APPENDIX 12

EPBC Self-assessment & Preliminary Flora & Fauna Assessment : Succession Ecology

succession ecology

Southern Barossa Winery & Tourist Accommodation Project

Preliminary Flora & Fauna Assessment

DOCUMENT SPECIFICATION

Client:	Turner & Townsend, on behalf of Strategic Alliance
Client contact:	Melody Young
Client email:	Melody.young@turntown.com
Succession Ecology contact:	Dr C. E. Timothy Paine
Succession Ecology email:	tim@successionecology.com.au
Prepared by:	Dr C. E. Timothy Paine & Glenn Maxwell Smyth
Document #:	ES1224-04
Citation:	Succession Ecology (2024). Southern Barossa Winery & Tourist Accommodation Project: Preliminary Flora and Fauna Assessment. Succession Ecology report ES1224-04 prepared for Turner & Townsend, on behalf of Strategic Alliance.

DOCUMENT HISTORY

Version	Issue Date	Prepared By	Reviewed By	Status
1	11/12/2024	Glenn Maxwell Smyth	Dr C. E. Timothy Paine	Draft
2	20/01/2025	Glenn Maxwell Smyth	Dr C. E. Timothy Paine	Final
3	11/07/2025	Glenn Maxwell Smyth	Dr C. E. Timothy Paine	Edits to Project background - Final

ACKNOWLEDGEMENT OF COUNTRY

Succession Ecology acknowledges and pays respect to the past, present and future Traditional Custodians and Elders of this nation and the continuation of cultural, spiritual and educational practices of Aboriginal and Torres Strait Islander peoples.

LIST OF ABBREVIATIONS

ALA	Atlas of Living Australia
BAM	Bushland Assessment Methodology
BDBSA	Biological Database of South Australia
DEW	Department for Environment and Water
EPBC	Environment Protection and Biodiversity Conservation (Commonwealth legislation)
IBRA	Interim Biogeographical Regionalisation of Australia (IBRA)
LSA	Landscape South Australia (SA legislation)
NPW	National Parks and Wildlife (SA legislation)
NVA	Native Vegetation Act (SA legislation)
NVC	Native Vegetation Council
SAM	Scattered Tree Assessment Methodology
SBWTAP	Southern Barossa Winery and Tourist Accommodation Project

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Turner & Townsend have engaged Succession Ecology on behalf of the Principal, Strategic Alliance, to prepare a preliminary Flora and Fauna Assessment for the Southern Barossa Winery and Tourist Accommodation Project (SBWTAP). The project is proposed to be developed on Lot 102, Hoffnungsthal Road, Williamstown, in the Southern Barossa Valley of South Australia. The project has been declared an 'Impact Assessed' Development by the Minister for Planning. Turner & Townsend and the Principal must prepare a Scoping Application as part of the criteria requirements for the Environmental Impact Statement (EIS) process. The assessment will investigate potential bushfire hazard risk, traffic impacts, infrastructure requirements, urban design, water management, environmental impacts, and more. Establishing the baseline environmental values of the site will support the EIS process.

1.1 Project background

The Barossa Valley is known worldwide for its wine production. Much of its arable land is used for viticulture to produce various white and red wines. The proposed development will be built on Lot 102, which was cleared for rural purposes before 1949 and has been maintained that way ever since (Appendix B).

The project is to be constructed in two parts:

Stage 1 (Hotel): The hotel (and associated external functional and car parking areas) will occupy an estimated 14,000 m2, and include approximately 150 rooms, restaurant/function space (max 450-person capacity), lounge bar, outdoor dining terrace, meeting/conference spaces, pool, fitness centre, a wellness spa, access tracks and a carpark

Stage 2 (Winery and Cellar Door): New winery and cellar door to be constructed together with an upgrade to the existing vineyard to facilitate wine production (up to a max of 500 tonnes per year), restaurant, VIP tasting room, function space, access tracks and a carpark.

1.1.1 Project area

The project area is Lot 102 Hoffnungsthal Rd, Williamstown, SA 5351. The project site is 4 km Southeast from Lyndoch town centre, 5 km Northeast from Williamstown town centre and 44 km Northeast from the Adelaide CBD (Figure 1). The project site is located within the Barossa Council Area, Northern and Yorke Landscape Management Region. A map of the high and low to moderate environmental value areas and invasive species are shown in Figure 11.

Five conservation parks occur near the Project area. Ten km to the northeast is Kaiserstuhl Conservation Park, 6.5 km and 10 km South are Hale and Warren Conservation Parks, respectively, 10 km Southwest is Para Wirra Conservation Park and 5 km West is Sandy Creek Conservation Park. Finally, Mount Crawford pine forest, which is used for production forestry, is 10 km South of the site.

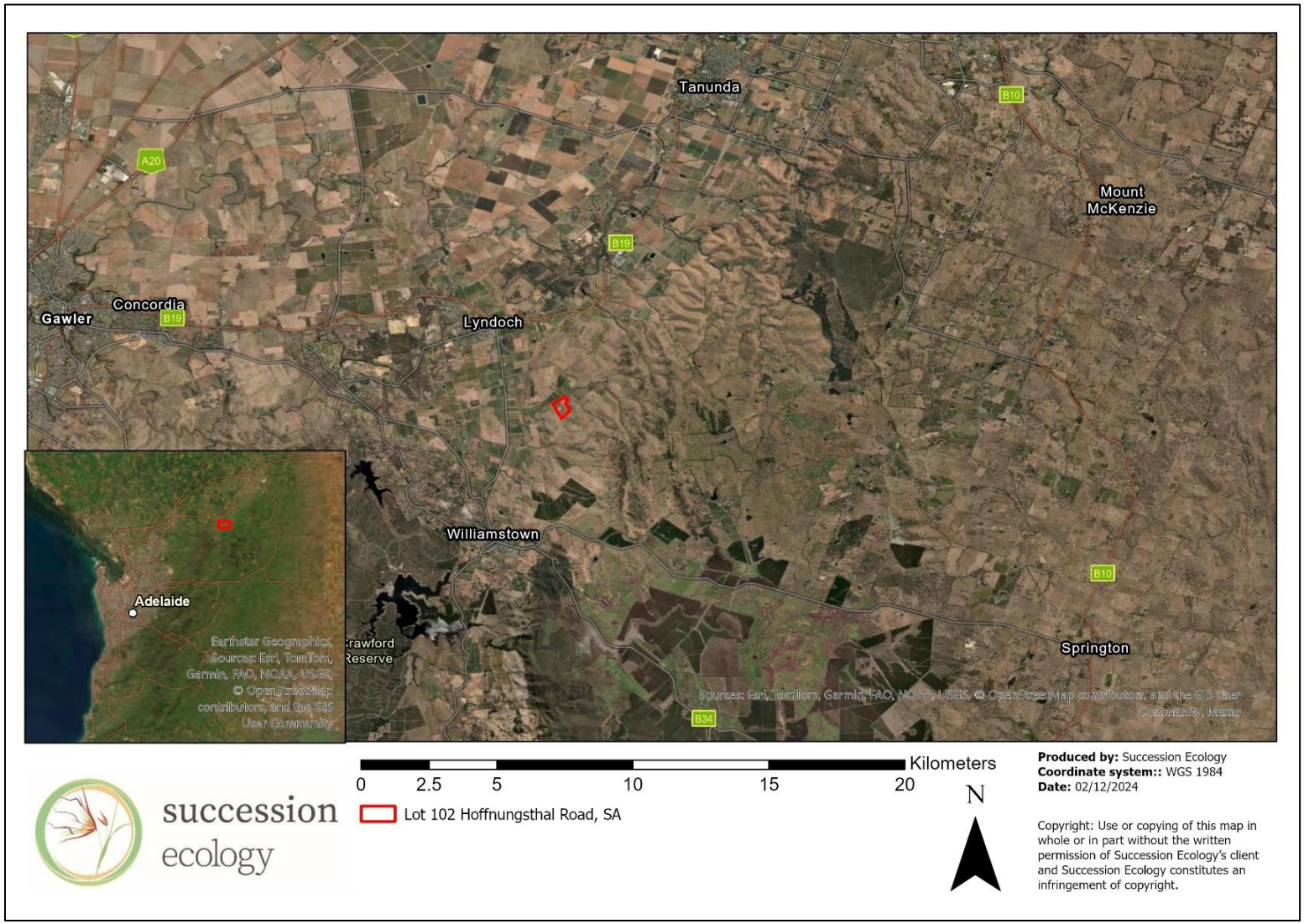


Figure 1: The project area is outlined in red, in context to surrounding towns and Adelaide CBD.

1.2 IBRA region

The Project area is located within the Flinders Lofty Block Interim Biogeographic Regionalisation for Australia (IBRA) Region, the Mount Lofty Ranges Sub-region and the Rosedale Association. The local area contains a relatively low level of remnant native vegetation with 16 % of remnancy mapped within 5 km of the site (statistic derived from NatureMaps). The Rosedale IBRA association contains 5 % remnancy with only 11% of that vegetation protected, the Mount Lofty Ranges Sub-region has 15 % native vegetation remnancy and only 5.33 % of that vegetation is protected (Native Vegetation Council 2024a).

Table 1: IBRA bioregion description (Thackway and Cresswell 1995).

IBRA region	Flinders Lofty Block
Landform	Ranges and hills with extensive rock outcrop and shallow soils; stony pediments and small basin plains; some remnants of stony downs; narrow valleys, some with gorges. Ranges and hills in form of hogback ridges in quartzite
Geology	Bare rock; some alluvium & colluvium (sand, silt & clay); less common dune sand & some sand mantles. Calcrete gravels derived from silcrete deposits & probably equate with Ripon Calcrete. Younger Telford gravels (Middle Pleistocene).
Soil	Loamy soils with weak pedologic development, Crusty loamy soils with red clayey subsoils
Vegetation	Chenopod Shrub, Samphire Shrub and Forbland. An 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
Climate	E6: Semi-arid climate that is too dry to support field crops. Soil moisture tends to be greatest in winter. In the South of the Flinders Lofty Block, the climate is more representative of mediterranean with vegetation growth beginning in winter and peaking in spring.

1.3 Environmental approvals/legislative summary

The following legislation applies at this site:

1) *Native Vegetation* (NV) *Act 1991* (South Australia) – Any clearance of vegetation must be approved by the Native Vegetation Council (NVC) in accordance with Section 28 of the Act or is permitted under Division 5 of the *Native Vegetation Regulations 2017*.

2) *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (Commonwealth) and the *EPBC Regulations 2000* – Provide a framework for the protection and management of threatened flora, fauna, ecological communities, and other Matters of National Environmental Concern. Any action that significantly impacts these will require a referral under the *EPBC Act*.

3) *National Parks and Wildlife (NPW) Act 1972* (South Australia) – Provides a framework for the protection of flora and fauna.

4) *Landscape South Australia (LSA) Act 2019* and *Landscape SA Regulations 2020* – Under this legislation land holders have the responsibility to manage declared pest plants and animals and prevent land degradation.

2 METHODOLOGY

2.1 Flora and Fauna assessment

2.1.1 Desktop assessment

A desktop assessment was conducted to undertake preliminary mapping of native vegetation protected under the *NV Act 1991* via the NatureMaps tool. This mapping was used to plan the assessment and inform the field methodology.

The desktop assessment was also undertaken to determine the threatened ecological communities, flora species, and fauna species that potentially occur in the area. Communities and species were evaluated as threatened if they were listed under the *National Parks and Wildlife (NPW) Act 1972* and/or the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, as outlined below:

- ***NPW Act 1972***
  - Schedule 7 – Endangered Species
  - Schedule 8 – Vulnerable Species
  - Schedule 9 – Rare Species
- ***EPBC Act 1999***

  Part 13 – Species and communities – Division 1- Listed threatened species and ecological communities – Subdivision A – Listing – 178 Listings of threatened Species

  - Section 178 (c) – Critically Endangered
  - Section 178 (d) – Endangered
  - Section 178 (e) – Vulnerable

Threatened communities and species were evaluated if they had been recorded within 5 km of the project site since 1995 or were considered 'known' to occur within the search area via the Protected Matters Search Tool.

Databases searched during the desktop assessment included:

- Protected Matters Search Tool (PMST): to identify Matters of National Environmental Significance (MNES) under the *EPBC Act 1999,* including nationally threatened species and ecological communities, 'known' to occur in the search area.
- NatureMaps: to identify records of threatened flora and fauna listed under either the *NPW Act 1972* or *EPBC Act 1999*, recorded since 1995 within the search area.
- Biological Database of South Australia: to identify threatened flora and fauna listed under either the *NPW Act 1972* or *EPBC Act 1999*, recorded since 1995 within the search area that have restricted access to distribution data.
- Atlas of Living Australia (ALA): to identify threatened flora and fauna listed under either the *NPW Act 1972* or *EPBC Act 1999*, recorded since 1995 within the search area. Records from 'citizen science' initiatives are excluded from results.
- Appendices in the NVC Bushland and Scattered Tree Assessment Manuals: to determine scattered trees species that provide suitable habitat for threatened fauna and threatened ecological communities protected under *NPW Act 1972*.
- DEH (in progress) unpublished and provisional list of Threatened Ecosystems: to identify threatened and rare ecosystems.

A likelihood of occurrence/habitat use assessment was carried out for threatened communities, fauna and flora species identified during the Desktop Assessment. The likelihood of these species using the site following the metric described in Table 2.

