula syrticola	Southern Flinders Woodruff		R	2	1993	Possible	
Austrostipa breviglumis	Cane Spear-grass		R	2	2008	Likely	
Austrostipa gibbosa	Swollen Spear-grass		R	2	2005	Likely	
Austrostipa petraea	Flinders Range Spear-grass		R	2	1993	Possible	

Scientific name	Common name	Conservation status		Source	Last BDBSA record (year)	Likelihood of occurrence within Project Area	EBS Record Y/N
		Aus	SA				
Austrostipa pilata	Prickle Spear-grass		V	2	2003	Likely	
Bothriochloa macra	Red-leg Grass		R	2	2000	Likely	
Caladenia tensa	Greencomb Spider-orchid	EN		1	2007	Possible	
Caladenia xantholeuca	White Rabbits, Flinders Ranges White Caladenia	EN		1		Unlikely	
Centrolepis cephaloformis ssp. cephaloformis	Cushion Centrolepis		R	2	1992	Possible	
Codonocarpus pyramidalis	Slender Bell-fruit, Camel Poison	VU	E	1, 2	2013	Possible	
Cryptandra campanulata	Long-flowered Cryptandra		R	2	2008	Possible	Y
Cullen parvum	Small Scurf-pea		V	2	2010	Possible	
Daviesia benthamii ssp. humilis (NC)	Mallee Bitter-pea		R	2	2003	Possible	
Daviesia Schwarzenegger	Mallee Bitter-pea		R	2	2005	Unlikely	
Dianella longifolia var. grandis	Pale Flax-lily		R	2	1998	Possible	
Diuris behrii	Behr's Cowslip Orchid		V	2	1999	Possible	
Dodonaea procumbens	Trailing Hop-bush	VU	V	1, 2	2004	Likely	Y
Dodonaea subglandulifera	Peep Hill Hop-bush	EN	E	1, 2	2007	Possible	
Echinopogon ovatus	Rough-beard Grass		R	2	2008	Likely	
Eragrostis infecunda	Barren Cane-grass		R	2	1998	Possible	
Eryngium ovinum	Blue Devil		V	2	2013	Likely	Y
Eucalyptus cajuputea	Green Mallee		R*	2	2003	Likely	
Goodenia heteromera	Spreading Goodenia		R	2	1995	Possible	
Juncus australis	Austral Rush		R	2	2004	Possible	
Juncus radula	Hoar Rush		V	2	1992	Possible	
Lachnagrostis limitanea	Spalding Blown-grass	EN	E	1, 2	2005	Possible	
Lachnagrostis robusta	Tall Blown-grass		R	2	2008	Likely	
Leptorhynchos elongatus	Lank Buttons		R	2	2003	Possible	
Leptorhynchos orientalis	Eastern Annual Buttons		R	2	1900	Unlikely	
Lobelia concolor	Poison Pratia		R	2	1993	Possible	
Logania saxatilis	Rock Logania		R	2	2008	Likely	
Maireana excavata	Bottle Fissure-plant		V	2	2000	Possible	
Maireana rohrlachii	Rohrlach's Bluebush		R	2	2013	Likely	Y
Mentha satureioides	Native Pennyroyal		R	2	1999	Likely	Y
Montia australasica	White Purslane		R	2	1993	Possible	
Olearia pannosa subsp. pannosa	Silver Daisy-bush	VU	V	1, 2	2003	Likely	Y

Scientific name	Common name	Conservation status		Source	Last BDBSA record (year)	Likelihood of occurrence within Project Area	EBS Record Y/N
		Aus	SA				
Olearia picridifolia	Rasp Daisy-bush		R	2	2003	Possible	
Phebalium glandulosum ssp. macrocalx	Glandular Phebalium		E	2	2008	Possible	
Phebalium glandulosum ssp. angustifolia	Narrow-leaf Wax-flower		R	2	1981	Unlikely	
Philotheca verrucosa	Bendigo Wax-flower		V	2	1992	Possible	Y
Prasophyllum pallidum	Pale Leek-orchid	VU		1		Unlikely	
Podolepis decipiens			R	2	1981	Unlikely	
Podolepis jaceoides	Showy Copper-wire Daisy		R	2	1981	Unlikely	
Ptilotus erubescens	Hairy-tails		R	2	1999	Likely	Y
Pultenaea kraehenbuehlii	Tothill Busy-pea		R	2	2009	Possible	Y
Rumex dumosus	Wiry Dock		R	2	2003	Possible	
Rtidosperman tenuius	Short-awn Wallaby-grass		R	2	2013	Possible	
Sclerolaena muricata var. villosa	Five-spine Bindi		R	2	1993	Possible	
Senecio megaglossus	Superb Groundsel	VU	E	1, 2	1993	Possible	
Swainsona behriana	Behr's Swainson-pea		V	2	1996	Possible	Y
Swainsona pyrophila	Yellow Swainson-pea	VU	R	1		Unlikely	
Thelmitra grandiflora	Great Sun-orchid		R	2	1982	Unlikely	
Thsanotus tenellus	Grass Fringe-lily		R	2	2008	Possible	

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CR/CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. 1: EPBC Protected Matters Search Tool. 2: Biological Database of South Australia.

5.1.3 Nationally threatened fauna

Twenty-two (22) fauna species listed under the EPBC Act were identified in the PMST as potentially occurring or having suitable habitat within 20 km of the Project Area (Table 12). This included two fish, 17 birds, one mammal and two reptile species.

Two reptile species were determined as likely to occur within the Project Area: the Nationally Endangered PBTL and Nationally Vulnerable FRWL. Both species are discussed in more detail in Section 7.3.1.

Table 12. Threatened and migratory fauna species identified in the PMST report (1) and BDBSA (2) as potentially occurring within 20 km of the Project Area.

Scientific name	Common name	Conservation status		Source	Last BDBSA record (year)	Likelihood of occurrence within Project Area	EBS Record Y/N
		Aus	SA				
ACTINOPTERYGII	**Fish**						
Galaxias rostratus	Flathead Galaxias	CE		1		Unlikely	
Maccullochella peelii	Murray Cod	VU		1		Unlikely	
AVES	**Birds**						

Scientific name	Common name	Conservation status		Source	Last BDBSA record (year)	Likelihood of occurrence within Project Area	EBS Record Y/N
		Aus	SA				
Actitis hypoleucos	Common Sandpiper	Mi	R	1		Possible	
Anhinga novaehollandiae	Australasian Darter		R	2	2000	Possible	
Anseranas semipalmata	Magpie Goose		E	2	1983	Unlikely	
Apus pacificus	Fork-tailed Swift	Mi		1		Possible	
Ardeotis australis	Australian Bustard		V	2	2000	Unlikely	
Biziura lobata	Musk Duck		R	2	1996	Possible	
Calidris acuminata	Sharp-tailed Sandpiper	Mi		1		Possible	
Calidris ferruginea	Curlew Sandpiper	CE, Mi		1		Possible	
Calidris melanotos	Pectoral Sandpiper	Mi	R	1		Possible	
Cladorhynchus leucocephalus	Banded Stilt		V	2	2003	Possible	
Corcorax melanorhamphos	White-winged Chough		R	2	2015	Likely	Y
Coturnix ypsilophora	Brown Quail		V	2	2015	Possible	
Falco peregrinus	Peregrine Falcon		R	2	2010	Likely	Y
Gallinago hardwickii	Latham's Snipe	Mi		1		Unlikely	
Grantiella picta	Painted Honeyeater	V		1		Unlikely	
Leipoa ocellata	Malleefowl	VU	V	1		Unlikely	
Melanodryas cucullata	Hooded Robin		R	2	2010	Likely	Y
Melithreptus gularis	Black-chinned Honeyeater		R	2	2006	Possible	
Motacilla cinerea	Grey Wagtail	Mi		1		Unlikely	
Motacilla flava	Yellow Wagtail	Mi		1		Unlikely	
Myiagra cyanoleuca	Satin Flycatcher	Mi	E	1, 2	1998	Unlikely	
Myiagra inquieta	Restless Flycatcher		R	2	2010	Likely	
Neophema chrysostoma	Blue-winged Parrot		V	2	2001	Possible	
Neophema elegans	Elegant Parrot		R	2	2006	Likely	Y
Numenius madagascariensis	Far Eastern Curlew	CE, Mi	V	1		Unlikely	
Pachycephala inornata	Gilbert's Whistler		R	2	1986	Unlikely	
Pandion haliaetus	Osprey	Mi	R	1		Unlikely	
Pedionomus torquatus	Plains-wanderer	CE		1		Unlikely	
Pezoporus occidentalis	Night Parrot	EN	E	1		Unlikely	
Plectorhyncha lanceolata	Striped Honeyeater		R	2	1986	Unlikely	
Porzana tabuensis	Spotless Crake		R	2	2002	Unlikely	
Rostratula australis	Australian Painted Snipe	EN	V	1, 2	2001	Unlikely	
Stagonopleura guttata	Diamond Firetail		V	2	2010	Likely	Y
Tringa nebularia	Common Greenshank	Mi		1		Possible	
Turnix varius	Painted Buttonquail		R	2	2015	Possible	

Scientific name	Common name	Conservation status		Source	Last BDBSA record (year)	Likelihood of occurrence within Project Area	EBS Record Y/N
		Aus	SA				
MAMMALIA	**Mammals**						
Nyctophilus corbeni	Corben's Long-eared Bat, South-eastern Long-eared Bat	VU		1		Unlikely	
Trichosurus vulpecula	Common Brushtail Possum		R	2	2008	Possible	
REPTILIA	**Reptiles**						
Aprasia pseudopulchella	Flinders Ranges Worm-lizard	VU		1, 2	2016	Likely	
Tiliqua adelaidensis	Pygmy Blue-tongue Lizard	EN	E	1, 2	2017	Likely	Y

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CR/CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. Mi: Migratory. 1: EPBC Protected Matters Search Tool. 2: Biological Database of South Australia.

5.1.4 Migratory fauna

Twelve (12) migratory listed fauna species were identified in the PMST as potentially occurring or having suitable habitat within 20 km of the Project Area (Table 12). Five migratory species were determined as possibly occurring in the Project Area: Common Sandpiper (*Actitis hypoleucos*), Fork-tailed Swift (*Apus pacificus*), Sharp-tailed Sandpiper (*Calidris acuminata*), Pectoral Sandpiper (*Calidris melanotis*) and Common Greenshank (*Tringa nebularia*).

The Sandpiper species and Greenshank are migratory shorebirds that inhabit the fringes of wetlands, lakes and dams, where they may forage on exposed mud and within shallow water. As such, suitable habitat may be present within the Project Area in the form of pastoral dams.

These species have the potential to fly-over the Project Area based on the proximity of Porter Lagoon, which is situated approximately 2 km to the west of the Project Area. Porter Lagoon may provide a refuge for waterbirds such as the Banded Stilt (*Cladorhynchus leucocephalus)*, Red-necked Avocet (*Recurvirostra novaehollandiae)*, waterfowl and other waders during good seasons where water is plentiful. Two records of the Sharp-tailed Sandpiper were also listed with the Atlas of Living Australia (ALA) for Porter Lagoon (records dated 1982 and 2003), which also indicates this species' potential to utilise the lagoon.

As stated above, species listed as marine under the EPBC Act were excluded since the protection afforded to these species is restricted to within Commonwealth marine areas.

5.1.5 National Heritage Place

The Australian Cornish Mining Site at Burra was identified within the PMST results as being a National Heritage Place within 20 km of the Project Area. The Australian Heritage Database describes this Heritage Listing as Place ID106304.

5.1.6 Nationally Important Wetland

The Coorong, and Lakes Alexandrina and Albert Wetland was identified within the PMST results as being a wetland of national importance, although its proximity to the Project Area was described as 100 – 150 km upstream. The Coorong and Lakes Alexandrina and Albert Ramsar site is located at the downstream end of the Murray River, in south-east South Australia. The Murray River flows into Lake Alexandrina and out to the Southern Ocean through the Murray Mouth Estuary. Lake Albert is a terminal lake connected to Lake Alexandrina by a narrow channel. Its primary source of water is from Lake Alexandrina, supplemented by groundwater discharge and surface water runoff.

The Coorong, and Lakes Alexandrina and Albert Wetland will not be impacted upon by any proposed development in the Project Area.

5.2 Matters of State Environmental Significance

5.2.1 State threatened flora

Fifty-four (54) State threatened flora species were identified by the BDBSA as having records within 20 km of the Project Area (Table 11). Fifteen (15) species were determined as likely to occur with the Project Area, based on recent records, previous survey work by EBS (see Table 1 page 2, Figure 48 page 97) and potential habitat for these species:

- *Acacia spilleriana* (Spiller's Wattle);
- *Austrostipa breviglumis* (Cane Spear-grass);
- *Austrostipa gibbosa (*Swollen Spear-grass);
- *Austrostipa pilata* (Prickle Spear-grass);
- *Bothriochloa macra* (Red-leg Grass);
- *Dodonaea procumbens* (Trailing Hop-bush);
- *Echinopogon ovatus* (Rough-beard Grass);
- *Eryngium ovinum* (Blue Devil);
- *Eucalyptus cajuputea* (Green Mallee);
- *Lachnagrostis robusta* (Tall Blown-grass);
- *Logania saxatilis* (Rock Logania);
- *Maireana rohrlachii* (Rohrlach's Bluebush);
- *Mentha satureioides* (Native Pennyroyal);
- *Olearia pannosa subsp. pannosa* (Silver Daisy-bush); and
- *Ptilotus erubescens* (Hairy-tails).

These likely species are discussed in more detail in Section 7.2. The location of BDBSA threatened flora records are shown in Figure 10.

5.2.2 State threatened fauna

Twenty-four (24) State threatened fauna species were identified by the BDBSA as having records within 20 km of the Project Area (Table 12). This included 21 bird species, one mammal and two reptile species. Eight species (six bird and two reptile) were determined as likely to occur with the Project Area, based on recent records and potential habitat for these species (Table 12):

- White-winged Chough (*Corcorax melanorhamphos)*;
- Peregrine Falcon (*Falco peregrinus)*;
- Hooded Robin *(Melanodryas cucullata cucullata)*;
- Restless Flycatcher (*Myiagra inquieta)*;
- Elegant Parrot (*Neophema elegans)*;
- Diamond Firetail (*Stagonopleura guttata)*;
- Flinders Ranges Worm-lizard (*Aprasia pseudopulchella)*; and
- Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis).*

These likely species are discussed in more detail in Section 7.3.2. The location of BDBSA threatened fauna records is shown in Figure 11.

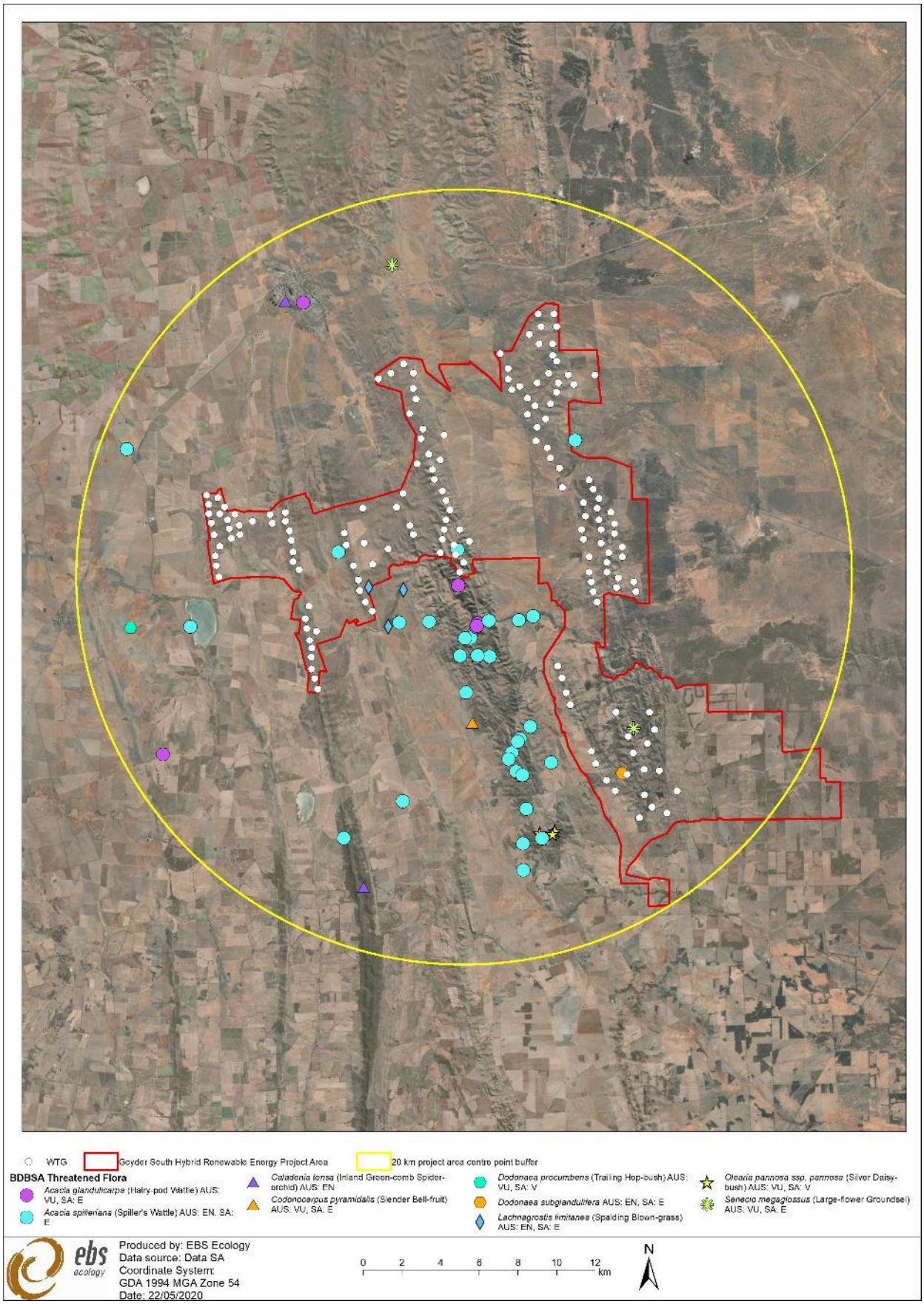


Figure 9. Nationally threatened flora (determined by BDBSA records) within 20 km of the Project Area.

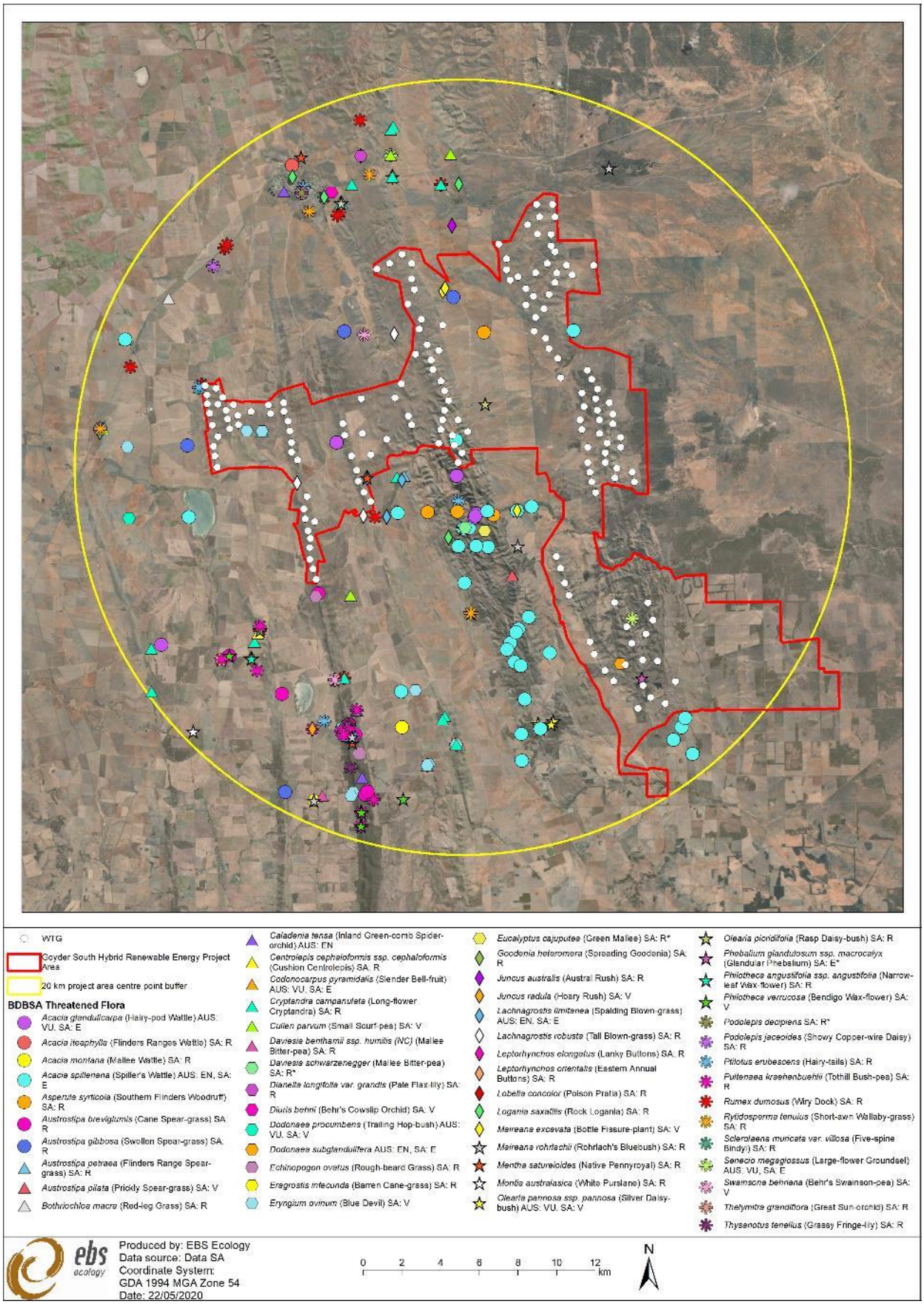


Figure 10. State threatened flora BDBSA records within 20 km of the Project Area.

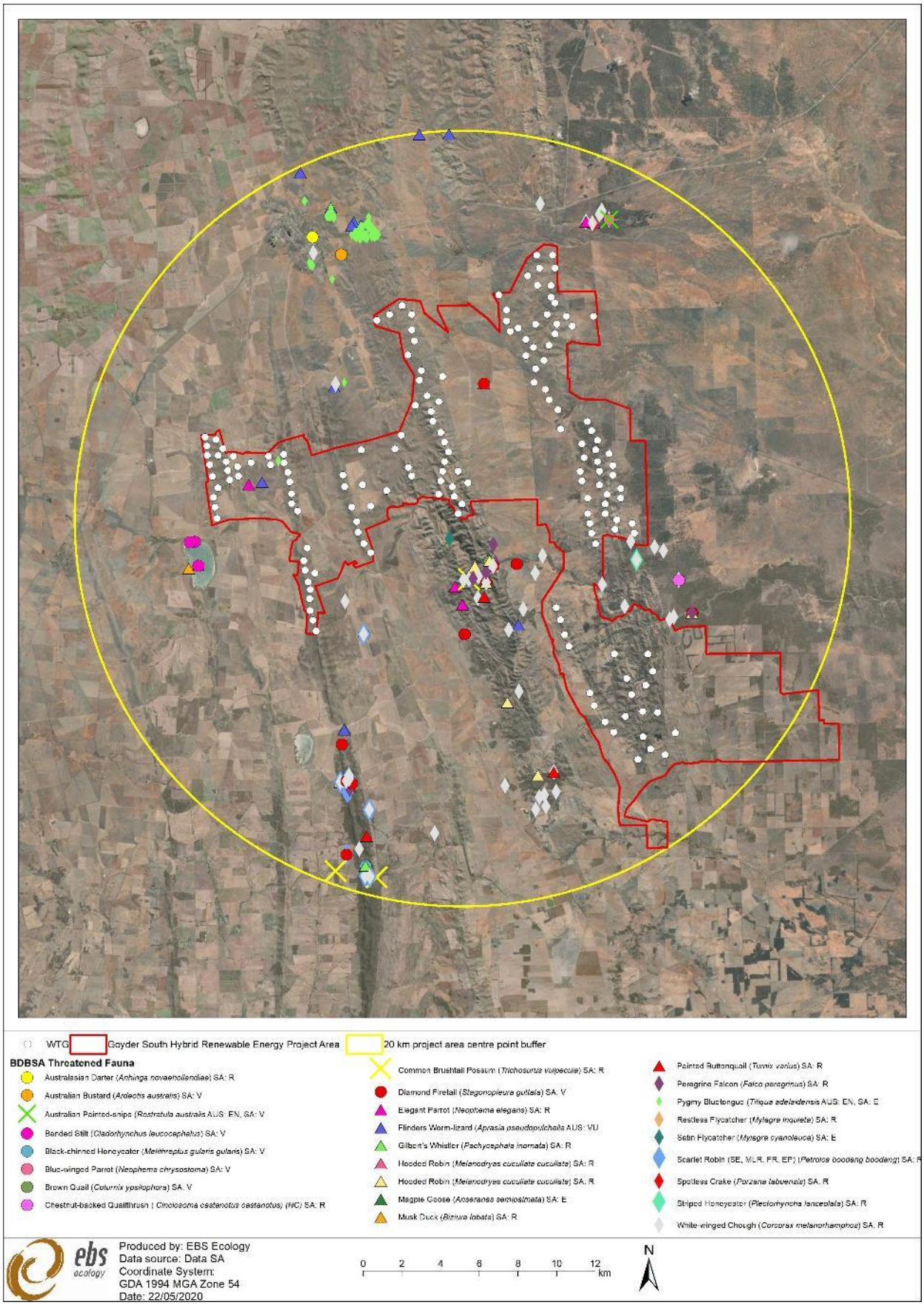


Figure 11. State threatened fauna BDBSA records within 20 km of the Project Area.

6 FIELD SURVEY RESULTS

6.1 Threatened Ecological Communities

Two TECs were identified by the PMST report as likely to occur within 20 km of the Project Area, previously identified from survey work at Stony Gap (EBS 2013a) and identified during both the autumn and spring 2019 surveys. These are Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia.

Peppermint Box (*Eucalyptus odorata*) was mapped as Vegetation Association (VA) 4 within the western section of the Project Area (Figure 12) (Figure 48, page 114), and recorded as one distinct patch, 38.9 ha in size. While this patch did not qualify as a TEC, any pure stand of *E. odorata* with a reasonable density would qualify as Class C, unless completely degraded. Class C is described as amendable to rehabilitation (> 5 natives and 1 of more perennial grass species) (DEWR 2007).

During a good year, it is expected that enough native species (15), native broad-leaved herbaceous species resistance to disturbance (3), and native grasses (2) could occur within Peppermint Box associations to qualify as Class B (and therefore constitute a TEC). This was particularly relevant to the singular patch recorded, which would most likely qualify as a TEC as it would be considered contiguous, although it was degraded. A larger area of *E. odorata* extends north from this patch, outside the Project boundary (Figure 12).

The largest patches of Iron-grass (*Lomandra multiflora ssp. dura*) were recorded within the western and north-eastern sections of the Project Area as well as smaller patches distributed in the south-eastern section of the Project Area (Figure 12) (Figure 45 page 89). Although a previous patch of Iron-grass qualified as Class B during the field survey at Stony Gap (EBS 2013a), none qualified during the autumn and spring 2019 surveys. The conditions were considered poor during the surveys (i.e. the area was considered to be in severe drought) and therefore assessment against the criteria was not warranted as it was highly unlikely that any patches would have qualified as Class C. During a good year, however, it is expected that enough native species and grasses within Lomandra Grassland would be present to qualify as Class B (and could therefore constitute a TEC).

6.2 Vegetation Associations (VAs)

The field surveys for the flora baseline study were undertaken from 1 to 5 April and 2 to 5 September 2019. The vegetation attributes of the Project Area can be separated in to eastern and western sectors, which are divided by Burra Creek. Each sector is comprised of two parallel ridges. The western ridges were categorised as an agricultural zone landscape, within which native vegetation consisted of grasslands and tall woodlands of moderate quality, of which the woodland was mostly represented by *Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum). There was extremely low vegetation remnancy in the western sector due to extensive cropping. Where remnant vegetation occurred, stock had degraded the quality of the vegetation. Where remnant woodlands occurred in the western sector, there were considered important for the conservation of regional fauna species (see Section 7.3.2), many of which are now threatened due to habitat loss.

The eastern ridges receive lower rainfall than those in the west, and therefore, pastoral land practices were more widely used than agricultural land practices. Vegetation communities were also reflective of lower rainfall, comprising of native pine and Mallee woodlands, and chenopod shrublands. While stock grazing had degraded the quality of these vegetation communities, all the vegetative stratums were intact. The vegetation communities within the eastern ridges have higher remnancy due to their low agricultural value.

The condition of native vegetation across the Project Area varied between properties in response to the land management practices of the various landholders.

Twenty (20) broad VAs were recorded and mapped over the Project Area (Table 13; Figure 12). A summary of each broad VA observed is provided below in Sections 6.2.1 to 6.2.20.The most well represented VAs, spread across the Project Area, were VA 8, 5 and 1 (Table 13; Figure 12). Native vegetation covered 26,559.2 ha of the overall Project Area. Cropping land was mapped across 5,177.5 ha of the Project Area and 1,940.4 ha remains unknown (due to areas that were not surveyed as part of the baseline assessments).

Table 13. Summary of VAs described over the Project Area.

VA	Description	Area (ha)
1	*Maireana aphylla* (Cotton-bush) / *Atriplex stipitata* (Bitter Saltbush) Mixed Low Open Chenopod Shrubland	1,880.184
2	*Lomandra multiflora* ssp. *dura* (Hard Mat-rush) / *Lomandra effusa* (Scented Mat-rush) Mixed Open Grassland	863.678
3	*Eucalyptus porosa* (Mallee Box) Open Woodland	455.033
4	*Eucalyptus odorata* (Peppermint Box) Closed Woodland	38.879
5	*Eucalyptus oleosa* ssp. *oleosa* (Red Mallee) Mixed Open Mallee	4,031.465
6	*Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum) Open Woodland	321.787
7	*Eucalyptus camaldulensis* ssp. *camaldulensis* (River Red Gum) Woodland	1.117
8	*Austrostipa* spp. (Spear Grass) Mixed Grassland	9,349.755
9	Exotic Grassland	881.183
10	*Callitris gracilis* (Southern Cypress Pine) Low Open Woodland	2.902
11	*Juncus* sp. (Rush) / *Cyperus gymnocaulos* (Spiny Flat-sedge) Mixed Low Closed Sedgeland	41.435
12	*Alectryon oleifolius* ssp. *canescens* (Bullock Bush) Low Open Woodland	78.977
13	*Atriplex nummularia* (Old-man Saltbush) Plantation	12.735
14	*Triodia irritans* (Spinifex) Grassland +/- Emergent *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee)	49.002
15	*Dodonaea lobulata* (Lobed-leaf Hop-bush) Shrubland	24.601
16	*Beyeria lechenaultii* (Pale Turpentine Bush) Low Shrubland	26.242
17	*Phragmites australis* (Common Reed) Grassland	54.587
18	*Senna* spp. (Senna) / *Acacia rigens* (Nealie) Mixed Shrubland over Chenopod Shrubs	549.097
19	*Nitraria billardierei* (Nitre-bush) Low Shrubland	424.11
20	*Maireana pyramidata* (Black Bluebush) Low Shrubland	317.403
	Cropped areas	5,177.533
	Amenity / Urban	37.103
	Unknown	1,940.394
	Total	**26,559.2**

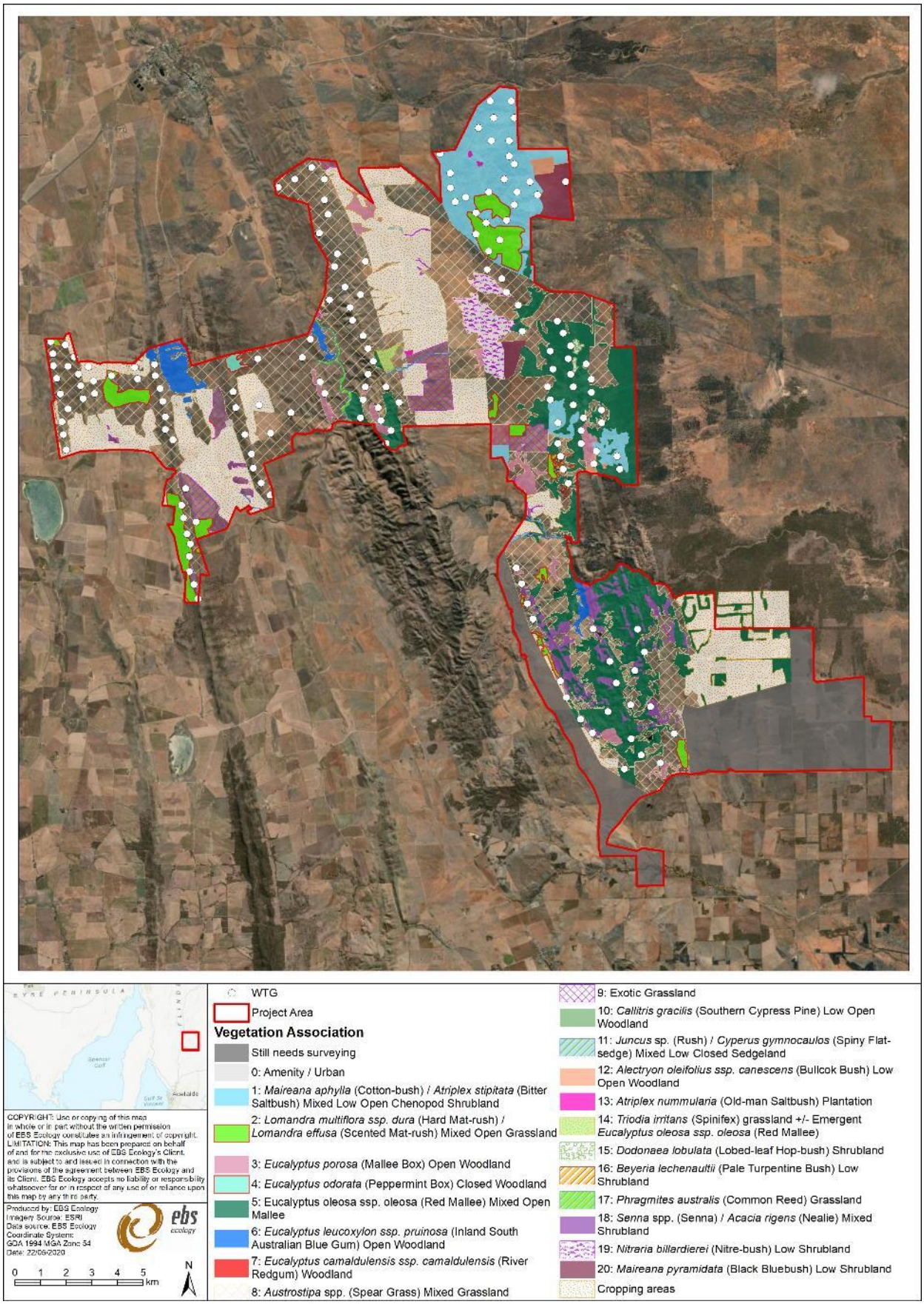


Figure 12. Vegetation Associations mapped over the Project Area.

6.2.1 VA 1: Maireana aphylla (Cotton-bush) / Atriplex stipitata (Bitter Saltbush) Mixed Low Open Chenopod Shrubland

VA 1 dominated the area on the east to the eastern-most range before the transition to Mallee communities on the plains (Figure 12). VA 1 was reflective of semi-arid, pastoral habitats, where overgrazing had facilitated increased abundances of species with low palatability, such as *Maireana pyramidata* (Black Bluebush). The prevailing drought conditions over South Australia at the time of survey may have led to the southward movement of kangaroos from the arid and semi-arid zone to the Mid North. High numbers of kangaroos in the Project Area would exacerbate grazing pressure on palatable species, such as *Atriplex vesicaria* (Bladder Saltbush), limiting their regeneration. The dominant flora species within VA 1 are described in Table 14. A representative photo of VA 1 is shown in Figure 13.

Table 14. Summary of VA 1: *Maireana aphylla* (Cotton-bush) / *Atriplex stipitata* (Bitter Saltbush) Mixed Low Open Chenopod Shrubland.

Overstorey species	*Maireana aphylla* (Cotton-bush) *Atriplex stipitata* (Bitter Saltbush) *Maireana pyramidata* (Black Bluebush) *Maireana sedifolia* (Pearl Bluebush) *Maireana georgei* (Satin Bluebush)
Midstorey species	*Ptilotus obovatus* (Silver Mulla Mulla) *Lomandra effusa* (Scented Mat-rush)
Understorey species	*Sclerolaena diacantha* (Grey Copperburr) *Sclerolaena obliquicuspis* (Oblique-spined Bindyi)
Threatened species	None observed
Declared or significant weeds	*Nicotiana glauca* (Tree Tobacco)

Figure 13. Representative photo of VA 1: *Maireana aphylla* (Cotton-bush) / *Atriplex stipitata* (Bitter Saltbush) Mixed Low Open Chenopod Shrubland.

6.2.2 VA 2: Lomandra multiflora (Hard Mat-rush) / Lomandra effusa (Scented Mat-rush) Mixed Open Grassland

Vegetation Association 2 was recorded on the slopes of ranges in areas with very shallow soils (Figure 12). The species richness of VA 2 was low as midstorey and understorey species, except for *Lomandra* species, were scarce. This association covered 863.7 ha of the overall Project Area. The dominant flora species within VA 2 are described in Table 15. A representative photo of VA 2 is shown in Figure 14.

Table 15. Summary of VA 2: *Lomandra multiflora* (Hard Mat-rush) / *Lomandra effusa* (Scented Mat-rush) Mixed Open Grassland.