The distribution of vegetation associations were assessed using satellite imagery and vegetation community data obtained through NatureMaps. All maps were generated using ArcGIS Pro.

Table 2: Criteria for the likelihood of occurrence/habitat use of species within the survey area.

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

2.1.2 Field assessment

2.1.2.1 Vegetation assessment

A vegetation survey was conducted on the 19/11/2024, with the objective of identifying the ecological assets and risks on site. The Native Vegetation Council (NVC) provides useful standardised tools for assessing vegetation in South Australia. The NVC Bushland and Scattered Tree methodologies are used to evaluate the site's habitat value, threatened species likelihood of use, vegetation condition, and provide a way to differentiate and score intra-site variation between vegetation patches. Using the NVC vegetation assessment methodology has the added benefit of streamlining the process for preparing an NVC Data report, should the project require vegetation clearance. The site was surveyed using the Bushland Assessment Methodology (Native Vegetation Council 2024a) and Scattered Tree Assessment Methodology (Native Vegetation Council 2024b), as appropriate. Careful inspection was undertaken to identify any threatened flora and threatened fauna species known to occur in the region.

2.1.2.2 Fauna assessment

An opportunistic observation-based survey (sightings, tracks and scats) was conducted to identify any fauna species using the vegetation as habitat.

2.2 Limitations

As with any field survey several factors can limit outcomes. In particular, the timing of a field survey (season) and the prevailing weather conditions (wind, rain, temperature) affect the opportunity for representative data collection (e.g., plant identification and animal activity). Overall, it is unlikely that a single survey event can generate a complete biological catalogue of an area. As such, the results of this preliminary survey provide a baseline of species presence during this time. Many of the threatened flora species identified in the desktop assessment were orchids. The growing seasons for many of these species had already passed at the time of the field survey. As a result, the baseline assessment cannot guarantee the absence of orchids or any other threatened species.

Generally, plant identification can be limited by the life-stage of the plant and as such plant diversity can be underestimated due to a lack of distinguishable features such as flowers or fruit. However, many perennial and annual species were in flower at the time of the survey, facilitating identification.

3 RESULTS

3.1 Desktop assessment

3.1.1 Threatened ecological communities

The desktop assessment did not identify any threatened ecological communities listed under the *EPBC Act* occurring within the survey area. The Protected Matters Search Tool did assess Peppermint Box (*Eucalyptus odorata*) Grassy Woodlands as being likely to occur within the area, however, this community was not observed on site during the field survey.

3.1.2 Threatened fauna

The desktop search identified a total of 31 threatened fauna species within the search area. Nine are listed under the *EPBC Act 1999* and 27 fauna are further listed as threatened under the *NPW Act 1972*. Of these species, Nine species listed under the *EPBC Act 1999* and 27 further species listed under the *NPW Act 1972* have been included in the likelihood of use assessment (Table 3), using the site following the metric described in Table 2. None of the threatened fauna species identified within the desktop search were identified within the Project area during the field survey.

Table 3: A summary of the fauna species observed on site or recorded within 5 km of the application area since 1995, or those listed as known to occur in the PMST.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
AVES						
Acanthiza lineata whitei (Striated Thornbill)		ssp	3	2024	Found in most wooded habitats on the island such as open forests and woodlands, dominated by eucalyptus with a well-developed understorey, most tall riparian forest, isolated strands of Sugar Gum *(Eucalyptus cladocalyx*) forest, stringybark scrub, most forms of mallee (including roadside corridors and remnant farm paddocks, and Swamp Paperbark (*Melaleuca ericifolia*) stands (DAWE 2021a).	Not Applicable – The *EBPC* listed sub-species is a Kangaroo Island subspecies that does not occur near the project site.
Corcorax melanorhamphos (White-winged Chough)	R		2, 3	2024	Woodland and tall mallee, with a preference for wetter areas with leaf-litter for feeding and mud for building nests (DEH 2014).	**Likely –** The species has been recorded within 5 km in the last 12 months. No sightings have been recorded in the surrounding farmland. However, many observations have been recorded in the surrounding conservation parks. It is possible that this species would utilise this property for foraging habitat.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Coturnix ypsilophora australis (Brown Quail)	V		2, 3	2012	Cryptic species that occurs in dense crops (especially oats), irrigated pastures, rank grasslands and sedgelands, especially where native species predominate, and often bordering swamps (DEH 2008a).	Unlikely - The species has not been seen in the local area within the last 20 years. Additionally, the species has specific habitat requirements which are not met at the project site.
Falco peregrinus macropus (Peregrine Falcon)	R		2, 3	2020	Found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water, and may even be found nesting on high city buildings (DEH 2009).	**Highly likely –** The species is known to occur in the area and the property contains both potential feeding and nesting habitat for the species. There is a high likelihood the species would use the property.
Falco subniger (Black Falcon)	R		2, 3	1999	Nomadic, preferring sparse woodlands, scrubby grasslands and farmlands (Birds SA 2021).	Possible – The species has not been observed in the area for over 20 years. Although the site does contain preferrable habitat for the species.
Falcunculus frontatus frontatus (Eastern Shrike-tit)	R		2, 3	2010	Found in a variety of habitats, including woodlands, scattered trees, forested gullies. Rarely feeds near the ground (Australian Museum 2020).	**Likely –** The species is known to occur in the area and has been seen within the last 20 years. The site has many mature scattered trees which are preferred habitat.
Gerygone fusca (Western Gerygone)	R		2, 3	1999	Widespread in forests and woodlands dominated by *Eucalyptus* and wattles (Birdlife Australia 2024).	Unlikely – The project site does not contain preferred habitat, and the species has not been seen in the area for over 20 years.
Hieraaetus morphnoides (Little Eagle)	V		2, 3	2020	Seen over woodland, forested land and open country. Avoids heavy forest (Birdlife Australia 2021a).	Possible – The species has been seen just over 5 km away (5.2 km). The project site contains the species preferred habitat.
Lewinia pectoralis pectoralis (Lewin's Rail)	V		3	1999	Inhabit permanent to ephemeral, fresh to saline wetlands with dense emergent or fringing vegetation. Also use artificial habitats with similar structural features (DEH 2008b).	Unlikely – Lewin's Rail has not been seen in the area for over 20 years and there is minimal essential habitat on site.
Lophoictinia isura (Square-tailed Kite)	E		2, 3	2015	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses (DEH 2022).	Possible – The project site has preferred habitat and the species has been observed in the area in the last 10 years.
Melanodryas cucullata cucullata (Hooded Robin (YP,	R	EN	2, 3, 5	2022	Dry Eucalyptus and acacia woodlands and shrublands with an open understorey, some grassy	**Likely** – The property habitat does not perfectly match the species preferred

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
MN, AP, MLR, MM, SE))					areas and a complex ground layer. Species avoids woodlands with tall trees or dense tree cover but sometimes occur in tall, dense heaths with scattered open areas. Known to occur in patches as small as 2.9 ha (DCCEEW 2023a).	habitat. However, the species has been seen in the area within the last couple of years and is known to occur outside of preferred habitat.
Melithreptus brevirostris (Brown-headed Honeyeater)		ssp	3	2024	It mainly inhabits temperate assemblages, especially those dominated by E*ucalyptus*, as well as forests, mallee, and stringybark scrub. Can also be found within urban environments, including golf courses and gardens (DAWE 2021b).	Not Applicable – The *EPBC* listed sub-species occurs only on Kangaroo Island, not in the project area.
Melithreptus gularis gularis (Black-chinned Honeyeater)	V		3	2001	Occupy dry *Eucalyptus* woodland with an annual rainfall range of 400-700 mm, particularly associations containing ironbark and box. Favoured habitats incorporate a mixture of mature and regenerating woodland *Eucalyptus*, although adjacent scattered paddock trees are also used (DEH 2008c).	Possible – The habitat on site and within the surrounding area could support the species, although, the species has not been seen in the area for over 20 years.
Microeca fascinans ssp *fascinans* (Jacky Winter)	R		2, 3	1999	Prefer open woodland (Eucalyptus and mallee) with an open shrub layer and bare ground. Often seen in farmland and parks. Within the AMLR the preferred broad vegetation groups are Grassy Woodland and Mallee (DEH 2008d).	Possible – Preferred habitat is present in the area and on site, but the species has not been seen in the area for over 20 years.
Myiagra cyanoleuca (Satin Flycatcher)	E		3	1999	Inhabit heavily vegetated gullies in moist, eucalyptus-dominated forests and taller woodlands. During migration can also occur in coastal forests, woodlands, mangroves and drier woodlands and open forests (DCCEEW 2023b).	Unlikely – No preferred habitat is present on site and the species has not been seen in the area for over 20 years.
Myiagra inquieta (Restless Flycatcher)	R		2, 3	2008	Open forests, woodlands and mallee, associated with species such as *Eucalyptus camaldulensis, E. leucoxylon, E. oleosa* and *E. gracilis* (DEH 2021).	**Likely –** The species has been observed within the last 20 years and the site contains large remnant *Eucalyptus camaldulensis* which is its preferred habitat.
Neophema elegans elegans (Elegant Parrot)	R		2, 3	1999	Wide range of open habitats, including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh and farmland (Birdlife Australia 2021b).	Possible – No observations in 5 km have occurred within the last 20 years. More recent observations have occurred 11 km to the west. There is some habitat on site the bird would utilise.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Oriolus sagittatus sagittatus (Olive-backed Oriole)	R		3	1999	Inhabits many sorts of woodlands, foraging singly or in pairs, singing frequently (Birdlife Australia n.d.).	Unlikely – The bird has not been recorded in the area for over 20 years, there is limited habitat on site.
Pachycephala olivacea hesperus (Olive Whistler)	E		3	1999	In N of range, found in rainforest above 1000 m; usually cool temperate forest with southern beech (Nothofagus) or coachwood (Ceratopetalum), but occasionally warm temperate rainforest and wet Eucalyptus forest. (Cornell lab 2020).	Unlikely – There is no preferred habitat on site for the species. No observations have been recorded in the last 20 years. Closest recent records of the species are near Mt Gambier.
Petroica boodang boodang (Scarlet Robin)	R		2, 3	1999	Occurs predominantly in Eucalyptus woodlands and forests. Good leaf litter, perches in the height range 1-2 m, and fallen logs are important components of habitat (DEH 2008e)	Unlikely – The species has not been seen within 5 km of the site for over 20 years. The site has limited preferred habitat. Recent observations are in the surrounding conservation parks.
Platycercus elegans (Crimson Rosella)		ssp	3	2022	Commonly associated with tall Eucalyptus and wetter forests (Birdlife Australia 2023)	Not Applicable – The flagged Crimson Rosella sub-species that is vulnerable is a Kangaroo island variant and is not applicable to this project site.
Stagonopleura guttata (Diamond Firetail)	V	VU	2, 3, 5	2017	Occurs in a wide range of Eucalyptus dominated habitat with a grassy understorey (DCCEEW 2023c)	**Highly likely –** The species occurs in the surrounding conservation parks and farmland. The project site has preferred habitat.
Strepera versicolor (Grey Currawong)	ssp		3	2016	Known to occur in the far NW corner of South Australia (Atlas of Living Australia 2021).	Not Applicable – The sub-species listed under the *NPW Act* occurs in the far west, not at the project site.
Turnix varius varius (Painted Buttonquail)	R		2,3	2012	Found in dry woodlands where it feeds by making circular scrapes among deep leaf litter (DEWNR 2019).	Possible – There is limited to no habitat on site. All observations are in nearby conservation parks.
Zanda funerea whiteae (Yellow-tailed Black Cockatoo)	V		2, 3	2001	Inhabits a variety of habitats, favours Eucalyptus woodland and pine plantations (Birdlife Australia 2021c).	Possible – There is some habitat on site that the species could use, but it has not been seen on site for over 20 years.
Zoothera lunulata halmaturina (South Australian Bassian Thrush (southern FR, MLR, KI))	SP	EN	3, 5	2012	This subspecies mostly inhabits damp Eucalyptus forest or woodland. Its habitat consists of densely forested areas and gullies, usually with a thick canopy overhead, a thick understorey of small trees and tall shrubs, and leaf-litter below (DEH 2008f)	Possible – Limited preferred habitat is available on site, though the species is known to frequent the conservation parks and remnant woodland habitats in the surrounding area.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
MAMMALIA						
Isoodon obesulus obesulus (Southern Brown Bandicoot)		EN	5		Inhabit a variety of habitats including heathland, shrubland, sedgeland, heathy open forest and woodland and are usually associated with infertile, sandy and well drained soils, but can be found in a range of soil types (DCCEEW 2022).	Unlikely – Not observed within 5 km. Recent observations are restricted to heavily forested locations further south.
Myotis macropus (Large-footed Myotis)	E		3	2005	Generally, roost in groups of 10 - 15 close to water in tree hollows, caves, mines, culverts storm water channels, buildings, wharves, bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface (Australian Museum 2024).	Possible – There is some habitat and required food sources for this species within the surrounding area, however it has been 20 years since the last observation in the area and there is better habitat outside of the 5 km buffer along the Murry River to the east.
Pteropus poliocephalus (Grey-headed Flying-fox)	R	VU	3	2020	Typically roost in tall dense trees next to a water source. They will move up to 20km from their roost site to forage (DEWNR 2020).	**Likely –** Site is within range of the Adelaide flying fox camp. During flowering season for the large remnant gums the bats would visit to consume food. However, it is unlikely that the species would roost on site.
Tachyglossus aculeatus (Short-beaked Echidna)	ssp	ssp	3	2020	Prefers woodlands and other natural areas they are also seen on farmland and roadsides (DCCEEW 2023d).	Not Applicable – The Vulnerable occurs only on Kangaroo Island.
Trichosurus vulpecula (Common Brushtail Possum)	R		3	2022	Inhabits woodland, forests, heath and urban areas using trees with hollows for nesting (Australian Museum 2022).	**Highly likely –** The project site contains preferred habitat for the species, with many large remnant Red Gums on site and within the surrounding farmland.
Source; 1- BDBSA, 2 - ALA, 3 – NatureMaps, 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others NPW Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable						

3.1.3 Species profiles

The following section provides a brief description for species that were assessed as likely or highly likely in Table 3. The species profile describes the animal's appearance, preferred habitat, distribution, their current and potential future threats, and their local population.

***Corcorax melanorhamphos* (White-winged Chough); *NPW Act (R)* – Likely**

White Winged Choughs are large, black birds with a distinctively curved beak, a red eye and a large white wing patch, which is seen in flight (DEH 2014). The species is strongly social often occurring in flocks of up to 20 birds (DEH 2014). Flocks can comprise breeding adults as well as non-breeding helpers, which can be young from previous years' broods (DEH 2014). The species is widespread within its range across the east and southeast of Australia (Figure 2). They inhabit woodland areas including mallee and prefer areas with leaf litter where they forage for insects, suitable native shrubs with seeds for feeding as well as mud for nest building (DEH 2014).

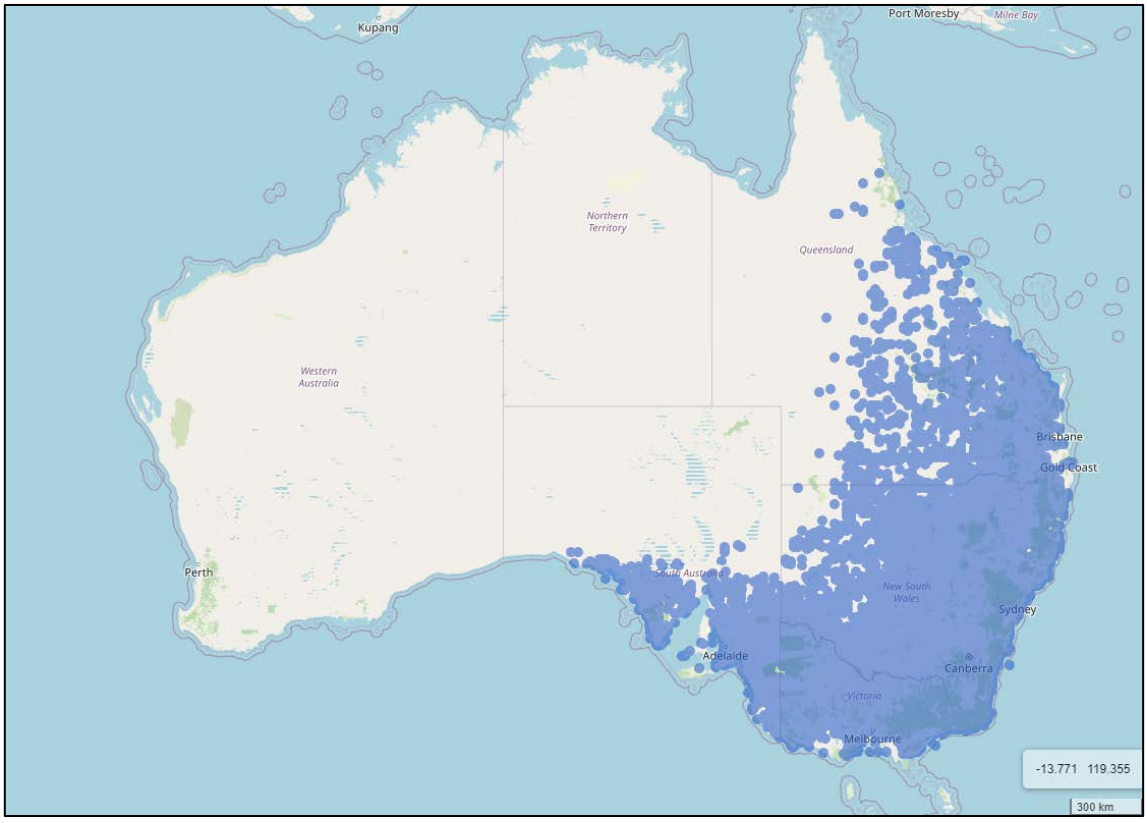


Figure 2: Distribution of White-winged Chough records across Australia. Records obtained from Atlas of Living Australia (accessed 13/09/2024).

Threats

White-winged Chough is threatened by predation from invasive predators as well as removal of habitat and feeding resources (DEH 2014). The species persists in remnant woodland areas within a farmland matrix, indicating that the species is capable of dispersing across open areas (DEH 2014).

Local Populations

The project site contains the required habitat features for this species. Most observations have been recorded in the conservation parks and the immediate adjacent farmlands. The species is known to inhabit agricultural areas with remnant scattered trees that represent an open woodland. Looking at aerial and satellite imagery of the site, it is relatively connected to surrounding habitat. This would enable the species to travel to and between sites. No nests or observations of the species were recorded during the field survey.

***Falco peregrinus macropus* (Peregrine Falcon); *NPW Act (R)* – Highly Likely**

Peregrine Falcon is a powerful, medium-sized raptor and is the fastest bird in the world (DEH 2009). They have dark grey, brown wings backs and hoods with pale undersides marked by brown bars and yellow to black beaks (DEH 2009). Peregrine Falcons are found in most habitats across Australia from rainforests to arid zones, coastal to alpine and mountainous regions to flat plains (DEH 2009). The key requirements for this species include abundant prey and safe nesting areas (DEH 2009). They are typically found using coastal and inland cliffs, near woodlands with permanent water sources and can be found nesting in city buildings (DEH 2009). The species prefers to consume small to medium birds, rabbits and other diurnal mammals. They will swoop from above using their speed to catch or knock prey, capturing it and taking it to a perch to consume. Pairs inhabit a home range of 20-30 km^2 (DEH 2009).

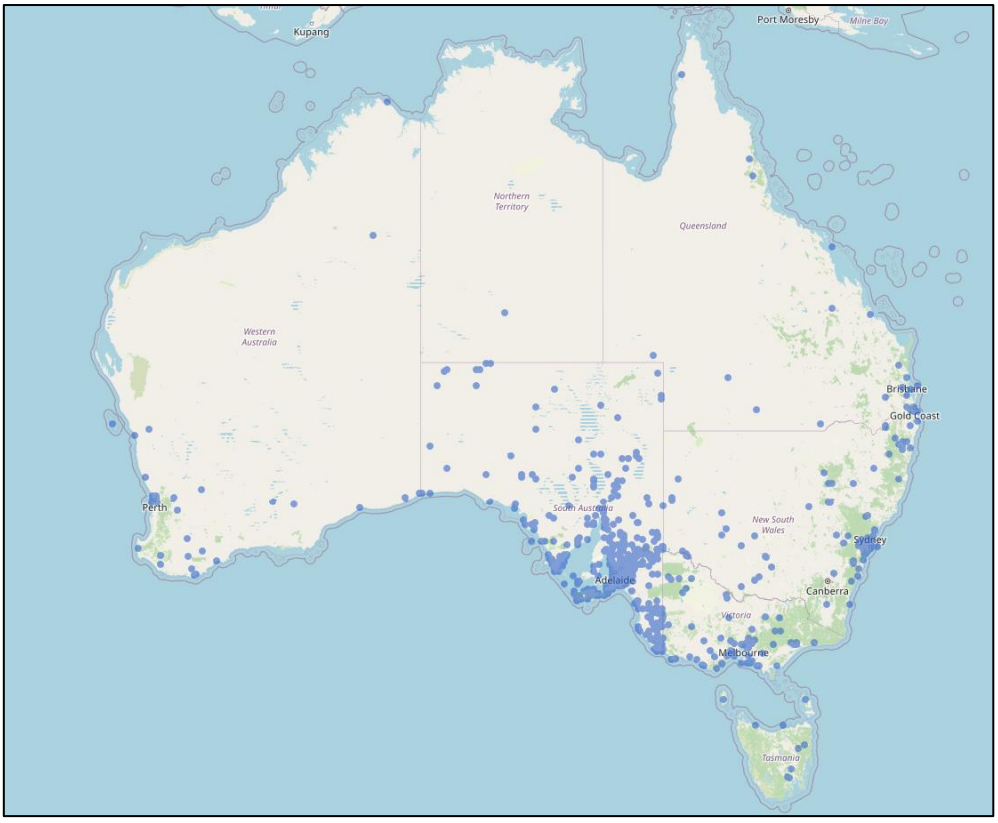


Figure 3: Distribution of Peregrine Falcon records across Australia. Records obtained from Atlas of Living Australia (accessed 06/12/2024).

Threats

Bio-accumulation of organophosphate chemicals caused the population size to decline precipitously in the 1970's (Rix 2022). Agriculture has diverged from organophosphates to neonicotinoids and other pesticide

chemical groups (Rix 2022). Prior to this shift chemicals such as DDT would bio accumulate in the animal and would thin eggs shells, decreasing breeding success (Rix 2022). Since the ban of organophosphate groups in Australia the species has had a resurgence and is having its rare status in South Australia reassessed (Rix 2022).

Local populations

There are records of the species in the area and the animal is likely to utilise both the nearby conservation areas and the adjacent farmland. The property has some preferred habitat for Peregrine Falcons. During the field survey no nests were found, but the property is likely to be used for foraging.

***Falcunculus frontatus frontatus* (Eastern Shrike-tit); *NPW Act (R)* – Likely**

Eastern Shrike-tit is a striking stocky small to medium bird with a black and white striped head with a black crest of feathers that runs along the top of the bird's head (Australian Museum 2020). The throat is black with a pale-yellow breast, their back and wings are an olive brown (Australian Museum 2020). Males and females differ slightly in colour, with females having a black chin transitioning into a dark olive green, grey throat (Australian Museum 2020)t. The species preferred habitat is Eucalyptus woodlands and forests, but can be seen in grassy woodlands, heathy woodlands and riparian areas (Australian Museum 2020). Not a lot is known about the species, they typically occur singly or in pairs and likely are territorial.

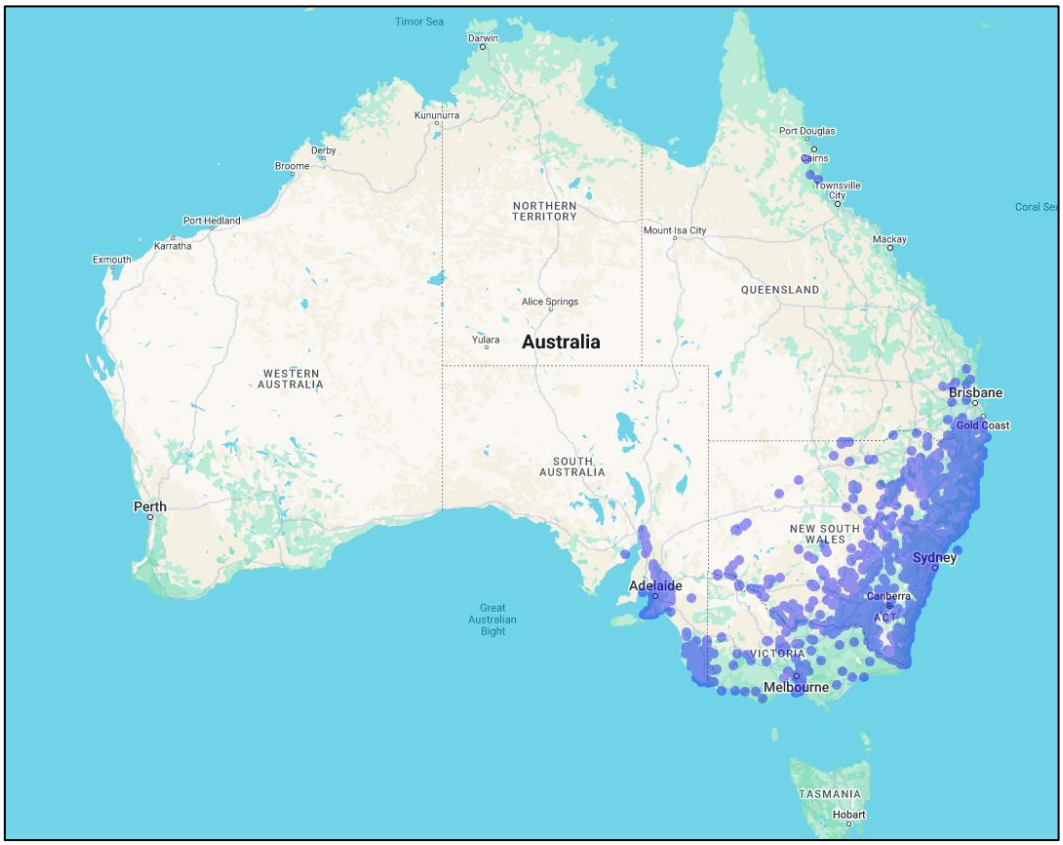


Figure 4:Distribution of Eastern Shrike-tit records across Australia. Records obtained from Atlas of Living Australia (accessed 06/12/2024).