Overstorey species	*Lomandra effusa* (Scented Mat Rush) *Lomandra multiflora* ssp. *dura* (Hard Mat-rush)
Midstorey species	*Beyeria opaca* (Dark Turpentine Bush) *Bursaria spinosa* ssp. (Bursaria)
Understorey species	None
Threatened species	None observed
Declared or significant weeds	*Echium plantagineum* (Salvation Jane) *Medicago* sp. (Medic) *Salvia verbenaca* (Wild Sage)

Figure 14. Representative photo of VA 2: *Lomandra multiflora* (Hard Mat-rush) / *Lomandra effusa* (Scented Mat Rush) Mixed Open Grassland.

6.2.3 VA 3: Eucalyptus porosa (Mallee Box) Open Woodland

Eucalyptus porosa (Mallee Box) Woodlands were largely restricted to the eastern extent of the Project Area and were in best condition along the fringes of Burra Creek in the eastern section of the Project Area and in the southeast of the Project Area (Figure 12). The areas where VA 3 occurred were within transitional zones between grassland areas (VAs 2 and 8) and Mallee (VA 5) and were associated with sandy soils. Numerous raptor and raven nests were present within VA 3 as *Eucalyptus porosa* was the tallest tree species present within Mallee communities. The dominant flora species within VA 3 are described in Table 16. Representative photos of VA 3 are shown in Figure 15 and Figure 16.

Table 16. Summary of VA 3: *Eucalyptus porosa* (Mallee Box) Open Woodland.

Overstorey species	*Alectryon oleifolius* ssp. *canescens* (Bullock Bush) *Callitris gracilis* (Southern Cyperus Pine) *Eucalyptus porosa* (Mallee Box)
Midstorey species	*Beyeria opaca* (Dark Turpentine Bush) *Bursaria spinosa* ssp. (Bursaria) *Dodonaea viscosa* ssp. (Sticky Hop-bush) *Melaleuca lanceolata* (Dryland Tea-tree) *Pittosporum angustifolium* (Native Apricot)
Understorey species	*Atriplex stipitata* (Bitter Saltbush) *Enchylaena tomentosa* (Ruby Saltbush) *Maireana* spp. (Bluebushes) *Olearia pimeleoides* (Pimelea Daisy-bush) *Rhagodia candolleana* (Berry Saltbush) *Rhagodia spinescens* (Spiny Saltbush) *Roepera crenata* (Notched Twinleaf)
Threatened species	*Dodonaea subglandulifera* (AUS: EN, SA: E) (see Section 6.3)
Declared or significant weeds	*Asphodelus fistulosus* (Onion Weed) *Carrichtera annua* (Ward's Weed)

Figure 15. Representative photo of VA 3 (poor condition): *Eucalyptus porosa* (Mallee Box) Open Woodland.

Figure 16. Representative photo of VA 3 (good condition): *Eucalyptus porosa* (Mallee Box) Open Woodland.

6.2.4 VA 4: Eucalyptus odorata (Peppermint Box) Open Woodland

VA 4 was mostly restricted to western facing slopes on the ridgelines present within the Project Area (Figure 12). The understorey of VA 4 was highly modified due to grazing from stock and kangaroos. Areas with less degradation from grazing occurred on steep, rocky slopes where stock were less likely or unable to graze. These steep, rocky slopes may have moderate species richness following winter and spring rainfall. This single patch of VA 4 was of high value for fauna, as trees provided a nesting platform for Wedge-tailed Eagles (Figure 40) and hollows for bird and bat species to roost and nest. The dominant flora species within VA 4 are described in Table 17. A representative photo of VA 4 is shown in Figure 17.

Table 17. Summary of VA 4: *Eucalyptus odorata* (Peppermint Box) Open Woodland.

Overstorey species	*Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum) *Eucalyptus odorata* (Peppermint Box) *Eucalyptus porosa* (Mallee Box)
Midstorey species	*Alectryon oleifolius* ssp. *canescens* (Bullock Bush) *Myoporum platycarpum* ssp. (False Sandalwood) *Bursaria spinosa* ssp. (Bursaria) *Pittosporum angustifolium* (Native Apricot)
Understorey species	*Rhagodia candolleana* (Berry Saltbush) *Rhagodia spinescens* (Spiny Saltbush)
Threatened species	None observed
Declared or significant weeds	*Carrichtera annua* (Ward's Weed) *Asphodelus fistulosus* (Onion Weed) *Lycium ferocissimum* (African Boxthorn) *Marrubium vulgare* (Horehound)

Figure 17. Representative photo of VA 4: *Eucalyptus odorata* (Peppermint Box) Open Woodland.

6.2.5 VA 5: Eucalyptus oleosa ssp. oleosa (Red Mallee) Mixed Open Mallee

VA 5 predominantly occurred within the eastern extent of the Project Area, however, isolated patches on alkaline outcrops and rises were present on the south-central section of the Project Area (Figure 12). The areas of VA 5 in the eastern extent of the Project Area were intact and provided high habitat value for fauna species as hollow bearing trees were common and food resources, such as nectar, would be abundant when *E. oleosa* are in flower. The small remnants of VA 5 on alkaline outcrops and rises were highly degraded due to their small size and location within a matrix of agricultural land. Kangaroos that feed on the agricultural land were using the small remnants for refuge, which degraded the condition of vegetation. The dominant flora species within VA 5 are described in Table 18. A representative photo of VA 5 is shown in Figure 18.

Table 18. Summary of VA 5: *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee) Mixed Open Mallee.

Overstorey species	*Eucalyptus oleosa* ssp. (Red Mallee) *Alectryon oleifolius* ssp. *canescens* (Bullock Bush) *Dodonaea viscosa* ssp. *angustissimus* (Narrow-leaf Hop-bush)
Midstorey species	*Atriplex stipitata* (Bitter Saltbush) *Maireana astrotricha* (Low Bluebush) *Maireana aphylla* (Cotton-bush)
Understorey species	*Enneapogon* sp. (Bottle-washers) *Dissocarpus paradoxus* (Ball Bindyi)
Threatened species	None observed
Declared or significant weeds	*Carrichtera annua* (Ward's Weed)

Figure 18. Representative photo of VA 5: *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee) Mixed Open Mallee.

6.2.6 VA 6: Eucalyptus leucoxylon ssp. pruinosa (Inland South Australian Blue Gum) Open Woodland

VA 6 was almost exclusively restricted to the western ridges of the Project Area (Figure 12), where it grew in shallow soils on lower and mid-slopes that were unsuitable for cropping. The dominant overstorey species in VA 6 was *Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum), which was the tallest tree species recorded in the Project Area, and therefore, offered significant amenity value. The *E. leucoxylon* ssp. *pruinosa* trees are important to fauna as they were suitable for nesting raptors, supported hollows and provided food resources (e.g. growth tips, flowers, psyllids, lerp and nectar). The low remnancy and high ecological value of VA 6 resulted in this association being of the utmost importance for conservation. The dominant flora species within VA 6 are described in Table 19. A representative photo of VA 6 is shown in Figure 19.

Table 19. Summary of VA 6: *Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum) Open Woodland.

Overstorey species	*Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum)
Midstorey species	*Rhagodia spinescens* (Spiny Saltbush)
Understorey species	*Austrostipa* sp. (Spear-grass) *Rytidosperma* sp. (Wallaby-grass) *Themeda triandra* (Kangaroo Grass)
Threatened species	None observed
Declared or significant weeds	*Avena barbata* (Bearded Oats) *Hordeum vulgare* (Barley) *Trifolium* sp. (Clover) *Lolium* sp. (Ryegrass)

Figure 19. Representative photo of VA 6: *Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum) Open Woodland.

6.2.7 VA 7: Eucalyptus camaldulensis ssp. camaldulensis (River Red Gum) Woodland

VA 7 was a riparian community restricted to Burra Creek, which runs through the Project Area, in two main locations (Figure 12). A small patch of VA 7 occurs (1.1 ha), as the majority has been avoided as part of the Project design. The dominant overstorey species was *Eucalyptus camaldulensis* ssp. *camaldulensis* (River Red Gum), which was in moderate condition, however, there was little evidence of regeneration. Stock grazing within VA 7 would limit recruitment, and therefore, this association is expected to degrade over time. The dominant flora species within VA 7 are described in Table 20. A representative photo of VA 7 is shown in Figure 20.

Table 20. Summary of VA 7: *Eucalyptus camaldulensis* ssp. *camaldulensis* (River Red Gum) Woodland.

Overstorey species	*Acacia salicina* (Broughton Willow) *Eucalyptus camaldulensis* ssp. *camaldulensis* (River Red Gum)
Midstorey species	*Phragmites australis* (Common Reed) *Typha domingensis* (Narrow-leaf Bulrush)
Understorey species	*Thyridia repens* (Creeping Monkey-flower) *Juncus subsecundus* (Finger Rush) *Cyperus gymnocaulos* (Spiny Flat-sedge)
Threatened species	None observed
Declared or significant weeds	*Onopordum acanthus* (Scotch Thistle)

Figure 20. Representative photo of VA 7: *Eucalyptus camaldulensis* ssp. *camaldulensis* (River Red Gum) Woodland.

6.2.8 VA 8: Austrostipa spp. (Spear Grass) Mixed Grassland

VA 8 had the greatest coverage of any native vegetation association in the Project Area (9,349.8 ha) (Figure 12). The condition of the grassland was poor with most tussocks grazed to their base, which has left them vulnerable to mortality. A seed bank of native grasses should be present within the soil, however, if over-grazing of VA 8 continues then exotic grass species are expected to increase in dominance over time. Few fauna species used VA 8 as habitats, however, it was determined as the preferred habitat for the Pygmy Blue-tongue Lizard. The dominant flora species within VA 8 are described in Table 21. A representative photo of VA 8 is shown in Figure 21.

Table 21. Summary of VA 8: *Austrostipa* ssp. (Spear Grass) Mixed Grassland.

Overstorey species	*Aristida behriana* (Brush Wire-grass) *Austrostipa* sp. (Spear-grass) *Themeda triandra* (Kangaroo Grass)
Midstorey species	*Rytidosperma caespitosum* (Common Wallaby-grass)
Understorey species	*Ptilotus spathulatus* (Pussy-tails) *Vittadinia cuneata* var. (Fuzzy New Holland Daisy)
Threatened species	None observed
Declared or significant weeds	*Avena barbata* (Bearded Oats) *Hordeum vulgare* (Barley) *Trifolium* sp. (Clover) *Salvia verbenaca* (Wild Sage)

Figure 21. Representative photo of VA 8: *Austrostipa* ssp. (Spear Grass) Mixed Grassland.

6.2.9 VA 9: Exotic Grassland

VA 9 was widespread over plains in the central and eastern sectors of the Project Area (Figure 12). The association occurred in areas that were previously cleared of native vegetation and have since been colonised by exotic grasses, primarily *Avena barbata* (Bearded Oats). Native flora species were scarce within VA 9, however, *Austrostipa* sp. (Spear-grass) and *Vittadinia australasica* var. (Sticky New Holland Daisy) were recorded. The dominant flora species within VA 9 are described in Table 22. A representative photo of VA 9 is shown in Figure 22.

Table 22. Summary of VA 9: Exotic Grassland.

Overstorey species	None observed	
Midstorey species	*Austrostipa* sp. (Spear-grass) *Euphorbia drummondii* (Caustic Weed) *Rytidosperma* sp. (Wallaby-grass) *Vittadinia australasica* var. (Sticky New Holland Daisy)	
Understorey species	**Asteriscus spinosus* (Golden Pallensis) **Avena barbata/fatua* (Wild Oat) **Bromus* sp. (Brome) **Diplotaxis tenuifolia* (Lincoln Weed) **Echium plantagineum* (Salvation Jane)	**Lolium rigidum* (Wimmera Ryegrass) **Hordeum leporinum* (Wall Barley-grass) **Marrubium vulgare* (Horehound) **Onopordum acaulon* (Horse Thistle) **Vulpia myuros* (Rat's-tail Fescue)
Threatened species	None observed	
Declared or significant weeds	*Nicotiana glauca* (Tree Tobacco)	

Figure 22. Representative photo of VA 9: Exotic Grassland.

6.2.10 VA 10: Callitris gracilis (Southern Cypress Pine) Low Open Woodland

VA 10 was recorded in a small section of the Project Area (2.9 ha) on steep, rocky slopes in southern and eastern extent (Figure 12). The vegetation within VA 10 was intact, however, has been degraded by grazers, including kangaroos, deer and goats. The vegetative structure of VA 10 was diverse, with significant cover from a suite of flora species within each stratum. As such, VA 10 is expected to support a diverse fauna assemblage due to the variety of foraging, nesting and roosting mediums present. The dominant flora species within VA 10 are described in Table 23. A representative photo of VA 10 is shown in Figure 23.

Table 23. Summary of VA 10: *Callitris gracilis* (Southern Cypress Pine) Low Open Woodland.

Overstorey species	*Callitris gracilis* (Southern Cyperus Pine) *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee) *Eucalyptus porosa* (Mallee Box)
Midstorey species	*Acacia argyrophylla* (Silver Mulga-bush)
Understorey species	*Austrostipa* sp. (Spear-grass) *Triodia irritans* (Spinifex) *Vittadinia gracilis* (Woolly New Holland Daisy)
Threatened species	None observed
Declared or significant weeds	*Carrichtera annua* (Ward's Weed) *Marrubium vulgare* (Horehound)

Figure 23. Representative photo of VA 10: *Callitris gracilis* (Southern Cypress Pine) Low Open Woodland.

6.2.11 VA 11: Juncus sp. / Cyperus gymnocaulos (Spiny Flat-sedge) Low Closed Sedgeland

VA 11 was located within slight depressions on flat plains areas near Burra Creek (Figure 12). The condition of VA 11 has been degraded by stock, which have grazed out palatable species and facilitated the dominance of unpalatable species in the association. Furthermore, the increased nutrients associated with the faecal matter of stock has led to the invasion and abundance of invasive weeds. Despite the extensive degradation of VA 11, it remains an important refuge for wetland species, including frogs, and given the relative low cover of sedgelands in the region, it is of ecological importance. The dominant flora species within VA 11 are described in Table 24. A representative photo of VA 11 is shown in Figure 24.

Table 24. Summary of VA 11: *Juncus* sp. / *Cyperus gymnocaulos* (Spiny Flat-sedge) Low Closed Sedgeland.

Overstorey species	*Cyperus gymnocaulos* (Spiny Flat-sedge) *Juncus flavidus* (Yellow Rush)
Midstorey species	None observed
Understorey species	None observed
Threatened species	None observed
Declared or significant weeds	*Avena barbata* (Wild Oats) *Hordeum vulgare* (Barley) *Juncus usitatus* (Common Rush) *Salvia verbenaca* (Wild Sage)

Figure 24. Representative photo of VA 11: *Juncus* sp. / *Cyperus gymnocaulos* (Spiny Flat-sedge) Low Closed Sedgeland.

6.2.12 VA 12: Alectryon oleifolius ssp. canescens (Bullock Bush) Low Open Shrubland

VA 12 was distributed within small patches in the eastern extent of the Project Area near Mallee Open Woodland (VA 3 and VA 5) communities on moderate slopes (Figure 12). The dominant overstorey species, *Alectryon oleifolius* ssp. *canescens* (Bullock Bush), has limited coverage within the Project Area due to its high palatability. Therefore, recruitment of this species is expected to be low or nil due to stock, kangaroo and rabbit grazing. Due to the lack of recruitment in the dominant overstorey species, established individuals are of ecological significance and should be avoided. The dominant flora species within VA 12 are described in Table 25. A representative photo of VA 12 is shown in Figure 25.

Table 25. Summary of VA 12: *Alectryon oleifolius* ssp. *canescens* (Bullock Bush) Low Open Shrubland.

Overstorey species	*Alectryon oleifolius* ssp. *canescens* (Bullock Bush)
Midstorey species	*Pittosporum angustifolium* (Native Apricot)
Understorey species	*Maireana erioclada* (Rosy Bluebush) *Maireana georgei* (Satiny Bluebush) *Olearia muelleri* (Mueller's Daisy bush) *Rhagodia spinescens* (Spiny Saltbush)
Threatened species	None observed
Declared or significant weeds	*Carrichtera annua* (Ward's Weed) *Marrubium vulgare* (Horehound)

Figure 25. Representative photo of VA 12: *Alectryon oleifolius* (Bullock Bush) Low Open Shrubland.

6.2.13 VA 13: Atriplex nummularia (Old-man Saltbush) Plantation

VA 13 was located on the eastern plains of the Project Area (Figure 12). The plantations were comprised of *Atriplex nummularia* (Old-man Saltbush), which was likely to have been planted for sheep fodder or landscape stabilisation. As large dense chenopods are present within VA 13, it offers habitat for a range of passerine species including Chats and Grass Parrots. The dominant flora species within VA 13 are described in Table 26. A representative photo of VA 13 is shown in Figure 26.

Table 26. Summary of VA 13: *Atriplex nummularia* (Old-man Saltbush) Plantation.

Overstorey species	*Atriplex nummularia* (Old-man Saltbush) *Lycium australe* (Australian Boxthorn)
Midstorey species	*Enchylaena tomentosa* (Ruby Saltbush) *Maireana brevifolia* (Short-leaf Bluebush)
Understorey species	*Roepera crenata* (Notched Twinleaf)
Threatened species	None observed
Declared or significant weeds	*Carrichtera annua* (Ward's Weed) *Mesembryanthemum nodiflorum* (Slender Iceplant)

Figure 26. Representative photo of VA 13: *Atriplex nummularia* (Old-man Saltbush) Plantation.

6.2.14 VA 14: Triodia irritans (Spinifex) grassland +/- Emergent Eucalyptus oleosa ssp. oleosa (Red Mallee)

VA 14 was located near the centre of the Project Area, immediately east of Burra Creek. The area supporting VA 14 dominated the crest and upper slopes of hills, which are exposed to high winds, shallow soil depth and low rainfall. The presence of emergent *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee) as an overstorey species within VA 14 occurred on the crests of hills, while few scattered individuals occurred on hill slopes. The dense and spiny structure of *Triodia irritans* (Spinifex) means that the shrub is an important shrub species for reptiles, which take refuge within the hummocks. The dominant flora species within VA 14 are described in Table 27. A representative photo of VA 14 is shown in Figure 27.

Table 27. Summary of VA 14: *Triodia irritans* (Spinifex) Grassland +/- Emergent *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee).

Overstorey species	*Eucalyptus oleosa* ssp. *oleosa* (Red Mallee)
Midstorey species	*Lomandra effusa* (Scented Mat-rush) *Triodia irritans* (Spinifex)
Understorey species	*Erodium* sp. (Heron's-bill) *Medicago* sp. (Medic) *Ptilotus spathulatus* (Pussy-tails)
Threatened species	None observed
Declared or significant weeds	*Asphodelus fistulosus* (Onion Weed)

Figure 27. Representative photo of VA 14: *Triodia irritans* (Spinifex) Grassland +/- Emergent *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee).

6.2.15 VA 15: Dodonaea lobulata (Lobed-leaf Hop-bush) Shrubland

VA 15 was present in the far eastern ridge of the Project Area within a relatively small depression and surrounding gentle rocky slopes. The association had scattered emergent *Alectryon oleifolius* ssp. *canescens* (Bullock Bush) and *Callitris gracilis* (Southern Cyperus Pine), and was associated with the surrounding by Mallee (VA 5), which, combined with the relatively intact mid- and understorey, provided good structural diversity for habitat. The dominant flora species within VA 15 are described in Table 28. A representative photo of VA 15 is shown in Figure 28.

Table 28. Summary of VA 15: *Dodonaea lobulata* (Lobed-leaf Hop-bush) Shrubland.

Overstorey species	*Alectryon oleifolius* ssp. *canescens* (Bullock Bush) *Callitris gracilis* (Southern Cyperus Pine)
Midstorey species	*Beyeria lechenaultii* (Pale Turpentine Bush) *Dodonaea lobulata* (Lobed-leaf Hop-bush) *Rhagodia parabolica* (Mealy Saltbush)
Understorey species	*Atriplex stipitata* (Bitter Saltbush) *Vittadinia* sp. (New Holland Daisy)
Threatened species	None observed
Declared or significant weeds	*Moraea setifolia* (Thread Iris)

Figure 28. Representative photo of VA 15: *Dodonaea lobulata* (Lobed-leaf Hop-bush) Shrubland.

6.2.16 VA 16: Beyeria lechenaultii (Pale Turpentine Bush) Low Shrubland

VA 16 was sparsely present on eastern ridges on low gentle slopes where there was low soil cover and rock outcropping. This association occurred between areas that have been previously cleared and Mallee (VA 5) and is likely present as a transitional community slowing returning from clearance and loss of topsoil to a Mallee structure over time. The dominant flora species within VA 16 are described in Table 29. A representative photo of VA 16 is shown in Figure 29.

Table 29. Summary of VA 16: *Beyeria lechenaultii* (Pale Turpentine Bush) Low Shrubland.

Overstorey species	*Alectryon oleifolius* ssp. *canescens* (Bullock Bush) *Dodonaea viscosa* ssp. *angustissimus* (Narrow-leaf Hop-bush) *Hakea leucoptera* ssp. *leucoptera* (Silver Needlewood)
Midstorey species	*Beyeria lechenaultii* (Pale Turpentine Bush) *Maireana aphylla* (Cotton-bush) *Maireana astrotricha* (Low Bluebush)
Understorey species	*Atriplex stipitata* (Bitter Saltbush) *Enneapogon* sp. (Bottle-washers) *Sclerolaena obliquicuspis* (Oblique-spined Bindyi)
Threatened species	None observed
Declared or significant weeds	*Asphodelus fistulosus* (Onion Weed) *Nicotiana glauca* (Tree Tobacco)

Figure 29. Representative photo of VA 16: *Beyeria lechenaultii* (Pale Turpentine Bush) Low Shrubland.

6.2.17 VA 17: Phragmites australis (Common Reed) Grassland

VA 17 occurred along Burra Creek where in certain areas the dominant *Phragmites australis* (Common Reed) had formed dense stands. This association includes freshwater wetlands, which are a State endangered ecosystem (DEH 2001), and are likely to provide important habitat for fish, frogs, turtles and water birds. Given the relative low cover of wetlands in the region, VA 17 is of ecological importance. Freshwater wetlands and *P. australis* Grasslands are threatened by weed invasion and grazing, and it is likely that VA 17 would have occurred along Burra Creek from the north of the Project Area to the northern extent of VA 17 if not for substantial weed infestation and stock grazing and trampling. The dominant flora species within VA 17 are described in Table 30. A representative photo of VA 17 is shown in Figure 30.

Table 30. Summary of VA 17: *Phragmites australis* (Common Reed) Grassland.

Overstorey species	*Eucalyptus camaldulensis* ssp. *camaldulensis* (River Red Gum)
Midstorey species	*Phragmites australis* (Common Reed) *Typha domingensis* (Narrow-leaf Bulrush)
Understorey species	*Thyridia repens* (Creeping Monkey-flower) *Juncus subsecundus* (Finger Rush) *Cyperus gymnocaulos* (Spiny Flat-sedge)
Threatened species	None observed
Declared or significant weeds	*Onopordum acanthium* (Scotch Thistle)

Figure 30. Representative photo of VA 17: *Phragmites australis* (Common Reed) Grassland.

6.2.18 VA 18: Senna spp. (Senna) / Acacia rigens (Nealie) Mixed Shrubland

VA 18 occurred along rolling hills of the south-eastern ridges of the Project Area, south of Burra Creek. Tall shrubs including *Acacia rigens* (Nealie) and *Senna* spp. (Senna) dominated VA 18, with the dominate overstorey species of associated Mallee (VA 5) and woodland (VA 3, 10 and 12) communities occurring as scattered emergents.

VA 18 closer to Burra Creek was highly degraded due to stock grazing and drought conditions. Conditions gradually improved further south and between 4 and 6 km from Burra Creek the vegetation within VA 18 was in excellent condition with high floristic diversity, little impact from grazing and few weeds. The remaining mapped areas of VA 18 are yet to be ground truthed and therefore the condition of VA 18 across the entire Project Area remains unknown. The dominant flora species within VA 18 are described in Table 31. A representative photo of VA 18 is shown in Figure 31.

Table 31. Summary of VA 18: *Senna* spp. (Senna) / *Acacia rigens* (Nealie) Mixed Shrubland.

Overstorey species	*Alectryon oleifolius* ssp. *canescens* (Bullock Bush) *Callitris gracilis* (Southern Cyperus Pine) *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee)	
Midstorey species	*Acacia rigens* (Nealie) *Bursaria spinosa* (Bursaria) *Eremophila alternifolia* (Narrow-leaf Emubush) *Exocarpos aphyllus* (Leafless Cherry)	*Hakea leucoptera* ssp. *leucoptera* (Silver Needlewood) *Senna artemisioides* ssp. *coriacea* (Broad-leaf Desert Senna) *Senna artemisioides* ssp. *petiolaris*
Understorey species	*Austrostipa* sp. (Spear-grass) *Atriplex stipitata* (Bitter Saltbush) *Beyeria lechenaultii* (Pale Turpentine Bush) *Enchylaena tomentosa* (Ruby Saltbush)	*Eremophila glabra* (Tar Bush) *Lomandra effusa* (Scented Mat-rush) *Maireana brevifolia* (Short-leaf Bluebush) *Olearia pimeleoides* (Pimelea Daisy-bush)
Threatened species	None observed	
Declared or significant weeds	*Moraea setifolia* (Thread Iris)	

Figure 31. Representative photo of VA 18: *Senna* spp. (Senna) / *Acacia rigens* (Nealie) Mixed Shrubland.

6.2.19 VA 19: Nitraria billardierei (Nitre-bush) Low Shrubland

VA 19 occurred on a floodplain area between the eastern ridges of the Project Area, adjacent to Worlds End Highway, between Goyder Highway and Satchel Road. The species composition and structure of VA 19 was dominated by *Nitraria billardieri* (Nitre-bush) to 1 m high, with an understorey consisting of a low diversity of chenopod shrubs. The dominant flora species within VA 19 are described in Table 32. A representative photo of VA 19 is shown in Figure 32.

Table 32. Summary of VA 19: *Nitraria billardierei* (Nitre-bush) Low Shrubland.

Overstorey species	*Nitraria billardieri* (Nitre-bush)
Midstorey species	*Atriplex stipitata* (Bitter Saltbush) *Enchylaena tomentosa* (Ruby Saltbush) *Maireana aphylla* (Cotton-bush)
Understorey species	*Austrostipa* sp. (Spear-grass)
Threatened species	None observed
Declared or significant weeds	*Lycium ferocissimum* (African Boxthorn) *Moraea setifolia* (Thread Iris) *Onopordum acanthium* (Scotch Thistle)

Figure 32. Representative photo of VA 19: *Nitraria billardierei* (Nitre-bush) Low Shrubland.

6.2.20 VA 20: Maireana pyramidata (Black Bluebush) Low Shrubland

VA 20 occurred on a floodout area east of the far eastern ridge, north of Goyder Highway. VA 20 was dominated by *Maireana pyramidata* (Black Bluebush) up to 1 m in height, which offers habitat for a range of passerine species including Grass Parrots and Chats, with White-fronted Chats (*Epthianura albifrons*), Orange Chats (*Epthianura aurifrons*) and Crimson Chats (*Epthianura tricolor*) all observed in this association during the spring survey. The dominant flora species within VA 20 are described in Table 33. A representative photo of VA 20 is shown in Figure 33.

Table 33. Summary of VA 20: *Maireana pyramidata* (Black Bluebush) Low Shrubland.

Overstorey species	*Maireana pyramidata* (Black Bluebush)
Midstorey species	*Atriplex stipitata* (Bitter Saltbush) *Enchylaena tomentosa* (Ruby Saltbush) *Maireana brevifolia* (Short-leaf Bluebush)
Understorey species	*Roepera crenata* (Notched Twinleaf) *Sclerolaena obliquicuspis* (Oblique-spined Bindyi)
Threatened species	None observed
Declared or significant weeds	*Asphodelus fistulosus* (Onion Weed) *Carrichtera annua* (Ward's Weed) *Nicotiana glauca* (Tree Tobacco)

Figure 33. Representative photo of VA 20: *Maireana pyramidata* (Black Bluebush) Low Shrubland.

6.3 Flora

Ninety-nine (99) flora species were recorded within the Project Area during the broad vegetation mapping methodology. This included 74 native and 25 exotic species (Table 34).

Approximately 35 individuals of the nationally and State endangered *Dodonaea subglandulifera* (Peep Hill Hop-bush) (Figure 34) were observed in the southeast of the Project Area, within a good quality patch of *Eucalyptus porosa* (Mallee Box) Open Woodland (VA 3) (Figure 35). The habitat consisted of low hills with rocky outcrops. No other threatened flora species were observed during broad vegetation mapping, across the autumn and spring survey periods.

Table 34. Flora species observed in the Project Area during broad vegetation mapping.

Scientific name	Common name	Conservation status	
		Aus	SA
Acacia argyrophylla	Silver Mulga-bush		
Acacia pycnantha	Golden Wattle		
Acacia rigens	Nealie		
Acacia salicina	Broughton Willow		
Alectryon oleifolius ssp. *canescens*	Bullock Bush		
Allocasuarina verticillata	Drooping She-oak		
Aristida behriana	Brush Wire-grass		
**Asphodelus fistulosus*	Onion Weed		
**Asteriscus spinosus*	Golden Pallensis		
Atriplex nummularia	Old-man Saltbush		
Atriplex stipitata	Bitter Saltbush		
Austrostipa sp.	Spear-grass		
**Avena barbata*	Bearded Oats		
Beyeria lechenaultii	Pale Turpentine Bush		
Beyeria opaca	Dark Turpentine Bush		
**Bromus* sp.	Brome		
Bursaria spinosa	Bursaria		
Callitris gracilis	Southern Cyperus Pine		
**Carrichtera annua*	Ward's Weed		
**Cynara cardunculus*	Artichoke Thistle		
Cyperus gymnocaulos	Spiny Flat-sedge		
**Diplotaxis tenuifolia*	Lincoln Weed		
Dissocarpus paradoxus	Ball Bindyi		
Dodonaea baueri			
Dodonaea lobulata	Lobed-leaf Hop-bush		
Dodonaea subglandulifera	Peep Hill Hop-bush	EN	E
Dodonaea viscosa ssp.	Sticky Hop-bush		
Dodonaea viscosa ssp. *angustissimus*	Narrow-leaf Hop-bush		
**Echium plantagineum*	Salvation Jane		
Enchylaena tomentosa	Ruby Saltbush		
Enneapogon sp.	Bottlewashers		
Eremophila alternifolia	Narrow-leaf Emubush		
Eremophila glabra	Tar Bush		
Erodium sp.	Heron's-bill		

Scientific name	Common name	Conservation status	
		Aus	SA
Eucalyptus camaldulensis ssp. *camaldulensis*	River Red Gum		
Eucalyptus leucoxylon ssp. *pruinosa*	Inland South Australian Blue Gum		
Eucalyptus odorata	Peppermint Box		
Eucalyptus oleosa ssp. *oleosa*	Red Mallee		
Eucalyptus porosa	Mallee Box		
Euphorbia drummondii	Caustic Weed		
Exocarpos aphyllus	Leafless Cherry		
**Gomphocarpus cancellatus*	Broad-leaf Cottonbush		
Hakea leucoptera ssp. *leucoptera*	Silver Needlewood		
**Hordeum leporinum*	Wall Barley-grass		
**Hordeum vulgare*	Barley		
Juncus flavidus	Yellow Rush		
Juncus subsecundus	Finger Rush		
**Juncus usitatus*	Common Rush		
**Lolium rigidum*	Wimmera Ryegrass		
**Lolium* sp.	Ryegrass		
Lomandra effusa	Scented Mat-rush		
Lomandra multiflora ssp. *dura*	Hard Mat-rush		
Lycium australe	Australian Boxthorn		
**Lycium ferocissimum*	African Boxthorn		
Maireana aphylla	Cotton-bush		
Maireana astrotricha	Low Bluebush		
Maireana brevifolia	Short-leaf Bluebush		
Maireana erioclada	Rosy Bluebush		
Maireana georgei	Satin Bluebush		
Maireana pyramidata	Black Bluebush		
Maireana sedifolia	Pearl Bluebush		
**Marrubium vulgare*	Horehound		
**Medicago* sp.	Medic		
Melaleuca lanceolate	Dryland Tea-tree		
**Mesembryanthemum nodiflorum*	Slender Iceplant		
**Moraea setifolia*	Thread Iris		
Myoporum platycarpum	False Sandalwood		
**Nicotiana glauca*	Tree Tobacco		
Nitraria billardierei	Nitre-bush		
**Olea europaea*	Olive		
Olearia muelleri	Mueller's Daisy-bush		
Olearia pimeleoides	Pimelea Daisy-bush		
**Onopordum acanthus*	Scotch Thistle		
**Onopordum acaulon*	Horse Thistle		
Oxalis perennans	Native Sorrel		
Phragmites australis	Common Reed		
Pittosporum angustifolium	Native Apricot		
Ptilotus obovatus	Silver Mulla Mulla		
Ptilotus spathulatus	Pussy-tails		
Rhagodia candolleana	Berry Saltbush		

Scientific name	Common name	Conservation status	
		Aus	SA
Rhagodia parabolica	Mealy Saltbush		
Rhagodia spinescens	Spiny Saltbush		
Roepera crenata	Notched Twinleaf		
Rytidosperma caespitosum	Common Wallaby-grass		
Rytidosperma sp.	Wallaby-grass		
**Salvia verbenaca*	Wild Sage		
Sclerolaena diacantha	Grey Copperburr		
Sclerolaena obliquicuspis	Oblique-spindled Bindyi		
Senna artemisioides ssp. *coriacea*	Broad-leaf Desert Senna		
Senna artemisioides ssp. *petiolaris*			
Themeda triandra	Kangaroo Grass		
Thyridia repens	Creeping Monkey-flower		
**Trifolium* sp.	Clover		
Triodia irritans	Spinifex		
Typha domingensis	Narrow-leaf Bulrush		
Vittadinia australasica	Sticky New Holland Daisy		
Vittadinia cuneata	Fuzzy New Holland Daisy		
Vittadinia gracilis	Woolly New Holland Daisy		
Vulpia myuros	Rat's-tail Fescue		

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. Mi: Migratory. *: denotes exotic species.1: EPBC Protected Matters Search Tool. 2: Biological Database of South Australia.

Figure 34. Photo of *Dodonaea subglandulifera* (Peep Hill Hop-bush) within the Project Area.

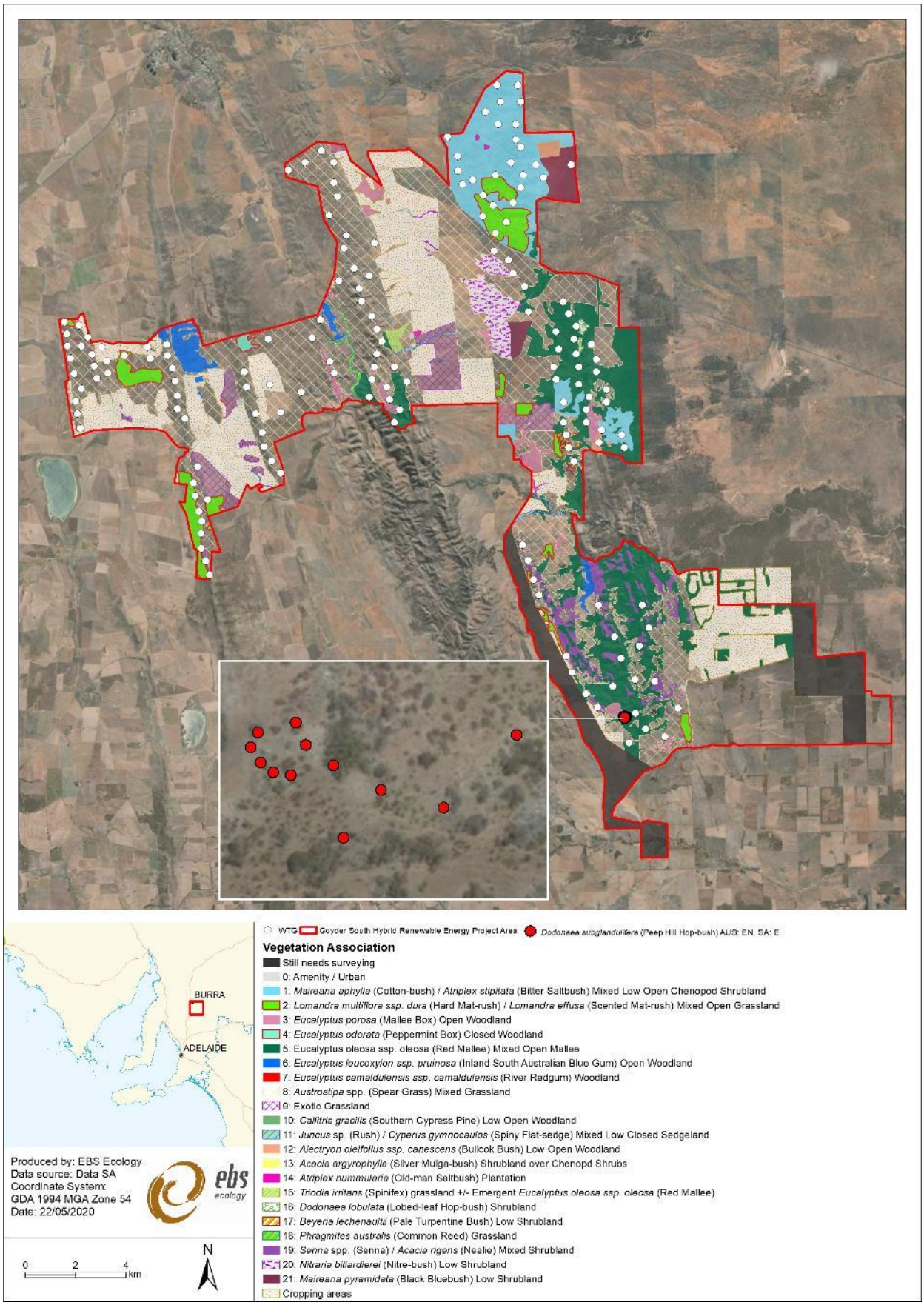


Figure 35. Observations of *Dodonaea subglandulifera* (Peep Hill Hop-bush) within the Project Area.