Threats

The threats for the species are not well known, likely the continued reduction in habitat resulting from clearance, fragmentation and loss of specific habitat resources are contributing to their decline. Any

preferred habitat is considered essential, and clearance of these areas are a serious concern for the species continued occupation (Australian Museum 2020).

Local populations

There are recent observations in the area and a known population at the Sandy Creek Conservation Park. Survey bias of the local Conservation Parks is likely contributing to the limited observations in the neighbouring farmland. It is likely that the species utilises the local farmland periodically while emigrating between preferred habitats.

***Melanodryas cucullata cucullata* (South-eastern Hooded Robin); *NPW Act (R); EPBC Act (EN)* – Likely**

Conservation advice (DCCEEW 2023a)

The South-eastern Hooded Robin is a large Australian robin reaching up to 17 cm in length, with males featuring distinctive black and white markings, the black forming a bold hood extending to a white breast. The subspecies is listed as Endangered under the *EPBC Act* owing to an observed decrease in population size across its range. South-eastern Hooded Robins occur in south-eastern South Australia, across Victoria and NSW and into parts of southern Queensland (Figure 5). The population is not considered severely fragmented, however fragmented populations do occur in some areas and these are genetically isolated.

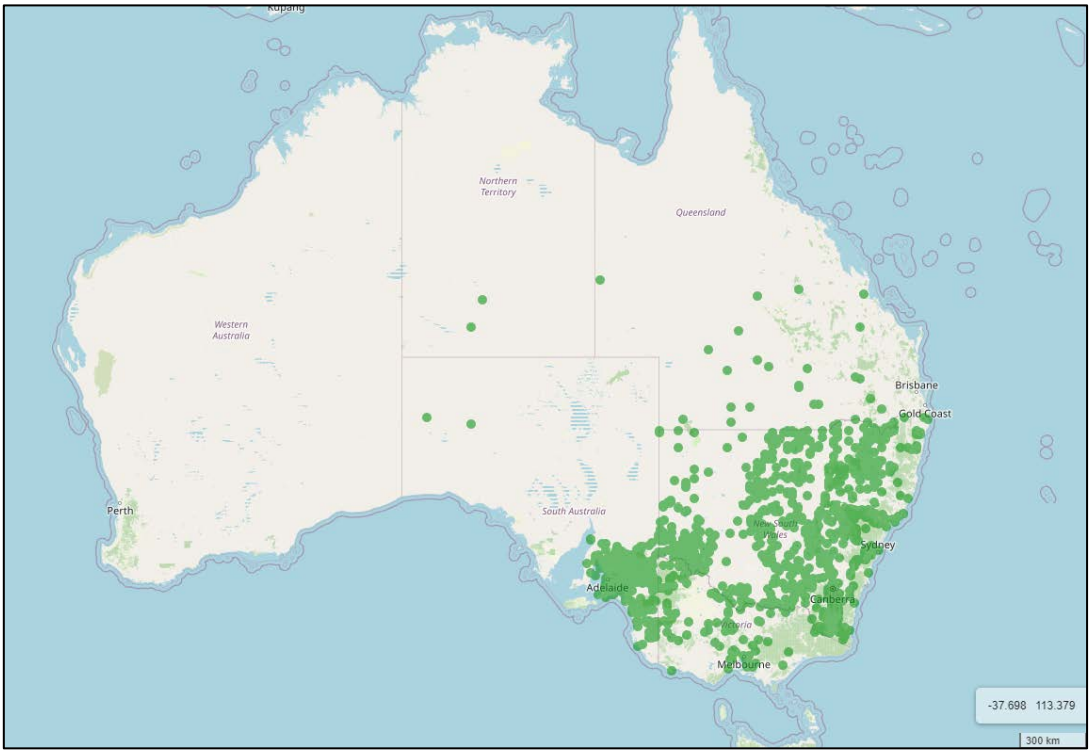


Figure 5: The distribution of South-eastern Hooded Robin sightings across Australia. Records obtained from Atlas of Living Australia (accessed 17/09/2024).

They are a shy and sedentary species, mostly seen in pairs or small groups within dry Eucalyptus and acacia woodlands and shrublands (DEH 2022). They prefer areas with an open understorey, some grassy areas and a complex ground layer (DEH 2022). In agricultural landscapes, they prefer patches of native vegetation greater than 10 ha in size with moderately deep to deep soils.

Habitat considered critical to the survival of the South-eastern Hooded Robin include areas of:

- dry Eucalyptus and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas;
- structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses;
- standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging;
- moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat.

The conservation advice states that habitat critical to the survival should not be cleared, fragmented or degraded and any known or likely habitat should be considered as habitat critical to the survival of the subspecies (Figure 6)(DCCEEW 2023a). Additionally, areas that are not currently occupied by the species due to recent disturbance (e.g. fire, grazing or human activity), but should became suitable again in the future, should also be considered habitat critical to the survival of the species (Figure 6).

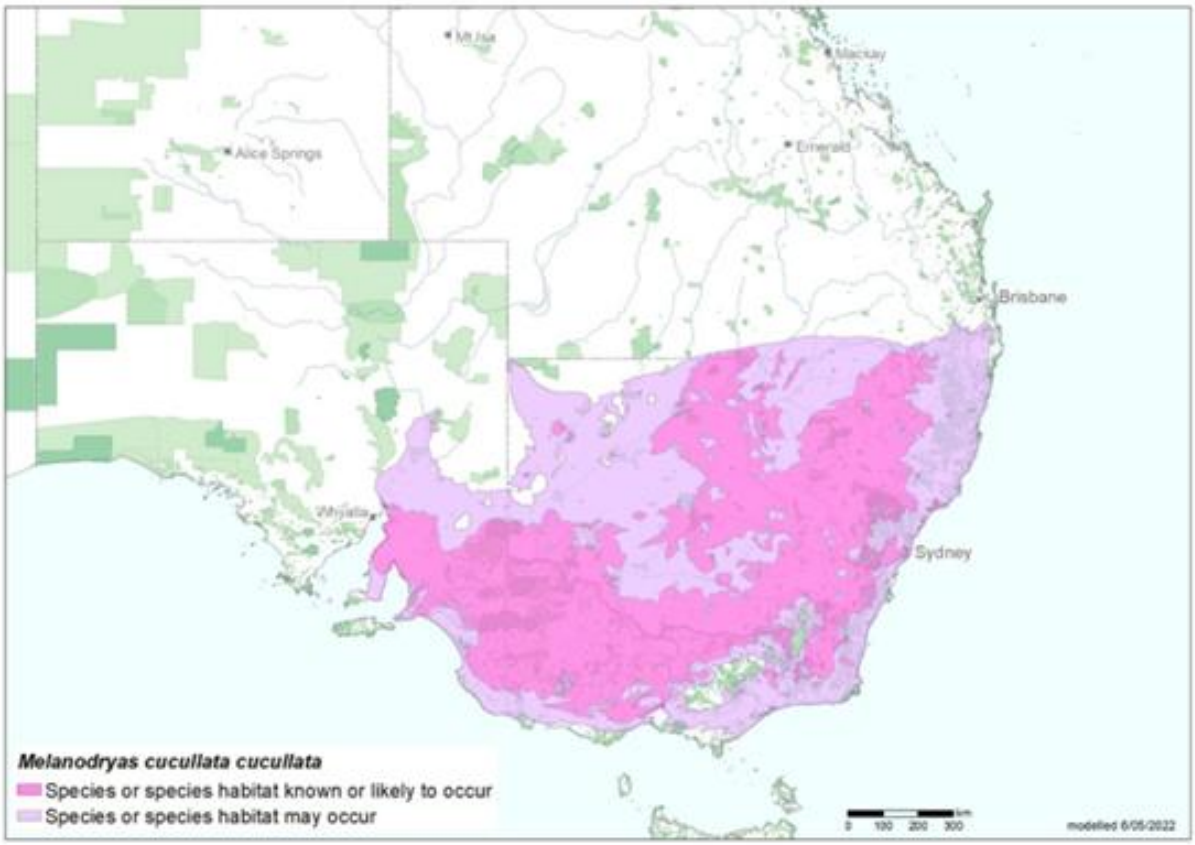


Figure 6: Distribution of modelled critical habitat for South-eastern Hooded Robin, defined as any area of known or likely habitat, source: (DCCEEW 2023a).

Threats

Habitat fragmentation is considered to be the key threatening process for this species, with historical clearance resulting in legacies of fragmentation and degradation in now increasingly isolated populations (DEH 2022). By-products of past clearance and fragmentation include other threats such as altered fire-regimes resulting in different understorey structure and assemblages (DEH 2022). Removal of complexity in the habitat through overgrazing and tidying of farmland and adjacent bush blocks, and increased exposure to predation by cats and foxes are also key threats (DEH 2022). Weed invasion has also been estimated to

increase in isolated patches while periodic drought in arid zones has had an exacerbated impact on already isolated and unstable populations (DEH 2022).

Local populations

The local records for this population are in the surrounding Conservation Parks and heritage areas. Search effort likely has been concentrated in those areas and does not indicate that the species does not frequent the surrounding farmland. There is some preferred habitat on site and the local population could us the property for short to extended periods of time while the animals move between preferred habitats.

***Myiagra inquieta* (Restless Flycatcher); *NPW Act* (R) – Likely**

The Restless Flycatcher is a small to medium bird with a glossy blue-black head and bill with a white chin and underside (DEH 2021). The topside of the wings and tail are a dark grey with an orange-brown tint (DEH 2021). The animal is highly active hovering and darting around while feeding. It can be heard while feeding making whirring and hissing noises while hovering (DEH 2021). Restless Flycatchers are typically found in similar habitats as Willie Wagtails which are similar in appearance and size. The species can be found through most of Australia, outside of the driest areas (Figure 7).

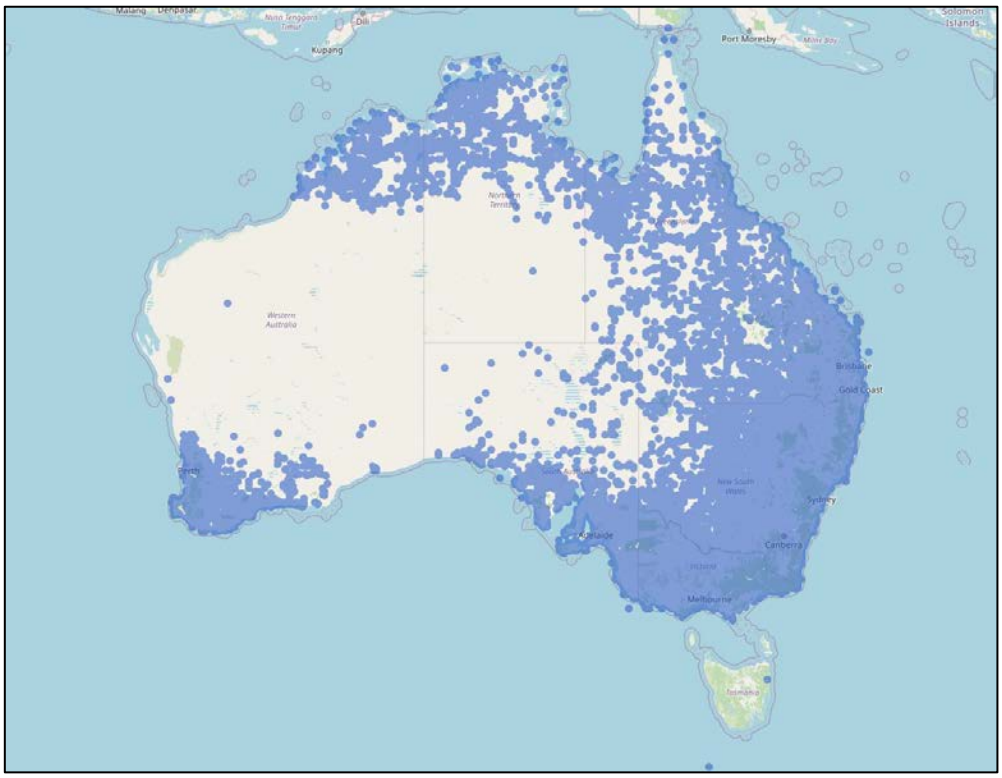


Figure 7: The distribution of Restless Flycatcher sightings across Australia. Records obtained from Atlas of Living Australia (accessed 09/12/2024).

The species prefers open forest and woodlands and can be observed within farmland (DEH 2021). Restless Flycatcher inhabits woodland areas in SA consisting of *Eucalyptus camaldulensis, E. leucoxylon* and Box woodlands. Typically, Restless Flycatchers are observed singly or in pairs (DEH 2021).

Threats

The species is at threat from habitat clearance and simplification in habitat structures. The species relies on complex habitats for perching and insectivorous prey (DEH 2021).

Local population

Many of the observations, especially the most recent, are isolated to the surrounding conservation parks. Like with many of the other species listed here, observation bias may contribute to a lack of observations within the wooded farmland. There is the likely possibility due to the preferred habitat trees on site for the species to frequent the property.

***Stagonopleura guttata* (Diamond Firetail); *NPW Act (V); EPBC Act (VU)* – Highly likely**

Diamond Firetail *(Stagonopleura guttata)* is a large finch which is distributed from southeast Queensland, along the coast and 300 km inland through NSW, Victoria, and as far west as the Eyre Peninsula of South Australia (Figure 8, DCCEEW 2023e). Under the *NPW Act 1972,* Diamond Firetail are listed as a Vulnerable species. In March 2023, the Threatened Species Scientific Committee assessed the species as Vulnerable under the *EPBC Act* on the basis of an observed decline in population size which is expected to continue in the future.

Biology and Ecology

The habitat preferences of Diamond Firetail are woodlands and open forests with few areas of dense vegetation for roosting, open areas with low tree, log and litter density and with a grassy understorey for foraging (DCCEEW 2023e). Preferred dominant species are *Eucalyptus, Acacia or Casuarina.* However, they can be found in farmland and grasslands with scattered trees if suitable roosting and foraging resources are available (DCCEEW 2023e). Diamond Firetail can be found feeding in small (5) to large (40) groups at ground level, they feed on grass seed, leaves and insects and in some parts of the mount lofty ranges the species can be seen feeding on the seeds from *Allocasuarina verticillata* (DCCEEW 2023e). The species breeding season is between August and January, both the male and females are involved in the collection of materials, although only the female will build the nest. The species sometimes build nests inside the nests of large birds of prey for protection or among spiny shrubs, both males and females will incubate the eggs and take care of the young.

Threats

Threats to the species survival come from the clearance of and degradation to habitat within the agricultural regions of Australia. It is important to protect large areas of habitat (areas ≥ 200 ha), control the invasion of exotic weeds and grasses which alter habitat and seed flowering times. Also important is removal of stock and ecologically out of control native herbivores from preferred habitat to limit grazing pressure and soil damage which limits roosting and foraging habitat (DCCEEW 2023e). Other threats that are less severe but still have negative compounding impacts, is competition with and predation from native species (Noisy Miners and Pied Currawongs), impacts from climate change and increasingly frequent and severe wildfires (DCCEEW 2023e).

Local population

Most of the Atlas of Living Australia records for this species are in Para Wirra Conservation Park, Sandy Creek Conservation Park and Kaiserstuhl Conservation Park. Although there are no records in the surrounding farmland, it is likely that there has been little search effort in the farmlands. The project site contains

preferred habitat for the species, and with the number of local records, it is likely the local population could utilise the property for habitat and foraging.

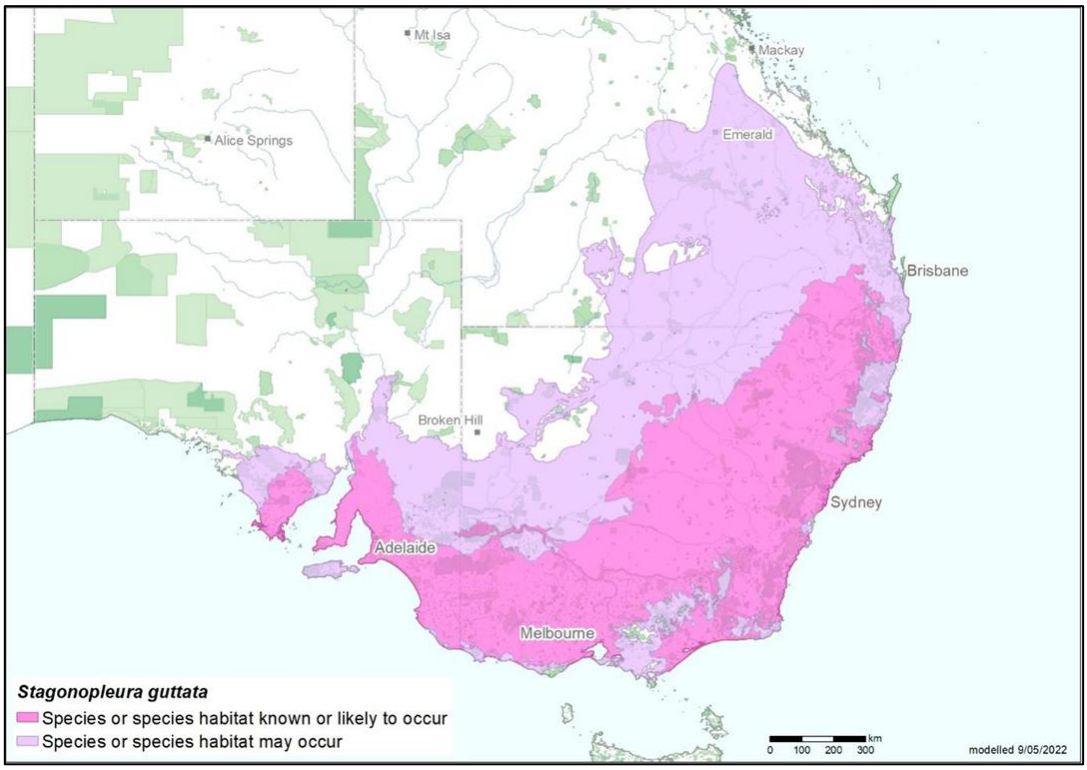


*Figure 8: Modelled distribution of critical habitat for the Diamond Firetail (*Stagonopleura guttata*) defined as any area of known or likely habitat (map source: DCCEEW 2023).*

***Pteropus poliocephalus* (Grey-headed Flying-fox); *NPW Act (R); EPBC Act (VU)* –likely**

Grey-headed Flying-foxes are Australia's largest endemic *Pteropus* bat species (DEWNR 2020). They are easily recognisable by their size (600 – 1000 grams) and orange to brown fur which encircles their neck (DEWNR 2020). The species is a nocturnal frugivore and nectivore, and can be found feeding within rainforests, open forests and woodlands (DCCEEW 2001). The species is highly social and can be found during the day roosting on branches in common areas (DEWNR 2020). These roosts are referred to as camps and can contain tens of thousands of bats, a singular large tree can contain 100s-1000s of bats. In recent years due to anthropogenic impacts and climate change the species has been migrating into urban environments setting up permanent camps. In March – April, mating occurs, males will form harems attracting females (DEWNR 2020). After a six-month gestation period females will give birth, the young will be mother dependent for four to five weeks. After the first four to five weeks the young will be left in maternal camps with the female flying foxes returning each morning to feed and take care of the young. After 12 weeks the young should have matured enough to become independent (DEWNR 2020).

Grey-headed Flying-foxes can be found as far north as Mackay and Bundaberg in Queensland heading south along the east coast, through Victoria to their most southwestern population in South Australia. In South Australia there is one nationally important camp in Botanic Park Adelaide, with some smaller camps establishing in the surrounding Adelaide Hills and as far as Port Augusta. The species is highly mobile, and its population is continuous throughout its range, with individuals frequently moving between camps.

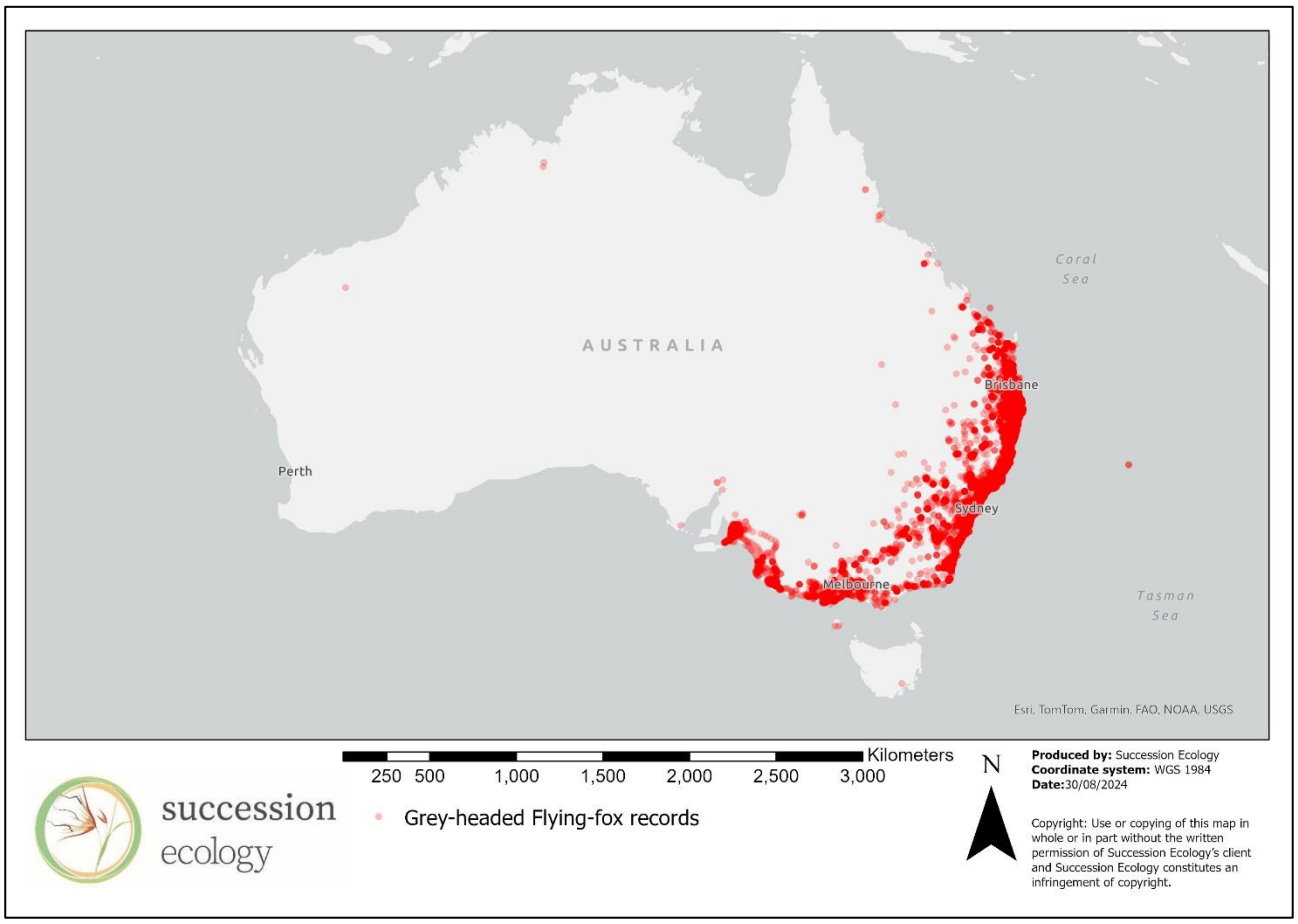


Figure 9: Grey-headed Flying-fox distribution. The red dots indicate an independent observation, the varying opacity is where dots overlap indicating higher density (source: Atlas of Living Australia, accessed on 30 August 2024.).

Threats

The species is threatened by habitat loss and fragmentation. Since settlement, clearance of native vegetation has been significant across Australia, with much of it continuing (Boardman 2021). For this species the loss of reliable winter and spring time foraging areas is of most concern, since much of their preferred high output nectar species have been cleared (Boardman 2021). GHFF are sensitive to environmental extremes, during times of stress the animal can abort and abandon juveniles (Boardman 2021). When temperatures exceed 38 degrees GHFF can succumb to heat (Boardman 2021). Climate change threatens to increase the severity and duration of heat impacting both the species reliable foraging habitat but directly causing mortality from heat stress (Boardman 2021). The species also suffers from interactions with anthropogenic infrastructure, fruit netting, fencing, barbed wire and electrical powerlines entangling the animal resulting in injuries, mortality and electrocution (Boardman 2021). Being a frugivore the species is also at persecution from farmers who illegally shoot the animals to stop them from feeding on crops. Not only does the animal directly pass away but mother dependent young also suffers and is at risk of starvation.

Local populations

The species is not known to roost in the area, with the closest large camp located in Botanic Park, Adelaide and smaller sub camps in the Adelaide hills. However, the species can travel up to 40 km per night in search of food. It is therefore possible that GHFF would utilise the large remnant River Red Gums and South

Australian Blue Gums as a food resource. It is not likely that GHFF use the site for roosting. Thus, any impacts to this species would only affect individual bats, rather than a nationally recognised important camp.

***Trichosurus vulpecula* (Common Brushtail Possum); *NPW Act (R)* – Likely**

Common Brushtail Possum is a large stocky nocturnal animal about the size of a domestic cat (Australian Museum 2022). They are silver-grey with pale undersides and a dark black or brown thick bushy tail (Australian Museum 2022). They are typically solitary within their home range. Common Brushtail Possums can be quite vocal when defending their territory and while mating, making loud hissing, growling and coughing sounds (Australian Museum 2022). They are herbivorous, eating foliage, flowers and fruit, but do on occasion consume insects, eggs and meat. They are an arboreal mammal and are found in woodlands, utilising hollows for dens where they nest and raise young (Australian Museum 2022).