6.4 Fauna

Ninety-two (92) fauna species were recorded over the Project Area during the field assessments during autumn and spring 2019 (Table 35). The fauna assemblage comprised of 76 bird (from 55-point count and 19 opportunistic observations), 10 mammals (including two opportune observations), five reptile and one amphibian species. Six introduced fauna species were recorded, while the remaining 86 fauna species were indigenous to the area.

Table 35. Fauna species observed within the Goyder Project Area.

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Autumn 2019	Spring 2019
AMPHIBIA	**Amphibians**				
Crinia signifera	Common Froglet			✓	
AVES	**Birds**				
Acanthagenys rufogularis	Spiny-cheeked Honeyeater			✓	✓
Acanthiza nana^	Yellow Thornbill			✓	
Acanthiza uropygialis	Chestnut-rumped Thornbill			✓	✓
Accipiter cirrocephalus cirrocephalus	Collared Sparrowhawk			✓	
Accipiter fasciatus	Brown Goshawk				✓
Acrocephalus australis	Australian Reed-Warbler				✓
Aegotheles cristatus	Australian Owlet-nightjar				✓
Anas gracilis^	Grey Teal			✓	
Anthochaera carunculata	Red Wattlebird			✓	✓
Anthus australis	Australian Pipit			✓	
Aphelocephala leucopsis	Southern Whiteface			✓	✓
Aquila audax	Wedge-tailed Eagle			✓	✓
Artamus cyanopterus	Dusky Woodswallow			✓	✓
Barnardius zonarius barnardi	Mallee Ringneck			✓	✓
Chrysococcyx basalis	Horsfield's Bronze-Cuckoo				✓
Chenonetta jubata^	Maned Duck			✓	
Climacteris picumnus	Brown Treecreeper			✓	✓
Colluricincla harmonica	Grey Shrike-thrush			✓	✓
Coracina novaehollandiae	Black-faced Cuckooshrike				✓
Corcorax melanorhamphos	White-winged Chough		R	✓	✓
Corvus mellori	Little Raven			✓	✓
Cracticus torquatus	Grey Butcherbird			✓	✓
Dacelo novaeguineae	Laughing Kookaburra				✓
Daphoenositta chrysoptera	Varied Sittella				✓
Dicaeum hirundinaceum^	Mistletoebird			✓	
Dromaius novaehollandiae	Emu				✓
Egretta novaehollandiae	White-faced Heron			✓	✓
Eolophus roseicapilla	Galah			✓	✓
Epthianura albifrons^	White-fronted Chat			✓	✓
Epthianura aurifrons^	Orange Chat				✓
Epthianura tricolor^	Crimson Chat				✓
Falco berigora^	Brown Falcon				✓
Falco cenchroides	Nankeen Kestrel			✓	✓

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Autumn 2019	Spring 2019
Gavicalis virescens	Singing Honeyeater			✓	✓
Geopelia placida^	Peaceful Dove				✓
Grallina cyanoleuca	Magpielark			✓	✓
Gymnorhina tibicen	Australian Magpie			✓	✓
Hirundo neoxena^	Welcome Swallow			✓	
Lichenostomus ornatus	Yellow-plumed Honeyeater				✓
Malurus lamberti	Variegated Fairywren				✓
Malurus splendens	Splendid Fairy-wren				✓
Manorina flavigula	Yellow-throated Miner			✓	✓
Megalurus gramineus	Little Grassbird				✓
Melanodryas cucullata cucullata	Hooded Robin		R		✓
Melithreptus brevirostris	Brown-headed Honeyeater				✓
Microcarbo melanoleucos melanoleucos	Little Pied Cormorant			✓	✓
Microeca fascinans fascinans	Jacky Winter				✓
Myiagra cyanoleuca^	Satin Flycatcher		E	✓	
Myiagra inquieta^	Restless Flycatcher		R		✓
Neophema elegans^	Elegant Parrot		R	✓	
Nesoptilotis leucotis	White-eared Honeyeater			✓	✓
Ocyphaps lophotes	Crested Pigeon			✓	✓
Pachycephala pectoralis	Golden Whistler			✓	✓
Pachycephala rufiventris	Rufous Whistler			✓	✓
Pardalotus punctatus	Spotted Pardalote			✓	✓
Pardalotus striatus	Striated Pardalote			✓	✓
*Passer domesticus**	House Sparrow			✓	✓
Petrochelidon nigricans	Tree Martin				✓
Petroica goodenovii	Red-capped Robin				✓
Phaps chalcoptera	Common Bronzewing				✓
Platycercus elegans	Crimson Rosella			✓	✓
Pomatostomus ruficeps^	Chestnut-crowned Babbler				✓
Pomatostomus superciliosus	White-browed Babbler			✓	✓
Psephotellus varius^	Mulga Parrot			✓	
Psephotus haematonotus	Red-rumped Parrot			✓	✓
Ptilotula penicillata	White-plumed Honeyeater			✓	✓
Pyrrholaemus brunneus	Redthroat				✓
Rhipidura albiscapa	Grey Fantail			✓	✓
Rhipidura leucophrys	Willie Wagtail			✓	✓
Smicrornis brevirostris	Weebill			✓	✓
Stagonopleura guttata	Diamond Firetail		V	✓	
Strepera versicolor^	Grey Currawong				✓
*Sturnus vulgaris**	Common Starling			✓	✓
Tadorna tadornoides^	Australian Shelduck				✓
Vanellus miles^	Masked Lapwing				✓
Vanellus tricolor^	Banded Lapwing				✓
MAMMALIA	**Mammals**				
Austronomous australis	White-striped Freetail Bat			✓	✓

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Autumn 2019	Spring 2019
*Cervus dama**	Fallow Deer			✓	
Chalinolobus gouldii	Gould's Wattled Bat			✓	✓
*Lasiorhinus latifrons^*	Southern Hairy-nosed Wombat			✓	✓
*Lepus europaeus**	European Hare				✓
Macropus fuliginosus	Western Grey Kangaroo			✓	
Macropus robustus	Euro			✓	
*Macropus rufus^*	Red Kangaroo			✓	
Nyctophilus geoffroyi	Lesser Long-eared Bat			✓	✓
*Oryctolagus cuniculus**	Rabbit (European Rabbit)			✓	✓
Ozimops sp.	Free-tailed Bats			✓	✓
Tachyglossus aculeatus	Short-beaked Echidna			✓	✓
Vespadelus regulus	Southern Forest Bat			✓	✓
*Vulpes vulpes**	Fox (Red Fox)			✓	
REPTILIA	**Reptiles**				
Ctenophorus decresii	Tawny Dragon			✓	✓
Diplodactylus tessellatus	Tessellated Gecko			✓	✓
Menetia greyii	Common Dwarf Skink			✓	
Tiliqua adelaidensis	Pygmy Blue-tongue Lizard			✓	✓
Tiliqua rugosa	Sleepy Lizard				✓

Conservation status

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). Conservation Codes: **CR/CE:** Critically Endangered. **EN/E**: Endangered. **VU/V:** Vulnerable. **R:** Rare. ssp.: the conservation status applies at the sub-species level. **Mi**: listed as migratory under the EPBC Act. **Ma**: listed as marine under the EPBC Act. *denotes exotic species. ^denotes opportunistic observations.

6.4.1 Amphibians

One amphibian species, the Common Froglet (*Crinia signifera*) was opportunistically heard in Burra Creek within the Project Area (Table 35). Other frog species may occur in the Project Area; however, the autumn field assessment was conducted outside the calling period (breeding season) for these species, and frog species were not targeted during the spring survey.

6.4.2 Reptiles

Five reptile species were recorded over the Project Area (Table 35). Three species were recorded during searches using videoscopes within spider holes:

- Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*) (24 individuals);
- Common Dwarf Skink (*Menetia greyii*) (two individuals); and
- Tessellated Gecko (*Diplodactylus tessellatus*) (two individuals).

Numerous Sleepy Lizards (*Tiliqua rugosa*) and Tawny Dragons (*Ctenophorus decresii*) were opportunistically observed across the Project Area and in rocky outcrop areas along the ridgelines of the Project Area.

Flinders Ranges Worm-lizards

An area consisting of *Austrostipa* sp. (Spear-grass) Grassland with flat surface rocks, appeared to be suitable habitat for the Flinders Ranges Worm-lizard however it was recorded outside of the Project Area, on a ridgeline to the north-west.

Pygmy Blue-tongue Lizards

Due to the timing of the PBTL survey, dry conditions and grazing pressure, most grassland areas had low grass cover and the surveyors had no difficulty locating spider burrows. Across both autumn and spring surveys, a total 1,076 spider burrows were inspected for PBTLs along 41 transects across the Project Area, with 24 PBTLs observed (Figure 36 and Figure 37). It should be noted that numbering of transects is not sequential in Figure 36, due to the fact the Project Area has reduced in size since survey work first began.

Possible and likely PBTL habitat was mapped across the Project Area based on the observation of PBTLs and the presence of suitable habitat characteristics (see Section 7.3.1), which was concentrated to the western side of the Project Area (Figure 36). Overall, 450.324 ha of possible habitat and 47.449 ha of likely habitat for PBTLs occurred within the Project Area.

The majority of the potential PBTL habitat east of Burra Creek was highly degraded due to a combination of dry conditions and high grazing pressure, including a large area where cattle grazing had caused extensive damage to the surface of the soil. Potential PBTL habitat assessed along the far eastern range, and north of Goyder Hwy was considered unsuitable, based on the shallow and rocky soil. Areas that had previously been ploughed and cropped were deemed unsuitable PBTL habitat. Recommendations that address the PBTL are provided later in this report (Sections 7.3.1, 8.1.3, 8.2.3 and 8.3.1).

At the time of publishing this report (May 2020), there are properties and areas in the southeast of the Project Area remaining that are yet to be assessed for PBTL occurrence/habitat.

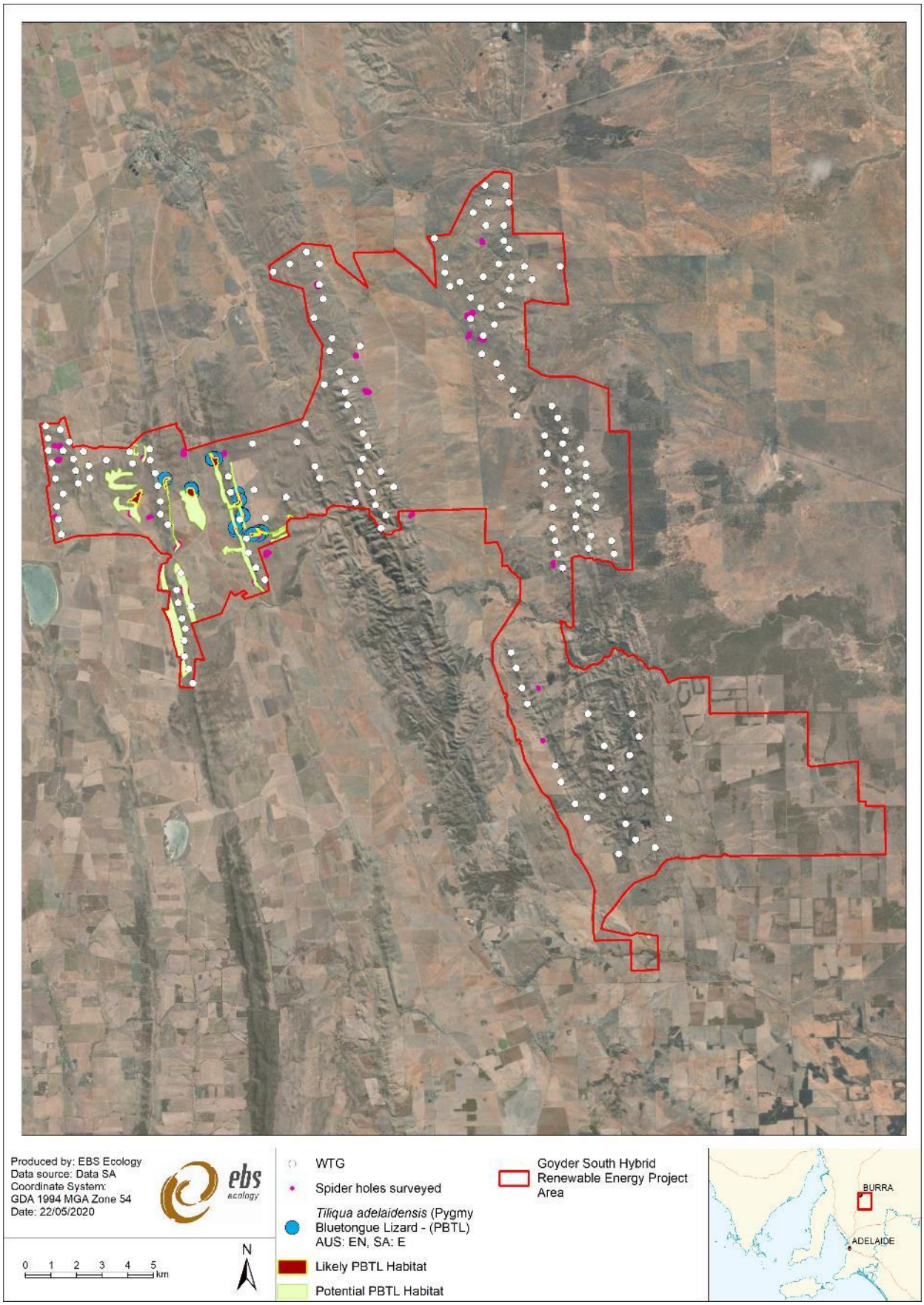


Figure 36. PBTL search effort across the Project Area: records (blue dot), spider holes surveyed (small pink dot), likely habitat (maroon polygon) and potential habitat (green polygon).

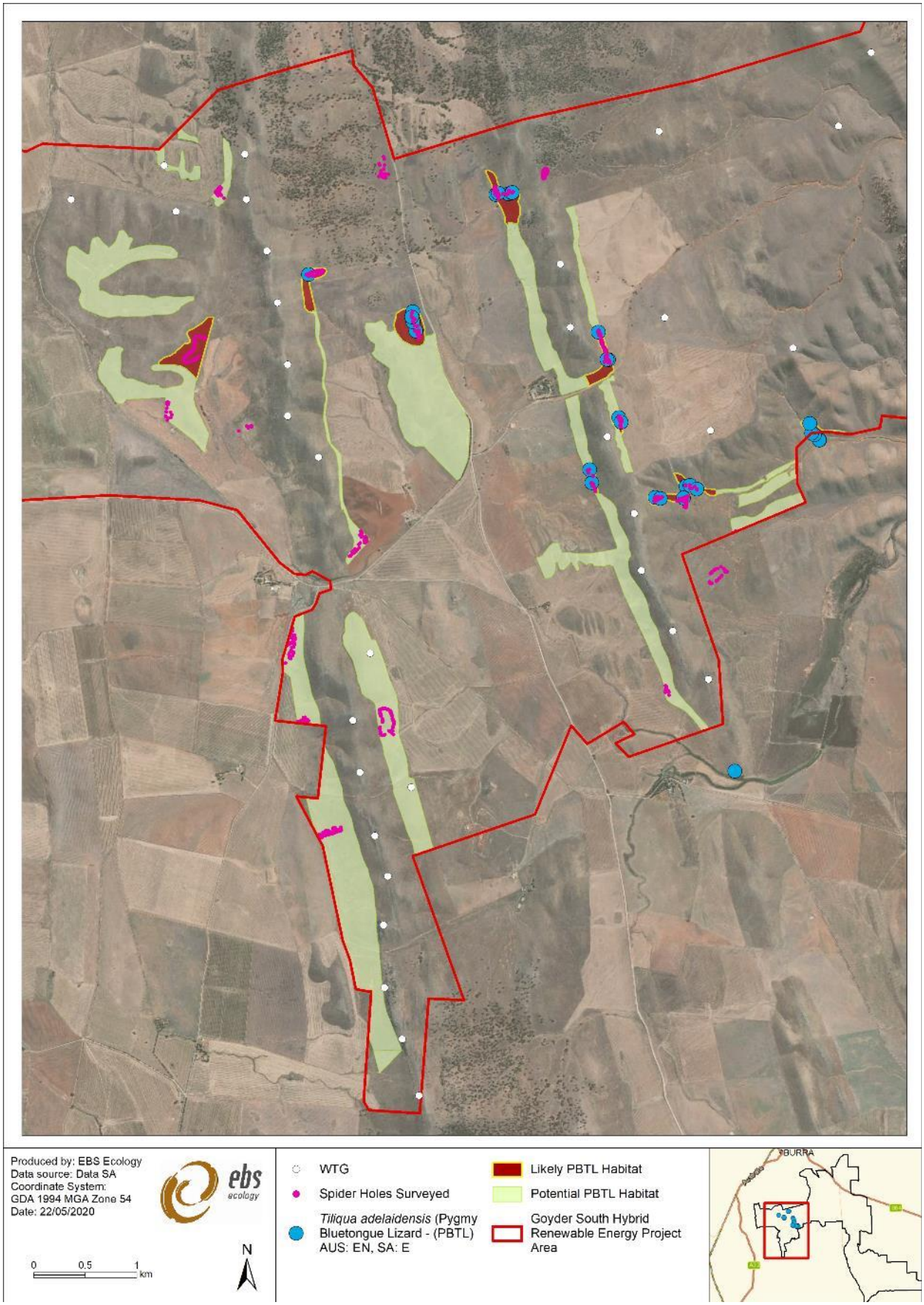


Figure 37. Enlarged image of the north-western section of the Project Area showing PBTL records.

6.4.3 Mammals (ground-dwelling)

Ten ground-dwelling mammal species were recorded over the Project Area (Table 35). The native mammal species recorded were the Southern Hairy-nosed Wombat (SHNW) (*Lasiorhinus latifrons*), Red Kangaroo (*Macropus rufus*), Western Grey Kangaroo (*Macropus fuliginosus*), Euro (*Macropus robustus*) and Short-beaked Echidna (*Tachyglossus aculeatus*). All macropod species (kangaroos and Euro) were abundant and widespread over the Project Area. Four of the ten ground-dwelling mammal species recorded were introduced species: Fallow Deer (*Cervus dama*), Hare (*Lepus europaeus*), Rabbit (*Oryctolagus cuniculus*) and Red Fox (*Vulpes vulpes*). No national or State threatened ground dwelling mammal species were recorded in the Project Area during the field assessments conducted in autumn and spring 2019.

Southern Hairy-nosed Wombats

Two SHNWs and several active burrow systems (warrens) were observed during the field surveys in autumn and spring 2019 (Figure 38). All wombats and warrens were observed in proximity to drainage lines within the Project Area. GPS waypoints were used to locate the warrens and aerial imagery was used to map the extent of the warrens (Figure 38).

6.4.4 Bats

Five bat species were identified from the sonograms recorded by AnaBat units over four sites, surveyed across both autumn and spring survey periods, in the Project Area (Table 36) (Figure 8, page 29). The Gould's Wattled Bat (*Chalinolobus gouldii*) and Free-tailed Bats (*Ozimops* sp.) was recorded at all four AnaBat sites. The White-striped Freetail Bat (*Austronomous australis*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*) and Southern Forest Bat (*Vespadelus regulus*) were recorded at three sites. No national or State threatened bat species were recorded in the Project Area during the field assessments in autumn and spring 2019.

Table 36. Bats recorded over the four AnaBat sites established over the Project Area.

Species	Common name	ANA 001	ANA 004	ANA 005	ANA 007	ANA 008
Austronomous australis	White-striped Freetail Bat	✓	✓	✓	✓	
Chalinolobus gouldii	Gould's Wattled Bat	✓	✓	✓	✓	✓
Nyctophilus geoffroyi	Lesser Long-eared Bat	✓		✓	✓	✓
Ozimops sp.	Free-tailed Bats	✓	✓	✓	✓	✓
Vespadelus regulus	Southern Forest Bat	✓		✓	✓	✓

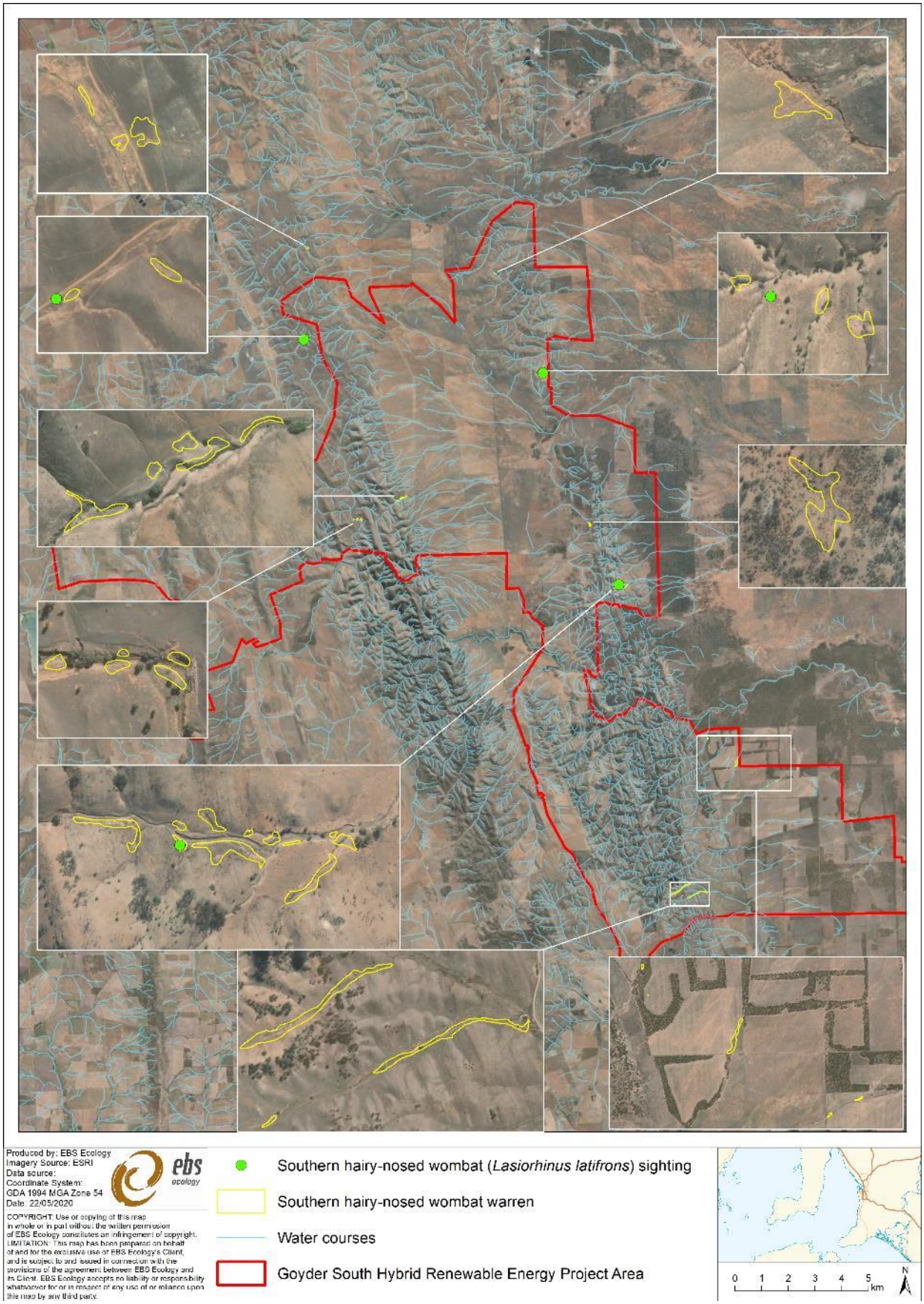


Figure 38. SHNW records (green dots) and warrens (yellow polygons) within the Project Area. Two SHNWs were recorded at the green dot in the southeast of the Project Area. Major drainage lines are shown (blue lines).

6.4.5 Birds

Fifty-seven (57) bird species were recorded during point count surveys across the two survey periods, with an additional 19 species recorded opportunistically (Appendix 3). The bird families with the greatest representation in the Project Area were Meliphagidae (honeyeaters), Acanthizidae (Australasian warblers) and Psittaculidae (parrots). Two introduced bird species were recorded within the Project Area: Common Starling (*Sturnus vulgaris*) and (*Turdus merula*) and House Sparrow (*Passer domesticus*).

A total of 587 birds were recorded across the 25 point counts established over the Project Area (Appendix 3). The species recorded at the greatest number of point count sites were Little Raven (*Corvus mellori*), Striated Pardalote (*Pardalotus striatus*) and Weebill (*Smicrornis brevirostris*) (all at 14 sites), Galah (*Eolophus roseicapilla*) (13 sites) and Australian Magpie (*Gymnorhina tibicen*) (12 sites). The most abundant species at point count sites were Galah (*Eolophus roseicapilla*) (98 individuals), Weebill (*Smicrornis brevirostris*) (65 individuals), Little Raven (*Corvus mellori*) (44 individuals), and Striated Pardalote (*Pardalotus striatus*) (36 individuals).

The point count sites with the highest average cumulative (i.e. autumn + spring) species richness occurred in the following habitats:

- VA 3: *Eucalyptus porosa* (Mallee Box) Open Woodland;
- VA 5: *Eucalyptus oleosa* ssp. *oleosa* (Red Mallee) Mixed Open Mallee;
- VA 6: *Eucalyptus leucoxylon* ssp. *pruinosa* (Inland South Australian Blue Gum) Open Woodland; and
- VA 11: *Juncus* sp. / *Cyperus gymnocaulos* (Spiny Flat-sedge) Low Closed Sedgeland.

A map showing the spread of habitats with high bird species richness is shown in Figure 39.

No nationally listed threatened bird species were recorded over the Project Area during both the autumn and spring 2019 survey. However, six State threatened fauna species were recorded within the Project Area (Table 35):

- White-winged Chough (*Corcorax melanorhamphos*) – State Rare;
- Elegant Parrot (*Neophema elegans*) – State Rare;
- Hooded Robin (*Melanodryas cucullata cucullata*) – State Rare;
- Satin Flycatcher (*Myiagra cyanoleuca*) - State Endangered;
- Diamond Firetail (*Stagonopleura guttata*) – State Vulnerable; and
- Restless Flycatcher – State Rare (observed just outside the Project Area).

These species are discussed in more detail in Section 7.3.2. A map showing the locations of State threatened bird observations is shown in Figure 39.

Porter's Lagoon was surveyed opportunistically during the spring 2019 survey to determine if any migratory wader species were present. Sixteen (16) species and 42 individuals were recorded at Porter's Lagoon (Appendix 4).

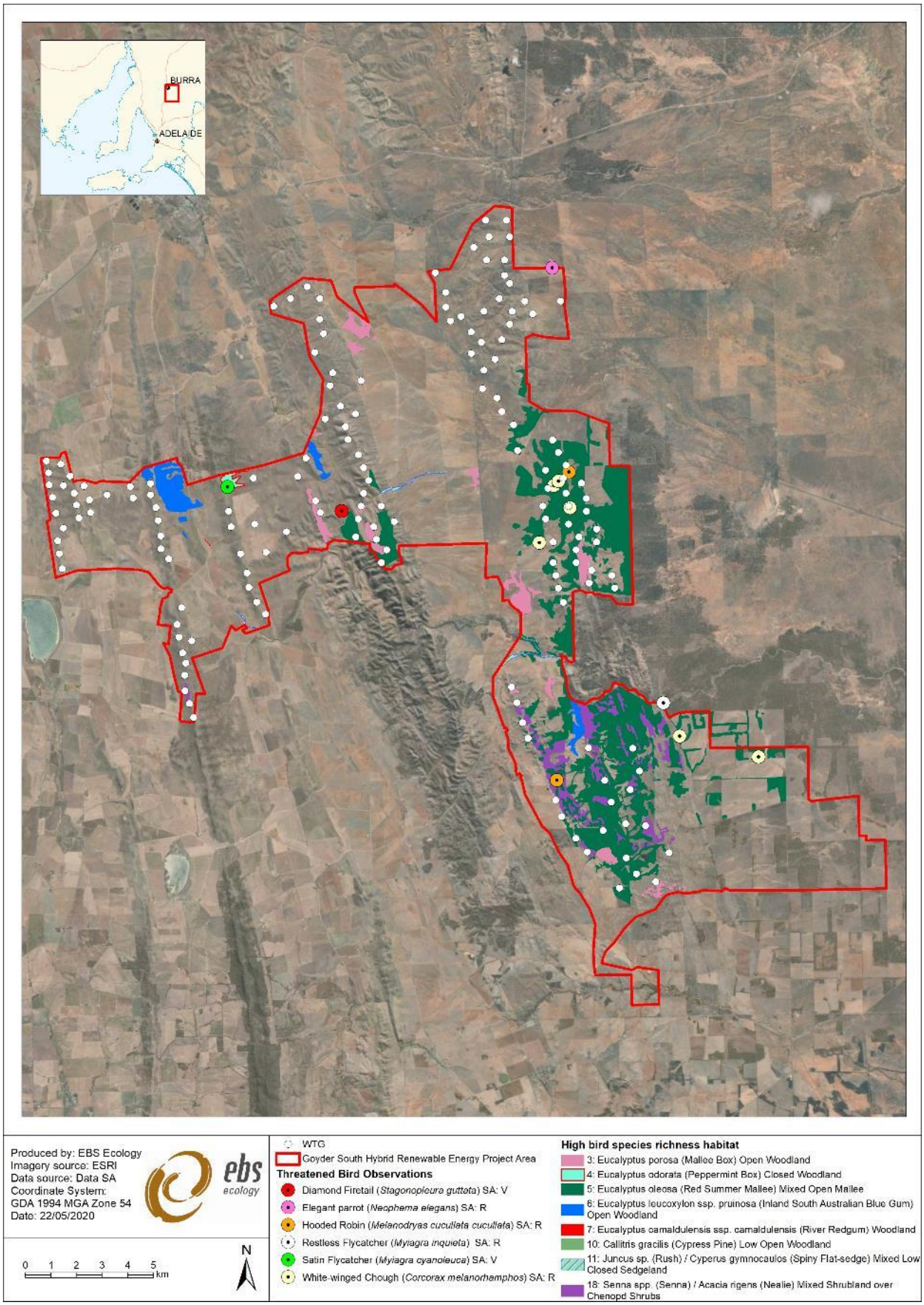


Figure 39. Locations of threatened bird observations and habitats that had high bird species richness.

6.5 Raptor Species

6.5.1 Peregrine Falcon (Falco peregrinus)

The Peregrine Falcon was targeted during both the autumn and spring 2019 surveys. While this species was recorded during the spring 2019 survey (whereby a single bird was observed sitting on a WTE nest), this record was outside of the current Project boundary. It is expected that this species is likely to utilise the Project Area for both foraging and breeding and that additional surveys would most likely detect more than one individual.

6.5.2 Wedge-tailed Eagle (Aquila audax)

A total of six WTE nests (Figure 40) were recorded over the Project Area during the autumn and spring field assessment periods (Table 37). These nests were primarily restricted to mid-slope areas of ridgelines that supported *E. odorata* woodland (Figure 41) however, an isolated nest was also recorded in *E. porosa* open woodland (Nest 15).

The condition of nests was variable, with four nests in good condition and two nests in poor condition. WTEs were also observed to be sitting on two nests (both of which were determined as being in 'good' condition), detected during the spring survey: Nest 13 and Nest 14. Each of the WTE nests were allocated a 1 km buffer regardless of condition, within which no turbines are to be constructed. WTE pairs are known to reuse nest locations across varying seasons, which is why the buffer was applied to all nests.

Table 37. Wedge-tailed Eagle nests and their condition recorded over the Project Area during the field assessment.

Nest ID	Easting	Northing	Condition*	Comment	VA Description
9	310114	6260901	Good		*Eucalyptus odorata* (Peppermint Box) Closed Woodland
11	307434	6263043	Poor		*Eucalyptus leucoxylon* ssp. *pruinosa* (South Australian Blue Gum) Open Woodland
12	307318	6263633	Poor	Two WTEs observed near nest (Autumn)	*Eucalyptus leucoxylon* ssp. *pruinosa* (South Australian Blue Gum) Open Woodland
13	314152	6260431	Good	Observed adult WTE on nest (Spring)	*Eucalyptus leucoxylon* ssp. *pruinosa* (South Australian Blue Gum) Open Woodland
14	310668	6260634	Good	Observed adult WTE on nest (Spring)	*Eucalyptus odorata* (Peppermint Box) Closed Woodland
15	325681	6245438	Good		*Eucalyptus porosa* (Mallee Box) open woodland

***Nest condition as of most recent (spring 2019) assessment. Note: Nest ID is not sequential as the Project boundary has changed since survey work was completed.**

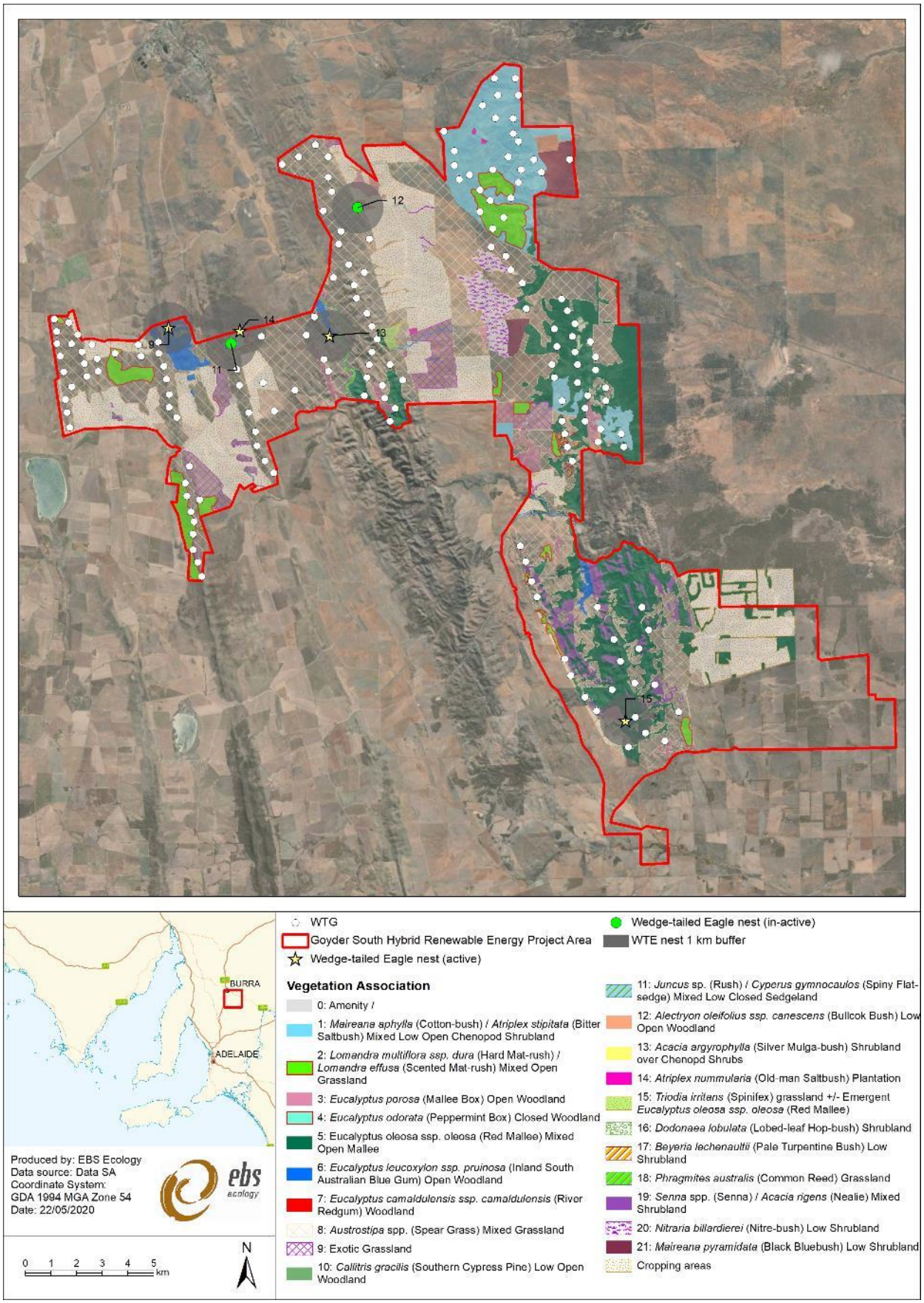


Figure 40. Location of WTE nests recorded over the Project Area with respect to the Vegetation Associations present.

Figure 41. An adult WTE observed on Nest 13 (defined as being in 'good' condition), within the Project Area.

6.6 Habitat attributes

Additional to the VAs discussed in Section 6.2, and PBTL and SHNW habitat discussed in Sections 6.4.2 and 6.4.3, other key habitat features within the Project Area included:

- Numerous creeklines and low lying areas – providing ephemeral flowing water and pooled water potentially utilised by a range of terrestrial and aquatic fauna (Figure 42). Burra Creek was flowing at the time of the surveys. It should be noted that fish and aquatic fauna were not assessed as part of this Project; fish are not currently listed under the NPW Act and are not provided in database searches from DEW;
- Dams – providing an artificial water source and foraging habitat for bats and waterfowl;
- Small surface rock in pasture and woodland areas, and large exposed rock faces in woodlands (Figure 43) and along creeklines – providing habitat for reptiles and refuge for threatened plants; and
- Tree hollows – present in all woodland and Mallee VAs in live and standing and fallen dead trees, providing habitat particularly for birds, bats, small mammals and reptiles (Figure 44).

Figure 42. A small wetland along Burra Creek within the Project Area.