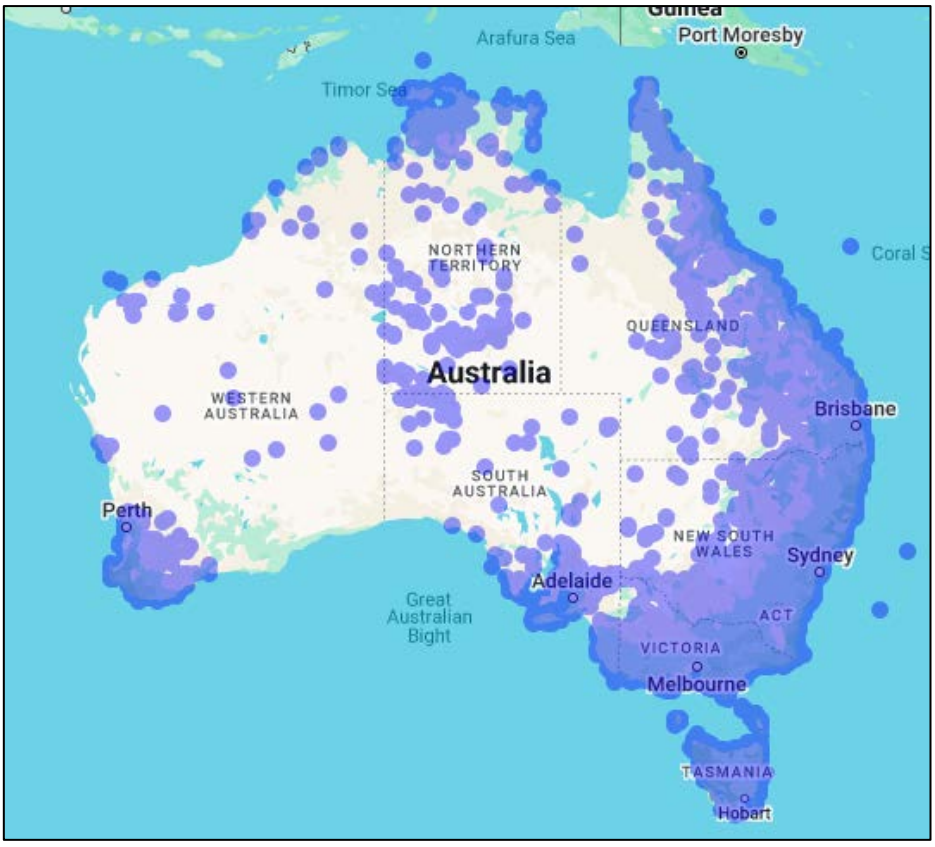


Figure 10: Distribution of Common Brushtail Possums records across Australia. Records obtained from Atlas of Living Australia (accessed 06/12/2024).

Threats

In the arid to semi-arid regions of South Australia, prolonged drought has impacted the species food source causing its population to decline. In higher rainfall areas, such as Adelaide and Kangaroo Island, habitat fragmentation and loss of old growth forests and woodlands impact the species. The species is also susceptible to predation from feral meso-predators, and in urban areas, suffers from negative human-wildlife interactions. In contrast, the species is doing well throughout the majority of Australia, and, in some places, has become ecologically out of control. Common Brushtail Possums became a serious pest when they were introduced to New Zealand.

Local populations

The species is regularly observed in the surrounding Conservation Parks. The species is known to occur on farmland with large old, scattered trees which have hollows and provide a food source. The animal was not observed during the field survey. However, the project site provides good habitat for the species. The lack of observations in the neighbouring farmland is likely due to survey bias with effort focused on surrounding natural settings.

3.1.4 Threatened flora

The desktop search identified a total of 35 threatened flora species within the search area; Nine are listed under the *EPBC Act 1999* as known, or have habitat known to occur and 31 further flora species are listed as threatened under the *NPW Act 1972*. Of these species, Nine species listed under the *EPBC Act 1999* and 31 species listed under the *NPW Act 1972* have been included in the likelihood of use assessment (Table 4), using the site following the metric described in Table 2. None of the threatened flora species identified within the desktop search were identified within the Project area during the field survey.

Table 4: A summary of the flora species observed on site or recorded within 5 km of the application area since 1995, or those listed as known to occur in the PMST.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
Acacia dodonaeifolia (Hop-bush Wattle)	R		2, 3	1998	Mainly in woodland and open forest vegetation formation (Electronic Flora of SA 2021).	Unlikely – After completing the desktop assessment and the field survey this species was not present on site and has not been seen in the area for over 20 years.
Acacia iteaphylla (Flinders Ranges Wattle)	R		2, 3	2004	Found in hills on rocky outcrops or in valleys along rocky creeks (Flora of Australia 2021)	Unlikely – The property has been managed agriculturally for many years. There is minimal habitat for this species on site and has not been seen for 20 years. The recent observations of the species are in nearby conservation parks.
Anogramma leptophylla (Annual Fern)	R		2, 3	2008	Grows in shallow soil layers over rock on outcrops in dry or damp sclerophyll forest (Nature Values Atlas 2019).	Unlikely – There is minimal required landscape features on site for this species to grow. All recent observations of this species are in nearby conservation parks.
Austrostipa gibbosa (Swollen Spear-grass)	R		2, 3	2020	Growing in rich loamy soil along creeks and seasonally wet areas in woodland and grassland (Seeds of SA 2021a).	Unlikely – The site lacks the required soil types, landscape features and because the property is maintained as a vineyard, it is unlikely for this species to be on site.
Austrostipa tenuifolia	R		2, 3	2004	Found in sandy soils in grassland or grassy woodland associated with Callitris or Allocasuarina (Seeds of SA 2018a).	Unlikely – There is limited required habitat for the species on site. The plant also has not been recorded in the area for over 20 years.
Caladenia argocalla (White-beauty Spider-orchid)		EN	5		Open grassy woodland with herb understorey and fertile soils. Found with *Eucalyptus macrorhyncha* and *E. leucoxylon* (DEH 2008g).	Possible – The property has been used for viticulture for many years, much of the property has been cleared and is maintained as

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
						cleared. However, there are some areas on the property that may have the right growing conditions.
Caladenia behrii (Pink-lipped Spider-orchid)		EN	5		Occurs on loamy soils. Very sensitive to grazing by native and introduced herbivores, and does not persist in weed infested areas (DEH 2008h).	Unlikely – Much of the site has been cleared and the areas on site that have not been cleared for viticulture are heavily weed infested.
Caladenia leptochila ssp. leptochila (Narrow-lip Spider-orchid)	R		2, 3	2008	Occurs singly or in small groups in clay or gravelly soils in open to dense forest. Not uncommon in the Adelaide Hills (Electronic Flora of SA 2007a).	Possible – Majority of the site has been clear felled and used for producing grapes. Along the creek line there possibly could be an opportunity for the species. Most local records are in the surrounding conservation parks with few in agricultural properties.
Caladenia reticulata (Veined Spider-orchid)	R		2, 3	2023	Occurs singly or in small groups in clay or gravelly soils on forested slopes (Electronic Flora of SA 2024).	Possible - The species has been recorded in the area as of 2023, however there is limited habitat for the plant on site.
Caladenia rigida (Stiff White Spider-orchid)		EN	5		Occurs in *Eucalyptus obliqua, E. fasciculosa, E. leucoxylon, E. goniocalyx, E. microcarpa* open forests with a relatively open shrub layer. This habitat type has been extensively cleared or degraded in the Southern MLR since European settlement (DEH 2008i).	Unlikely – The species has specific habitat requirements which are not present on site. The plant is found in native forest reserves and intact tracts of preferred species.
Centrolepis cephaloformis ssp. cephaloformis (Cushion Centrolepis)	R		2, 3	2020	In mallee and disturbed communities on sand and other infertile soils, also on the margins of clay pans and salt marshes (Electronic Flora of SA 2022a).	Possible – The species is known to occur in the area. However, it is unlikely due to the property's agricultural history and lack of required soil types.
Corybas unguiculatus (Small Helmet-orchid)	R		2, 3	2009	Found on Kangaroo Island, southern Mount Lofty Ranges and the lower South-east in South Australia, growing in small colonies in damp sand in stringy bark forest, coastal scrubs, woodland and low, heathy vegetation on winter-wet sandy or peaty soils (Plants of South Australia 2024a).	Unlikely – The habitat requirements for this species are not present on the project site. The closest observations are within forested environments in the local conservation parks.
Corybas X dentatus (Finniss Helmet-orchid)	E	VU	2, 3, 5	2011	Occurs on damp, grey sandy loam soils in areas with elevation between 250-450 m above sea level. Usually associated with *Eucalyptus fasciculosa E. baxteri* or *Callitris gracilis* woodland (DCCEEW 2014).	Unlikely – The plants required soil type and habitat community is not present at the project site.
Cycnogeton alcockiae	R		2, 3	2008	Found in freshwater and brackish wetland communities (Atlas of Living Australia 2022a).	Unlikely – The creek beds on site are ephemeral, heavily weed

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
(Alcock's Water-ribbons)						infested and would not support this species.
Dianella longifolia var. grandis (Pale Flax-lily)	R		2, 3	2021	Grassy woodland (Seeds of SA 2021b).	Possible – The site has an extensive agricultural history making it unlikely for this species to survive, however it has been seen recently within the area.
Diuris behrii (Behr's Cowslip Orchid)	V		3	2011	Occurs in native grassland, open woodland and grassy forest; grows on more fertile soils, especially amongst Kangaroo Grass and Triodia on gentle slopes and flats (DEH 2008j).	Unlikely – The property is maintained as a viticultural farm clearing the likely areas of occurrence for this species.
Eucalyptus fasciculosa (Pink Gum)	R		2, 3	2023	Found in woodlands, low shrublands, in well-drained sandy soils (Seeds of SA 2018b).	Unlikely – The desktop search indicates that it is likely or highly likely this species would occur on site. This species was not observed at the project site.
Eucalyptus viminalis ssp. viminalis (Manna Gum)	R		2, 3	2008	Found in the southern Mount Lofty Ranges in South Australia, growing in high rainfall areas on well-drained soils in open forest vegetation (Seeds of SA 2018c).	Unlikely – The tree is known to grow in the area after a thorough field survey no trees of this species were found on site.
Euphrasia collina ssp. osbornii (Osborn's Eyebright)	E	EN	2, 3	2010	Generally found in moist open habitat, in mallee scrub but also in woodlands and coastal heath (DEH 2010).	Unlikely – This plant was observed in the surrounding conservation parks within preferred habitat. The site with its agricultural history likely could not support this plant.
Hypolepis rugosula ssp. rugosula (Ruddy Ground-fern)	R		2, 3	2008	Forms dense thickets along shady forested streams or in more open wetter areas, frequently in ditches or on embankments beside tracks (VicFlora 2018a).	Unlikely – The site has ephemeral creek beds that regularly dry. The project site could not support the species naturally.
Juncus homalocaulis (Wiry Rush)	V		2, 3	2005	Growing in damp sites in grassland, woodland and dry sclerophyll forests (Plants of South Australia 2024b).	Unlikely – The farming history and the ephemeral nature of the property likely would not support this species.
Lomandra multiflora ssp. multiflora (Many-flower Mat-rush)	E		2, 3	2017	Found only in the lower south-east in South Australia, growing in woodland and forest (Plants of South Australia 2024c).	Possible – The species was not seen during the field survey however is known to occur in the area and could possibly be found along the ephemeral creek.
Maireana excavata (Bottle Fissure-plant)	V		2, 3	2009	In Victoria formerly widespread on loamy and clay soils of the mid north-west (particularly in the Wimmera), but through clearing, now rather rare and confined to small remnant stands. Commonly associated with Buloke (*Allocasuarina luehmannii*) woodlands (VicFlora 2019).	Unlikely – The habitat requirements for this species are not present and the property was cleared and is used for viticulture.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
Montia australasica (White Purslane)	R		2, 3	2008	Grows in moist areas including swamps (Atlas of Living Australia 2022b).	Unlikely – The property does not have the required habitat features for the species.
Prasophyllum australe (Austral Leek-orchid)	R		3	2020	Common in bogs and damp depressions in heath or woodland, persisting in lightly grazed farmland. Flowers late Oct.-Jan. in open forest, heathland or grassland in water retentive soils (VicFlora 2024).	Unlikely – The required habitat features are not present at the project site. The agricultural lands have been extensively cleared to make way for a vineyard.
Prasophyllum fecundum (Self-pollinating Leek-orchid)	R		2, 3	2009	In mallee heathland, native pine and Pink Gum woodland or on rocky outcrops in the Lower North wheat belt on sandy or loamy soils (DEH 2008k).	Unlikely – The species occurs in the area, however, observations are restricted to the sandy creek conservation park. The property does not feature the correct habitat requirements.
Prasophyllum pallidum (Pale Leek-orchid)	R	VU	3, 5	2014	Fertile soils of woodland and well-grassed open forests (Seeds of SA 2019).	Possible – The project site has been extensively cleared, however there is the possibility the species occurs along the creek line.
Prasophyllum pruinosum (Plum Leek-orchid)	E	EN	3, 5	2014	Found in the Adelaide and Mount Lofty Ranges Region, recorded in a range of open woodland habitats, usually with an overstorey of Eucalyptus fasciculosa and/or Eucalyptus leucoxylon (DCCEEW 2010).	Unlikely – The species habitat requirements are not met on site.
Pterostylis psammophila (Two-bristle Greenhood)	E	CR	2, 3, 5	2018	Usually found in deep white sands in open woodland of *Callitris gracilis* (native pine) and *Melaleuca uncinata* (broombush) shrub-land amid annual herbs, usually with other orchid species (Threatened Species Scientific Committee 2016)	Unlikely – Although the species occurs within the area the plants habitat requirements are not met on site.
Pterostylis sp. (Hale (R.Bates 21725)Hale Dwarf Greenhood)		EN	2, 5	2008	This species occurs in mallee and Broombush communities, in sandy soils. Plants tend to exist as small, discrete, clonal colonies or in small colonies with very little genetic variation (DCCEEW 2008).	Unlikely – The species requires specific vegetation communities which are not present at the project site.
Ptilotus erubescens (Hairy-tails)	R		2, 3	2020	Relatively fertile soils supporting grassland and woodland communities (VicFlora 2018b).	Unlikely – The species is known to occur within the area and has broad habitat requirements. The closest observation of the species is 1.5 km north-east. The species is unlikely to occur at the project site due to its extensive agricultural history.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
Thelymitra batesii (Bate's Sun-orchid)	R		2, 3	2008	Heathy woodlands and heathy open forest on sandy and gravelly clay loam soils (Seeds of SA 2021c).	Unlikely – The species requires specific soil types and vegetation communities which are not present at the project site.
Thelymitra carnea (Small Pink Sun-orchid)	R		2, 3	2017	Occurs singly or in small groups in soil which is boggy in winter but dries hard in summer, usually in open clearings in light scrubland (Electronic Flora of SA 2007b).	Unlikely – The species has been observed in the local conservation parks. However, the site lacks the required habitat features for this species to grow.
Thelymitra grandiflora (Great Sun-orchid)	R		2, 3	2008	Occurs singly or in small groups, in clay or gravel soils in forest or scrubland, or in the SE in damp sand around swamp margins (Electronic Flora of SA 2022b)	Unlikely – The required habitat features for the species are not present and it is unlikely that the species occurs on site.
Wurmbea latifolia ssp. *vanessae* (Broad-leaf Nancy)	R		3	2008	Growing in low scrub on exposed sites (Seeds of SA 2022).	Possible – The plant has broad habitat requirements that are present on site. There is the possibility of this species occurring.
Source; 1- BDBSA, 2 - ALA, 3 – NatureMaps 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others NPW Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable						

No threatened flora was assessed as likely to occur on site, no further description or assessment for these species are provided.