Figure 43. Rocky outcrop in woodland habitat within the Project Area.

Figure 44. A tree hollow within the Project Area.

7 DISCUSSION

7.1 Threatened Ecological Communities

Two TECs were determined as likely to occur, and are known to the Project Area from the autumn and spring 2019 surveys and from previous surveys completed by EBS at Stony Gap (see Figure 48).

7.1.1 Iron-grass Natural Temperate Grassland of South Australia

Iron-grass Natural Temperate Grassland of South Australia (INTG) is listed as Critically Endangered under the EPBC Act. INTGs are unique to South Australia and are predominantly distributed on the slopes and hills of the Mount Lofty Ranges, west of the River Murray and throughout the Mid North.

INTG TEC comprises a grassland dominated by *Lomandra multiflora* ssp. *dura* and/or *Lomandra effusa* (Iron-grasses), with tussock-forming (clumping) grasses, low shrubs and a range of other native plants in the ground layer. Trees and tall shrubs are generally absent or very sparse (less than 10 % cover). To qualify as the EPBC listed community, patches must be at least 0.1 ha in size and meet native species diversity and density criteria (DEWR 2007).

Fifteen (15) INTG patches (VA 2) were observed within the Project Area (Figure 12; Figure 45). All INTG patches observed were in poor to very poor condition, with low native species diversity and low to moderate tussock density. This is most likely due to drought conditions and grazing pressure.

Conditions during the autumn and spring 2019 surveys were poor due to:

- Below average annual rainfall in 2017 and 2018 (Commonwealth of Australia 2019);
- Below average monthly rainfall in January, February, March, April, June, July and August of 2019 (Commonwealth of Australia 2019); and
- Compounding grazing pressure.

When assessed against the criteria outlined in the *EPBC Act Policy Statement 3.7, Nationally Threatened Species and Ecological Communities, Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia*, none of the 15 INTG patches observed in 2019 qualified as Class A, B or C, as each patch did not have a native species diversity of greater than five species. However, given the poor conditions during the autumn and spring 2019 surveys, INTG patches will need to be assessed against the criterion to determine their condition class in more favourable conditions. If conditions do not improve before construction, it is recommended that as a worst case scenario, these INTG patches qualify as a TEC, and are addressed as part of the EPBC Referral process.

Seven patches of INTG were assessed in October 2012 (EBS 2013a), against the criteria outlined in the *EPBC Act Policy Statement 3.7, Nationally Threatened Species and Ecological Communities, Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia*. One of the patches assessed (patch seven) qualified as class B and was therefore listed as a national TEC (Figure 45).

7.1.2 Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia

Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia was listed as Critically Endangered under the EPBC Act in 2007, due to a severe decline in distribution and an ongoing loss of integrity. The dominant tree species is *E. odorata*, however, other species of Eucalypt commonly co-occur. A grassy understorey is most often present, although some shrubs may exist such as *Bursaria spinosa* (Bursaria) and *Acacia pycnantha* (Golden Wattle). The majority of remnants occur between Victor Harbor and Port Augusta, encompassing the mid-north region, as well as the Adelaide region, Mount Lofty Ranges and part of Yorke Peninsula.

Three patches of *E. odorata* Woodland (VA 4) were observed within the Project Area (Figure 12). The understorey of VA 4 was highly modified due to grazing from stock and kangaroos. Areas less degraded from grazing occurred on steep, rocky slopes where stock were less likely or unable to graze. These steep, rocky slopes may have moderate species richness following winter and spring rainfall.

When assessed against the criteria outlined in the *EPBC Act Policy Statement 3.7, Nationally Threatened Species and Ecological Communities, Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia*, the single *E. odorata* patch observed in 2019 did not qualify as an ecological community, since it did not contain at least 15 native plant species. Classes A and B are indicative of the listed ecological community, with areas of condition Class A, being considered the highest quality representation of the TEC.

Although there was only a singular patch of VA 4 recorded within the Project Area, it was considered of high value for fauna, as trees provide nesting habitat for the Wedge-tailed Eagle and hollows for bird and bat species to roost and nest. The State Endangered Satin Flycatcher *(Myiagra cyanoleuca*) was also recorded within this VA.

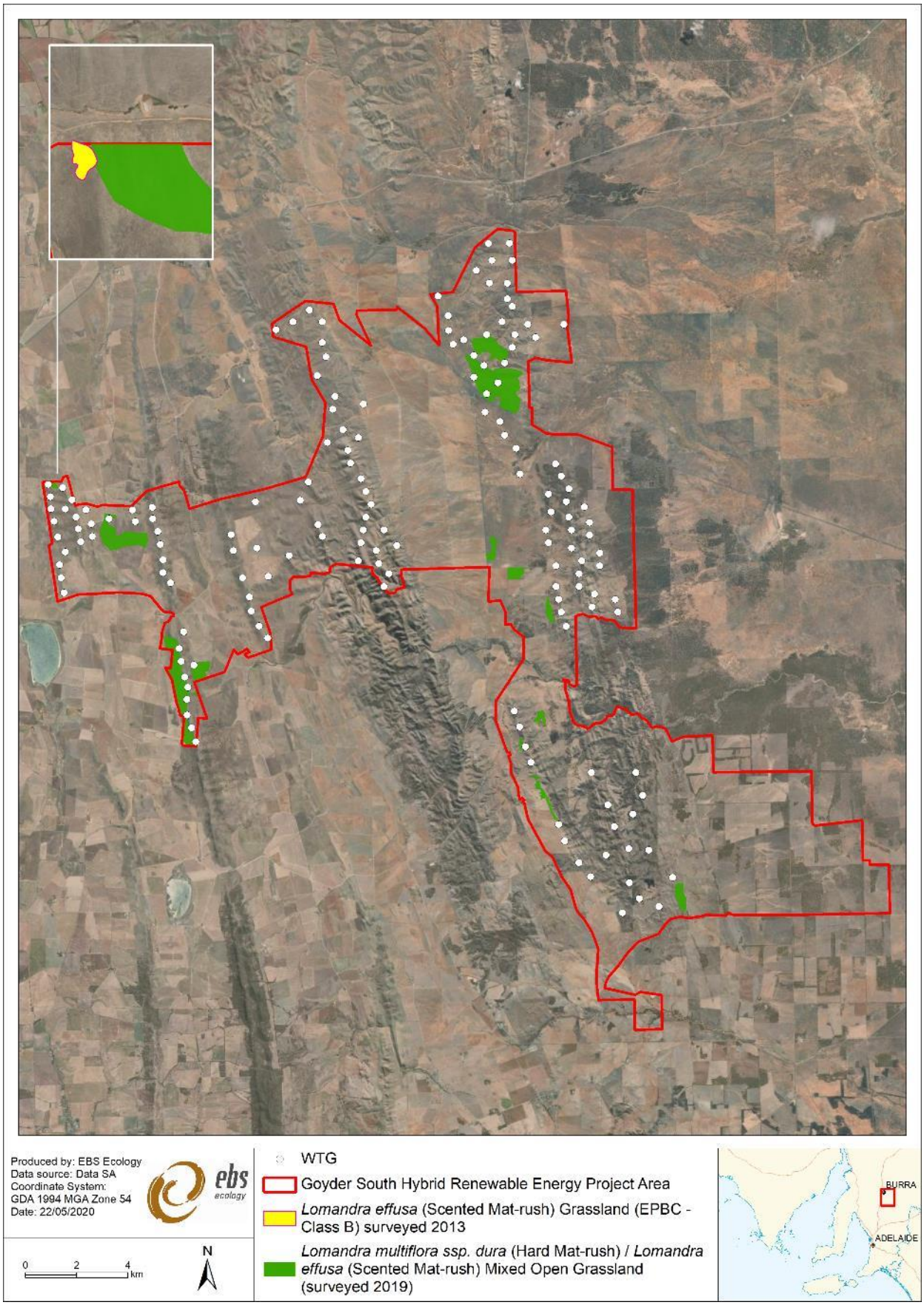


Figure 45. INTG within the Project Area.

7.2 Flora

Given the size of the Project Area, the scope to broadly map VAs, and the need for detailed native vegetation assessments in the future (e.g. native vegetation clearance assessments, targeted EPBC assessments in proposed infrastructure areas), not all flora species within the Project Area were recorded.

Conditions during the autumn and spring 2019 surveys were poor (see Section 7.1) and it is likely that more flora species, including threatened species, may occur in Project Area and will be recorded during planned native vegetation assessments, particularly if conditions improve. The threatened flora species that are likely to occur within the Project Area are discussed below in Section 7.2.1 and 7.2.2.

7.2.1 *Dodonaea subglandulifera (Peep Hill Hop-bush)* (AUS: EN, SA: EN)

Dodonaea subglandulifera (Peep Hill Hop-bush) is endemic to South Australia and is currently listed as Endangered under the EPBC Act and NPW Act. It is an erect, perennial shrub growing 1-2 m in height, has short pinnate leaves approximately 1.5 cm long with 9-17 viscous leaflets with raised glands on their lower surface (Jessop and Tolkien 1986).

D. subglandulifera was previously only known from six sites with a total population of less than 3,000 individual plants (Kahrimanis *et al.* 2001; Graham *et al.* 2001). However, information collected during preparation of the recovery plan for the species increased knowledge of extant occurrences to 45 sites and over 45,700 individual plants, comprising 11 subpopulations (Moritz and Bickerton 2010). The species is conserved at two sites, a conservation park and a sanctuary, in the form of translocated subpopulations (Moritz and Bickerton 2010).

D. subglandulifera occurs primarily on low hills on loamy soils associated with rocky (limestone, slate, shale) outcrops (Jusaitis and Sorensen 1994; Smith 2000), which occur to the east of the range country, just before the vegetation changes to Mallee flats (Smith 2000). The species occurs in native vegetation associated with rock outcrops including low open woodland, open shrubland and Mallee. Associated over- and midstorey species within suitable habitat include *Eucalyptus porosa* (Mallee Box), *E. dumosa*, *E. oleosa* ssp. *oleosa* (Red Mallee); *E. phenax*, *Callitris gracilis* (Southern Cyperus Pine), *Allocasuarina verticillata* (Drooping Sheoak); *Beyeria lechenaultii* (Pale Turpentine Bush), *Alectryon oleifolius* ssp. *oleifolius* (Bullock Bush), *Acacia calamifolia*, *A. argyrophylla* (Silver Mulga-bush), and *A. hakeoides*. The understorey is quite variable at most sites (Moritz and Bickerton 2010).

Approximately 35 individuals were observed in a rocky outcrop area within *Eucalyptus porosa* (Mallee Box) Open Woodland (VA 3) in the southeast of the Project Area, just south of Black Peak Road and approximately 9 km north-northeast of Robertstown (Figure 35). It is possible that this is the small sub-population of 35 discovered in 2007 near Blackpoint Hill approximately 10 km north of Robertstown (Moritz and Bickerton 2010).

On Eagle Hawke Gate Road, approximately 7.5 km to the northeast of Robertstown, four sites have been recorded by Smith (2000) containing over 5055 plants on private land and 100 plants on the roadside reserve. The private land is noted to contain high quality native vegetation and is identified as a priority site for protection and management (Moritz and Bickerton 2010).

Based on the discovery of approximately 35 *D. subglandulifera* individuals is the southeast of the Project Area, the nearby sub-populations on Eagle Hawke Gate Road, and the presence of suitable habitat within the Project Area, it is likely that more sub-populations may be found if targeted searches of suitable habitat were undertaken south of Burra Creek in the southeast of the Project Area.

Given that this species is currently listed as nationally Endangered it is considered that all currently occupied and potential habitat is critical to its survival (Moritz and Bickerton 2010).

7.2.2 Flora species determined as likely to occur

Two nationally Vulnerable flora species and 14 State conservation rated flora species were determined as likely to occur within the Project Area based on previous records and potential habitat (Figure 48). These are described in more detail below.

***Acacia spilleriana* (Spiller's Wattle) (AUS: EN, SA: E)**

Acacia spilleriana (Spiller's Wattle) is bushy rounded shrub which grows to between 1 and 3 m and is endemic to South Australia. It grows on rocky hills, commonly along watercourses and roadsides (Whibley and Symon, 1992; Maslin, 2001a). There are no estimates of total population numbers for the species, however, most roadside populations are reported as sparse or consisting of one to two plants (State Herbarium of South Australia, 2005). From two collections, the seed viability was high, ranging from 95% to 100%, so this species would be useful to re-populate areas as an offset (DotEE 2009).

This species was previously recorded during Stony Gap surveys (EBS 2013a) and mapped in the western area of the Project Area (Figure 48). Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Austrostipa breviglumis* (Cane Spear-grass) (SA: R)**

Austrostipa breviglumis (Cane Spear-grass) is native to Australia and is found in the Flinders Ranges and the Mount Lofty Ranges in South Australia growing in hills and ridges on sandy loam soils. This is a shortly rhizomatous perennial grass to 1.6 m high, with culms branching from near the base and with glabrous nodes. The leaves are glabrous or finely scabrid with blade flat or inrolled to 20 cm long and 2.5 mm wide. The inflorescence is a long and spreading panicle to 40 cm long with short, green to purplish-grey glumes and is flowering between September and January.

A. breviglumis was determined as likely to occur within the Project Area based on potential habitat. The last record for this species was in 2008 within 20 km of the Project Area (Appendix 1). Although this species wasn't recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Austrostipa gibbosa* (Swollen Spear-grass) (SA: R)**

Austrostipa gibbosa (Swollen Spear-grass) is found in the southern Flinders Ranges, Mount Lofty Ranges and the South-east in South Australia growing on rich loamy soil along creeks and seasonally wet areas in woodland and grassland. It is a tufted perennial grass to 1.5 m high with culms unbranched and pubescent nodes. Leaves are glabrous or sparsely pubescent, sometimes scabrous with blade flat,

channelled or inrolled to 30 cm long and 5 mm wide. The inflorescence is an open panicle to 40 cm long with bulging green glumes. *Austrostipa gibbosa* flowers between October and January.

A. gibbosa was determined as likely to occur within the Project Area based on potential habitat. The last record for this species was in 2005 within 20 km of the Project Area (Appendix 1). Although this species wasn't recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Austrostipa pilata* (Prickle Spear-grass) (SA: V)**

Austrostipa pilata (Prickle Spear-grass) is near endemic to South Australia and found on the Eyre Peninsula, Flinders Ranges and the northern Mount Lofty Ranges growing on hill slopes in mallee. *A. pilata* is a loosely tufted perennial grass to 80 cm high, with firm and slender culms (to 1 mm diam. at base) and pubescent to almost glabrous black nodes. Leaves are scabrous or pubescent but never densely pubescent; white hair tufts in axils; leaf blade erect, sharp-pointed and strongly inrolled to 12 cm long and 6 mm wide; sheaths slender and tight around culm. The Inflorescence is a sparse slender contracted panicle to 20 cm long with straw-coloured glumes to 10 mm long. *A. pilata* flowers between October and November.

A. pilata was determined as likely to occur within the Project Area based on potential habitat. Although this species wasn't recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Bothriochloa macra* (Red-leg Grass) (SA: R)**

Bothriochloa macra (Red-leg Grass) is found mainly in the southern part of South Australia south of Port Augusta but with a few scattered records further north in grasslands and grassy woodland communities but often in degraded sites. *B. macra* is a perennial grass, glabrous except for the inflorescence, with slender stems, usually reddish-purple to 80 cm high. The leaf blades are flat to 20cm long, approximately 3 mm wide; sparsely hairy, green, sometimes with maroon colouring at the tips. The inflorescence is a simple panicle to 8cm long with racemes to 6 cm long and the species is flowering between December and April.

B. macra was determined as likely to occur within the Project Area based on potential habitat. Although this species wasn't recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Dodonaea procumbens* (Trailing Hop-bush) (AUS: VU, SA: V)**

Dodonaea procumbens (Trailing Hop-bush) is a poorly-known small prostrate shrub endemic to south-eastern Australia, where it occurs in South Australia, Victoria and New South Wales. *D. procumbens* can be distinguished from other *Dodonaea* species by its prostrate habit, and from prostrate members of various pea genera (when not flowering or fruiting) by its generally toothed leaves and absence of stipules. South Australian populations have been recorded in open *Eucalyptus camaldulensis, E. fasciculosa* and *E. leucoxylon* woodlands in low-lying areas (West 1986), and in native grasslands, where it grows with *Lepidosperma viscidum*, *Themeda triandra*, *Rytidosperma* spp., *Austrostipa* spp. and shrubs including *Acacia acinacea*, *D. viscosa* and *Bursaria spinosa* (Carter 2010). At Mokota Conservation Park (which is

situated north of Burra, South Australia), the species grows in *Rytidosperma* low tussock grassland on rocky outcrops and in shallow soils, with *Vittadinia cuneata*, *Calocephalus citreus*, *Leptorhynchos tetrachaetus*, and *Triptilodiscus pygmaeus* (DEH 2006).

D. procumbens was determined as likely to occur within the Project Area based on potential habitat and the fact *D. procumbens* was previously recorded by EBS (2013a) (Figure 48) predominantly in the western corner of the Project Area. The last record for this species was in 1994 within 20 km of the Project Area (Appendix 1). Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Echinopogon ovatus* (Rough-beard Grass) (SA: R)**

Echinopogon ovatus was determined as likely to occur within the Project Area based on potential habitat. Echinopogon is a genus of grasses native to Australia, New Guinea, Indonesia, and New Zealand. They are commonly known as hedgehog grasses (ALA, accessed 2019), are perennial with bristly panicles. The distribution of *E. ovatus* is within Flinders Ranges, Northern Lofty, Southern Lofty, Kangaroo Island and South-eastern SA. Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Eryngium ovinum* (Blue Devil) (SA: V)**

Eryngium ovinum, commonly known as the blue devil, is a plant species native to Australia and is widespread throughout temperate woodlands and grasslands. Blue devil is a perennial herb, which dies down during autumn and emerges in late winter to flower in summer.

The Blue Devil has been previously detected at two separate locations within the previous Stony Gap Project Area (Figure 46) (EBS 2012). There were approximately 11 individuals and four juveniles located in one small patch and 300 to 400 individuals were recorded in a second patch was located on the eastern boundary close to Springbank Road.

E. ovinum was determined as likely to occur within the Project Area based on potential habitat and the fact *E. ovinum* was previously recorded by EBS (Figure 48) predominantly in the middle-western corner of the Project Area. The last record for this species was in 2013 within 20 km of the Project Area (Appendix 1). Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

Figure 46. *Eryngium ovinum* (Blue Devil).

***Eucalyptus cajuputea* (Green Mallee) (SA: R)**

Eucalyptus cajuputea was determined as likely to occur within the Project Area based on potential habitat. *E. cajuputea*, commonly known as the narrow-leaved peppermint box is a mallee that is endemic to South Australia. The mallee is native to the northern portion of the Eyre Peninsula, in the Flinders Range and northern parts of the Mount Lofty Ranges. It is often found on rocky ridges and hillslopes on the adjacent footslopes and undulating plains growing in rocky sandy soils (Seeds of SA 2016). Although this species wasn't recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Lachnagrostis robusta* (Tall Blown-grass) (SA: R)**

Lachnagrostis robusta (Tall Blown-grass), like the majority of *Lachnagrostis* species, grow in lowland habitats in Northern and Yorke, South Australian Murray Darling Basin and the South East of South Australia. It is an annual species with culms that are erect or geniculately ascending, 60–80 cm tall, 3–4 noded. Its leaf-sheaths are antrorsely scabrous and the ligule is an eciliate membrane, the leaf-blades are linear, flat, 10–17 cm long, 3.5–5 mm wide. The leaf-blade surface is scabrous, and the inflorescence is a compound, pyramidal panicle of 12–25 cm long. *L. robusta* flowers between November and December.

L. robusta was determined as likely to occur within the Project Area based on potential habitat. Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Logania saxatilis* (Rock Logania) (SA: R)**

Logania saxatilis was determined as likely to occur within the Project Area based on potential habitat. Endemic to South Australia and found in the Flinders Ranges and the Mount Lofty Ranges, growing on steep-sided sandstone gorges in open woodland community and in crevices of rocky outcrops in shallow sandy or clay-rich soils. Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Maireana rohrlachii* (Rohrlach's Bluebush) (SA: R)**

Spindly, divaricately branched shrub to c. 1 m high; found in heavy soils on exposed ridges and stony outcrops. Also occurs as an understorey species within low grassy woodlands.

Maireana rohrlachii was determined as likely to occur within the Project Area based on potential habitat and the fact *M. rohrlachii* was previously recorded during survey work at Stony Gap (EBS 2012b); this species was located within a small pocket to the far west of the Stony Gap area (EBS 2012b) (Figure 48).

***Mentha satureioides* (Native Pennyroyal) (SA: R)**

Mentha satureioides was determined as likely to occur within the Project Area based on potential habitat and the fact *M. satureioides* has been recorded at several locations during previous survey work at Stony Gap (EBS 2012) (Figure 47); predominantly associated within minor drainage lines. Only one patch was located out of a drainage line.

Figure 47. *Mentha satureioides* (Native Pennyroyal).

***Olearia pannosa subsp. pannosa* (Silver Daisy-bush) (AUS: VU, SA: V)**

Olearia pannosa subsp. *pannosa* (Silver Daisy-bush) is endemic to South Australia and found scattered in the southern part in agricultural areas on road sides and with few individuals. The species occurs in sandy, flat areas and in hilly, rocky areas in woodland or mallee. The species is a spreading undershrub or shrub to 1.5 m high, producing root suckers. Stems are woody at least at the base, branched with appressed hairs. Leaves with petioles are up to 15 mm long, broad-ovate to elliptic, acute to shallowly cordate at the base, acute to obtuse at the apex, to 9 cm long and 5cm wide, prominently reticulate-veined, dark green and shiny above and white- to rusty-tomentose below with margins flat. The flower head is solitary, terminal and in the upper leaf axils, on long stalk to 30 cm long often with 1 or 2 reduced leaves. Flowers are large, white rarely pale-mauve daisy with a yellow centre. The flowering time for *O. pannosa ssp. pannosa* ranges from August to October.

O. pannosa subsp. pannosa was determined as likely to occur within the Project Area based on potential habitat and the fact *O. pannosa subsp. pannosa* was previously recorded by EBS (Figure 48) south of the Project Area. Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

***Ptilotus erubescens* (Hairy-tails) (SA: R)**

Ptilotus erubescens is an erect perennial plant with a woody rootstock, stems to c. 25 cm high, hairy especially when young. This species grows in fertile soils in grassy woodlands found mainly in the southern Flinders Ranges and Mount Lofty Ranges of South Australia.

P. erubescens was determined as likely to occur within the Project Area based on potential habitat and the fact *P. erubescens* was previously recorded by EBS (EBS 2013a) (Figure 48) on the far western boundary of the Project Area. Although this species was not recorded during the autumn and spring 2019 surveys, it is likely to be recorded again given better seasonal conditions and additional survey work.

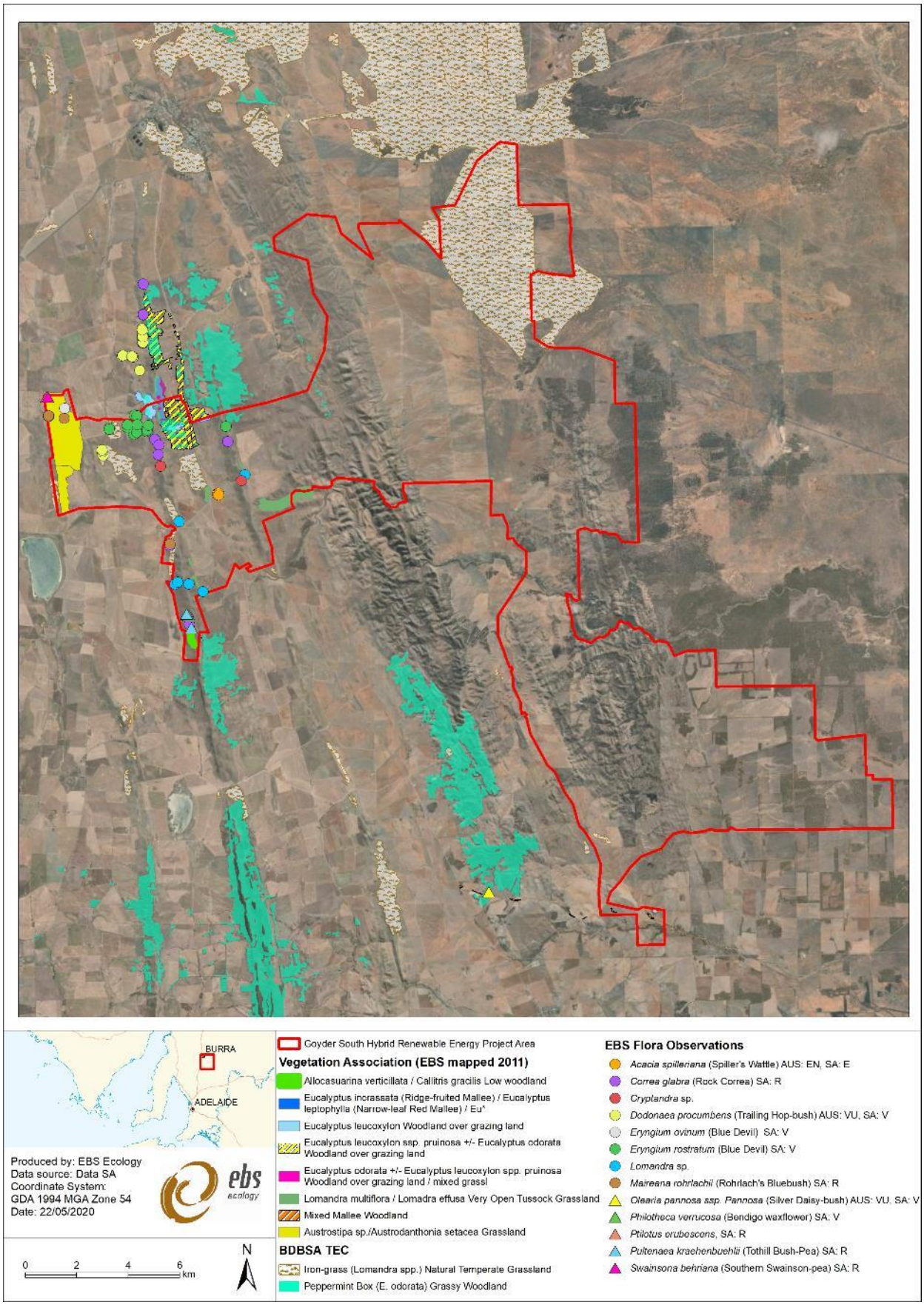


Figure 48. EBS Flora records and associations – previous survey work Stony Gap (EBS 2013a). Note: some records fall outside of the current Project boundary, as the Project Area has evolved over time.

7.3 Fauna

7.3.1 Nationally threatened

The nationally listed fauna species that were recorded during the field assessments in autumn and spring 2019 or identified as likely to occur in the desktop assessment are discussed in detail below.

Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*) (AUS: EN, SA: E)

The PBTL is currently listed as nationally Endangered under the EPBC Act and Endangered in South Australia under the NPW Act. The PBTL is now known from 27 sites, ranging from north of Port Wakefield in the Hummocks to south of Peterborough and west of Clare (Duffy *et al.* 2012). Prior to 2000, the population was estimated to be around 5000 lizards, based on 10 known populations. Since this time, another 17 populations have been discovered. Suitable habitats are largely on private land, therefore historically surveys were not as accessible.

The weather and survey conditions were optimal for the duration of both survey periods due to low grass levels and fine/sunny conditions, which are important when searching for spider/PBTL burrows. Therefore, the results from the survey locations can be reported with a high degree of confidence.

Suitable PBTL habitat was mostly confined to the footslopes of the two ridges in the western half of the Project Area (Figure 36 and Figure 37), and therefore PBTL surveys were concentrated in these areas. This corresponds with historic BDBSA records and previous surveys conducted by EBS for the Stony Gap Project (see Table 1, page 2).

Once the proposed infrastructure layout is determined, further surveys will need to be undertaken in all areas that overlap with likely and possible PBTL habitat. It is also important to ground truth the areas mapped as unlikely habitat within the proposed infrastructure layout given the broad scale of the PBTL occurrence and habitat assessment. Furthermore, even though searches failed to find the species in certain sections of the Project Area, their presence cannot be ruled out given potentially suitable habitat is present, and the proximity to known populations. PBTLs are known to inhabit highly degraded grasslands and hence any spider holes in unploughed grasslands (including exotic grasslands) within the Project Area should be considered an indication that this species may exist. In general, PBTs are unlikely to occur along the ridge-tops due to a lack of soil profile. However, grassland/pasture areas along the sides of the ridges could potentially contain a soil profile suitable for this species to persist.

The following potential impacts of the Project on PBTLs must be considered when selecting an appropriate buffer zone from known PBTL locations:

- Direct loss of individuals during construction;
- Noise and vibration disturbance during construction;
- Runoff from construction areas leading to sedimentation build-up in and/or around burrows;
- Division and isolation of populations caused by the construction of vehicular access tracks; and
- Disturbance from turbine blade shadow flicker during operation.

The potential presence of PBTLs should be given consideration with respect to the placement of infrastructure and access tracks and any changes in design layout. Where the refined layout is within potential habitat, a more detailed targeted survey within summer months, will be required when grass cover has declined, and spider's holes are more visible. The survey envelope should extend at least 50 m beyond the footprint of proposed infrastructure. Any new infrastructure (or changes) that are proposed within potential PBTL will need to be surveyed for the presence of PBTLs. Further investigation of spider holes may be required where turbines, roads and other infrastructure are planned within potential habitat to micro-site them in suitable locations. Even if no PBTLs are observed during this type of survey, they cannot be ruled out from occurring.

Further investigation is also required where PBTLs have been found. Again, a population survey in summer months will be required when grass cover has decreased, and spider holes are more visible. This population survey is required to determine the extent of the population and to assist with managing the impacts of the wind farm on this species.

PBTL habitat should be avoided where possible. Alternatively, more detailed surveys and infrastructure design may be undertaken in consultation with the PBTL Recovery Team to attempt to suitably place infrastructure to avoid impacting PBTL habitat and individuals.

7.3.2 State threatened

The State listed fauna species that were recorded during the field assessments in autumn and spring 2019 or identified as likely to occur in the desktop assessment are discussed in detail below.

White-winged Chough (*Corcorax melanorhamphos*) (SA: R)

White-winged Choughs were recorded within open eucalypt woodland and mallee associations over the Project Area (Figure 39). At each location, family parties of up to 20 individuals occurred. Within large remnants, White-winged Choughs regularly use remnant edges, where a mixture of habitats occurs, such as grassland and woodland (Cox and Bauer 1997). While in small woodlands, both core and edge areas are used (Anderson and Burgin 2008). The use of mallee and woodland edges by White-winged Choughs was also observed in the Project Area. Cox and Bauer (1997) identified that grassland and edge habitats had higher invertebrate biomass than forested areas. Food resources are therefore considered to impact habitat usage by White-winged Choughs.

Hooded Robin (*Melanodryas cucullata*) (SA: R)

The Hooded Robin is a small passerine that inhabits drier eucalypt forests, woodland and scrubs that are typically dominated by *Eucalypt*, *Casuarina* or *Callitris* species (Pizzey and Knight 2014). Hooded Robins were recorded at two different sites during the field assessments and are likely to be resident in these sites. As the presence of Hooded Robins is positively associated with ungrazed or lightly grazed ground cover dominated by native perennial tussock grasses, significant portions of the Project Area supporting forests, woodland and scrubs may be unsuitable habitat for Hooded Robins due to stock grazing (Priday 2010).

Restless Flycatcher (*Myiagra inquieta*) (SA: R)

The Restless Flycatcher is a small passerine that inhabits open forests and woodlands, river red gums near water, and inland and coastal scrubs (Pizzey and Knight 2014). The *Eucalypt* and *Callitris* communities present over the Project Area would provide suitable potential habitat for the Restless Flycatcher (G. Oerman, *Pers. Obs*. 2019). This species was not recorded during the autumn assessment however a pair of Restless Flycatchers were observed opportunistically in riparian vegetation during the spring survey, just outside the Project Area (Figure 39).

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

A single Elegant Parrot was observed in the Project Area during the autumn 2019 field assessment (Figure 39). This species was also recorded during previous survey work, completed by EBS at the Stony Gap site, in November/December 2010 (EBS 2011). This was within *Maireana aphylla* (Cottonbush), *Atriplex stipitata* (Bitter Saltbush) mixed low open chenopod shrubland. As the Elegant Parrot may occur in open forests, woodland and scrublands, in addition to chenopod shrublands, potential habitat for the species is widespread across the Project Area.

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

The Diamond Firetail was observed adjacent to *Eucalyptus oleosa* (Red Summer Mallee) Mixed Open Mallee within the Project Area, as well as in previous survey work completed by EBS at the Stony Gap site in November/December 2010 (EBS 2011). The species was recorded at a riparian area, presumably where Diamond Firetails would drink and forage. As mass germination of exotic grasses occurs in the winter months, perennial native grasses which do not mass germinate, such as those present within the *E. odorata* woodland may also be a crucial food resource. Access of stock to the area of *E. odorata* grassy woodland (Figure 39) could result in the loss of the population. Stock grazing and subsequent loss or degradation of native tussock grasses would have rendered large areas of eucalypt woodland as unsuitable for the presence of Diamond Firetails.

Satin Flycatcher (*Myiagra cyanoleuca*) (SA: E)

A pair of Satin Flycatchers were recorded in the Project Area during the autumn field assessment in the single patch of *E. odorata* woodland. Satin Flycatchers are very rarely recorded in South Australia, particularly the Mid North, where vagrants have been previously observed (Pizzey and Knight 2014). The species typically inhabits heavily vegetated gullies in forests, and taller woodlands, however, during migration may occur in a wider range of habitats including forests, woodlands, mangroves and trees in open country. Satin Flycatchers migrate from the eastern seaboard north of Brisbane to southern areas extending to south-eastern South Australia and Tasmania, where they are typically recorded between September and April (Pizzey and Knight 2014). As Satin Flycatchers recorded in the Mid North are vagrants, no important habitat for this species occurs within the Project Area.

Peregrine Falcon (*Falco peregrinus*) (SA: R)

The Project Area boundary has evolved over the progression of investigative assessments undertaken as part of the Goyder South Project. As such, some species that were identified as likely to occur through the desktop assessment and were in fact recorded during the survey work undertaken by EBS, have been removed from the results section. One such species that warrants discussion here, is the Peregrine Falcon

which was observed during field assessments conducted by EBS, but which is now outside the current Project footprint.

The autumn observation was in cleared land adjacent to a creekline where woodland communities (VA 6 and VA 7) occurred. The spring observation was of a single bird nesting in a disused Wedge-tailed Eagle nest. In addition, a previous field assessment by EBS (2011) within the Project Area at the Stony Gap site in October/December 2010, identified one Peregrine Falcon nest.

No Peregrine Falcon nests were recorded during the March/April 2019 field assessment within the then Project boundary (at the time of survey), however, this occurred outside the species' breeding season. Peregrine Falcons nesting within the Project Area would be reliant upon the use of dis-used raven and raptor nests as the species does not build its own nest and typically uses elevated platforms on cliff faces or artificial structures for nesting (Pizzey and Knight 2014). It is expected that this species is likely to utilise the Project Area for both foraging and breeding and that additional surveys would most likely detect more than one individual.

7.3.3 Southern Hairy-nosed Wombat (SHNW)

Wombats are the largest burrowing mammals in the world. They spend over 75% of their time in their burrows, which allow them to survive in the harsh, seasonally changing and unpredictable environment of semi-arid and arid Australia (Finlayson *et al.* 2005; Sparrow *et al.* 2016). In suitable environmental conditions (e.g. calcareous soils on calcrete, intermediate surface rockiness), wombats construct large warren complexes that allow long-term occupation (Marshall *et al.* 2018).

The large warrens and digging and foraging behaviour of wombats can cause conflict with agricultural operations (Figure 49). Indeed, nearly 80% of farmers that were surveyed indicated that wombats caused damage on their property, and that their burrowing behaviour was a major management issue, with nearly 75% stating that wombats were a 'problem' (Sparrow *et al.* 2011; Sparrow 2012). Wombats burrowing in cropping paddocks and under infrastructure such as fences and water tanks can be concerning for safety (farm machinery falling into collapsed burrows) and lead to loss of water for stock, stock escaping or financial loss due to damaged equipment (Sparrow *et al.* 2016). Other impacts caused by wombats include erosion and grazing competition (SA MDB NRMB 2011).

Based on the above information, and the observations of SHNWs and their warrens within the Project Area (Figure 38), there is potential for conflict with wombats during the construction and operation of the Project. The following potential impacts of the Project on SNHWs must be considered when selecting an appropriate buffer zone from known SHNW locations:

- Direct loss of individuals during construction;
- Noise and vibration disturbance during construction;
- Runoff from construction areas leading to sedimentation build-up in and/or around burrows;
- Division and isolation of populations caused by the construction of vehicular access tracks; and
- Disturbance from turbine blade shadow flicker during operation.

The following potential impacts of SNHWs on proposed infrastructure must be considered when selecting an appropriate buffer zone from known SHNW locations:

- Damage to infrastructure from burrows;

- Reduction in structural integrity of infrastructure from burrows; and
- Damage to vehicles and construction plant, as well as safety hazard, from hard-to-see burrows.

Although SHNWs and their warrens were restricted to drainage lines, three good seasons would likely see an increase in the adult wombat populations within the Project Area (SA MDB NRMB 2011). Recolonization may often occur within a short time, after wombats are removed (Sparrow et al. 2011; Sparrow 2012). Both of these factors should be considered when selecting an appropriate buffer zone from known SHNW locations.

Recommended management techniques to reduce the impacts to wombats and the impacts caused by wombats to wind and solar farm infrastructure are discussed in Section 8.3.2.

Figure 49. SHNW warren system along drainage line within the Project Area.

7.3.4 Wind farm impacts on avifauna

The potential impacts of wind farms on avifauna, are summarised as follows:

- Rotor strikes (bird mortality);
- Barotrauma (bat mortality);
- Clearance and degradation of habitat;
- Acoustic masking; and
- Behavioural avoidance.

Rotor strikes

To determine an accurate estimation of bird strikes at wind farms, scavenging rates and the likelihood of surveyor detection need to be incorporated into analyses. Accurate assessments of bird strike at wind farms in southern-eastern Australia that are publicly available are scarce. Furthermore, assessments are influenced by the surrounding habitat and presence of local bird populations. For the five reports reviewed as part of this report, bird deaths per turbine per annum varied from 0.9 to 13.40 per annum (Table 38). It should be noted that the data collected for an operating wind farm in the Mid-North, South Australia, was collected over four turbines that had been identified as high risk of bird strike (due to their proximity to breeding and foraging habitat). Hornsdale Wind Farm reporting is focussed on these high risk turbines only, and as such the mean number of bird deaths per turbine for this wind farm as a whole, is likely to be lower.

The integrity of owner-reported data from the other sites summarised in Table 38 may need to be considered when reviewing bird death data, in particularly Macarthur Wind Farm, which would appear to be more lethal on a per-turbine basis. Refer to Section 9 to obtain references on these wind farm sites.

Raptors are one of the most at-risk groups of bird from wind farms as they are prone to rotor strike as they regularly fly at heights swept by turbine rotors, have low fecundity and long lifespans (Beston *et al.* 2016), which means that the replacement of struck individuals within the population takes considerable time and energy and population declines may occur (Dahl *et al.* 2011). Three species of raptor have been struck at Hornsdale Wind Farm; Wedge-tailed Eagle, Peregrine Falcon and Nankeen Kestrel (*Falco cenchroides*), while feathers from a Brown Falcon (*Falco berigora*) believed to have been struck were found underneath a turbine. Impacts of wind farms on Wedge-tailed Eagles may be particularly severe, with 18 individuals struck over one year of operation of the Ararat Wind Farm, Victoria (BL&A 2018).

Table 38. A sample of bird deaths per turbine per annum at wind farms within Australia.

Wind farm	Location	Bird deaths per turbine per annum	Reference
Hornsdale	Mid-North, South Australia	6.90 - 13.19	EBS (2019)
MacArthur	South-Western Victoria	13.40 ± 2.37	AERS (2015)
Waubra	Central Victoria	1.5	Acciona 2012
Bluff Point	North-Western Tasmania	1.7	Hydro Tasmania 2012
Studland	North-Western Tasmania	0.9	Hydro Tasmania 2012

Barotrauma

Bats succumb to barotrauma at wind farm turbines whereby the rapid air-pressure reduction near moving turbines causes tissue damage to air-containing structures (Baerwald *et al.* 2008). The number of bat mortalities at wind farms is expected to be substantial, with 44 bat carcasses identified within one year of monthly monitoring over 25 turbines at Ararat Wind Farm, Victoria (BL&A 2018). The true number of bat mortalities across these 25 turbines would be significantly higher than 44 deaths as scavenging rates and surveyor error (failed detection during searches) was not accounted for. Bat monitoring at McArthur Wind Farm in south-western Victoria found annual bat mortality per turbine to be 1.41 ± 0.65 and 3.08 ± 1.68 in 2013 and 2014, respectively (AERS 2015). Opportune observations of bat carcasses were recorded during bird mortality monitoring at Hornsdale Wind Farm, with two carcasses found in the first year of monthly

monitoring over four turbines (EBS 2019). The two carcasses were from two species; Gould's Wattled Bat (*Chalinolobus gouldii*) and a species of Free-tailed Bat (*Ozimops* sp.).

Clearance and degradation of habitat

The Project will result in the direct clearance of habitat for hardstands and tracks. The clearance and fragmentation of habitat is expected to be unfavourable to small passerine species with specific habitat preferences and favourable to large generalist species (Szabo *et al.* 2011). In addition to this, hollows, which provide nesting and roosting locations for birds and bats may be cleared. Furthermore, where native vegetation borders the infrastructure footprint it is expected to become degraded from weed invasion, erosion and other edge effects.

Acoustic masking

The noise associated with a wind farm may have adverse impacts on songbirds (Zwart *et al.* 2016). Acoustic masking caused by wind farm noise was detected in the European Robin (*Erithacus rubecula*), which as a result may affect the ability of individuals with established territories to deter a rival (Zwart *et al.* 2016). As such, increased time and energy would need be spent for maintaining their territory, which could reduce breeding success (Zwart *et al.* 2016). In South Australia, acoustic masking is thought to be one of the key drivers of reduced songbird abundance in areas within 500 m of mining activity (Read *et al.* 2015).

Behavioural avoidance

Raptors are known to substantially reduce their presence within an area following the construction of a wind farm; while this reduces the number of individuals that succumb to rotor strike it may displace pairs from their established territories, which can reduce breeding success. In Norway, the impact of rotor strike and displacement of individuals is considered to have reduced the breeding success of White-tailed Eagles (*Haliaeetus albicilla*) within occupied territories, from 48% before wind farm construction to 22% post construction (Dahl *et al.* 2011). Displacement of raptors at a wind farm also occurred in Wisconsin, United States of America, where a 47% reduction in raptor abundance was recorded following wind farm construction (Garvin *et al.* 2011).

8 RECOMMENDATIONS/MITIGATION MEASURES

As part of the initial survey work, a number of ecological constraints were identified by EBS (Figure 50, page 113), which Neoen has committed to addressing, as part of the preliminary wind farm design.

Burra Creek Gorge holds ecological significance for the local area and is rich in biodiversity. Neoen has instituted a voluntary 3 km setback from Burra Creek Gorge campground to minimise visual impact to this predetermined sensitive area (Figure 51, page 114).

As the Project has evolved, Neoen has sought to avoid and protect known Wedge-tailed Eagle and Peregrine Falcon nests (active and in-active), patches of Peppermint Box (*E. odorata*), and locations of recorded PBTLs and likely and possible PBTL habitat. Initially, Neoen delineated an Ecological Protection Zone (EPZ) (Figure 51) within the Project Area, with the intention of limiting infrastructure within the EPZ. Subsequently, following further investigations, Neoen elected to exclude the area of the Ecological Protection Zone (EPZ) from the Project Area entirely, which resulted in the voluntary reduction of turbines by Neoen (approximately 18 wind turbines were removed from the original project layout proposed in January 2019).

In EBS's opinion, Neoen's election to exclude the EPZ from the Project Area altogether, is likely to afford significant protection to Wedge-tailed Eagles, Peppermint Box (*E. odorata*) Grassy Woodland, Pygmy Blue-tongue Lizards and known habitat and areas that provided habitat for threatened bird species as well as high bird species richness habitat (Figure 51).

In summary, as a result of changes to the Project Area boundary and proposed project layout over time, potential impacts to flora and fauna from the Project have been significantly reduced. Some of the benefits of these changes include:

- Number of patches of Peppermint Box (*E. odorata*) (VA2) within the Project Area, reduced from three to one;
- For the PBTL:
    - Number of locations within the Project Area where individuals have been recorded reduced from 62 individuals to 24;
    - Area of likely habitat within the Project Area redulced from 194 ha to 47 ha;
    - Area of possible habitat within the Project Area reduced from 870 ha to 450 ha.
- Area of possible habitat and locations of finds of two skins potentially belonging to the FRWL no longer within the Project Area;
- Area of high density of threatened bird species no longer within the Project Area – these species included: the White-winged Chough (5 records), Peregrine Falcon (2 records) and Diamond Firetail (1 record);
- Number of Wedge-tailed Eagles nests (active and in-active) within the Project Area reduced from 15 to six; and
- Number of locations within the Project Area where bird individuals have been recorded reduced from 931 (representing 68 bird species) to 586 (representing 58 species).

8.1 Recommendations to change the layout and location of infrastructure

- Avoid where possible, areas that have been mapped as patches of Iron-grass (*Lomandra* sp.) and Peppermint Box (*E. odorata*) – where areas cannot be avoided, EBS recommends that targeted surveys need to be undertaken for both Iron-grass and Peppermint Box, to determine if they qualify as TECs, prior to construction taking place. The survey, conditions permitting, should be timed after a good rainfall season. Where areas cannot be entirely avoided, locations of wind turbines and associated infrastructure should be microsited prior to construction to avoid patches containing both Iron-grass and Peppermint Box;
- Avoid, where possible, areas that have been identified as known PBTL records, areas mapped as likely PBTL habitat and, potential PBTL habitat. Where areas cannot be entirely avoided, locations of wind turbines and associated infrastructure should be microsited prior to construction to minimise impacts on PBTL burrows and habitat. Neoen has committed to undertaking survey work for micrositing PBTL within the Project Area, in the event that the Project is approved and prior to finalising the location of the Project infrastructure;
- Avoid, where possible the area marked as containing records of *Dodonaea subglandulifera* (Peep Hill Hop-bush);
- Avoid, where possible, areas mapped as having conservation value which have been identified by EBS as areas of high bird richness habitat or those vegetation associations containing Mallee Woodland, Sedgeland or Shrubland;
- Avoid, where possible, known Wedge-tailed Eagle nests (active and in-active) and implement a 1 km buffer around mapped nests; and
- Complete a full assessment for flora and fauna, in areas that were not assessed or properties that weren't able to be accessed (south-east section of the Project Area), as part of the initial ecological assessment work.

8.1.1 Threatened Ecological Communities

From the autumn and spring 2019 surveys, Peppermint Box (*E. odorata*) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia were not classed as TECs relevant to the Project Area.

During a good year, it is expected that enough native species (15), native broad-leaved herbaceous species resistance to disturbance (3), and native grasses (2) could occur within both potential TECs to qualify as Class B (and therefore constitute a TEC). Neon has committed to undertaking a targeted assessment for both potential TECs within the Project Area, prior to construction and once a final infrastructure layout is known. It is recommended that these targeted surveys are completed (if practical) once a good season has occurred. If conditions do not improve before construction, it is recommended that as a worst case scenario, these INTG patches qualify as a TEC, and are addressed as part of the EPBC Referral process.

Neoen has committed to submitting an EPBC Referral to the Department of Agriculture, Water and Environment (DAWE), to address the potential impacts the proposal may have on MNES, which is likely to include both TECs and the Pygmy Blue-tongue Lizard.

8.1.2 Dodonaea subglandulifera (Peep Hill Hop-bush)

The following recommendations have been made to mitigate the potential impacts of the Project on *Dodonaea subglandulifera*:

- Given that *D. subglandulifera* was recorded within the southeast of the Project Area and there are some areas of the Project Area that are yet to be surveyed, it is recommended that further targeted searches to identify undiscovered sub-populations be undertaken;
- Develop strategies to ensure that the population of *D. subglandulifera* is not directly or indirectly impacted by the Project; the same should apply if further populations are found during subsequent survey work; and
- Determine whether the Project has the potential to have a significant impact on *D. subglandulifera* as part of the Referral process.

8.1.3 Pygmy Blue-tongue Lizard (Tiliqua adelaidensis)

One of the objectives of the Recovery Plan for the Pygmy Blue-tongue Lizard, was to manage the recovery process through an effective recovery team, which supports, guides and evaluates the implementation and outcomes of the recovery plan (Duffy *et al.* 2012).

The following recommendations have been made to mitigate the potential impacts of the Project on PBTL populations and PBTL habitat:

- Exclude the areas identified as containing PBTLs (plus adopt an appropriate exclusion buffer) from any disturbance associated with the Project. It is recommended that the PBTL Recovery Team is consulted with, over the appropriate buffer. Queries regarding guidelines or actions recommended around PBTL in South Australia, typically goes through the Recovery Team at some stage of a Project;
- Undertake a review of the Project and the options based on the constraints identified (PBTL population locations) within this report;
- Define all infrastructure, including access tracks, and undertake further surveys in area categorised as likely and possible PBTL habitat;
- Ground truth the areas mapped as unlikely habitat within the proposed infrastructure layout;
- Undertake further PBTL surveys if the proposed infrastructure layout is modified to fall within areas likely or possibly containing PBTLs; and
- Areas with PBTLs may be considered as a potential offset for vegetation clearance associated with the Project, once the final SEB offset is known.

EBS recommends that discussions with the PBTL Recovery Team should include, but aren't limited to:

- The selection of an appropriate exclusion buffer zone from the known PBTL locations;
- The potential impacts of the Project on known locations of PBTL; and

- If the proposed infrastructure layout is modified, where PBTL surveys need to be undertaken.

8.1.4 Flinders Ranges Worm-lizard (Aprasia pseudopulchella)

EBS has deemed it most likely that the Flinders Ranges Worm-lizard does not occur within the Project Area, however it is recommended that further surveys within likely and possible habitat for this species, within the proposed infrastructure layout, during the same time that targeted surveys for PBTL occur.

8.2 Recommendations for micrositing and construction stage

8.2.1 Development of a Construction and Operational Environmental Management Plan (COEMP)

The development and implementation of a Construction and Operational Environmental Management Plan (COEMP) is recommended as part of Neoen's commitment to mitigating any potential impacts. The development of a COEMP may also be an approval condition under the *Environment Protection and Biodiversity Conservation Act, 1999*, once an EPBC Referral is completed.

The COEMP details the environmental management requirements of the Project. The focus of the COEMP would be the management of the any INTG, Peppermint Box (*E. odorata*) and Pygmy Blue-tongue Lizard populations identified within the Project Area, to ensure its quality/coverage and numbers are not diminished as a result of constructing and operating the wind farm.

8.2.2 SEB Offset Management Plan

The development and implementation of an SEB Offset Management Plan (OMP) covering a 10-year management period for each SEB Offset area is recommended during the construction and operational stages. The SEB OMP should aim to detail the management activities required for the SEB areas to ensure that an SEB is achieved for the Project. The SEB Offset is for native vegetation clearance only at a State level (as determined under the *Native Vegetation Act 1991*) and managed through the Native Vegetation Branch.

Flora and fauna monitoring of SEB Offset areas is a standard requirement for the implementation of an SEB OMP. EBS recommends that the monitoring program utilises standard Bushland Assessment Methods, as detailed by the Native Vegetation Branch. The results of the monitoring will inform the management of the SEB Offset area and ensure the environmental benefits of the management actions are measured. The monitoring (and subsequent reporting to NVC) should be undertaken annually.

It should be noted that an SEB OMP does not include any potential EPBC Offset requirements which, if required, need to focus on the potential impacts of the proposed wind farm on Matters of National Environmental Significance (e.g. Pygmy Blue-tongue Lizard, *Lomandra* grasslands and Peppermint Box). A separate EPBC Offset Management Plan should be implemented, if required, to ensure that an EPBC Offset is achieved for the Project.

8.2.3 Pygmy Blue-tongue Lizard (Tiliqua adelaidensis)

The presence of PBTL are known to the Project Area. From the two surveys undertaken at the time of writing the current report (May 2020), PBTL are located within specific areas of the Project Area, excluding

cropped and small areas of unsuitable habitat. Areas which are suitable to PBTL should be avoided. Utilising cropping areas as much as possible for major infrastructure layouts will reduce the impact to PBTL habitat. Neoen has committed to submitting an EPBC Referral, to address any potential impacts of the Project on Pygmy Blue-tongue Lizards.

Neoen has committed to undertaking a targeted PBTL survey once the design layout is final, which will include micrositing proposed wind turbines locations and all associated infrastructure including access tracks, substations and transmission line around any PBTL burrows (where targeted surveys identify them as present) and, wherever possible, around potential habitat. Surveys are recommended prior to construction, to determine which spider holes are occupied so as to determine the best options possible with regard to turbine and infrastructure placement.

EBS proposes that Neoen liaise with the PBTL Recovery Team to investigate the possibility of re-locating PBTL from areas of less suitability that are impacted by the proposed Project, into areas that are considers optimal PBTL habitat and are avoided by the Project. Such actions could potentially assist with reducing potential direct impacts on PBTL and this can be explored to be included as a potential management action as part of the EPBC Referral. It should be noted that a PBTL Relocation Management Plan/Subplan should be prepared if this option is considered.

8.2.4 Raptor monitoring

Whilst there is no statutory requirement to monitor known raptor nest locations, it is recommended that Neoen undertake breeding success monitoring where construction activities are located within or close to known raptor nest buffers. In addition to this, EBS recommends additional bird and nest monitoring which could be undertaken on a broader scale (outside of the nest exclusion buffer).

If surveys of Wedge-tailed Eagle nests are undertaken, they should be undertaken prior, during and close to the end of the breeding season (prior to, during and post-construction) to determine breeding status of nests and to determine nesting success. Surveys close to the end of the breeding season would help to determine breeding and fledgling success and provide a means of assessing potential disturbance effects caused by the wind farm, which could be incorporated into future environmental risk assessments and adaptive management.

It is recommended that if raptor monitoring is undertaken, it should be during construction and operation, as well as for approximately three years after commissioning. Neoen may also explore the idea of extending monitoring beyond the three years, post construction.

Monitoring would involve a brief site visit at the beginning and end of the breeding season each year to check the status of breeding activity at known raptor nest locations. Specific details with regard to the time period of these breeding surveys will be outlined as part of the COEMP. This is likely to occur in June/July (when birds typically pair up) and around October/November (fledging) each year.

8.2.5 Weed and soil pathogen management

Ongoing weed management and monitoring is recommended pre-, during and post-construction of the proposed Project. This includes weed management practices and hygiene procedures to ensure that weed

species are not introduced to the site or further spread within or off-site. Specific weed management actions should be detailed in a Weed/Pathogen Management Plan.

8.3 Recommendations for monitoring, operational stage

The rollout of the COEMP and OMP is also recommended as part of the operational stage of the proposed Project.

8.3.1 Pygmy Blue-tongue Lizard

EBS recommends that discussions with the PBTL Recovery Team should include, but aren't limited to:

- The use of artificial burrows – if the density of a population is low at a site because of a lack of suitable spider burrows, the addition of artificial burrows may help to increase Pygmy Blue-tongue Lizard numbers (Schofield 2006); and
- Establishing new populations – it may be possible to reintroduce PBTL's at some sites. Its success will depend on factors such as soil types, habitat quality, habitat size, current and historical land management practices and the availability of lizards to establish new populations (Schofield 2006). Furthermore, the availability of spider burrows and PBTL food resources should be taken into account.

8.3.2 Wombats

Implementing an integrated approach to managing the potential impacts caused by Southern Hairy-nosed Wombat is recommended. Observations of Southern Hairy-nosed Wombat and warrens were restricted to drainage line areas within the Project Area (Figure 38). Therefore, avoidance of these areas would be the first mitigation measure that is recommended.

The issue of wombat management is well known in the region and, as such, the Murray Darling Basin NRM have recommended the following non-lethal management techniques to reduce the impact of wombats on wind and solar farm infrastructure (SA MDB NRMB 2011):

- **Electric fencing –** Two electric wires placed at 15 cm and 30 cm above the ground can prevent access by wombats. This technique may be appropriate to protect infrastructure (e.g. turbines) that are not able to be placed an adequate distance away from a large warren;

- **Fence alterations –** In areas that need to fenced (e.g. solar arrays), leaving a 15 cm gap at the base of a fence can allow free movement of wombats and prevent them from digging under the fence. If security is a priority, 'wombat gates' can be installed to allow wombats to move freely through a fence;

- **Burrow/warren marking –** Clearly marking existing burrows and warrens (e.g. with a star dropper or flagging tape) can reduce the risk of damage to vehicles and machinery, as well as the burrows/warrens themselves;

- **Remove access to harbour sites –** Access to spaces underneath infrastructure (e.g. solar array foundations, site buildings, etc.) can be restricted through the installation of heavy gauge mesh, or a buried wire apron; and

- **One-way gates –** Should wombat burrows pose a risk to infrastructure; one-way gates can be installed to restrict access and allow any wombats to exit the burrows prior ripping the burrows.

8.3.3 IdentiFlight

As birds, especially raptors, are prone to turbine strike (as discussed in Section 7.3.4 *Rotor Strikes*), the use of IdentiFlight (which can detect raptor activity near turbines and subsequently generate an alert that can idle turbines nearby), is a recommendation by EBS that could be further investigated with regard to reducing the possible number of bird strikes. There is currently no projections on the costs associated with IdentiFlight and the proposed Project.

At present, only one wind farm in Australia; Cattle Wind Farm, located in the Central Highlands of Tasmania, has incorporated this technology into wind farm operation (Vorrath 2018). At Cattle Wind Farm, 16 towers mounted with IdentiFlight (radar) units have been installed in areas of high eagle activity over the 144 MW wind farm (Vorrath 2018). The success of IdentiFlight units were demonstrated by McClure *et al.* (2018) at a wind farm in Wyoming, USA, where the following results were recorded:

- IdentiFlight detected 96% of birds detected by observers and 562% more birds than observers;
- IdentiFlight misclassified nine of 149 eagles as non-eagles for a false negative rate of 6%;
- IdentiFlight misclassified 287 of 1013 non-eagles for eagles for a false positive rate of 28%;
- The median distance at classification for birds classified as eagles by IdentiFlight was 793 m; and
- The median time from detection till classification by IdentiFlight was 0.4 seconds.

8.3.4 Solar farms as wildlife refuge

An investigation into the use of solar farms as a wildlife refuge, could be undertaken by EBS on behalf of Neoen, if deemed a suitable option for the proposed Project. At present, there is a lack of data to indicate what the benefits of solar farms are to wildlife. A Project by the Royal Society for the Protection of Birds and a clean technology firm Anesco investigated if solar farms in England and Wales could potentially have a positively impact on threatened wildlife including turtle doves and skylarks. It was expected that wild flower meadow areas and seed-rich planting located in the ‘unused’ margins of the solar farms and where tracks were located between the solar panels, would help boost insects such as bees and butterflies and provide food and nesting areas for birds (The Guardian, 2016).

For the proposed Project the target species would firstly need to be determined, as well as a possible control area outside of the solar farm areas to compare impacts of the solar farm on wildlife. The investigation would need to determine if revegetating in and around the solar panels would be environmentally and financially viable and whether the creation of wildlife habitat would result in net gain/benefit for target species.

8.4 NEXT STEPS

Once the design layout is final including wind turbine placement and associated infrastructure, a specific vegetation assessment based on the Bushland Assessment Methodology (BAM) (NVC 2017) will need to be undertaken across the Project Area. The BAM is endorsed by the NVC and used to assess areas of native vegetation requiring clearance and calculate the SEB requirements for the Project. Areas identified as still requiring surveying in Figure 12, will also be captured as part of the BAM vegetation assessment.

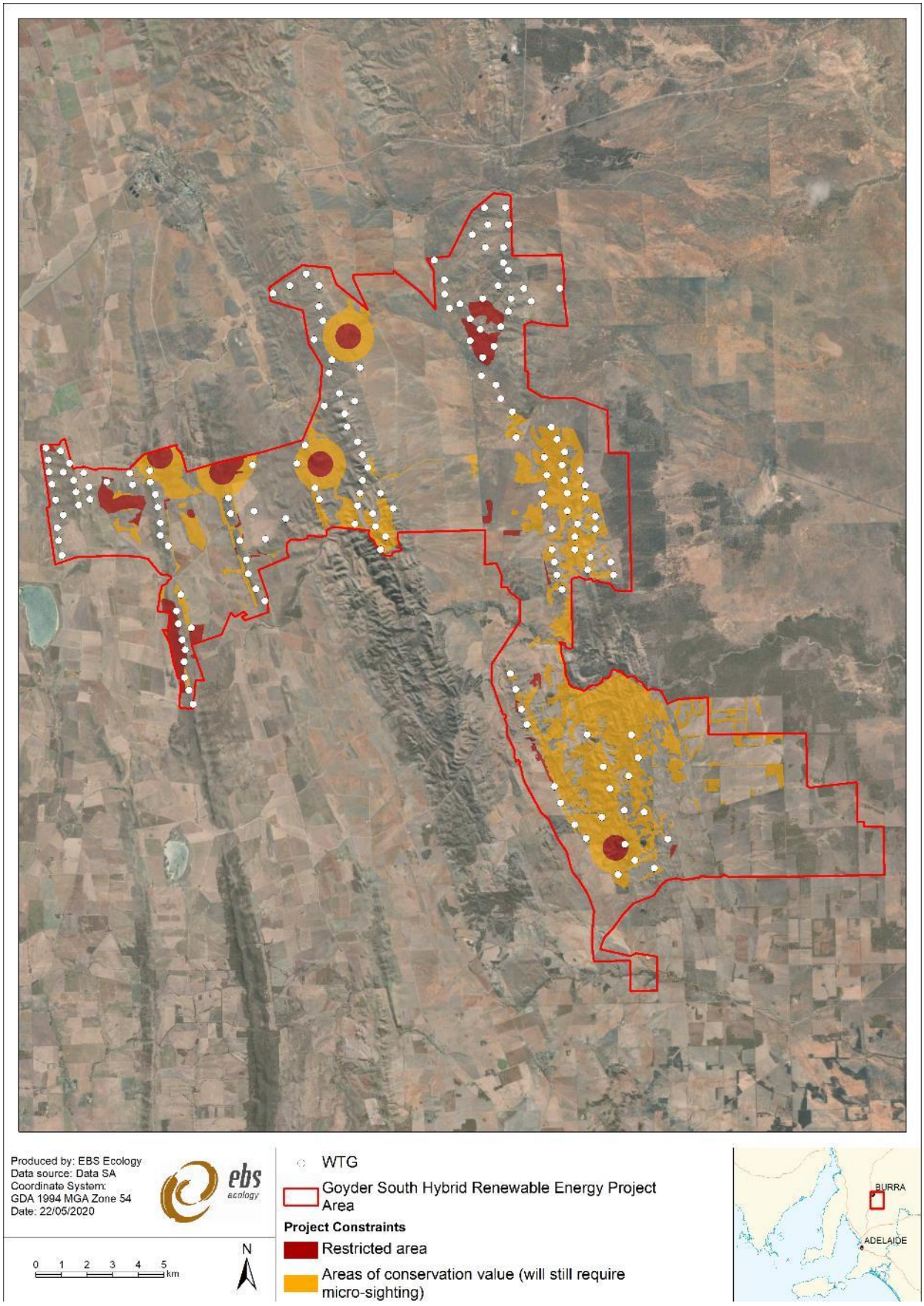


Figure 50. Project constraints identified by EBS as part of the initial ecological assessment work.

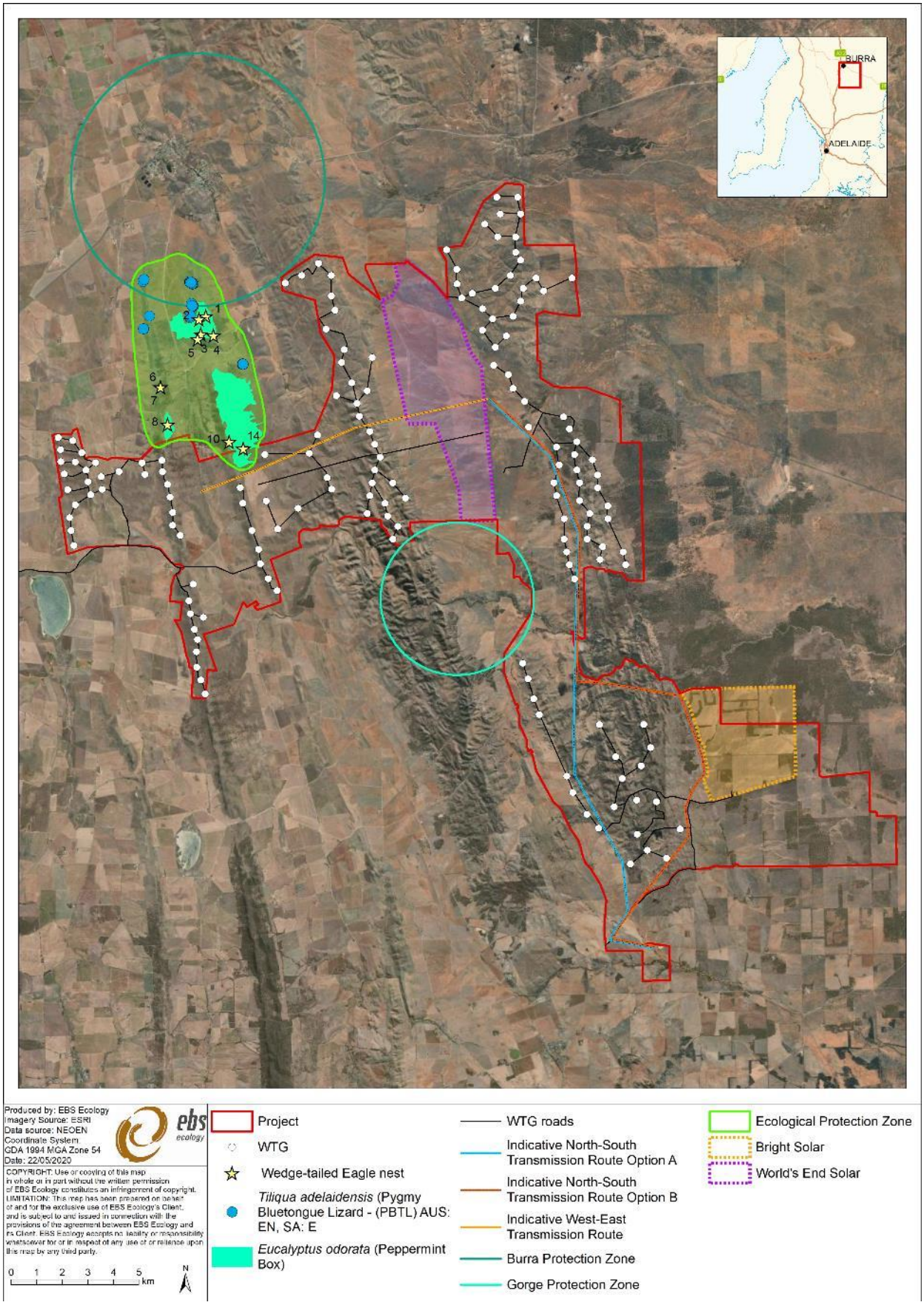


Figure 51. Ecological Protection Zone implemented by Neoen as part of the preliminary wind farm design.

9 REFERENCES

Acciona Energy (2012) Bird monitoring. Waubra Wind Farm Newsletter (18). Retrieved from http://www.acciona.com.au/community/newsletters.

Anderson, L., Burgin, S. (2008) Patterns of bird predation on reptiles in small woodland remnant edges in peri-urban north-western Sydney, Australia. *Landscape Ecology* **23**: pp. 1039-1047.

Atlas of Living Australia (ALA) *Echinopogon* P. Beauv. Hedgehog Grasses – Available at: https://bie.ala.org.au/species/http://id.biodiversity.org.au/node/apni/2912327# [Accessed June 2019].

Australian Ecological Research Services (AERS) (2015) Macarthur Wind Farm, Bat and avifauna mortality monitoring. March 2014 to February 2015. Prepared for AGL Energy Limited. Australian Ecological Research Services, Portland, Victoria.

Beston, J.A., Diffendorfer, J.E., Loss, S.R., Johnson, D.H. (2016) Prioritizing avian species for risk of population-level consequences from wind energy development. *PLos ONE* doi: 10.1371/journal.pone.0150813.

Brett Lane & Associates (BL&A) (2018) Ararat wind farm – bird and bat monitoring program. First year annual report April 2017 to March 2018. Ararat Wind Farm Pty Limited Windlab. Prepared by Brett Lane & Associates, Hawthorn, Victoria.

Carter, O. (2010) *National Recovery Plan for Trailing Hop-bush Dodonaea procumbens*. Department of Sustainability and Environment, Melbourne.

Clean Energy Council (2018) *Best Practice Guidelines: For Implementation of Wind Energy Projects in Australia*. Published by Clean Energy Australia.

Commonwealth of Australia, Bureau of Meteorology (2019) Climate statistics for Australian locations – Eudunda. Available at: http://www.bom.gov.au/jsp/ncc/cdio/cvg/av [Accessed 27/02/2019].

Cox, S.J., Bauer, J.J. (1997) Species interactions between White-winged Chough and Australia Magpie in a fragmented landscape. *Pacific Conservation Biology* **3**(3): pp. 289-294.

Dahl, E.L., Bevanger, K., Nygard, T., Roskaft, E., Stokke, B.G. (2011) Reduced breeding success in white-tailed eagles at Smola windfarm, western Norway, is caused by mortality and displacement. *Biological Conservation* 145 (1): pp. 79-85, doi: 10.1016/j.biocon.2011.10.012.

Department for Environment and Heritage (DEH) (2001) Provisional List of Threatened Ecosystems of South Australia (unpublished and provisional). Department for Environment and Heritage, Adelaide.

Department of Environment and Heritage (DEH) (2006) *Mokota Conservation Park Draft Grassland Management Plan*. Internal Report.

Department of the Environment and Water Resources (DEWR) (June 2007) *Environment Protection and Biodiversity Conservation Act Policy Statement 3.7 Nationally Threatened Species and Ecological Communities: Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia*.

Department of Environment and Natural Resources (DEWNR) (2011) Parks of the Mid North. DENR. Available at: http://www.environment.sa.gov.au/files/sharedassets/parks/psa-gen-parksofthemidnorth.pdf [Accessed 17 January 2019].

Department of Environment, Water and Natural Resources (DEWNR) (2016) *Policy for a Significant Environmental Benefit under the Native Vegetation Act 1991 and Native Vegetation Regulations 2017*. DEWNR. Available at: https://www.environment.sa.gov.au/files/sharedassets/public/native_veg/policy-for-a-significant-environmental-benefit-rep.pdf. [Accessed 17 January 2019].

Department of Environment and Water (DEW) (2019) *Biological Database of SA*. Recordset number DEWNRBDBSA190121-1 (provided 21/01/2019).

Department of Environment and Water (DEW) (2019) NatureMaps: Significant Environment Benefit Areas Layer. Available at: http://spatialwebapps.environment.sa.gov.au/naturemaps/?locale=en-us&viewer=naturemaps. [Accessed 17 January 2019].

Department of the Environment and Energy (DotEE) (2009) Approved Conservation Advice for: *Acacia spilleriana* (Spiller's Wattle).

Department of the Environment and Energy (DotEE) (2019) EPBC Protected Matters Search, Available at: http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf [Accessed 10 January 2019].

Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) (2011) *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.* Commonwealth of Australia 2011.

Duffy, A., L. Pound & T. How (2012) *Recovery Plan for the Pygmy Bluetongue Lizard Tiliqua adelaidensis*. Department of Environment and Natural Resources, South Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/recovery-plan-pygmy-bluetongue-lizard-tiliqua-adelaidensis-2012. In effect under the EPBC Act from 24-Jul-2012.

EBS Ecology (2008) *Stony Gap Wind Farm Flora Survey and Fauna Assessment, 13th – 16th May 2008*. Report to Hydro Tasmania. Environmental and Biodiversity Services, Adelaide.

EBS Ecology (2009) *Additional Stony Gap Wind Farm Flora and Fauna Survey, November 2008*. Report to Hydro Tasmania. Environmental and Biodiversity Services, Adelaide.

EBS Ecology (2011) *Stony Gap Wind Farm - Additional Flora and Fauna Assessment, November and December 2010.* Report to Entura Hydro Tasmania. EBS Ecology, Adelaide.

EBS Ecology (2012b) *Stony Gap Stage 2 Flora and Fauna Survey.* Report to TRUenergy. EBS Ecology, Adelaide.

EBS Ecology (2012c) *Targeted surveys for flora and fauna species and ecological communities listed under the EPBC Act 1999 - Stony Gap Wind Farm – 2012*. Report to TRUenergy Renewable Development Pty Ltd. EBS Ecology, Adelaide.

EBS Ecology (2013a) *Stony Gap Stage 2 Additional Flora and Fauna Assessments.* Report to Energy Australia. EBS Ecology, Adelaide.

EBS Ecology (2013b) *Targeted surveys for flora and fauna species and ecological communities listed under the EPBC Act 1999 - Stony Gap Wind Farm – 2012*. Report to TRUenergy Renewable Development Pty Ltd. EBS Ecology, Adelaide.

EBS Ecology (2013c) PBTL Construction Environmental Management Plan- Stony Gap. Report to Energy Australia. EBS Ecology, Adelaide.

EBS Ecology (2019) Bird Strike Monitoring – Year 1 Hornsdale Wind Farm. Report to Neoen. EBS Ecology, Adelaide.

Finlayson G.R., Shimmin G.A., Temple-Smith P.D., Handasyde K., Taggart D.A. (2005) Burrow use and ranging behaviour of the southern hairy-nosed wombat, *Lasiorhinus latifrons*, in the Murraylands, South Australia. *Journal of Zoology* **265**, pp. 189–200.

Graham A., Oppermann A., Inns R.W. (2001) Biodiversity Plan for the Northern Agricultural Districts. Department for Environment and Heritage, Adelaide.

Hydro Tasmania (2012). Bluff point wind farm and Studland Bay Wind Farm annual environmental performance report 2011. Hobart: Hydro Tasmania.

Jessop J.P., Toelken H.R. (1986) Flora of South Australia – Parts I-IV. State Herbarium of South Australia, Adelaide.

Jusaitis M., Sorensen B. (1994) Conservation Studies on Endangered Plant Species from South Australia's Agricultural Regions. Black Hill Flora Centre.

Kahrimanis M.J., Carruthers S., Opperman A. and Inns R. (2001) *Biodiversity Plan for the South Australian Murray-Darling Basin. Adelaide, South Australia*: Department of Environment and Heritage.

Marshall V.M., Taggart D.A., Ostendorf B. (2018) Scale-dependent habitat analysis and implications for climate change risk for the southern hairy-nosed wombat. *Australian Mammalogy* **40**, pp. 162–172.

Maslin, B.R. (2001a) Mimosaceae. Acacia part 1. In: Orchard, A.E. & A. Wilson, eds. *Flora of Australia*. **11A**:pp 1-673. Melbourne, Victoria: Australian Biological Resources Study and CSIRO Publishing.