3.1.5 Introduced species

The desktop assessment for introduced species returned 230 flora species and 15 feral fauna species, of which seven are birds and eight are mammals. These species are listed in Appendix A.

4 FIELD SURVEY RESULTS

4.1 Site condition

The project area was extensively cleared historically and since then has been maintained for agriculture. Although there has been significant clearance, the site contains some substantial vegetation. All native vegetation on site was restricted to the watercourse, along the roadside and fence lines, and a cluster of regenerating *Eucalyptus camaldulensis* (River Red Gum) in the southeastern corner of the northeastern paddock. Outside of these areas no native vegetation of significance was found along the vehicle tracks, grassland paddocks or vineyards. These areas were heavily impacted by invasive weeds and maintained for viticulture.

The vegetation of the project area can be divided into three broad categories (Figure 11):

- remnant native trees of high ecological value,
- remnant native trees of moderate to low ecological value,
- and areas of viticulture and exotic species.

These areas are detailed in section 4.3.

The site has had extensive agricultural history, historical aerial photographs reveal the area was cleared as early as 1935-49 (Appendix B). The large remnant River Red Gums that line the water course through the centre of the Project area were preserved during clearance and are therefore at least 80 years old.

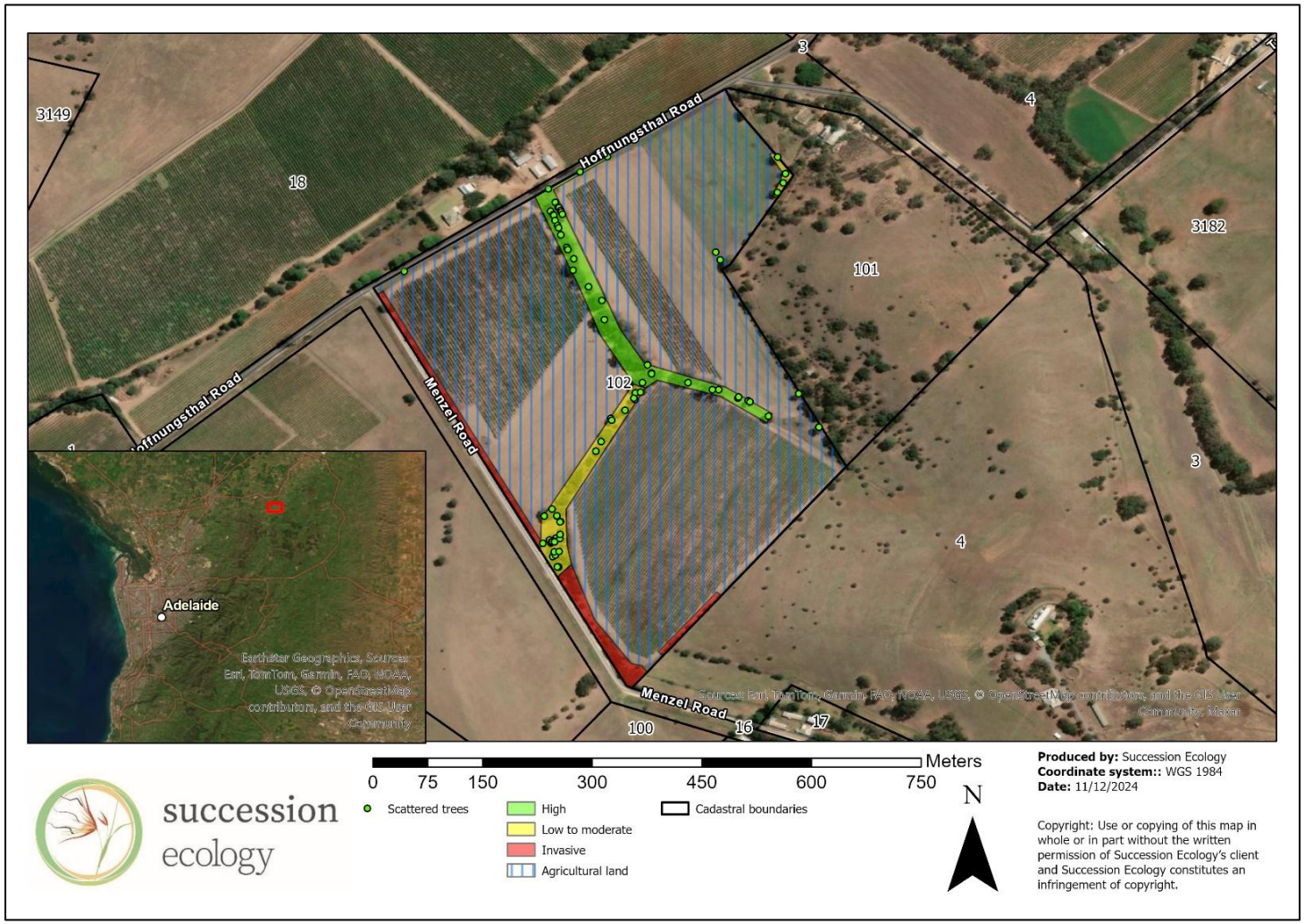


Figure 11: Environmental values and risks associated with Project area. Green shading represents the area of highest environmental value, with yellow representing low-to-moderate value, and red representing areas with a high density of Declared Plants. Green points represent scattered trees. Blue hatched areas are maintained for agriculture and lack native vegetation except for a few scattered trees.

4.2 Matters of environmental significance

4.2.1 Ecological communities

No threatened ecological communities were detected in the Project area.

4.2.2 Flora and fauna

No threatened flora or fauna identified in the desktop assessment were observed in the Project Area. Due to the survey being a single snapshot in time, it does not guarantee that the site is absent of threatened flora and fauna (section 2.2).

4.3 Vegetation survey

All vegetation on site was assessed using the Scattered Tree Assessment Methodology (SAM) because less than 5 % of the vegetation in the understory (ground and shrub layer) was deemed to be native species. As a result, only the remnant trees on the property were assessed for their ecological value and risk. A total of 106 trees were surveyed using the SAM, 64 as individual trees and the remainder in five clumps. Clump A) contained five trees, Clump B) contained three trees, Clump C) contained four trees, Clump D) contained 13 trees and Clump E) contained 17 trees. The tree species assessed were *Eucalyptus camaldulensis* (River Red Gum), *E. leucoxylon* (South Australian Blue Gum), and *Allocasuarina verticillata* (Drooping Sheoak).

The property can be divided into four sections by ecological value:

4.3.1 High ecological value

- *Values:* This area contained large old remnant River Red Gums (*Eucalyptus camaldulensis*) with an age of at least 80 years, as determined by historical aerial photography. In the 1949 image, the trees were already of significant size and are therefore likely to be much older. Old River Red Gums are fantastic habitat trees for many common and threatened avian and arboreal mammal species, especially in areas that have been extensively cleared. Their growth structure is expansive growing up to 25 m high and typically with a complex canopy which is covers a large area with twisting branches which provides many opportunities for perching and nesting. River Red Gums, like many other *Eucalyptus* species, have a tendency to drop limbs as they age, creating opportunities for the formation of hollows, which are essential for many native threatened avian and mammal species. On top of their environmental benefits, River Red Gums provide great amenity. They form an important visual component of Australia's rural landscape.
- *Risks:* Although River Red Gums are not considered a threatened species, the South Australian Government recognises the value of large remnant trees, including River Red Gums, for their environmental and amenity value. Because River Red Gums hold high environmental value, they are expensive to clear. These trees would be costly to remove or prune unless justified, for example, by safety concerns. Removal of significant number of these trees would incur significant costs to remove and require an offset for the loss of ecological value. Depending on the nature of clearance it could potentially be rejected by the Native Vegetation Council. Clearance of these trees may attract unwanted public scrutiny.

Figure 12: One of the large River Red Gums on site, which contribute to amenity and ecology.

4.3.2 Low to moderate ecological value

- *Values:* The moderate to low environmental value areas contained two species of native tree, *Allocasuarina verticillata* (Drooping Sheoak) and *Eucalyptus leucoxylon* (South Australian Blue Gum), with a mid-storey of *Acacia victoriae* (Elegant or Bramble Wattle). These trees are scattered sparsely along the creekline and compete with Weeds of National Significance (WONS), Declared Plants and environmental weeds. South Australian Blue Gum is a small to medium tree which is common in the surrounding landscape. *Allocasuarina verticillata* (Drooping Sheoak) is a small native deciduous tree which grows throughout Southern parts of South Australia. Neither are threatened species, however, and when fully grown they can provide great ecological value to the habitat. The Drooping Sheoak and South Australian Blue Gum on site are either juvenile, early-aged mature individuals, and many face strong competition from invasive species. Both species are great habitat and amenity trees. Weed management within this section of the creek line would be of great benefit to both the trees, releasing them from competition enhancing their growth and vigour, and forming an amenity component of the creekline.
- *Risks:* The vegetation within this section varies in condition, though all the vegetation would fall under the moderate to low ecological value. In comparison to the large River Red Gums, the two native species are not as important as habitat and foraging trees, but they do provide valuable habitat and would incur a cost to remove or lop beyond safety reasons. These trees do provide an amenity value and are at risk of being lost or significantly impacted by the invasive species that grow among them. The creek within this section consists of erosional soils and any removal of vegetation may increase the risk of further bank gullying and collapse. Careful sediment management and revegetation would be important.

Figure 13: Image of Allocasuarina verticillata (Drooping Sheoak) growing in competition with exotic plants.

4.3.3 Invasive species

- *Values:* The southern and western boundary of the property are choked with invasive woody weeds. No native vegetation was found along vehicle tracks that surrounded the vineyards. The open paddocks and grasslands were inspected for native vegetation. No native vegetation was observed except for regenerating *Eucalyptus camaldulensis* in the corner of one paddock and along the fence line of the northern paddocks.
- *Risks:* Many of the dense weed species that were found on the property are Weeds of National Significance or Declared plants. Under the *Landscapes South Australia Act* (*LSA Act*), these plants must be controlled by the landowner with species such as African Boxthorn (*Lycium ferocissimum*) requiring specific treatment. Invasive weed species reduce the amenity value of the property. They can be an eyesore and displace native species.

Figure 14: Lycium ferocissimum *(African boxthorn), growing amid invasive grasses.*

4.3.4 Agricultural land

- *Values:* The bulk of the property is arable land given over to vineyards. The vineyard was largely devoid of native vegetation, apart from a few regenerating River Red Gums in the northern paddock and two mature South Australian Blue Gum along the fence line (Figure 11 and Figure 15, Figure 11). The South Australian Blue Gums provide some ecological value and amenity value. The regenerating River Red Gums provide relatively little ecological or amenity value, given their small stature and relatively poor condition.
- *Risks:* There are minimal environmental risks associated with the agricultural land. The trees in this area would require clearance approval and incur a financial fee, albeit significantly less than the other areas. The preliminary concept designs appear to avoid these trees, meaning that they could be left as they are.

Figure 15: Regenerating Eucalyptus camaldulensis *(River Red Gum) in the northern paddock*

4.4 Observed flora and fauna

4.4.1 Native and introduced flora and fauna

Table 5 presents the native and introduced species that were recorded during the field survey.

Table 5: Table of native and introduced flora and fauna observed during the field survey.