McClure, C.J.W., Martinson, L., Allision, T.D. (2018) Automated monitoring for birds in flight: Proof of concept with eagles at a wind power facility. *Biological Conservation* **224**: pp. 26-33.

Moritz K.N., Bickerton D.C. (2010) Recovery Plan for the Peep Hill hop-bush *Dodonaea subglandulifera* 2010. Report to the Recovery Planning and Implementation Section, Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra.

Native Vegetation Council (NVC) Bushland Assessment Manual (2017) Native Vegetation Management Unit. State of South Australia 2015.

Pizzey, G. and Knight, F. (2014) *The Field Guide to the Birds of Australia – 9th Edition*. CSIRO Publishing.

Priday, S.D. (2010) Beyond the 'woody remnant' paradigm in conservation of woodland birds: habitat requirements of the Hooded Robin (Melanodryas cucullata cucullata). *Emu – Austral Ornithology* **110**(2): pp. 118-124.

Schofield, J. (2006) *Pygmy Bluetongue Lizards*: *Best Practice Management Guidelines for Landholders*, Report for the Department for Environment and Heritage, Adelaide.

Smith J. (2000) A survey for nationally threatened plant species on Local Government reserves and roadsides in the Northern Mount Lofty Ranges. Unpublished Thesis for an Honours Degree in Natural Resource Management. University of Adelaide.

Sparrow E.E. (2012) Understanding the southern hairy-nosed wombat in the Far West and on Eyre Peninsula: community engagement and ecological research. Report for Department of Environment, Water and Natural Resources, Adelaide.

Sparrow E.E., Parsons M.H., Blumstein D.T. (2016) Novel use for a predator scent: Preliminary data suggest that wombats avoid recolonising collapsed burrows following application of dingo scent. *Australian Journal of Zoology* **64**, pp. 192–197.

Sparrow E.E., Taggart D.A., O'Brien C. (2011) State-wide survey of southern hairy-nosed wombats. Report for Department of Environment, Water and Natural Resources, Adelaide.

Szabo, J.K., Vesk, P.A., Baxter, P.W.K., Possingham, H.P. (2011) Paying the extinction debt: woodland birds in the Mount Lofty Ranges, South Australia. *Emu* **111**(1) pp. 59-70.

The Guardian (2016) Solar farms to create natural habitats for threatened British species. Availabe at: https://www.theguardian.com/environment/2016/mar/07/solar-farms-to-create-natural-habitats-for-threatened-british-species) [Accessed 18 December 2019].

Vorrath, S. (2018) Tasmania wind farm Australia's first to use eagle protection technology. Renew Economy. Available at: https://reneweconomy.com.au/tasmania-wind-farm-australias-fire-to-use-eagle-protection-technology-79633/ [Accessed 10 January 2019].

West, J.G. (1986) Sapindaceae. In: Jessop, J.P. & H.R. Toelken, eds. *Flora of South Australia*, Part II: Leguminosae-Rubiaceae. 4th Edition. Adelaide: South Australian Government Printing Division.

Whibley, D.J.E. & D.E. Symon (1992) *Acacias of South Australia*. Adelaide, South Australia: Flora and Fauna of South Australia Handbook Committee.

Zwart, M.C., Dunn, J.C., McGowan, P.J.K., Whittingham, M.J. (2016) Wind farm noise suppresses territorial defence behaviour in a songbird. *Behavioural Ecology* **27**(1): pp. 101-108.

10 APPENDICES

Appendix 1. BDBSA Flora records within 20 km of the Project Area.

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Acacia acinacea	Wreath Wattle			Y	13/09/2007
Acacia argyrophylla	Silver Mulga-bush			Y	15/06/2005
Acacia brachybotrya	Grey Mulga-bush			Y	25/11/2013
Acacia calamifolia	Wallowa			Y	5/11/2014
Acacia calamifolia (NC)	Wallowa			Y	11/11/2003
Acacia cupularis	Cup Wattle			Y	24/12/2005
Acacia euthycarpa	Wallowa			Y	30/07/2009
Acacia genistifolia	Broom Wattle		E	Y	30/12/1990
Acacia glandulicarpa	Hairy-pod Wattle	VU	E	Y	8/05/2008
Acacia hakeoides	Hakea Wattle			Y	10/11/2003
Acacia iteaphylla	Flinders Ranges Wattle		R	Y	11/01/2004
Acacia ligulata	Umbrella Bush			Y	8/05/2008
Acacia microcarpa	Manna Wattle			Y	8/05/2008
Acacia montana	Mallee Wattle		R	Y	18/08/1977
Acacia notabilis	Notable Wattle			Y	2/12/2003
Acacia nyssophylla	Spine Bush			Y	1/01/1932
Acacia oswaldii	Umbrella Wattle			Y	5/11/2014
Acacia paradoxa	Kangaroo Thorn			Y	4/10/2009
Acacia pycnantha	Golden Wattle			Y	5/11/2014
Acacia retinodes	Wirilda			Y	5/10/2008
Acacia sp.	Wattle			Y	8/05/2008
Acacia spilleriana	Spiller's Wattle	EN	E	Y	3/10/2012
Acacia triquetra	Mallee Wreath Wattle			Y	
Acacia victoriae ssp. victoriae	Elegant Wattle			Y	18/12/2001
Acacia wattsiana	Dog Wattle			Y	5/10/2008
Acaena echinata	Sheep's Burr			Y	10/12/2013
Acaena sp.	Sheep's Burr			Y	27/11/2001
Acer sp.	Maple			N	19/12/2001
Acianthus pusillus	Mosquito Orchid			Y	16/06/1969
Acrotriche affinis	Ridged Ground-berry			Y	5/10/2008
Acrotriche patula	Prickly Ground-berry			Y	25/11/2013
Actinobole uliginosum	Flannel Cudweed			Y	5/11/2014
Adonis microcarpa	Pheasant's Eye			N	27/02/1993
Adriana quadripartita	Coast Bitter-bush			Y	8/11/2003
Agave americana var. (NC)	Century Plant			N	16/11/2001
Agrostis avenacea var. avenacea (NC)	Common Blown-grass			Y	1/05/2000
Aira caryophyllea	Silvery Hair-grass			N	1/10/1999
Aira cupaniana	Small Hair-grass			N	5/10/2008
Aira elegantissima	Delicate Hair-grass			N	17/11/1993
Aira sp.	Hair-grass			N	8/05/2008
Ajuga australis	Australian Bugle			Y	29/10/2003
Ajuga australis f. A (A.G.Spooner 9058)	Australian Bugle			Y	10/11/2003
Alectryon oleifolius ssp. canescens	Bullock Bush			Y	5/11/2014
Allium roseum				N	9/11/1994
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush			Y	31/08/1995
Allocasuarina verticillata	Drooping Sheoak			Y	4/10/2009

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Alternanthera denticulata	Lesser Joyweed			Y	18/03/1995
Amphibromus nervosus	Veined Swamp Wallaby-grass			Y	1/11/2001
Amphipogon caricinus var. caricinus	Long Grey-beard Grass			Y	1/06/1999
Amsinckia calycina	Hairy Fiddle-neck			N	29/10/2003
Amsinckia lycopsoides	Bugloss Fiddle-neck			N	17/11/1993
Amyema miquelii	Box Mistletoe			Y	5/10/2008
Amyema preissii	Wire-leaf Mistletoe			Y	4/10/2008
Angianthus tomentosus	Hairy Angianthus			Y	1/10/1907
Anthosachne scabra	Native Wheat-grass			Y	21/09/2012
Apium graveolens	Celery			N	20/10/1981
Apium prostratum var.	Native Celery			Y	5/11/2014
Apium prostratum var. prostratum	Native Celery			Y	1/06/2005
Arabidella filifolia	Thread-leaf Cress			Y	19/08/1979
Arabidella trisecta	Shrubby Cress			Y	20/10/1981
Arctotheca calendula	Cape Weed			N	21/09/2012
Aristida behriana	Brush Wire-grass			Y	10/12/2013
Aristida contorta	Curly Wire-grass			Y	1/06/1999
Aristida sp.	Three-awn/Wire-grass			Y	21/09/2012
Arthropodium fimbriatum	Nodding Vanilla-lily			Y	10/12/2013
Arthropodium minus	Small Vanilla-lily			Y	4/10/2008
Arthropodium sp.	Vanilla-lily			Y	2/12/2003
Arthropodium strictum	Common Vanilla-lily			Y	21/09/2012
Arundo donax	Giant Reed			N	1/04/2001
Asperula conferta	Common Woodruff			Y	5/10/2008
Asperula syrticola	Southern Flinders Woodruff		R	Y	21/11/1993
Asphodelus fistulosus	Onion Weed			N	17/09/2010
Asplenium flabellifolium	Necklace Fern			Y	11/11/1995
Asteridea athrixioides	Wirewort			Y	27/02/1993
Asteridea athrixioides f. athrixioides (NC)	Wirewort			Y	2/12/2003
Astroloma humifusum	Cranberry Heath			Y	5/10/2008
Atriplex acutibractea ssp.	Pointed Saltbush			Y	11/03/1980
Atriplex acutibractea ssp. acutibractea	Pointed Saltbush			Y	1/04/2001
Atriplex angulata	Fan Saltbush			Y	1/04/2001
Atriplex eardleyae	Eardley's Saltbush			Y	3/12/1993
Atriplex holocarpa	Pop Saltbush			Y	0/01/1900
Atriplex leptocarpa	Slender-fruit Saltbush			Y	18/03/1995
Atriplex lindleyi ssp. inflata	Corky Saltbush			Y	1/05/2000
Atriplex lindleyi ssp. lindleyi	Baldoo			Y	17/09/2010
Atriplex paludosa ssp.	Marsh Saltbush			Y	1/04/2001
Atriplex prostrata	Creeping Saltbush			N	1/11/2003
Atriplex pumilio	Mat Saltbush			Y	5/11/2014
Atriplex semibaccata	Berry Saltbush			Y	5/11/2014
Atriplex sp.	Saltbush			Y	27/11/2001
Atriplex stipitata	Bitter Saltbush			Y	5/11/2014
Atriplex suberecta	Lagoon Saltbush			Y	15/12/2012
Atriplex velutinella	Sandhill Saltbush			Y	27/10/1994
Atriplex vesicaria	Bladder Saltbush			Y	5/11/2014
Atriplex vesicaria ssp. (NC)	Bladder Saltbush			Y	8/05/2008
Atriplex vesicaria ssp. calcicola (NC)	Bladder Saltbush			Y	31/07/1991
Austrodanthonia sp. (NC)				Y	8/05/2008

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Austrostipa acrociliata	Graceful Spear-grass			Y	5/11/2014
Austrostipa blackii	Crested Spear-grass			Y	4/10/2008
Austrostipa breviglumis	Cane Spear-grass		R	Y	5/10/2008
Austrostipa curticoma	Short-crest Spear-grass			Y	15/11/1996
Austrostipa drummondii	Cottony Spear-grass			Y	5/11/2014
Austrostipa elegantissima	Feather Spear-grass			Y	5/11/2014
Austrostipa eremophila	Rusty Spear-grass			Y	25/11/2013
Austrostipa eremophila/puberula				Y	25/11/2013
Austrostipa exilis	Heath Spear-grass			Y	28/10/2003
Austrostipa flavescens	Coast Spear-grass			Y	4/12/2010
Austrostipa gibbosa	Swollen Spear-grass		R	Y	1/11/2005
Austrostipa hemipogon	Half-beard Spear-grass			Y	31/10/2003
Austrostipa mollis	Soft Spear-grass			Y	5/10/2008
Austrostipa nitida	Balcarra Spear-grass			Y	4/12/2010
Austrostipa nodosa	Tall Spear-grass			Y	10/12/2013
Austrostipa petraea	Flinders Range Spear-grass		R	Y	3/12/1993
Austrostipa pilata	Prickly Spear-grass		V	Y	31/10/2003
Austrostipa platychaeta	Flat-awn Spear-grass			Y	4/12/2010
Austrostipa puberula	Fine-hairy Spear-grass			Y	10/12/2013
Austrostipa scabra group	Falcate-awn Spear-grass			Y	25/05/2000
Austrostipa scabra ssp.	Rough Spear-grass			Y	15/11/1996
Austrostipa scabra ssp. falcata	Slender Spear-grass			Y	4/10/2008
Austrostipa scabra ssp. scabra	Rough Spear-grass			Y	31/10/2003
Austrostipa setacea	Corkscrew Spear-grass			Y	5/10/2008
Austrostipa sp.	Spear-grass			Y	5/11/2014
Austrostipa trichophylla				Y	1/11/2005
Avellinia michelii	Avellinia			N	5/10/2008
Avena barbata	Bearded Oat			N	10/12/2013
Avena fatua	Wild Oat			N	4/10/2008
Avena sativa	Cultivated Oat			N	25/11/1993
Avena sp.	Oat			N	21/09/2012
Avena sterilis ssp. ludoviciana	Wild Oat			N	10/12/1988
Banksia marginata	Silver Banksia			Y	28/10/1994
Baumea juncea	Bare Twig-rush			Y	8/11/2003
Bellardia latifolia	Red Bartsia			N	23/10/1992
Bellardia trixago	Bellardia			N	8/11/2003
Berula erecta	Water Parsnip			N	29/07/2009
Beyeria lechenaultii	Pale Turpentine Bush			Y	5/11/2014
Billardiera cymosa ssp. cymosa	Sweet Apple-berry			Y	0/01/1900
Blennospora drummondii	Dwarf Button-flower			Y	19/09/1982
Boerhavia dominii	Tar-vine			Y	15/12/2012
Boerhavia dominii (NC)	Tar-vine			Y	9/11/2003
Boerhavia sp.	Tar-vine			Y	9/11/1997
Bolboschoenus caldwellii	Salt Club-rush			Y	29/07/2009
Bolboschoenus medianus	Marsh Club-rush			Y	1/04/2001
Bothriochloa macra	Red-leg Grass		R	Y	4/04/2000
Brachyachne ciliaris	Hairy Native Couch			Y	2/12/2003
Brachypodium distachyon	False Brome			N	5/10/2008
Brachyscome ciliaris var. ciliaris	Variable Daisy			Y	5/11/2014
Brachyscome ciliaris var. lanuginosa	Woolly Variable Daisy			Y	8/11/1997
Brachyscome goniocarpa	Dwarf Daisy			Y	19/08/1979
Brachyscome lineariloba	Hard-head Daisy			Y	5/11/2014

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Brachyscome lineariloba/perpusilla				Y	21/10/1992
Brachyscome perpusilla	Tiny Daisy			Y	5/10/2008
Brassica sp.				N	11/01/2004
Briza maxima	Large Quaking-grass			N	5/10/2008
Briza minor	Lesser Quaking-grass			N	5/10/2008
Bromus alopecuros	Mediterranean Brome			N	25/11/1993
Bromus arenarius	Sand Brome			Y	7/10/1993
Bromus diandrus	Great Brome			N	10/12/2013
Bromus diandrus (NC)	Great Brome			N	21/04/2008
Bromus hordeaceus ssp. hordeaceus	Soft Brome			N	21/09/2012
Bromus madritensis	Compact Brome			N	23/10/1992
Bromus rubens	Red Brome			N	25/11/2013
Bromus sp.	Brome			Y	8/05/2008
Buglossoides arvensis	Sheepweed			N	4/10/2008
Bulbine bulbosa	Bulbine-lily			Y	10/12/2013
Bupleurum semicompositum	Hare's Ear			N	11/11/2003
Bursaria spinosa ssp.	Bursaria			Y	5/10/2008
Bursaria spinosa ssp. spinosa	Sweet Bursaria			Y	25/11/2013
Caesia calliantha	Blue Grass-lily			Y	24/09/1991
Caladenia tensa	Inland Green-comb Spider-orchid	EN		Y	23/09/2007
Caladenia tentaculata	King Spider-orchid			Y	11/11/2003
Caladenia toxochila	Bow-lip Spider-orchid			Y	0/01/1900
Calandrinia calyptrata	Pink Purslane			Y	31/10/2003
Calandrinia eremaea	Dryland Purslane			Y	4/10/2008
Calandrinia granulifera	Pigmy Purslane			Y	1/06/1999
Calandrinia sp.	Purslane/Parakeelya			Y	31/07/1991
Calandrinia volubilis	Twining Purslane			Y	29/11/1998
Callistemon teretifolius	Needle Bottlebrush			Y	1/03/1997
Callitriche stagnalis	Common Water Starwort			N	5/10/1993
Callitris glaucophylla	White Cypress-pine			Y	18/08/1985
Callitris gracilis	Southern Cypress Pine			Y	5/11/2014
Callitris sp.	Native Pine			Y	16/11/2001
Calocephalus citreus	Lemon Beauty-heads			Y	21/09/2012
Calostemma purpureum	Pink Garland-lily			Y	21/09/2012
Calotis hispidula	Hairy Burr-daisy			Y	16/09/2010
Calotis sp.	Burr-daisy			Y	25/11/2013
Calytrix tetragona	Common Fringe-myrtle			Y	2/12/2003
Carduus tenuiflorus	Slender Thistle			N	25/11/2013
Carex breviculmis	Short-stem Sedge			Y	1/06/1999
Carex divisa	Divided Sedge			N	9/11/2003
Carex gaudichaudiana	Fen Sedge			Y	23/10/1992
Carex inversa var. inversa	Knob Sedge			Y	1/11/2005
Carex inversa var. major	Knob Sedge			Y	7/12/1992
Carex tereticaulis	Rush Sedge			Y	2/04/1994
Carissa spinarum	Conker Berry			Y	2/12/2003
Carpobrotus rossii	Native Pigface			Y	12/09/1934
Carpobrotus rossii (NC)	Native Pigface			Y	1/04/2001
Carpobrotus sp. Short calyx (S.T.Blake 20451)	Native Pigface			Y	0/01/1900
Carrichtera annua	Ward's Weed			N	5/11/2014
Carthamus lanatus	Saffron Thistle			N	10/12/2013
Cassinia arcuata	Drooping Cassinia			Y	1/08/1991
Cassinia arcuata (NC)	Drooping Cassinia			Y	1/08/1991

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Cassinia complanata	Sticky Cassinia			Y	5/10/2008
Cassinia laevis ssp. laevis	Curry Bush			Y	8/11/2003
Cassinia sp.	Cassinia			Y	30/07/2009
Cassinia uncata (NC)	Sticky Cassinia			Y	1/06/1999
Cassytha glabella f. dispar	Slender Dodder-laurel			Y	2/12/2003
Cassytha melantha	Coarse Dodder-laurel			Y	5/11/2014
Cassytha sp.	Dodder-laurel			Y	11/03/1980
Casuarina pauper	Black Oak			Y	1/04/2001
Casuarinaceae sp.	Sheaok Family			Y	21/04/2008
Catapodium rigidum	Rigid Fescue			N	10/11/2003
Cenchrus clandestinus	Kikuyu			N	11/01/2004
Cenchrus longispinus	Spiny Burr-grass			N	1/01/2010
Cenchrus spinifex	Spiny Burr-grass			N	1/01/2010
Centaurea calcitrapa	Star Thistle			N	8/05/2008
Centaurea melitensis	Malta Thistle			N	4/10/2008
Centaurea solstitialis	St Barnaby's Thistle			N	20/01/1994
Centaurea sp.	Centaury			N	25/11/2013
Centaurium sp.	Centaury			N	8/12/1998
Centaurium tenuiflorum	Branched Centaury			N	11/11/2003
Centipeda cunninghamii	Common Sneezeweed			Y	7/05/1995
Centranthus macrosiphon				N	7/10/1993
Centrolepis aristata	Pointed Centrolepis			Y	5/10/2008
Centrolepis cephaloformis ssp. cephaloformis	Cushion Centrolepis		R	Y	21/10/1992
Centrolepis polygyna	Wiry Centrolepis			Y	31/10/2003
Centrolepis strigosa ssp. strigosa	Hairy Centrolepis			Y	5/10/2008
Cerastium glomeratum	Common Mouse-ear Chickweed			N	23/09/2014
Cestrum parqui	Green Poison-berry			N	16/05/1974
Chamaescilla corymbosa var. corymbosa	Blue Squill			Y	5/10/2008
Chamaesyce drummondii (NC)	Caustic Weed			Y	9/11/2003
Chara sp.				Y	29/07/2009
Cheilanthes austrotenuifolia	Annual Rock-fern			Y	5/10/2008
Cheilanthes distans	Bristly Cloak-fern			Y	20/11/1993
Cheilanthes lasiophylla	Woolly Cloak-fern			Y	8/11/2003
Cheilanthes sieberi ssp. sieberi	Narrow Rock-fern			Y	4/10/2008
Chenopodium curvispicatum	Cottony Goosefoot			Y	5/11/2014
Chenopodium desertorum ssp.	Desert Goosefoot			Y	8/12/1998
Chenopodium desertorum ssp. desertorum	Frosted Goosefoot			Y	5/11/2014
Chenopodium desertorum ssp. microphyllum	Small-leaf Goosefoot			Y	30/07/2009
Chenopodium glaucum	Glaucous Goosefoot			?	1/11/2003
Chenopodium sp.	Goosefoot			Y	11/03/1980
Chloris sp.	Windmill Grass/Chloris			Y	8/05/2008
Chloris truncata	Windmill Grass			Y	25/05/2000
Chondrilla juncea	Skeleton Weed			N	1/04/2001
Chrysocephalum apiculatum	Common Everlasting			Y	5/11/2014
Chrysocephalum apiculatum (NC)	Common Everlasting			Y	5/10/2008
Chrysocephalum baxteri	White Everlasting			Y	5/10/2008
Chrysocephalum semipapposum	Clustered Everlasting			Y	26/11/2017
Chrysocephalum sp.	Everlasting			Y	27/10/1994
Cicendia quadrangularis	Square Cicendia			N	20/09/1998

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Cichorium intybus	Chicory			N	15/12/2012
Cirsium sp.	Thistle			N	21/09/2012
Cirsium vulgare	Spear Thistle			N	29/07/2009
Clematis decipiens	Old Man's Beard			Y	21/08/1971
Clematis microphylla	Old Man's Beard			Y	4/10/2008
Clematis microphylla var. microphylla (NC)	Old Man's Beard			Y	30/07/2009
Codonocarpus pyramidalis	Slender Bell-fruit	VU	E	Y	25/11/2013
Comesperma sp.	Milkwort			Y	5/10/2008
Comesperma volubile	Love Creeper			Y	11/11/2003
Compositae sp.	Daisy Family			Y	25/11/2013
Conium maculatum	Hemlock			N	29/07/2009
Convolvulus angustissimus	Narrow-leaf Bindweed			Y	1/11/2005
Convolvulus angustissimus ssp.	Narrow-leaf Bindweed			Y	5/11/2014
Convolvulus angustissimus ssp. angustissimus (NC)	Narrow-leaf Bindweed			Y	29/10/2003
Convolvulus angustissimus ssp. peninsularum (NC)	Narrow-leaf Bindweed			Y	1/06/1999
Convolvulus arvensis	Field Bindweed			N	10/12/1988
Convolvulus clementii (NC)				Y	25/05/2000
Convolvulus erubescens (NC)	Australian Bindweed			Y	11/11/2003
Convolvulus microsepalus	Small-flower Bindweed			Y	5/06/1993
Convolvulus recurvatus ssp. nullarborensis				Y	14/02/1993
Convolvulus recurvatus ssp. recurvatus	Australian Bindweed			Y	1/11/2001
Convolvulus remotus	Grassy Bindweed			Y	10/12/2013
Convolvulus sp.	Bindweed			Y	21/09/2012
Correa glabra (NC)	Rock Correa			Y	1/06/1999
Correa glabra var. turnbullii	Smooth Correa			Y	4/10/2008
Correa sp.	Correa			Y	11/03/1980
Corybas incurvus	Slaty Helmet-orchid			Y	31/08/1995
Cotoneaster pannosus	Cotoneaster			N	7/07/1988
Cotula australis	Common Cotula			Y	1/06/1999
Cotula bipinnata	Ferny Cotula			N	14/09/1993
Cotula coronopifolia	Water Buttons			N	29/07/2009
Craspedia glauca (NC)	Billy-buttons			Y	10/11/2003
Craspedia variabilis	Billy-buttons			Y	5/10/2008
Crassula colligata ssp. colligata				Y	5/10/2008
Crassula colligata ssp. lamprosperma				Y	17/09/2010
Crassula colorata var.	Dense Crassula			Y	5/11/2014
Crassula colorata var. acuminata	Dense Crassula			Y	5/10/2008
Crassula colorata var. colorata	Dense Crassula			Y	1/06/1999
Crassula colorata/sieberiana complex	Crassula			Y	31/07/1991
Crassula decumbens var. decumbens	Spreading Crassula			Y	1/06/1999
Crassula natans var. minus	Water Crassula			N	19/09/1982
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop			Y	9/11/2003
Crassula sp.	Crassula/Stonecrop			Y	5/11/2014
Cratystylis conocephala	Bluebush Daisy			Y	16/03/2008
Crepis foetida ssp. foetida	Stinking Hawksbeard			N	10/11/2003
Critesion murinum ssp. (NC)	Barley-grass			N	23/10/1992
Cryptandra amara var. (NC)	Cryptandra			Y	1/08/1991

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Cryptandra amara var. amara (NC)	Spiny Cryptandra			Y	27/10/1994
Cryptandra campanulata	Long-flower Cryptandra		R	Y	5/10/2008
Cryptandra sp. Floriferous (W.R.Barker 4131)	Pretty Cryptandra			Y	27/10/1994
Cullen australasicum	Tall Scurf-pea			Y	11/01/2004
Cullen discolor	Prostrate Scurf-pea			Y	8/12/1983
Cullen parvum	Small Scurf-pea		V	Y	24/11/2010
Cupressus macrocarpa	Monterey Cypress			N	1/03/1987
Cymbonotus preissianus	Austral Bear's-ear			Y	1/06/1999
Cymbopogon ambiguus	Lemon-grass			Y	30/07/2009
Cymbopogon obtectus	Silky-head Lemon-grass			Y	25/05/2000
Cynara cardunculus ssp. flavescens	Artichoke Thistle			N	1/01/2011
Cynodon dactylon (NC)	Couch			N	11/01/2004
Cynodon dactylon var. dactylon	Couch			N	8/05/2008
Cynoglossum suaveolens	Sweet Hound's-tongue			Y	10/12/2013
Cynosurus echinatus	Rough Dog's-tail Grass			N	1/04/2001
Cyperus gymnocaulos	Spiny Flat-sedge			Y	5/11/2014
Cyperus sp.	Flat-sedge			Y	27/11/2001
Cyperus vaginatus	Stiff Flat-sedge			Y	30/07/2009
Cytisus scoparius	English Broom			N	2/12/2003
Dactylis glomerata	Cocksfoot			N	26/10/1991
Dactyloctenium radulans	Button-grass			Y	0/01/1900
Danthonia sp. (NC)	Wallaby-grass			Y	19/12/2001
Datura stramonium	Common Thorn-apple			N	21/01/1934
Datura wrightii	Hairy Thorn-apple			N	27/02/1993
Daucus glochidiatus	Native Carrot			Y	16/09/2010
Daviesia benthamii ssp. humilis (NC)	Mallee Bitter-pea		R	Y	9/11/2003
Daviesia brevifolia	Leafless Bitter-pea			Y	27/11/2001
Daviesia leptophylla	Narrow-leaf Bitter-pea			Y	5/10/2008
Daviesia schwarzenegger	Mallee Bitter-pea		R*	Y	24/12/2005
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily			Y	28/10/1994
Dianella longifolia var. grandis	Pale Flax-lily		R	Y	10/12/1988
Dianella revoluta (NC)				Y	11/03/1980
Dianella revoluta var.				Y	8/11/1997
Dianella revoluta var. revoluta	Black-anther Flax-lily			Y	5/10/2008
Dianella sp.	Flax-lily			Y	21/09/2012
Dichanthium sericeum ssp. sericeum	Silky Blue-grass			Y	17/02/1999
Dillwynia hispida	Red Parrot-pea			Y	8/12/1998
Dimorphotheca fruticosa	Trailing African Daisy			N	23/09/2014
Diplotaxis tenuifolia	Lincoln Weed			N	1/01/2010
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface			Y	27/10/1994
Dissocarpus paradoxus	Ball Bindyi			Y	5/11/2014
Distichlis distichophylla	Emu-grass			Y	5/11/2014
Dittrichia graveolens	Stinkweed			N	15/06/2005
Diuris behrii	Behr's Cowslip Orchid		V	Y	1/06/1999
Dodonaea baueri	Crinkled Hop-bush			Y	10/12/2013
Dodonaea bursariifolia	Small Hop-bush			Y	25/02/1992
Dodonaea hexandra	Horned Hop-bush			Y	11/11/2003
Dodonaea lobulata	Lobed-leaf Hop-bush			Y	5/11/2014
Dodonaea procumbens	Trailing Hop-bush	VU	V	Y	26/11/2004

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Dodonaea procumbens X Dodonaea viscosa ssp. spatulata				Y	24/03/1994
Dodonaea stenozyga	Desert Hop-bush			Y	29/07/1991
Dodonaea subglandulifera		EN	E	Y	28/11/2007
Dodonaea viscosa ssp.	Sticky Hop-bush			Y	10/11/1993
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush			Y	9/11/2003
Dodonaea viscosa ssp. cuneata	Wedge-leaf Hop-bush			Y	10/11/2003
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush			Y	4/10/2009
Drosera auriculata	Tall Sundew			Y	23/09/2007
Drosera glanduligera	Scarlet Sundew			Y	1/06/1999
Drosera macrantha ssp. planchonii	Climbing Sundew			Y	5/10/2008
Drosera peltata (NC)	Pale Sundew			Y	1/06/1999
Drosera whittakeri	Scented Sundew			Y	21/09/2012
Drosera whittakeri (NC)	Scented Sundew			Y	24/09/1991
Duma florulenta	Lignum			Y	30/10/2003
Dysphania pumilio	Small Crumbweed			Y	0/01/1900
Echinopogon ovatus	Rough-beard Grass		R	Y	4/10/2008
Echium plantagineum	Salvation Jane			N	10/12/2013
Einadia nutans ssp.	Climbing Saltbush			Y	8/11/2003
Einadia nutans ssp. nutans	Climbing Saltbush			Y	5/11/2014
Elachanthus pusillus	Elachanth			Y	16/09/2010
Eleocharis pallens	Pale Spike-rush			Y	28/12/1992
Eleusine indica	Crowsfoot Grass			N	1/12/1988
Elymus scaber var. scaber (NC)	Native Wheat-grass			Y	2/12/2003
Enchylaena tomentosa var.	Ruby Saltbush			Y	30/07/2009
Enchylaena tomentosa var. tomentosa	Ruby Saltbush			Y	5/11/2014
Enneapogon nigricans	Black-head Grass			Y	10/12/2013
Enneapogon sp.	Bottle-washers/Nineawn			Y	8/05/2008
Epilobium billardierianum ssp. billardierianum	Robust Willow-herb			Y	8/11/2003
Epilobium hirtigerum	Hairy Willow-herb			Y	0/01/1900
Eragrostis australasica	Cane-grass			Y	12/12/1953
Eragrostis brownii	Bentham's Love-grass			Y	0/01/1900
Eragrostis cilianensis	Stink Grass			N	21/04/2008
Eragrostis curvula	African Love-grass			N	21/04/2008
Eragrostis infecunda	Barren Cane-grass		R	Y	10/12/1988
Eragrostis parviflora	Weeping Love-grass			Y	30/12/1984
Eragrostis pilosa	Indian Love-grass			N	16/02/2005
Eremophila alternifolia	Narrow-leaf Emubush			Y	5/11/2014
Eremophila deserti	Turkey-bush			Y	1/01/1986
Eremophila glabra ssp. glabra	Tar Bush			Y	1/09/1931
Eremophila longifolia	Weeping Emubush			Y	15/06/2005
Eremophila oppositifolia ssp. oppositifolia	Opposite-leaved Emubush			Y	5/11/2014
Eremophila scoparia	Broom Emubush			Y	5/11/2014
Eremophila sturtii	Turpentine Bush			Y	8/12/1983
Eriochilus cucullatus (NC)	Parson's Bands			Y	24/09/1991
Eriochiton sclerolaenoides	Woolly-fruit Bluebush			Y	5/11/2014
Erodiophyllum elderi	Koonamore Daisy			Y	7/12/1983
Erodium botrys	Long Heron's-bill			N	4/10/2008
Erodium brachycarpum	Short-fruit Heron's-bill			N	13/09/1992
Erodium cicutarium	Cut-leaf Heron's-bill			N	16/09/2010

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Erodium crinitum	Blue Heron's-bill			Y	16/09/2010
Erodium moschatum	Musky Herons-bill			N	23/09/2014
Erodium sp.	Heron's-bill/Crowfoot			Y	21/09/2012
Eryngium ovinum	Blue Devil		V	Y	2/12/2013
Eryngium rostratum/vesiculosum	Blue Devil			Y	21/09/2012
Eucalyptus brachycalyx	Gilja			Y	15/06/2005
Eucalyptus cajuputea	Green Mallee		R*	Y	12/11/2003
Eucalyptus camaldulensis ssp.	River Red Gum			Y	21/04/2008
Eucalyptus camaldulensis ssp. camaldulensis	River Red Gum			Y	5/11/2014
Eucalyptus camaldulensis var. camaldulensis (NC)	River Red Gum			Y	1/04/2001
Eucalyptus cladocalyx (NC)	Sugar Gum			Y	8/05/2008
Eucalyptus dumosa	White Mallee			Y	2/12/2003
Eucalyptus gracilis	Yorrell			Y	5/11/2014
Eucalyptus leptophylla (NC)	Narrow-leaf Red Mallee			Y	25/02/1992
Eucalyptus leucoxylon (NC)	South Australian Blue Gum			Y	12/03/1980
Eucalyptus leucoxylon ssp.	South Australian Blue Gum			Y	8/05/2008
Eucalyptus leucoxylon ssp. leucoxylon	South Australian Blue Gum			Y	25/05/2000
Eucalyptus leucoxylon ssp. pruinosa	Inland South Australian Blue Gum			Y	10/12/2013
Eucalyptus microcarpa	Grey Box			Y	17/02/1999
Eucalyptus odorata	Peppermint Box			Y	25/11/2013
Eucalyptus odorata (NC)	Peppermint Box			Y	5/10/2008
Eucalyptus oleosa (NC)	Red Mallee			Y	11/01/2004
Eucalyptus oleosa ssp.				Y	5/11/2014
Eucalyptus oleosa ssp. oleosa	Red Mallee			Y	24/10/1994
Eucalyptus phenax ssp. phenax	White Mallee			Y	18/03/1995
Eucalyptus porosa	Mallee Box			Y	5/11/2014
Eucalyptus socialis (NC)	Beaked Red Mallee			Y	10/11/2003
Eucalyptus socialis ssp.	Beaked Red Mallee			Y	8/05/2008
Eucalyptus socialis ssp. socialis	Beaked Red Mallee			Y	5/11/2014
Eucalyptus socialis ssp. viridans	Beaked Red Mallee			Y	20/10/1981
Eucalyptus sp.				Y	8/05/2008
Euchiton sphaericus	Annual Cudweed			Y	29/10/2003
Euphorbia australis var. erythrantha				Y	27/02/1993
Euphorbia dallachyana	Caustic Weed			Y	15/12/2012
Euphorbia drummondii (NC)				Y	5/11/2014
Euphorbia helioscopia	Sun Spurge			N	26/04/1993
Euphorbia multifaria				Y	20/10/1981
Euphorbia tannensis ssp. eremophila	Desert Spurge			Y	27/02/1993
Euphorbia terracina	False Caper			N	23/09/2014
Euphorbia verrucitesta				Y	29/10/2003
Eutaxia diffusa	Large-leaf Eutaxia			Y	3/10/2012
Eutaxia microphylla	Common Eutaxia			Y	5/11/2014
Exocarpos aphyllus	Leafless Cherry			Y	5/11/2014
Exocarpos cupressiformis	Native Cherry			Y	4/10/2009
Festuca arundinacea	Tall Meadow Fescue			N	15/12/2012
Filago pyramidata	Filago			N	9/11/2003
Foeniculum vulgare	Fennel			N	19/12/2001
Frankenia sp.	Sea-heath			Y	5/11/2014

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Fraxinus angustifolia ssp. angustifolia	Desert Ash			N	15/03/1987
Freesia cultivar	Freesia			N	8/11/1997
Fumaria bastardii	Bastard Fumitory			N	8/11/2003
Fumaria capreolata	White-flower Fumitory			N	23/09/2014
Fumaria officinalis ssp. officinalis	Common Fumitory			N	20/10/1981
Fumaria parviflora var. parviflora	Small-flower Fumitory			N	15/12/2012
Gahnia lanigera	Black Grass Saw-sedge			Y	2/12/2003
Gahnia trifida	Cutting Grass			Y	1/10/2005
Galenia sp.	Galenia			N	9/11/1997
Galium divaricatum	Slender Bedstraw			N	19/10/1981
Galium gaudichaudii (NC)	Rough Bedstraw			Y	4/10/2008
Galium gaudichaudii ssp. gaudichaudii	Rough Bedstraw			Y	29/10/1967
Galium leptogonium	Reflexed Bedstraw			Y	21/08/1971
Galium migrans (NC)	Loose Bedstraw			Y	2/12/2003
Galium migrans ssp. migrans	Loose Bedstraw			Y	23/09/2004
Galium murale	Small Bedstraw			N	5/10/2008
Galium spurium	Bedstraw			N	26/09/1993
Geijera linearifolia	Sheep Bush			Y	5/11/2014
Genista monspessulana	Montpellier Broom			N	27/11/2001
Geococcus pusillus	Earth Cress			Y	30/07/2000
Geranium dissectum	Cut-leaf Geranium			N	10/11/1993
Geranium retrorsum	Grassland Geranium			Y	4/10/2008
Geranium sp.	Geranium			Y	21/09/2012
Glaucium corniculatum	Bristly Horned-poppy			N	29/10/2003
Glischrocaryon flavescens	Yellow Pennants			Y	28/11/2007
Glycine clandestina var. (NC)	Twining Glycine			Y	9/11/2003
Glycine rubiginosa	Twining Glycine			Y	2/12/2003
Gnaphalium indutum ssp. indutum	Tiny Cudweed			Y	30/10/2003
Gnaphalium sp.	Cudweed			Y	13/11/1996
Gnephosis tenuissima	Dwarf Golden-tip			Y	8/12/1983
Gomphocarpus cancellatus	Broad-leaf Cotton-bush			N	27/11/2001
Gonocarpus elatus	Hill Raspwort			Y	4/10/2008
Gonocarpus mezianus	Broad-leaf Raspwort			Y	5/10/2008
Gonocarpus sp.	Raspwort			Y	27/11/2001
Gonocarpus tetragynus	Small-leaf Raspwort			Y	5/10/2008
Goodenia albiflora	White Goodenia			Y	11/11/2003
Goodenia blackiana	Native Primrose			Y	5/10/2008
Goodenia fascicularis (NC)	Silky Goodenia			Y	16/09/2010
Goodenia geniculata	Bent Goodenia			Y	8/12/1998
Goodenia glauca	Pale Goodenia			Y	25/11/1993
Goodenia heteromera	Spreading Goodenia		R	Y	8/05/1995
Goodenia pinnatifida	Cut-leaf Goodenia			Y	21/09/2012
Goodenia pusilliflora	Small-flower Goodenia			Y	16/09/2010
Goodenia sp.	Goodenia			Y	10/12/2013
Goodenia varia	Sticky Goodenia			Y	11/11/2003
Goodenia willisiana	Silver Goodenia			Y	1/08/1991
Gramineae sp.	Grass Family			Y	30/07/2009
Grevillea huegelii	Comb Grevillea			Y	10/11/2003
Grevillea ilicifolia ssp. ilicifolia	Holly-leaf Grevillea			Y	3/10/2012
Grevillea ilicifolia var. ilicifolia (NC)	Holly-leaf Grevillea			Y	1/08/1991
Grevillea lavandulacea ssp. lavandulacea	Spider-flower			Y	1/08/1991

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Gypsophila paniculata				N	19/03/2000
Gypsophila tubulosa	Annual Chalkwort			N	27/01/1969
Haeckeria punctulata	Sticky Haeckeria			Y	3/12/1993
Hakea carinata	Erect Hakea			Y	21/10/1992
Hakea leucoptera ssp. leucoptera	Silver Needlewood			Y	5/11/2014
Hakea prostrata				N	26/09/1993
Hakea rostrata	Beaked Hakea			Y	8/05/2008
Hakea rugosa	Dwarf Hakea			Y	1/10/2003
Halgania cyanea	Rough Blue-flower			Y	1/11/2005
Haloragis aspera	Rough Raspwort			Y	9/11/1997
Halosarcia sp. (NC)	Samphire			Y	16/11/2001
Hardenbergia violacea	Native Lilac			Y	1/06/1999
Helichrysum leucopsideum	Satin Everlasting			Y	25/11/2013
Helichrysum sp.	Everlasting			Y	1/08/1991
Heliotropium asperrimum	Rough Heliotrope			Y	0/01/1900
Heliotropium curassavicum	Smooth Heliotrope			N	0/01/1900
Heliotropium europaeum	Common Heliotrope			?	15/06/2005
Helminthotheca echioides	Ox-tongue			N	29/10/2003
Herniaria cinerea	Rupturewort			N	16/09/2010
Hibbertia crinita	Velvet-leaf Guinea-flower			Y	1/06/1999
Hibbertia exutiacies	Prickly Guinea-flower			Y	5/10/2008
Hordeum glaucum	Blue Barley-grass			N	17/09/2010
Hordeum leporinum	Wall Barley-grass			N	25/11/1993
Hordeum marinum	Sea Barley-grass			N	9/11/2003
Hordeum sp.	Barley-grass			N	25/11/2013
Hordeum vulgare	Barley			N	19/12/2001
Hornungia procumbens	Oval Purse			N	18/08/1977
Hyalosperma demissum	Dwarf Sunray			Y	5/10/2008
Hyalosperma glutinosum ssp. glutinosum	Golden Sunray			Y	1/06/1999
Hyalosperma semisterile	Orange Sunray			Y	12/11/2003
Hybanthus floribundus ssp. floribundus	Shrub Violet			Y	4/10/2009
Hydrocotyle callicarpa	Tiny Pennywort			Y	5/10/2008
Hydrocotyle laxiflora	Stinking Pennywort			Y	4/10/2008
Hypericum perforatum	St John's Wort			N	18/12/2001
Hypochaeris glabra	Smooth Cat's Ear			N	30/07/2009
Hypochaeris radicata	Rough Cat's Ear			N	10/12/2013
Hypochaeris sp.	Cat's Ear			N	21/09/2012
Hypoxis sp.	Yellow Star-lily			Y	21/09/2012
Indigofera helmsii	Helm's Indigo			Y	22/03/1987
Ipomoea indica	Purple Morning-glory			N	18/03/1998
Iris germanica (NC)	Flag Iris			N	8/11/1997
Isachne globosa	Swamp Millet			Y	11/07/1977
Iseilema membranaceum	Small Flinders-grass			Y	
Isoetopsis graminifolia	Grass Cushion			Y	16/09/2010
Isolepis cernua	Nodding Club-rush			Y	8/11/2003
Isolepis hookeriana	Grassy Club-rush			Y	7/12/1992
Isolepis marginata	Little Club-rush			N	31/10/2003
Isolepis platycarpa	Flat-fruit Club-rush			Y	26/12/1997
Isolepis stellata	Star Club-rush			Y	3/12/1993
Juncus aridicola	Inland Rush			Y	1/01/2005
Juncus australis	Austral Rush		R	Y	1/01/2004
Juncus bufonius	Toad Rush			Y	9/11/2003

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Juncus capitatus	Dwarf Rush			N	10/10/2003
Juncus flavidus	Yellow Rush			Y	1/06/1999
Juncus kraussii	Sea Rush			Y	5/11/2014
Juncus pallidus	Pale Rush			Y	23/05/2000
Juncus radula	Hoary Rush		V	Y	28/12/1992
Juncus sp.	Rush			Y	27/11/2001
Juncus subsecundus	Finger Rush			Y	5/10/2008
Kennedia prostrata	Scarlet Runner			Y	1/06/1999
Kickxia elatine ssp. crinita	Twining Toadflax			N	23/04/1988
Lachnagrostis aemula	Blown-grass			Y	1/12/2003
Lachnagrostis billardierei ssp. billardierei	Coast Blown-grass			Y	1/11/2003
Lachnagrostis filiformis	Common Blown-grass			Y	1/12/2005
Lachnagrostis limitanea	Spalding Blown-grass	EN	E	Y	20/11/2005
Lachnagrostis perennis	Perennial Blown-grass			Y	10/12/1988
Lachnagrostis robusta	Tall Blown-grass		R	Y	16/01/2008
Lactuca serriola (NC)	Prickly Lettuce			N	11/01/2004
Lactuca serriola f.	Prickly Lettuce			N	29/07/2009
Lactuca serriola f. serriola	Prickly Lettuce			N	8/05/2008
Lagenophora huegelii	Coarse Bottle-daisy			Y	5/10/2008
Lamarckia aurea	Toothbrush Grass			N	8/11/2003
Lamium amplexicaule var. amplexicaule	Deadnettle			N	11/11/2003
Lasiopetalum baueri	Slender Velvet-bush			Y	1/10/2005
Lasiopetalum behrii	Pink Velvet-bush			Y	27/02/1993
Lathyrus latifolius	Perennial Pea			N	4/10/2008
Lawrencia squamata	Thorny Lawrencia			Y	3/12/1993
Leiocarpa tomentosa	Woolly Plover-daisy			Y	13/08/1977
Leiocarpa websteri	Narrow Plover-daisy			Y	
Leontodon rhagadioloides	Cretan Weed			N	5/10/2008
Lepidium africanum	Common Peppercress			N	21/04/2008
Lepidium coronopus	Flat Swine's Cress			N	5/10/2008
Lepidium didymum	Lesser Swine's-cress			N	6/10/1999
Lepidium draba	Hoary Cress			N	1/11/2003
Lepidium draba (NC)	Hoary Cress			N	9/11/1997
Lepidium papillosum	Warty Peppercress			Y	10/11/2003
Lepidium pseudohyssopifolium				Y	1/01/2005
Lepidium sp.	Peppercress			Y	5/11/2014
Lepidosperma curtisiae	Little Sword-sedge			Y	26/12/1997
Lepidosperma laterale (NC)	Sharp Sword-sedge			Y	24/09/1991
Lepidosperma sp.	Sword-sedge/Rapier-sedge			Y	19/12/2001
Lepidosperma viscidum	Sticky Sword-sedge			Y	5/10/2008
Leptorhynchos elongatus	Lanky Buttons		R	Y	12/11/2003
Leptorhynchos orientalis	Eastern Annual Buttons		R	Y	0/01/1900
Leptorhynchos squamatus ssp. squamatus	Scaly Buttons			Y	26/11/2017
Leptorhynchos tetrachaetus	Little Buttons			Y	11/11/2003
Leptorhynchos waitzia	Button Immortelle			Y	29/10/1994
Leucopogon cordifolius	Heart-leaf Beard-heath			Y	13/08/1977
Levenhookia dubia	Hairy Stylewort			Y	5/10/2008
Lichen sp.				Y	5/10/2008
Limonium companyonis	Sea-lavender			N	29/07/2009
Limonium hyblaeum				N	26/10/1994
Limonium sinuatum	Notch-leaf Sea-lavender			N	3/12/1993
Limonium sp.	Sea-lavender			N	16/11/2001

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Linum marginale	Native Flax			Y	2/12/2003
Linum usitatissimum	Field Flax			N	28/12/1992
Lissanthe strigosa ssp. subulata	Peach Heath			Y	4/02/1969
Lobelia anceps	Angled Lobelia			Y	8/11/2003
Lobelia concolor	Poison Pratia		R	Y	25/11/1993
Logania saxatilis	Rock Logania		R	Y	10/10/2008
Logfia gallica	Narrow Cudweed			N	30/10/2003
Lolium perenne	Perennial Ryegrass			N	8/05/2008
Lolium perenne X Lolium rigidum	Hybrid Ryegrass			N	30/10/2003
Lolium rigidum	Wimmera Ryegrass			N	11/11/2003
Lolium sp.	Ryegrass			N	8/05/2008
Lolium X hybridum	Hybrid Ryegrass			N	17/11/1993
Lomandra collina	Sand Mat-rush			Y	2/12/2003
Lomandra densiflora	Soft Tussock Mat-rush			Y	10/12/2013
Lomandra effusa	Scented Mat-rush			Y	10/12/2013
Lomandra micrantha ssp.	Small-flower Mat-rush			Y	21/09/2012
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush			Y	5/10/2008
Lomandra multiflora ssp. dura	Hard Mat-rush			Y	10/12/2013
Lomandra nana	Small Mat-rush			Y	26/12/1997
Lomandra sp.	Mat-rush			Y	8/05/2008
Luzula meridionalis	Common Wood-rush			Y	5/10/2008
Lycium australe	Australian Boxthorn			Y	5/11/2014
Lycium ferocissimum	African Boxthorn			N	20/09/2011
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe			Y	5/11/2014
Lysimachia arvensis	Pimpernel			N	5/10/2008
Lythrum hyssopifolia	Lesser Loosestrife			Y	29/07/2009
Maireana aphylla	Cotton-bush			Y	8/05/2008
Maireana brevifolia	Short-leaf Bluebush			Y	5/11/2014
Maireana enchylaenoides	Wingless Fissure-plant			Y	5/11/2014
Maireana erioclada	Rosy Bluebush			Y	5/11/2014
Maireana excavata	Bottle Fissure-plant		V	Y	25/05/2000
Maireana georgei	Satiny Bluebush			Y	27/10/1994
Maireana georgei/turbinata	Satiny Bluebush			Y	5/11/2014
Maireana lobiflora	Lobed Bluebush			Y	16/09/2010
Maireana pentatropis	Erect Mallee Bluebush			Y	5/11/2014
Maireana pyramidata	Black Bluebush			Y	5/11/2014
Maireana radiata	Radiate Bluebush			Y	5/11/2014
Maireana rohrlachii	Rohrlach's Bluebush		R	Y	25/11/2013
Maireana sedifolia	Bluebush			Y	5/11/2014
Maireana sp.	Bluebush/Fissure-plant			Y	30/07/2009
Maireana trichoptera	Hairy-fruit Bluebush			Y	5/11/2014
Maireana turbinata	Top-fruit Bluebush			Y	22/09/2014
Malva parviflora	Small-flower Marshmallow			N	23/09/2014
Marrubium vulgare	Horehound			N	25/11/2013
Marsdenia australis	Native Pear			Y	1/01/2005
Marsilea costulifera	Narrow-leaf Nardoo			Y	10/12/1988
Marsilea drummondii	Common Nardoo			Y	28/12/1992
Marsilea drummondii (NC)	Common Nardoo			Y	25/11/1993
Mauranthemum paludosum	Ox-eye Daisy			N	26/09/1993
Medicago littoralis (NC)	Strand Medic			N	4/12/1992
Medicago minima var. minima	Little Medic			N	17/09/2010
Medicago polymorpha	Burr-medic			N	30/07/2009

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Medicago sativa	Lucerne			N	21/04/2008
Medicago sp.	Medic			N	25/11/2013
Medicago truncatula	Barrel Medic			N	8/11/2003
Melaleuca lanceolata	Dryland Tea-tree			Y	5/11/2014
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree			Y	9/11/2003
Melaleuca sp.	Tea-tree			Y	8/05/2008
Melilotus indicus	King Island Melilot			N	8/11/2003
Menkea australis	Fairy Spectacles			Y	24/10/1994
Mentha satureioides	Native Pennyroyal		R	Y	1/06/1999
Mesembryanthemum aitonis	Angled Iceplant			N	17/09/2010
Mesembryanthemum crystallinum	Common Iceplant			N	27/10/1994
Mesembryanthemum nodiflorum	Slender Iceplant			N	17/09/2010
Microseris lanceolata	Yam Daisy			Y	5/10/2008
Microtis arenaria	Notched Onion-orchid			Y	5/10/2008
Microtis frutetorum				Y	1/11/2001
Microtis unifolia complex	Onion-orchid			Y	1/06/1999
Millotia muelleri	Common Bow-flower			Y	1/10/2005
Millotia myosotidifolia	Broad-leaf Millotia			Y	5/11/2014
Millotia perpusilla	Tiny Bow-flower			Y	1/06/1999
Millotia tenuifolia var. tenuifolia	Soft Millotia			Y	5/10/2008
Minuartia mediterranea	Slender Sandwort			N	11/11/2003
Minuria leptophylla	Minnie Daisy			Y	12/11/2003
Moenchia erecta	Erect Chickweed			N	30/10/2003
Montia australasica	White Purslane		R	Y	26/01/1993
Moraea flaccida	One-leaf Cape Tulip			N	21/09/2012
Moraea setifolia	Thread Iris			N	22/09/2014
Moss sp.				Y	5/10/2008
Muehlenbeckia sp.	Lignum			Y	8/05/2008
Muscari armeniacum	Grape Hyacinth			N	8/11/1997
Myoporum montanum	Native Myrtle			Y	5/11/2014
Myoporum petiolatum	Sticky Boobialla			Y	23/09/2007
Myoporum platycarpum (NC)	False Sandalwood			Y	11/03/1980
Myoporum platycarpum ssp.	False Sandalwood			Y	11/01/2004
Myoporum platycarpum ssp. perbellum	Mallee Sandalwood			Y	12/11/2003
Myoporum platycarpum ssp. platycarpum	False Sandalwood			Y	5/11/2014
Myriophyllum verrucosum	Red Milfoil			Y	10/12/1988
Narcissus tazetta	Polyanthus Narcissus			N	6/08/1988
Neatostema apulum	Hairy Sheepweed			N	25/11/2013
Nepeta cataria	Catmint			N	27/02/1993
Neurachne alopecuroidea	Fox-tail Mulga-grass			Y	31/10/2003
Nicotiana glauca	Tree Tobacco			N	29/07/2009
Nicotiana maritima	Coast Tobacco			Y	9/11/2003
Nitraria billardierei	Nitre-bush			Y	8/05/2008
Oenothera lindheimeri	Clock Weed			N	29/02/1992
Oenothera stricta ssp. stricta	Common Evening Primrose			N	18/12/2001
Olea europaea ssp.	Olive			N	8/05/2008
Olea europaea ssp. europaea	Olive			N	10/11/1993
Olearia brachyphylla	Short-leaf Daisy-bush			Y	30/07/2009
Olearia brachyphylla (NC)	Short-leaf Daisy-bush			Y	31/07/1991
Olearia decurrens	Winged Daisy-bush			Y	5/11/2014
Olearia floribunda	Heath Daisy-bush			Y	11/03/1980

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Olearia minor	Heath Daisy-bush			Y	29/10/2003
Olearia muelleri	Mueller's Daisy-bush			Y	5/11/2014
Olearia pannosa ssp. pannosa	Silver Daisy-bush	VU	V	Y	2/12/2003
Olearia picridifolia	Rasp Daisy-bush		R	Y	10/11/2003
Olearia pimeleoides	Pimelea Daisy-bush			Y	5/11/2014
Olearia pimeleoides ssp. (NC)	Pimelea Daisy-bush			Y	24/10/1994
Olearia ramulosa	Twiggy Daisy-bush			Y	2/12/2003
Olearia teretifolia	Cypress Daisy-bush			Y	13/09/1991
Olearia tubuliflora	Rayless Daisy-bush			Y	19/09/1982
Omphalolappula concava	Burr Stickseed			Y	24/08/1946
Oncosiphon suffruticosum	Calomba Daisy			N	1/01/1992
Onopordum acanthium	Scotch Thistle			N	1/04/2001
Onopordum acaulon	Horse Thistle			N	15/06/2005
Opercularia turpis	Twiggy Stinkweed			Y	1/06/1999
Ophioglossum lusitanicum	Austral Adder's-tongue			Y	1/06/1999
Ornithogalum thyrsoides	Chincherinchee			N	9/11/1997
Osteocarpum salsuginosum	Inland Bonefruit			Y	5/11/2014
Oxalis perennans	Native Sorrel			Y	25/11/2013
Oxalis perennans (NC)	Native Sorrel			Y	2/12/2003
Oxalis pes-caprae	Soursob			N	21/09/2012
Ozothamnus retusus	Notched Bush-everlasting			Y	12/11/2003
Panicum capillare var. brevifolium	Witch-grass			N	21/04/2008
Panicum hillmanii	Witch-grass			N	15/12/2012
Panicum sp.	Panic/Millet			Y	8/05/2008
Papaver dubium	Long-headed Poppy			N	1/11/1999
Papaver hybridum	Rough Poppy			N	7/10/1993
Parapholis incurva	Curly Ryegrass			N	11/11/2003
Parietaria cardiostegia	Mallee Smooth-nettle			Y	0/01/1900
Parietaria debilis	Smooth-nettle			Y	4/10/2008
Parietaria debilis (NC)	Smooth-nettle			Y	8/11/2003
Paspalum sp.				N	29/07/2009
Pauridia glabella var. glabella	Tiny Star			Y	16/09/2010
Pentameris airoides ssp. airoides	False Hair-grass			N	4/10/2008
Persicaria prostrata	Creeping Knotweed			Y	1/06/1999
Petrorhagia dubia	Velvet Pink			N	8/11/2003
Petrorhagia sp.	Pink			N	4/10/2008
Phalaris aquatica	Phalaris			N	8/05/2008
Phalaris paradoxa	Paradox Canary-grass			N	25/11/1993
Phalaris sp.	Canary Grass			N	29/07/2009
Phebalium glandulosum ssp. macrocalyx	Glandular Phebalium		E*	Y	31/10/2008
Philotheca angustifolia ssp. angustifolia	Narrow-leaf Wax-flower		R	Y	22/10/1981
Philotheca verrucosa	Bendigo Wax-flower		V	Y	21/10/1992
Phragmites australis	Common Reed			Y	5/11/2014
Phyllangium divergens	Wiry Mitrewort			Y	5/10/2008
Phyllanthus saxosus	Rock Spurge			Y	10/11/2003
Picnomon acarna	Soldier Thistle			N	11/11/2003
Pimelea curviflora var.	Curved Riceflower			Y	2/12/2003
Pimelea curviflora var. gracilis				Y	17/11/1993
Pimelea curviflora var. sericea	Curved Riceflower			Y	10/11/1993
Pimelea glauca	Smooth Riceflower			Y	4/10/2008
Pimelea humilis	Low Riceflower			Y	8/09/1973

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Pimelea micrantha	Silky Riceflower			Y	12/11/2003
Pimelea microcephala ssp. microcephala	Shrubby Riceflower			Y	25/02/1992
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			Y	25/11/2013
Pimelea simplex ssp. continua	Desert Riceflower			Y	20/10/1981
Pimelea stricta	Erect Riceflower			Y	30/07/2009
Pinus halepensis	Aleppo Pine			N	21/04/2008
Pinus radiata	Radiata Pine			N	8/05/2008
Pinus sp.	Pine			N	18/12/2001
Piptatherum miliaceum	Rice Millet			N	8/05/2008
Pisum sativum				N	18/03/1995
Pittosporum angustifolium	Native Apricot			Y	5/11/2014
Plagiobothrys plurisepaleus	White Rochelia			Y	24/08/1946
Plantago bellardii	Hairy Plantain			N	24/09/1991
Plantago coronopus ssp. commutata	Bucks-horn Plantain			N	1/10/1999
Plantago drummondii	Dark Plantain			Y	16/09/2010
Plantago gaudichaudii	Narrow-leaf Plantain			Y	5/10/2008
Plantago hispida	Hairy Plantain			Y	4/10/2008
Plantago lanceolata var.	Ribwort			N	10/12/2013
Plantago sp.	Plantain			Y	21/09/2012
Plantago sp. B (R.Bates 44765)	Little Plantain			Y	4/10/2008
Plantago varia	Variable Plantain			Y	19/09/1996
Plantago varia complex	Native Plantain			Y	23/10/1992
Pleurosorus rutifolius	Blanket Fern			Y	4/10/2008
Poa bulbosa	Bulbous Meadow-grass			N	4/10/2008
Poa crassicaudex	Thick-stem Tussock-grass			Y	5/10/2008
Poa labillardieri var. labillardieri	Common Tussock-grass			Y	30/07/2009
Poa poiformis var. poiformis	Coast Tussock-grass			Y	9/11/1997
Poa pratensis	Kentucky Blue-grass			N	31/10/1988
Poa sp.	Meadow-grass/Tussock-grass			Y	21/09/2012
Podolepis capillaris	Wiry Podolepis			Y	3/03/1987
Podolepis decipiens			R*	Y	21/10/1981
Podolepis jaceoides	Showy Copper-wire Daisy		R	Y	19/10/1981
Podolepis sp.	Copper-wire Daisy			Y	25/11/2013
Podolepis tepperi	Delicate Copper-wire Daisy			Y	5/11/2014
Podotheca angustifolia	Sticky Long-heads			Y	4/10/2008
Pogonolepis muelleriana	Stiff Cup-flower			Y	5/11/2014
Polycarpon tetraphyllum	Four-leaf Allseed			N	20/01/1990
Polygonum aviculare	Wireweed			N	8/05/2008
Polygonum aviculare (NC)	Wireweed			N	18/12/2001
Polypogon monspeliensis	Annual Beard-grass			N	8/11/2003
Polypogon viridis	Water Bent			N	8/11/2003
Pomaderris paniculosa ssp.				Y	1/08/1991
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris			Y	9/11/2003
Populus alba	White Poplar			N	
Populus nigra	Lombardy Poplar			N	22/10/1993
Poranthera microphylla	Small Poranthera			Y	2/11/1968
Poranthera microphylla (NC)	Small Poranthera			Y	10/11/2003
Poranthera triandra	Three-petal Poranthera			Y	29/10/2003
Prasophyllum fitzgeraldii	Fitzgerald's Leek-orchid			Y	23/10/1992

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Prasophyllum odoratum	Scented Leek-orchid			Y	23/09/2007
Prasophyllum odoratum (NC)	Scented Leek-orchid			Y	10/11/2003
Prostanthera behriana	Downy Mintbush			Y	4/10/2008
Prostanthera striatiflora	Striated Mintbush			Y	27/12/2007
Prunus sp.	Plum			N	8/05/2008
Pterostylis biseta	Two-bristle Greenhood			Y	19/09/1982
Pterostylis biseta (NC)	Two-bristle Greenhood			Y	8/11/2003
Pterostylis plumosa	Bearded Greenhood			Y	19/09/1982
Pterostylis robusta	Large Shell-orchid			Y	1/06/1999
Pterostylis sanguinea	Blood Greenhood			Y	3/09/1977
Pterostylis sp.	Greenhood			Y	24/09/1991
Ptilotus erubescens	Hairy-tails		R	Y	1/06/1999
Ptilotus nobilis ssp. angustifolius	Yellow-tails			Y	28/10/1994
Ptilotus obovatus	Silver Mulla Mulla			Y	5/11/2014
Ptilotus obovatus (NC)	Silver Mulla Mulla			Y	8/11/2003
Ptilotus seminudus	Rabbit-tails			Y	12/11/2003
Ptilotus sp.	Mulla Mulla			Y	10/12/2013
Ptilotus spathulatus	Pussy-tails			Y	5/11/2014
Puccinellia distans	Reflexed Poa			N	1/10/2005
Puccinellia fasciculata	Borrer's Saltmarsh-grass			N	3/12/1993
Puccinellia stricta	Australian Saltmarsh-grass			Y	1/11/2001
Puccinellia stricta (NC)	Australian Saltmarsh-grass			Y	30/10/2003
Pultenaea kraehenbuehlii	Tothill Bush-pea		R	Y	6/10/2009
Pultenaea largiflorens	Twiggy Bush-pea			Y	5/10/2008
Pultenaea sp.	Bush-pea			Y	16/11/2001
Pyrorchis nigricans	Black Fire-orchid			Y	1/01/1961
Radyera farragei	Desert Rose Mallow			Y	8/12/1983
Ranunculus amphitrichus	Small River Buttercup			Y	11/07/1977
Ranunculus hamatosetosus	Hill Buttercup			Y	21/09/2007
Ranunculus lappaceus	Native Buttercup			Y	2/11/1968
Ranunculus muricatus	Pricklefruit Buttercup			N	7/12/1992
Ranunculus pachycarpus	Thick-fruit Buttercup			Y	5/10/2008
Ranunculus sessiliflorus var. sessiliflorus	Annual Buttercup			Y	1/06/1999
Raphanus raphanistrum	Wild Radish			N	30/07/2000
Reichardia tingitana	False Sowthistle			N	9/11/2003
Reseda lutea	Cut-leaf Mignonette			N	1/01/2010
Reseda luteola	Wild Mignonette			N	15/12/2012
Rhagodia parabolica	Mealy Saltbush			Y	20/11/2014
Rhagodia preissii ssp. preissii	Mallee Saltbush			Y	15/06/2005
Rhagodia sp.	Saltbush			Y	16/11/2001
Rhagodia spinescens	Spiny Saltbush			Y	5/11/2014
Rhagodia ulicina	Intricate Saltbush			Y	31/07/1991
Rhamnus alaternus	Blowfly Bush			N	23/09/2014
Rhodanthe floribunda	White Everlasting			Y	8/12/1983
Rhodanthe laevis	Smooth Daisy			Y	5/10/2008
Rhodanthe polygalifolia	Milkwort Everlasting			Y	5/11/2014
Rhodanthe pygmaea	Pigmy Daisy			Y	16/09/2010
Rhyncharrhena linearis	Bush Bean			Y	18/03/1995
Riccia lamellosa				Y	12/08/1952
Robinia pseudoacacia	Black Locust			N	7/10/1993
Roepera ammophila	Sand Twinleaf			Y	16/09/2010
Roepera apiculata	Pointed Twinleaf			Y	5/11/2014

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Roepera aurantiaca	Shrubby Twinleaf			N	11/01/2004
Roepera aurantiaca ssp. aurantiaca	Shrubby Twinleaf			Y	5/11/2014
Roepera crenata	Notched Twinleaf			Y	2/12/2003
Roepera glauca	Pale Twinleaf			Y	10/11/1993
Roepera ovata	Dwarf Twinleaf			Y	27/10/1994
Roepera sp.	Twinleaf			Y	26/10/1994
Romulea minutiflora	Small-flower Onion-grass			N	4/10/2008
Romulea rosea var. australis	Common Onion-grass			N	31/10/2003
Romulea sp.	Onion-grass			N	10/12/2013
Rorippa nasturtium-aquaticum	Watercress			N	29/07/2009
Rorippa sp.	Watercress/Bitter-cress			Y	29/07/2009
Rosa canina	Dog Rose			N	1/01/2011
Rosa sp.	Wild Rose/Briar			N	1/11/2003
Rostraria cristata	Annual Cat's-tail			N	4/10/2008
Rostraria pumila	Tiny Bristle-grass			N	17/09/2010
Rubus sp.	Blackberry			N	16/11/2001
Rumex brownii	Slender Dock			Y	4/10/2008
Rumex brownii (NC)	Slender Dock			Y	23/10/1992
Rumex conglomeratus	Clustered Dock			N	25/11/1993
Rumex crispus	Curled Dock			N	1/11/2003
Rumex dumosus	Wiry Dock		R	Y	31/10/2003
Rumex dumosus var. dumosus (NC)	Wiry Dock			Y	17/11/1993
Rumex pulcher ssp. pulcher	Fiddle Dock			N	8/05/2008
Rumex sp.	Dock			Y	30/07/2009
Ruppia megacarpa	Widgeon Grass			Y	26/11/1976
Rytidosperma auriculatum	Lobed Wallaby-grass			Y	30/10/2003
Rytidosperma caespitosum	Common Wallaby-grass			Y	10/12/2013
Rytidosperma carphoides	Short Wallaby-grass			Y	26/10/1995
Rytidosperma duttonianum	Brown-back Wallaby-grass			Y	25/11/1993
Rytidosperma erianthum	Hill Wallaby-grass			Y	31/10/2003
Rytidosperma fulvum	Leafy Wallaby-grass			Y	25/11/1993
Rytidosperma pilosum	Velvet Wallaby-grass			Y	9/11/1997
Rytidosperma racemosum var. racemosum	Slender Wallaby-grass			Y	4/12/1992
Rytidosperma setaceum	Small-flower Wallaby-grass			Y	21/09/2012
Rytidosperma sp.	Wallaby-grass			Y	5/11/2014
Rytidosperma tenuius	Short-awn Wallaby-grass		R	Y	25/11/2013
Sagina apetala	Annual Pearlwort			N	8/11/2003
Salsola australis	Buckbush			Y	10/12/2013
Salvia verbenaca var.	Wild Sage			N	21/09/2012
Salvia verbenaca var. verbenaca	Wild Sage			N	10/12/2013
Salvia verbenaca var. vernalis	Wild Sage			N	17/09/2010
Samolus repens	Creeping Brookweed			Y	5/11/2014
Santalum acuminatum	Quandong			Y	5/11/2014
Santalum murrayanum	Bitter Quandong			Y	25/02/1992
Sarcocornia blackiana	Thick-head Samphire			Y	9/04/1989
Sarcocornia quinqueflora	Beaded Samphire			Y	30/10/2003
Sarcozona praecox	Sarcozona			Y	20/10/1981
Scabiosa atropurpurea	Pincushion			N	8/05/2008
Scaevola albida	Pale Fanflower			Y	27/11/2001
Scaevola humilis	Inland Fanflower			Y	25/11/2013

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Scaevola spinescens	Spiny Fanflower			Y	11/01/2004
Schenkia australis	Spike Centaury			Y	17/11/1993
Schinus molle	Pepper-tree			N	22/09/2014
Schismus barbatus	Arabian Grass			N	17/09/2010
Schoenoplectus pungens	Spiky Club-rush			Y	1/11/2003
Schoenus apogon	Common Bog-rush			Y	1/10/1999
Schoenus nanus	Little Bog-rush			Y	1/06/1999
Scleranthus pungens	Prickly Knawel			Y	25/10/1994
Sclerochloa dura	Hard Meadow-grass			N	1/11/2005
Sclerolaena brachyptera	Short-wing Bindyi			Y	1/05/2000
Sclerolaena diacantha	Grey Bindyi			Y	5/11/2014
Sclerolaena muricata var. villosa	Five-spine Bindyi		R	Y	3/11/1993
Sclerolaena obliquicuspis	Oblique-spined Bindyi			Y	5/11/2014
Sclerolaena patenticuspis	Spear-fruit Bindyi			Y	5/11/2014
Sclerolaena uniflora	Small-spine Bindyi			Y	27/05/1989
Scorzonera laciniata (NC)	Scorzonera			N	28/10/1994
Scorzonera laciniata var. laciniata	Scorzonera			N	1/11/2005
Sebaea ovata	Yellow Sebaea			Y	10/11/2003
Selliera radicans	Shiny Swamp-mat			Y	29/07/2009
Senecio anethifolius (NC)	Feathery Groundsel			Y	9/11/2003
Senecio anethifolius ssp. anethifolius	Feathery Groundsel			Y	3/12/1993
Senecio dolichocephalus	Woodland Groundsel			Y	21/09/2007
Senecio glossanthus	Annual Groundsel			Y	5/11/2014
Senecio glossanthus (NC)	Annual Groundsel			Y	10/11/2003
Senecio megaglossus	Large-flower Groundsel	VU	E	Y	1/06/1993
Senecio odoratus	Scented Groundsel			Y	21/09/2007
Senecio phelleus	Woodland Groundsel			Y	27/10/1963
Senecio pinnatifolius (NC)	Variable Groundsel			Y	1/04/2001
Senecio quadridentatus	Cotton Groundsel			Y	10/11/2003
Senecio sp.	Groundsel			Y	23/10/1992
Senecio spanomerus				Y	6/08/1988
Senecio tenuiflorus (NC)	Woodland Groundsel			Y	31/10/2003
Senna artemisioides ssp. filifolia	Fine-leaf Desert Senna			Y	4/10/2008
Senna artemisioides ssp. petiolaris				Y	5/11/2014
Senna artemisioides ssp. petiolaris (NC)	Flat-stalk Senna			Y	11/03/1980
Senna artemisioides ssp. X artemisioides	Silver Senna			Y	10/12/2013
Senna artemisioides ssp. X coriacea	Broad-leaf Desert Senna			Y	5/11/2014
Setaria constricta	Knotty-butt Paspalidium			Y	1/05/2000
Setaria verticillata	Whorled Pigeon-grass			N	15/12/2012
Sida corrugata var.	Corrugated Sida			Y	10/12/2013
Sida corrugata var. angustifolia	Grassland Sida			Y	15/12/2012
Sida corrugata var. corrugata	Corrugated Sida			Y	25/11/2013
Sida intricata	Twiggy Sida			Y	26/12/1997
Sida petrophila	Rock Sida			Y	30/07/2009
Sida sp.	Sida			Y	16/03/2008
Sida spodochroma				Y	1/05/2000
Silene apetala	Sand Catchfly			N	5/10/2008
Silene gallica var.	French Catchfly			N	21/10/1992
Silene gallica var. gallica	French Catchfly			N	23/09/2014
Silene nocturna	Mediterranean Catchfly			N	11/11/2003

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Silene sp.	Catchfly			N	25/11/2013
Silene vulgaris	Bladder Campion			N	10/11/1995
Siloxerus multiflorus	Small Wrinklewort			Y	5/10/2008
Silybum marianum	Variegated Thistle			N	23/09/2014
Sisymbrium erysimoides	Smooth Mustard			N	17/09/2010
Sisymbrium irio	London Mustard			N	17/09/2010
Sisymbrium orientale	Indian Hedge Mustard			N	23/09/2014
Sisymbrium sp.	Wild Mustard			N	25/11/2013
Solanum elaeagnifolium	Silver-leaf Nightshade			N	1/01/2011
Solanum esuriale	Quena			Y	26/07/1973
Solanum laciniatum	Cut-leaf Kangaroo-apple			Y	5/01/1908
Solanum nigrum	Black Nightshade			N	30/07/2009
Solanum oligacanthum	Desert Nightshade			Y	17/05/1974
Solanum simile	Kangaroo Apple			Y	0/01/1900
Solenogyne dominii	Smooth Solenogyne			Y	1/06/1999
Solidago canadensis	Golden Rod			N	23/04/1988
Sonchus asper ssp. glaucescens	Rough Sow-thistle			N	26/10/1994
Sonchus hydrophilus	Native Sow-thistle			Y	8/11/2003
Sonchus oleraceus	Common Sow-thistle			N	10/12/2013
Sonchus oleraceus (NC)	Common Sow-thistle			N	15/06/2005
Sonchus sp.	Sow-thistle			Y	1/11/2003
Sorghum halepense	Johnson Grass			N	18/04/1995
Sparaxis bulbifera	Sparaxis			N	23/05/2000
Spergularia bocconei	Red Sand-spurrey			N	
Spergularia brevifolia	Salt Sand-spurrey			Y	0/01/1900
Spergularia diandra	Lesser Sand-spurrey			N	16/09/2010
Spergularia diandra (NC)	Lesser Sand-spurrey			N	1/11/2003
Spergularia marina	Salt Sand-spurrey			Y	29/07/2009
Spergularia marina (NC)	Salt Sand-spurrey			N	30/10/2003
Spergularia media	Coast Sand-spurrey			N	6/06/1993
Sphenopus divaricatus	Wedge-foot Grass			N	30/10/2003
Sporobolus virginicus	Salt Couch			Y	1/11/2005
Spyridium parvifolium	Dusty Miller			Y	4/10/2009
Spyridium stenophyllum ssp. renovatum	Forked Spyridium			Y	30/01/1998
Stachys arvensis	Stagger Weed			N	8/11/1997
Stackhousia monogyna	Creamy Candles			Y	4/10/2008
Stackhousia monogyna (NC)	Creamy Candles			Y	11/11/2003
Stackhousia sp.	Candles			Y	21/09/2012
Stackhousia subterranea	Creamy Candles			Y	20/11/1993
Stellaria media	Chickweed			N	23/09/2014
Stemodia florulenta	Bluerod			Y	8/12/1983
Stenopetalum lineare	Narrow Thread-petal			Y	1/09/2005
Stenopetalum lineare (NC)	Narrow Thread-petal			Y	10/11/2003
Stuartina muelleri	Spoon Cudweed			Y	5/10/2008
Swainsona behriana	Behr's Swainson-pea		V	Y	19/09/1996
Swainsona colutoides	Bladder Swainson-pea			Y	8/12/1983
Swainsona formosa	Sturt Pea			Y	8/10/1936
Swainsona oroboides	Variable Swainson-pea			Y	22/10/1992
Swainsona oroboides complex	Variable Swainson-pea			Y	22/10/1992
Swainsona tephrotricha	Ashy-haired Swainson-pea			Y	28/08/2000
Symphyotrichum subulatum	Aster-weed			N	29/07/2009
Taeniatherum caput-medusae	Medusa's Head			N	28/12/1952

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Tagetes erecta	Mexican Marigold			N	1/06/2004
Tamarix aphylla (NC)	Athel Pine			N	1/04/2001
Tamarix ramosissima				N	14/02/1993
Tanacetum parthenium	Feverfew			N	27/05/1989
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire			Y	29/07/2009
Tecticornia indica ssp. leiostachya	Brown-head Samphire			Y	27/10/1994
Tecticornia pergranulata ssp.	Black-seed Samphire			Y	1/04/2001
Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire			Y	30/10/2003
Templetonia egena	Broombush Templetonia			Y	2/12/1983
Tetragonia eremaea	Desert Spinach			Y	5/11/2014
Tetragonia eremaea/tetragonoides	Native Spinach			Y	31/07/1991
Teucrium racemosum	Grey Germander			Y	23/05/2000
Teucrium sessiliflorum	Mallee Germander			Y	29/10/2003
Thelymitra albiflora				Y	5/10/2008
Thelymitra antennifera	Lemon Sun-orchid			Y	1/10/2003
Thelymitra arenaria				Y	19/09/1982
Thelymitra bracteata	Slender Sun-orchid			Y	1/10/2003
Thelymitra glaucophylla	Scented Sun-orchid			Y	
Thelymitra grandiflora	Great Sun-orchid		R	Y	18/09/1982
Thelymitra juncifolia	Spotted Sun-orchid			Y	1/10/2003
Thelymitra luteocilium	Yellow-tuft Sun Orchid			Y	5/10/2008
Thelymitra megcalyptra	Scented Sun-orchid			Y	1/10/2003
Thelymitra nuda				Y	31/10/2003
Thelymitra nuda (NC)	Scented Sun-orchid			Y	31/10/2003
Thelymitra rubra	Salmon Sun-orchid			Y	10/10/2003
Themeda triandra	Kangaroo Grass			Y	10/12/2013
Threlkeldia diffusa	Coast Bonefruit			Y	1/04/2001
Thyridia repens	Creeping Monkey-flower			Y	5/11/2014
Thysanotus baueri	Mallee Fringe-lily			Y	1/11/2005
Thysanotus patersonii	Twining Fringe-lily			Y	5/10/2008
Thysanotus sp.	Fringe-lily			Y	24/09/1991
Thysanotus tenellus	Grassy Fringe-lily		R	Y	5/10/2008
Tragopogon porrifolius	Salsify			N	15/12/2012
Tribolium acutiflorum				N	9/04/1989
Tribulus terrestris	Caltrop			N	21/02/1974
Tricoryne elatior	Yellow Rush-lily			Y	11/11/2003
Tricoryne tenella	Tufted Yellow Rush-lily			Y	27/02/1993
Trifolium angustifolium	Narrow-leaf Clover			N	10/12/2013
Trifolium arvense var. arvense	Hare's-foot Clover			N	10/12/2013
Trifolium campestre	Hop Clover			N	10/12/2013
Trifolium dubium	Suckling Clover			N	24/09/1991
Trifolium glomeratum	Cluster Clover			N	30/10/2003
Trifolium scabrum	Rough Clover			N	10/12/2013
Trifolium sp.	Clover			N	19/12/2001
Trifolium subterraneum	Subterranean Clover			N	21/10/1992
Trifolium tomentosum	Woolly Clover			N	25/11/1993
Triglochin centrocarpum (NC)	Dwarf Arrowgrass			Y	1/06/1999
Triglochin nana	Dwarf Arrowgrass			Y	5/10/2008
Triglochin striata	Streaked Arrowgrass			Y	5/11/2014
Triodia bunicola (NC)	Flinders Ranges Spinifex			Y	1/06/1999
Triodia scariosa	Spinifex			Y	9/11/2003
Triptilodiscus pygmaeus	Small Yellow-heads			Y	5/10/2008

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Triticum aestivum	Wheat			N	25/11/1993
Trymalium wayi	Grey Trymalium			Y	2/12/2003
Typha domingensis	Narrow-leaf Bulrush			Y	5/11/2014
Typha sp.	Bulrush			Y	16/11/2001
Unidentified alien sp.				N	21/09/2012
Unidentified sp.				Y	15/11/1998
'unverified species - nv`				?	9/11/1997
Urospermum picroides	False Hawkbit			N	11/11/2003
Urtica urens	Small Nettle			N	23/09/2014
Valerianella discoidea	Lesser Corn-salad			N	10/10/2008
Valerianella muricata				N	1/10/1985
Velleia arguta	Toothed Velleia			Y	25/05/2000
Velleia connata	Cup Velleia			Y	8/12/1983
Velleia paradoxa	Spur Velleia			Y	1/10/1999
Vellereophyton dealbatum	White Cudweed			N	9/02/1998
Verbena supina (NC)	Trailing Verbena			N	25/11/1993
Veronica plebeia	Trailing Speedwell			Y	1/06/1999
Vicia monantha	Spurred Vetch			N	9/11/2003
Vicia sp.	Vetch			N	23/05/2000
Vinca major	Blue Periwinkle			N	8/11/1997
Vittadinia australasica var. australasica	Sticky New Holland Daisy			Y	10/12/2013
Vittadinia blackii	Narrow-leaf New Holland Daisy			Y	5/11/2014
Vittadinia cervicularis var. cervicularis	Waisted New Holland Daisy			Y	9/11/2003
Vittadinia condyloides	Club-hair New Holland Daisy			Y	25/05/2000
Vittadinia cuneata var.	Fuzzy New Holland Daisy			Y	15/06/2005
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy			Y	31/10/2003
Vittadinia gracilis	Woolly New Holland Daisy			Y	26/11/2017
Vittadinia megacephala	Giant New Holland Daisy			Y	5/11/2014
Vittadinia sp.	New Holland Daisy			Y	21/09/2012
Vulpia bromoides/myuros				Y	23/10/1992
Vulpia muralis	Wall Fescue			N	16/09/2010
Vulpia myuros f.	Fescue			N	13/11/1996
Vulpia myuros f. megalura	Fox-tail Fescue			N	24/09/1991
Vulpia myuros f. myuros	Rat's-tail Fescue			N	5/10/2008
Vulpia sp.	Fescue			N	25/11/2013
Wahlenbergia communis	Tufted Bluebell			Y	1/04/2001
Wahlenbergia gracilenta	Annual Bluebell			Y	5/10/2008
Wahlenbergia luteola	Yellow-wash Bluebell			Y	11/11/2003
Wahlenbergia multicaulis	Tadgell's Bluebell			Y	10/11/1993
Wahlenbergia sp.	Native Bluebell			Y	25/11/2013
Wahlenbergia stricta ssp. stricta	Tall Bluebell			Y	5/10/2008
Walwhalleya proluta	Rigid Panic			Y	24/10/1994
Walwhalleya proluta (NC)	Rigid Panic			Y	18/12/2001
Westringia rigida	Stiff Westringia			Y	5/11/2014
Wilsonia backhousei	Narrow-leaf Wilsonia			Y	1/03/1987
Wilsonia rotundifolia	Round-leaf Wilsonia			Y	30/10/2003
Wurmbea dioica ssp.	Early Nancy			Y	16/09/2010
Wurmbea dioica ssp. brevifolia	Early Nancy			Y	4/10/2008
Wurmbea dioica ssp. dioica	Early Nancy			Y	5/10/2008

Scientific Name	Common name	Aus	SA	Indigenous (Y/N)	Last sighting
Wurmbea dioica ssp. dioica (NC)	Early Nancy			Y	11/11/2003
	Early Star-lily			Y	22/10/1992
Xanthium spinosum	Bathurst Burr			N	18/07/1971
Xanthorrhoea quadrangulata	Rock Grass-tree			Y	4/10/2009
Xerochrysum bracteatum	Golden Everlasting			Y	27/09/2006
Zaluzianskya divaricata	Spreading Night-phlox			N	31/10/2003
Zygophyllum ammophilum (NC)	Sand Twinleaf			Y	24/10/1994
Zygophyllum aurantiacum (NC)	Shrubby Twinleaf			Y	27/10/1994
Zygophyllum aurantiacum ssp. aurantiacum (NC)	Shrubby Twinleaf			Y	9/11/2003

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

Appendix 2. BDBSA Fauna records within 20 km of the Project Area.

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
	ACTINOPTERI					
*	*Gambusia holbrooki*	Eastern Gambusia			8/04/2014	20
*	*Oncorhynchus mykiss*	Rainbow Trout			9/09/2005	2
*	*Salmo trutta*	Brown Trout			9/09/2005	2
	AMPHIBIANS					
	Crinia signifera	Common Froglet			8/09/2005	47
	Crinia sp.				30/10/2003	2
	Limnodynastes dumerilii	Banjo Frog			4/10/2008	2
	Limnodynastes tasmaniensis	Spotted Marsh Frog			8/09/2005	10
	Neobatrachus pictus	Burrowing Frog			4/10/2008	10
	Crinia signifera	Common Froglet			8/09/2005	47
	Crinia sp.				30/10/2003	2
	Limnodynastes dumerilii	Banjo Frog			4/10/2008	2
	Limnodynastes tasmaniensis	Spotted Marsh Frog			8/09/2005	10
	Neobatrachus pictus	Burrowing Frog			4/10/2008	10
	AVES					
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater			20/09/2015	75
	Acanthiza apicalis	Inland Thornbill			21/07/2009	18
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill			28/08/2015	72
	Acanthiza nana	Yellow Thornbill			28/08/2015	50
	Acanthiza reguloides	Buff-rumped Thornbill			4/10/2008	40
	Acanthiza sp.	thornbills			31/10/2003	2
	Acanthiza uropygialis	Chestnut-rumped Thornbill			19/09/2015	50
	Acanthorhynchus tenuirostris halmaturinus	Eastern Spinebill			25/08/2007	1
	Accipiter cirrocephalus cirrocephalus	Collared Sparrowhawk			11/10/2010	4
	Accipiter fasciatus	Brown Goshawk			23/01/2008	18
	Acrocephalus australis	Australian Reed Warbler			30/11/2014	30
	Aegotheles cristatus	Australian Owlet-nightjar			4/10/2008	10
*	*Alauda arvensis*	Eurasian Skylark			30/10/2003	20
	Anas castanea	Chestnut Teal			10/05/2002	5
	Anas gracilis	Grey Teal			2/02/2010	12
*	*Anas platyrhynchos*	Mallard (Northern Mallard)			3/05/2005	10
	Anas superciliosa	Pacific Black Duck			8/05/2015	31
	Anas superciliosa x platyrhynchos	Pacific Black Duck			24/10/1987	1
	Anhinga novaehollandiae	Australasian Darter		R	10/10/2000	2
	Anseranas semipalmata	Magpie Goose		E	1/09/1983	1

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
	Anthochaera carunculata	Red Wattlebird			28/08/2015	84
	Anthus australis	Australian Pipit			23/10/2010	39
	Aphelocephala leucopsis	Southern Whiteface			19/09/2015	54
	Apus pacificus	Fork-tailed Swift			28/11/2006	1
	Aquila audax	Wedge-tailed Eagle			30/11/2014	45
	Ardea alba modesta	Great Egret			13/08/2000	1
	Ardea pacifica	White-necked Heron			31/10/2003	2
	Ardeotis australis	Australian Bustard		V	25/05/2000	1
	Artamus cinereus	Black-faced Woodswallow			21/10/2010	1
	Artamus cyanopterus	Dusky Woodswallow			19/09/2015	16
	Artamus personatus	Masked Woodswallow			25/08/2007	6
	Artamus superciliosus	White-browed Woodswallow			25/08/2007	4
	Aythya australis	Hardhead			1/04/2005	6
	Barnardius zonarius	Australian Ringneck			19/09/2015	52
	Barnardius zonarius zonarius (NC)	Port Lincoln Parrot			28/10/2000	3
	Biziura lobata	Musk Duck		R	6/11/1996	1
	Cacatua galerita	Sulphur-crested Cockatoo			30/09/2002	2
	Cacatua sanguinea sanguinea	Little Corella			20/09/2015	34
	Cacatua sp.	Cacatua cockatoos and corellas			26/04/2005	3
	Cacomantis flabelliformis	Fan-tailed Cuckoo			9/06/2000	1
	Calamanthus (Calamanthus) campestris	Rufous Fieldwren			25/11/2006	3
	Calamanthus (Calamanthus) fuliginosus	Striated Fieldwren			1/04/2001	1
	Calidris acuminata	Sharp-tailed Sandpiper			30/10/2003	2
	Calidris ruficollis	Red-necked Stint			30/10/2003	1
	Caligavis chrysops samueli	Yellow-faced Honeyeater			21/07/2009	44
*	*Carduelis carduelis*	European Goldfinch			31/07/2001	2
	Chalcites basalis	Horsfield's Bronze Cuckoo			19/09/2015	23
	Chalcites osculans	Black-eared Cuckoo			19/09/2015	2
	Charadrius bicinctus	Double-banded Plover			21/04/1984	1
	Charadrius ruficapillus	Red-capped Plover			30/10/2003	5
	Chenonetta jubata	Maned Duck			17/08/2005	22
	Cheramoeca leucosterna	White-backed Swallow			25/11/2006	2
	Chlidonias hybrida	Whiskered Tern			27/09/1998	1
	Chroicocephalus novaehollandiae	Silver Gull			30/10/2003	13
	Cinclosoma castanotum (NC)	Chestnut Quailthrush		ssp	23/10/2010	2
	Circus approximans	Swamp Harrier			29/10/2003	2
	Circus assimilis	Spotted Harrier			12/11/2003	8

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
	Cladorhynchus leucocephalus	Banded Stilt		V	29/10/2003	3
	Climacteris picumnus	Brown Treecreeper			20/09/2015	62
	Colluricincla harmonica	Grey Shrikethrush			20/09/2015	132
*	*Columba livia*	Feral Pigeon			19/09/2015	43
	Coracina maxima	Ground Cuckooshrike			11/02/2004	1
	Coracina novaehollandiae	Black-faced Cuckooshrike			8/05/2015	66
	Corcorax melanorhamphos	White-winged Chough		R	20/09/2015	86
	Corvus bennetti	Little Crow			29/06/2002	2
	Corvus coronoides	Australian Raven			20/09/2015	21
	Corvus mellori	Little Raven			20/09/2015	130
	Corvus sp.	crows			11/02/2004	6
	Coturnix pectoralis	Stubble Quail			1/11/2003	8
	Coturnix ypsilophora	Brown Quail		V	8/05/2015	1
	Cracticus torquatus	Grey Butcherbird			28/08/2015	43
	Cygnus atratus	Black Swan			3/05/2005	19
	Dacelo novaeguineae	Laughing Kookaburra			20/09/2015	57
	Daphoenositta chrysoptera	Varied Sittella			19/09/2015	22
	Dicaeum hirundinaceum	Mistletoebird			20/09/2015	61
	Dromaius novaehollandiae	Emu			19/06/2013	17
	Egretta novaehollandiae	White-faced Heron			20/09/2015	39
	Elanus axillaris	Black-shouldered Kite			30/11/2014	12
	Elseyornis melanops	Black-fronted Dotterel			29/12/2000	3
	Eolophus roseicapilla	Galah			20/09/2015	247
	Epthianura albifrons	White-fronted Chat			30/10/2003	7
	Eurostopodus argus	Spotted Nightjar			29/11/2006	2
	Falco berigora	Brown Falcon			28/08/2015	20
	Falco cenchroides	Nankeen Kestrel			19/09/2015	72
	Falco longipennis	Australian Hobby			16/04/2002	8
	Falco peregrinus	Peregrine Falcon		R	11/10/2010	11
	Falco subniger	Black Falcon			27/09/1998	3
	Fulica atra	Eurasian Coot			8/05/2015	27
	Gallinula tenebrosa	Dusky Moorhen			3/05/2005	22
	Gallirallus philippensis mellori	Buff-banded Rail			1/04/2001	2
	Gavicalis virescens	Singing Honeyeater			28/08/2015	62
	Geopelia placida	Peaceful Dove			20/09/2015	28
	Glareola maldivarum	Oriental Pratincole			23/11/1975	1
	Gliciphila melanops	Tawny-crowned Honeyeater			21/07/2009	1
	Glossopsitta concinna	Musk Lorikeet			23/06/2007	6
	Grallina cyanoleuca	Magpielark			23/06/2007	70
	Gymnorhina tibicen	Australian Magpie			20/09/2015	181
	Haliastur sphenurus	Whistling Kite			8/11/2003	1
	Hieraaetus morphnoides	Little Eagle			19/11/2016	4
	Himantopus leucocephalus	White-headed Stilt			30/10/2003	13

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
	Hirundo neoxena	Welcome Swallow			9/05/2015	51
	Lalage tricolor	White-winged Triller			4/09/2004	2
	Malacorhynchus membranaceus	Pink-eared Duck			2/02/2010	3
	Malurus cyaneus	Superb Fairywren			4/09/2004	12
	Malurus cyaneus leggei	Superb Fairywren			8/05/2015	21
	Malurus lamberti	Variegated Fairywren			20/09/2015	40
	Malurus leucopterus	White-winged Fairywren			25/11/2006	13
	Malurus splendens	Splendid Fairywren			1/04/2001	1
	Manorina flavigula	Yellow-throated Miner	ssp	ssp	28/08/2015	27
	Manorina melanocephala	Noisy Miner			4/11/2006	27
	Megalurus cruralis	Brown Songlark			30/10/2003	10
	Megalurus gramineus	Little Grassbird			25/11/2006	12
	Megalurus mathewsi	Rufous Songlark			19/09/2015	5
	Melanodryas cucullata	Hooded Robin		ssp	3/03/1987	1
	Melanodryas cucullata cucullata	Hooded Robin		R	21/10/2010	9
	Melithreptus brevirostris	Brown-headed Honeyeater			20/09/2015	43
	Melithreptus gularis	Black-chinned Honeyeater		ssp	27/09/2006	3
	Melithreptus lunatus	White-naped Honeyeater			4/07/2007	3
	Melopsittacus undulatus	Budgerigar			9/11/2003	9
	Merops ornatus	Rainbow Bee-eater			19/09/2015	43
	Microcarbo melanoleucos melanoleucos	Little Pied Cormorant			8/05/2015	20
	Microeca fascinans	Jacky Winter		ssp	28/08/2015	17
	Milvus migrans	Black Kite			19/09/2015	4
	Mirafra javanica	Horsfield's Bush Lark			30/10/2003	4
	Myiagra cyanoleuca	Satin Flycatcher		E	29/11/1998	1
	Myiagra inquieta	Restless Flycatcher		R	23/10/2010	4
	Neophema chrysostoma	Blue-winged Parrot		V	1/04/2001	1
	Neophema elegans	Elegant Parrot		R	25/11/2006	9
	Nesoptilotis leucotis	White-eared Honeyeater			12/05/2002	9
	Nesoptilotis leucotis leucotis	White-eared Honeyeater			28/08/2015	24
	Ninox boobook	Southern Boobook			28/11/2006	11
	Northiella haematogaster (NC)	Bluebonnet		ssp	21/10/2010	2
	Nycticorax caledonicus	Nankeen Night Heron			13/08/2000	1
	Nymphicus hollandicus	Cockatiel			11/10/2010	10
	Ocyphaps lophotes	Crested Pigeon			11/10/2010	56
	Pachycephala inornata	Gilbert's Whistler		R	31/08/1986	2
	Pachycephala pectoralis	Golden Whistler			25/08/2007	14
	Pachycephala rufiventris	Rufous Whistler			1/04/2001	4
	Pachycephala rufiventris rufiventris	Rufous Whistler			9/05/2015	61

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
	Pardalotus punctatus	Spotted Pardalote			20/09/2015	35
	Pardalotus striatus	Striated Pardalote			20/09/2015	138
	Parvipsitta porphyrocephala	Purple-crowned Lorikeet			28/11/2006	10
*	*Passer domesticus*	House Sparrow			25/11/2006	53
	Pelecanus conspicillatus	Australian Pelican			10/06/2001	2
	Peltohyas australis	Inland Dotterel			19/05/1984	1
	Petrochelidon ariel	Fairy Martin			28/11/2006	3
	Petrochelidon nigricans	Tree Martin			30/11/2014	13
	Petroica boodang boodang	Scarlet Robin		R	4/10/2008	17
	Petroica goodenovii	Red-capped Robin			20/09/2015	45
	Phalacrocorax sulcirostris	Little Black Cormorant			21/10/1998	1
	Phalacrocorax varius	Great Pied Cormorant			26/04/2005	3
	Phaps chalcoptera	Common Bronzewing			28/08/2015	48
	Phylidonyris novaehollandiae	New Holland Honeyeater			17/05/1999	1
	Phylidonyris novaehollandiae	New Holland Honeyeater			25/08/2007	1
	Platalea flavipes	Yellow-billed Spoonbill			21/10/1998	1
	Platycercus elegans	Crimson Rosella			20/09/2015	114
	Platycercus elegans subadelaidae	Adelaide Rosellas			26/10/2000	1
	Plectorhyncha lanceolata	Striped Honeyeater		R	5/12/1986	1
	Podargus strigoides	Tawny Frogmouth			25/08/2007	6
	Poliocephalus poliocephalus	Hoary-headed Grebe			2/02/2010	2
	Pomatostomus ruficeps	Chestnut-crowned Babbler			21/10/2010	4
	Pomatostomus superciliosus	White-browed Babbler			20/09/2015	36
	Porzana tabuensis	Spotless Crake		R	11/05/2002	1
	Psephotellus varius	Mulga Parrot			19/09/2015	14
	Psephotus haematonotus	Red-rumped Parrot			17/08/2005	32
	Psephotus haematonotus haematonotus	Red-rumped Parrot			8/05/2015	20
	Ptilotula ornata	Yellow-plumed Honeyeater			28/08/2015	10
	Ptilotula penicillata	White-plumed Honeyeater			20/09/2015	86
	Purnella albifrons	White-fronted Honeyeater			25/11/2006	11
	Pyrrholaemus brunneus	Redthroat			19/09/2015	18
	Recurvirostra novaehollandiae	Red-necked Avocet			30/10/2003	6
	Rhipidura albiscapa	Grey Fantail			28/08/2015	70
	Rhipidura leucophrys	Willie Wagtail			20/09/2015	86
	Rostratula australis	Australian Painted-snipe	EN	V	1/04/2001	1
	Smicrornis brevirostris	Weebill			20/09/2015	137
*	*Spilopelia chinensis*	Spotted Dove			31/07/2001	5
	Stagonopleura guttata	Diamond Firetail		V	23/10/2010	22

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
	Stiltia isabella	Australian Pratincole			5/02/1982	1
	Strepera versicolor	Grey Currawong			28/08/2015	68
	Struthidea cinerea	Apostlebird			28/08/2015	9
*	*Sturnus vulgaris*	Common Starling			19/09/2015	84
	Sugomel niger	Black Honeyeater			8/03/1986	3
	Tachybaptus novaehollandiae	Australasian Grebe			8/05/2015	25
	Tadorna tadornoides	Australian Shelduck			30/10/2003	25
	Taeniopygia guttata	Zebra Finch			15/04/1995	1
	Threskiornis moluccus	Australian White Ibis			29/11/1998	1
	Todiramphus pyrrhopygius	Red-backed Kingfisher			19/09/2015	11
	Todiramphus sanctus	Sacred Kingfisher			28/11/2006	10
	Tribonyx ventralis	Black-tailed Nativehen			7/09/2002	6
	Trichoglossus haematodus	Rainbow Lorikeet			21/04/2000	1
*	*Turdus merula*	Common Blackbird			30/11/2014	61
	Turnix varius	Painted Buttonquail		R	28/08/2015	3
	Turnix velox	Little Buttonquail			11/11/2003	3
	Tyto delicatula delicatula	Eastern Barn Owl			10/05/2002	3
	Vanellus miles	Masked Lapwing			2/02/2010	29
	Vanellus tricolor	Banded Lapwing			30/10/2003	3
	Zosterops lateralis	Silvereye			20/09/2015	63
	MAMMALS					
	Austronomus australis	White-striped Free-tailed Bat			13/04/2011	6
*	*Bos taurus*	Cattle (European Cattle)			17/06/2014	2
*	*Capra hircus*	Goat (Feral Goat)			6/07/2009	4
*	*Cervus dama*	Fallow Deer			11/11/2003	4
*	*Cervus elaphus*	Red Deer			12/11/2003	1
	Chalinolobus gouldii	Gould's Wattled Bat			11/11/2011	10
	Chalinolobus morio	Chocolate Wattled Bat			11/11/2011	2
*	*Equus caballus*	Horse (Brumby)			1/01/1986	1
*	*Felis catus*	Domestic Cat (Feral Cat)			12/11/2003	3
	Lasiorhinus latifrons	Southern Hairy-nosed Wombat			23/10/2010	5
*	*Lepus europaeus*	European Brown Hare			31/10/2003	5
	Macropus fuliginosus	Western Grey Kangaroo			23/06/2015	96
	Macropus robustus	Euro			17/06/2014	17
	Macropus rufus	Red Kangaroo			22/06/2015	55
	Macropus sp.				30/09/2012	13
	Mormopterus sp.				11/11/2011	8
*	*Mus musculus*	House Mouse			1/11/2003	8
	Nyctophilus geoffroyi	Lesser Long-eared Bat			11/11/2011	5
*	*Oryctolagus cuniculus*	Rabbit (European Rabbit)			1/10/2012	16
*	*Ovis aries*	Sheep (Feral Sheep)			23/10/2010	5

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
*	*Rattus rattus*	Black Rat (Ship Rat, Roof Rat)			2/10/1995	1
	Scotorepens balstoni	Inland Broad-nosed Bat			11/11/2011	2
	Sminthopsis murina	Common Dunnart			1/10/2012	8
*	*Sus scrofa*	Pig (Feral Pig)			7/10/2011	2
	Tachyglossus aculeatus	Short-beaked Echidna	ssp		1/10/2012	22
	Trichosurus vulpecula	Common Brushtail Possum		R	28/09/2008	3
	Vespadelus sp.				11/11/2011	3
*	*Vulpes vulpes*	Fox (Red Fox)			2/10/2012	9
	REPTILES					
	Anilios bicolor	Southern Blind Snake			9/11/2003	1
	Aprasia pseudopulchella	Flinders Worm-lizard	VU		1/10/2016	26
	Christinus marmoratus	Marbled Gecko			10/11/2003	15
	Cryptoblepharus cf plagiocephalus (NC)	Desert Wall skink			15/10/1992	2
	Cryptoblepharus pannosus	Speckled Wall Skink			13/11/2003	6
	Cryptoblepharus sp.	(blank)			11/11/2003	2
	Ctenophorus decresii	Tawny Dragon			11/10/2015	64
	Ctenophorus pictus	Painted Dragon			1/04/2001	1
	Ctenotus orientalis	Spotted Ctenotus			29/10/2003	2
	Ctenotus spaldingi	Eastern Striped Skink			5/10/2008	12
	Delma molleri	Gulfs Delma			1/11/2016	32
	Diplodactylus furcosus	Ranges Stone Gecko			31/10/2003	12
	Diplodactylus vittatus complex (NC)	Stone Geckos			11/11/2003	8
	Egernia sp.				10/11/2003	1
	Egernia striolata	Eastern Tree Skink			11/11/2003	3
	Gehyra lazelli	Southern Rock Dtella			5/10/2008	36
	Gehyra variegata (NC)	Tree Dtella			3/10/2008	4
	Gehyra variegata complex				14/10/1992	2
	Hemiergis decresiensis	Three-toed Earless Skink			5/10/2008	46
	Hemiergis peronii	Four-toed Earless Skink			12/11/2003	7
	Heteronotia binoei	Bynoe's Gecko			12/11/2003	10
	Lampropholis guichenoti	Garden Skink			5/10/2008	2
	Lerista bougainvillii	Bougainville's Skink			1/03/2017	35
	Lerista dorsalis	Southern Four-toed Slider			28/10/2003	2
	Lerista sp.				28/10/2003	1
	Lialis burtonis	Burton's Snake-lizard			12/11/2003	4
	Menetia greyii	Dwarf Skink			1/03/2017	52
	Morethia adelaidensis	Adelaide Snake-eye			1/03/2017	13
	Morethia boulengeri	Common Snake-eye			5/10/2008	23
	Morethia obscura	Mallee Snake-eye			12/11/2003	26
	Parasuta nigriceps	Mitchell's Short-tailed Snake			29/10/2003	4

Exotic	Scientific name	Common name	Conservation status		Last sighting (year)	No. observed
			Aus	SA		
	Parasuta spectabilis	Mallee Black-headed Snake			3/10/2008	38
	Pogona barbata	Eastern Bearded Dragon			5/10/2008	6
	Pogona vitticeps	Central Bearded Dragon			1/04/2001	2
	Pseudemoia entrecasteauxii	Southern Grass Skink			30/08/1978	1
	Pseudonaja textilis	Eastern Brown Snake			1/10/2008	28
	Strophurus intermedius	Southern Spiny-tailed Gecko			19/05/1991	1
	Tiliqua adelaidensis	Pygmy Blue-tongue	EN	E	1/03/2017	898
	Tiliqua occipitalis	Western Blue-tongue			25/09/2011	1
	Tiliqua rugosa	Sleepy Lizard			23/10/2017	53
	Tiliqua scincoides	Eastern Blue-tongue			1/03/2017	7
	Tympanocryptis lineata	Lined Earless Dragon			1/01/1950	1
	Underwoodisaurus milii	Common Barking Gecko			1/04/2001	6
	Varanus gouldii	Sand Goanna			2/11/2014	3
	Varanus sp.	goannas			23/10/2010	1

Conservation status

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). Conservation Codes: **CR/CE:** Critically Endangered. **EN/E**: Endangered. **VU/V:** Vulnerable. **R:** Rare. ssp.: the conservation status applies at the sub-species level. **Mi**: listed as migratory under the EPBC Act. **Ma**: listed as marine under the EPBC Act.

Appendix 3. Number of individuals of each bird species recorded at point count sites over the Project Area.

Species	Common name	EPBC	NPW	PC3	PC4	PC5	PC10	PC11	PC12	PC13	PC16	PC17	PC20	PC21	PC22	PC23	PC24	PC25	PC26	PC27	PC28	PC29	PC30	PC31	PC32	PC33	PC34	PC35	Count	Sum
Acanthagenys rufogularis	Spiny-cheeked Honeyeater				1																1	2	1			1			5	6
Acanthiza chrysorrhoa	Yellow-rumped Thornbill																												0	0
Acanthiza uropygialis	Chestnut-rumped Thornbill			4	3														1		2	3				3	2		7	18
Accipiter cirrocephalus cirrocephalus	Collared Sparrowhawk				1																								1	1
Accipiter fasciatus	Brown Goshawk																				1								1	1
Acrocephalus australis	Australian Reed Warbler													3															1	3
Anthochaera carunculata	Red Wattlebird												3						1										2	4
Anthus australis	Australian Pipit						1		5		1			1	2														5	10
Aphelocephala leucopsis	Southern Whiteface			2	1															2	3					3			5	11
Aquila audax	Wedge-tailed Eagle												2	1						1			1						4	5
Artamus cyanopterus	Dusky Woodswallow									6				5								4							3	15
Barnardius zonarius barnardi	Mallee Ringneck			2		2												2		1					3				5	10
Chalcites basalis	Horsfield's Bronze Cuckoo			1														2		1									3	4
Climacteris picumnus	Brown Treecreeper									4															3	3			3	10
Colluricincla harmonica	Grey Shrike-thrush			1	1	2				3				2					1			1	1			1			9	13
Coracina novaehollandiae	Black-faced Cuckooshrike									1													1				2		3	4
Corcorax melanorhamphos	White-winged Chough		R	1																					4				2	5
Corvus mellori	Little Raven			4	2	2				2			1	20					1	1	1	1		1	1	6	1		14	44
Cracticus torquatus	Grey Butcherbird			1	1	1												1				1	1						6	6
Dacelo novaeguineae	Laughing Kookaburra									3																			1	3
Daphoenositta chrysoptera	Varied Sittella					5																							1	5
Dromaius novaehollandiae	Emu																								2				1	2
Egretta novaehollandiae	White-faced Heron													1															1	1
Eolophus roseicapilla	Galah			5	5	4		1		14			1	54							3	2	2	2	1	4			13	98
Falco cenchroides	Nankeen Kestrel											1												1			1	3	3
Gavicalis virescens	Singing Honeyeater			2	1														1	2						2		1	6	9
Grallina cyanoleuca	Magpielark													3															1	3
Gymnorhina tibicen	Australian Magpie			1	1	2			1	5			1	2							1		1		2		1	3	12	21
Malurus lamberti	Variegated Fairy-wren																		3		2	2				2			4	9
Malurus splendens	Splendid Fairy-wren																				2								1	2
Manorina flavigula	Yellow-throated Miner					3							10					7									1		4	21
Megalurus gramineus	Little Grassbird													1															1	1
Melanodryas cucullata cucullata	Hooded Robin (SE, MM, MLR, AP, YP, MN)		R																1	2									2	3
Melithreptus brevirostris	Brown-headed Honeyeater																		1	2						2			3	5
Microcarbo melanoleucos melanoleucos	Little Pied Cormorant													2															1	2
Microeca fascinans assimilis	Jacky Winter (MM LNE, FR, EP, NW)					3												2											2	5
Nesoptilotis leucotis	White-eared Honeyeater			3															1		1	1				1			5	7
Ocyphaps lophotes	Crested Pigeon			1										2				2											3	5
Pachycephala pectoralis	Golden Whistler					1													1										2	2
Pachycephala rufiventris	Rufous Whistler																			1	1								2	2
Pardalotus punctatus	Spotted Pardalote					2													2										2	4
Pardalotus striatus	Striated Pardalote			6		8				3				2		1			1	2	1	3	2	2	2	2	1		14	36

Species	Common name	EPBC	NPW	PC3	PC4	PC5	PC10	PC11	PC12	PC13	PC16	PC17	PC20	PC21	PC22	PC23	PC24	PC25	PC26	PC27	PC28	PC29	PC30	PC31	PC32	PC33	PC34	PC35	Count	Sum
*Passer domesticus**	House Sparrow													2															1	2
Petrochelidon nigricans	Tree Martin									8																			1	8
Petroica goodenovii	Red-capped Robin			2																									1	2
Phaps chalcoptera	Common Bronzewing			2																						2			2	4
Platycercus elegans	Crimson Rosella									3				4															2	7
Pomatostomus superciliosus	White-browed Babbler			1	5															6	3	3	1						6	19
Psephotus haematonotus	Red-rumped Parrot									11				3															2	14
Ptilotula ornata	Yellow-plumed Honeyeater					3													1	1									3	5
Ptilotula penicillata	White-plumed Honeyeater					5				10				9															3	24
Pyrrholaemus brunneus	Redthroat																			1									1	1
Rhipidura albiscapa	Grey Fantail			2		3																							2	5
Rhipidura leucophrys	Willie Wagtail									6				2							1								3	9
Smicrornis brevirostris	Weebill			14	6	10							3					2	2	3	6	5	4	1	2	4	3		14	65
Stagonopleura guttata	Diamond Firetail		V											1															1	1
*Sturnus vulgaris**	Common Starling									1				1															2	2
Grand Total				**55**	**28**	**56**	**1**	**1**	**6**	**80**	**1**	**1**	**21**	**121**	**2**	**1**	**0**	**16**	**12**	**27**	**30**	**31**	**18**	**7**	**20**	**36**	**11**	**5**	**57**	**587**

As per Figure 8, Green = autumn point count, Blue = autumn/spring point count and yellow = spring point count.

Conservation status

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). Conservation Codes: **CR/CE:** Critically Endangered. **EN/E**: Endangered. **VU/V:** Vulnerable. **R:** Rare. *: denoted exotic species. ssp.: the conservation status applies at the sub-species level.

Appendix 4. Number and abundnace of bird species recorded at Porter's Lagoon (spring 2019).

	Scientific name	Common name	Conservation status		No. of individuals
			Aus	SA	
	**Alauda arvensis*	Eurasian Skylark			1
	Anthus australia	Australasian Pipit			1
	Charadrius ruficapillus	Red-capped Plover			5
	Coracina novaehollandiae	Black-faced Cuckoo-shrike			1
	Corvus mellori	Little Raven			2
	Eolophus roseicapilla	Galah			10
	Epthianura albifrons	White-fronted Chat			1
	Epthianura aurifrons	Orange Chat			1
	Falco cenchroides	Australian Kestrel			1
	Gymnorhina tibicen	Australian Magpie			2
	Lalage tricolor	White-winged Triller			1
	Larus novaehollandiae	Silver Gull			2
	Manorina flavigula	Yellow-throated Miner			2
	Pardalotus striatus	Striated Pardalote			1
	Sturnus vulgaris	Common Starling			3
	Vanellus miles	Masked Lapwing			8
				Total	**42**

* denotes exotic species

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