SPECIES NAME	COMMON NAME
Native Flora	
Acacia victoriae ssp. *victoriae*	Elegant or Bramble Wattle
Allocasuarina verticillata	Drooping Sheoak
Austrostipa sp.	Spear grass
Eucalyptus camaldulensis	River Red Gum
Eucalyptus leucoxylon ssp.	South Australian Blue Gum
Exotic Flora	
Avena sp.	Wild oat
Briza maxima	Large Quaking Grass, Blowfly Grass
Bromus madritensis	Compact Brome
Cenchrus longisetus	Long-style Feather-grass, Feather-top
Echium plantagineum	Salvation Jane
Gomphocarpus cancellatus	Broad-leaved Cottonbush
Hordeum sp.	Barley
Lycium ferocissimum	African Boxthorn
Malva parvifolium	Marshmallow
Medicago sp.	Medic
Olea europaea	Olive
Phalaris aquatica	Harding Grass
Pinus halepensis	Aleppo Pine
Prunus sp.	Plum
Scabiosa sp.	Pincushions
Sisymbrium sp.	Mustard
Sonchus sp.	Sow-thistle
Trifolium angustifolium	Narrow-leaf Clover
Trifolium sp.	Clover
Triticum sp.	Wheat
Native Fauna	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill
Anthochaera carunculata	Red Wattlebird
Anthus novaeseelandiae	Australian Pipit
Cacatua sanguinea	Little Corella
Corvus mellori	Little Raven
Dacelo novaeguineae	Laughing Kookaburra
Gymnorhina tibicen	Australian Magpie
Lichenostomus virescens	Singing Honeyeater
Macropus fuliginosus	Western Grey Kangaroo
Malurus cyaneus	Superb Fairywren
Pardalotus striatus	Striated Pardalote
Phylidonyris novaehollandiae	New Holland Honeyeater
Platycercus elegans	Crimson Rosella
Pseudocheirus peregrinus	Common Ringtail Possum
Rhipidura leucophrys	Willie Wagtail
Spilopelia chinensis	Spotted Dove
Zosterops lateralis	Silvereye

5 OPPORTUNITIES AND RECOMMENDATIONS

This assessment aimed to determine the extent and condition of flora and fauna populations within the project area and determine the extent of potential impacts to the environment. This study provides a resource for identifying the environmental risks that may be encountered with regards to the proposed development.

This section describes the remnant vegetations intrinsic and ecological value to the immediate and local area, the risks associated with any actions against the remnant vegetation and recommendations for managing the remnant vegetation. The implementation of these recommendations will require coordination among specialist consultants, including but not limited to landscape architecture, stormwater engineering, and bushfire.

5.1 High Environmental value

- **Opportunities:** River Red Gums are one of Australia's best-known trees and form an environmental and cultural component of the landscape. Preserving these trees would provide tourists with an opportunity to form an intrinsic bond during their stay, whereas their removal would be a loss to both local amenity and to the guest experience. There is an opportunity to further improve upon amenity and the health of these trees through revegetating in between and along the creek line with local attractive native understory to compliment and enhance local ecology and amenity.
- **Recommendations**:
    - The preliminary concept designs provided do not indicate any impact to the River Red Gums. We recommend that the proposed siting of infrastructure be retained throughout design iterations.
    - During the field survey it was noted that many of these trees had dying or dead limbs, some of which may pose a safety risk to staff and guests. It is recommended that an arborist is consulted to assess the trees for safety and remove any limbs that pose a safety risk. An experienced fauna handler should be on site for any tree-pruning operations.
    - Succession Ecology recommends the control of the woody weeds beneath and between the canopies of the trees. Removal of the woody weeds would satisfy the requirements for management of WoNS and Declared plants by the Northern and Yorke landscape management board. Note that declared plans have specific management requirements, including limitations on their transport. The reduced competition would ensure the continued health of the trees and further improve the visual aspects of the area.

5.2 Low to moderate environmental value

- **Opportunities:** South Australian Blue Gum, Drooping Sheoak and Bramble Wattle are attractive native flora, but this section of the creekline is heavily impacted by exotic species. Removal of the exotic species would open up the understory allowing the native vegetation to flourish. By removing the invasive vegetation from the understory, it provides an opportunity to revegetate sections of the creekline with attractive species that are native to the local area. Revegetating with native species in the understory will enhance local ecology and further improve the site's amenity contributing to the guests intrinsic connection to the project site.

- **Recommendations:**
    - The preliminary designs for the hotel and vineyard will not impact upon the vegetation within this area. We recommend that the proposed siting of infrastructure be retained throughout design iterations.
    - We recommend the control of invasive species to satisfy requirements and for the health of the native vegetation. The removal of vegetation will need to be done carefully and with erosion control measures. Once clearance is complete, revegetation and bank stabilisation works should be implemented.

5.3 Invasive species

- **Opportunities:** Because these areas should be cleared to meet state and federal legislation surrounding Declared plants and WoNS, there is an opportunity to restore their environmental and intrinsic values. The banks along these sections of the creek line are erosional and will need restoration plantings to prevent bank collapse and gullying. The restoration can be done with local native plants, which would contribute and compliment the remnant vegetation whilst stabilising the erosional soil banks. Other sections that are denoted as 'invasive' in Figure 11 would benefit and contribute to local ecology and guest experience by planting attractive natives along the approach to the hotel and along the southern property, behind the hotel.
- **Recommendations:**
    - Succession Ecology recommends drafting a weed management plan to outline the aims and methods for managing weeds.
    - As weeds are cleared, they should be replaced with native species which reflect and enhance the local plant community, and which support the existing flora and fauna.
    - Removal of weeds from the creek line will risk further erosion into of its banks. Therefore, an erosion and sediment control management plan should be drafted to address erosion issues on site.

5.4 Agricultural land

- **Opportunities:** The vineyards and paddocks on site offer an opportunity to enhance native vegetation and restore ecological and amenity value. This could be done, for example, as native grass or shrubland with an elevated board walk for guests to explore including areas to sit and enjoy the native biodiversity and views of the working vineyard, while enjoying locally produced goods. It would compliment existing ecological values and amenity of the site and provide guests with a unique experience.
- **Recommendations:**
    - Strips of native chenopod shrubland could be established in any newly planted vineyards, between the rows of vines. Low-growing species can be used that would obviate the need for slashing, and reduce the need for weed control. Whilst revegetating introducing local understory species would be great for local flora and fauna, there are also guest engagement opportunities providing a catered experience to enjoy local produce and wine and attractive native vegetation.

6 CONCLUSION

From an ecological perspective, the project area is suitable for development. It contains some areas of high ecological value, particularly the large old River Red Gums. Impacts to these ecological assets can easily be avoided, and the preliminary concept drawings do not indicate any need for their removal. The site also offers multiple opportunities for ecological improvement. These opportunities include the fostering of attractive native trees and shrubs, the control of invasive exotic weeds, and the bolstering of amenity value. Their implementation would increase ecological value and biodiversity on the site, as well as the attractiveness for guests.

Any changes in design that require substantial pruning or removal of trees, beyond arborist-approved maintenance, will require consultation with an ecological consultant to reassess the project's impacts and prepare the required documentation for approval by the Native Vegetation Council.

As a matter of due diligence, Succession Ecology also recommends that an EPBC Self-assessment be performed. Because it takes a broader spatial view, an EPBC Self-assessment can pick up additional ecological risks not identified in the Baseline Flora and Fauna Assessment. Furthermore, EPBC Self-assessments are commonly provided as part of the development application for impact-assessed developments.

7 REFERENCES

Atlas of Living Australia. 2021. Species Profile: Strepera versicolor plumbea, Grey Currawong.
Atlas of Living Australia. 2022a. Species Profile: Cycnogeton alcockiae, Alcock's Water-ribbons.
Atlas of Living Australia. 2022b. Species Profile: Montia australasica, White Purslane.
Australian Museum. 2020. Species Profile: Falcunculus frontatus, Eastern Shriketit.
Australian Museum. 2022. Species Profile: Trichorurus vulpecula, Common Brushtail Possum.
Australian Museum. 2024. Species Profile: Myotis macropus (Large-footed Myotis, or Southerm Myotis).
Birdlife Australia. 2021a. Species Profile: Hieraaetus morphnoides, Little Eagle.
Birdlife Australia. 2021b. Species Profile: Neophema elegans, Elegant Parrot.
Birdlife Australia. 2021c. Species profile: Zanda funerea whiteae, Yellow-tailed Black Cockatoo.
Birdlife Australia. 2023. Crimson Rosella. https://www.birdsinbackyards.net/species/Platycercus-elegans.
Birdlife Australia. 2024. Western Greygone. Birdlife Australia.
Birdlife Australia. (n.d.). Olive-backed Oriole (Oriolus sagittatus). https://www.birdsinbackyards.net/species/Oriolus-sagittatus.
Birds SA. 2021. Species Profile: Falco subniger, Black Falcon.
Boardman, W. 2021. Setting up camp in Adelaide: Ecological Insights into the Range Expanding Grey-headed Flying-fox (Pteropus poliocephalus).
Cornell lab. 2020, March 4. Olive Whistler. Cornell lab.
DAWE. 2021a. Acanthiza lineata whitei (Kangaroo Island Striated Thornbill).
DAWE. 2021b. Conservation Advice for Melithreptus brevirostris magnirostris (Kangaroo Island Brown Headed Honeyeater.
DCCEEW. 2001. Pteropus poliocephalus (Grey-headed Flying-fox) Conservation Advice. Department of Climate change, Energy, the Environment and Water.
DCCEEW. 2008. Approved Conservation Advice for Pterostylis sp. Hale (R.Bates 21725) (Hale Dwarf Greenhood). Department of Climate Change, Energy, the Environment and Water.
DCCEEW. 2010. Approved Conservation Advice: Prasophyllum pruinosum (Plum Leek-orchid).
DCCEEW. 2014. Corybas dentatus — Toothed Helmet-orchid, Finniss Helmet-orchid. jurisdiction=Commonwealth of Australia; corporateName=Department of the Environment. http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=55042.
DCCEEW. 2022. Species Profile: Isoodon obesulus obesulus, Southern Brown Bandicoot.
DCCEEW. 2023a. Conservation Advice for Melanodryas cucullata cucullata (hooded robin (south-eastern)).
DCCEEW. 2023b. Species Profile and Threats Database: Myiagra cyanoleuca - Satin Flycatcher.
DCCEEW. 2023c. Conservation Advice for Stagonopleura guttata (Diamond firetail).
DCCEEW. 2023d. Tachyglossus aculeatus multiaculeatus (Kangaroo Island Echidna).
DCCEEW. 2023e. Conservation Advice for Stagonopleura guttata (diamond firetail). Department of Climate Change, Energy, the Environment and Water.
DEH. 2008a. Threatened Species Profile: Coturnix ypsilophora, Brown Quail.
DEH. 2008b. Threatened Species Profile: Lewina pectoralis pectoralis (Lewin's Rail (eastern)).
DEH. 2008c. Melithreptus gularis gularis (Black-chinned Honeyeater).
DEH. 2008d. Threatened Species Profile: Jacky Winter (Microeca fascinans fascinans).
DEH. 2008e. Threatened Species Profile: Petroica boodang boodang (Scarlet Robin).
DEH. 2008f. Threatened Species Profile: Zoothera lunulata halmaturina, Bassian Thrush.
DEH. 2008g. Threatened Species Profile: Caladenia argocalla, White Beauty Spider-orchid.
DEH. 2008h. Threatened Species Profile: Caladenia behrii, Pink-lipped Spider-orchid.
DEH. 2008i. Threatened Species Profile: Caladenia rigida, Stiff White Spider-orchid.
DEH. 2008j. Threatened Species Profile: Diuris behrii, Behr's Cowslip Orchid.
DEH. 2008k. Species profile: Prasophyllum fecundum.
DEH. 2009. Threatened Species Profile: Falco peregrinus, Peregrine Falcon.

DEH. 2010. Recovery Plan for the Endangered Osborn's Eyebright (Euphrasia collina ssp osbornii).
DEH. 2014. AMLR Threatened Species Profile: Corcorax melanorhamphos, White-winged Chough.
DEH. 2021. AMLR Threatened Spcies Profile: Myiagra inquieta, Restless Flycatcher.
DEH. 2022. Species Profile: Lophoictinia isura, Square-tailed Kite.
DEWNR. 2019. Threatened Species Fact Sheet: Turnix varius varius, Painted Buttonquail.
DEWNR. 2020. Threatened Species Profile: Pteropus poliocephalus, Grey-headed Flying Fox.
Electronic Flora of SA. 2007a. Fact sheet for Caladenia leptochila. http://www.flora.sa.gov.au/cgi-bin/speciesfacts_display.cgi?genus=Caladenia&species=leptochila.
Electronic Flora of SA. 2007b. Thelymitra carnea (Tiny Sun Orchid).
Electronic Flora of SA. 2021. Species Profile: Acacia dodonaeifolia, Hop-bush Wattle.
Electronic Flora of SA. 2022a. Species Profile: Centrolepis cephaloformis ssp cephaloformis, Cushion Centrolepis.
Electronic Flora of SA. 2022b. Species Profile: Thelymitra grandiflora, Great Sun-orchid.
Electronic Flora of SA. 2024. Fact sheet for Caladenia reticulata. http://www.flora.sa.gov.au/cgi-bin/speciesfacts_display.cgi?form=speciesfacts&name=Caladenia_reticulata.
Flora of Australia. 2021. Species Profile: Acacia iteaphylla, Flinders Ranges Wattle.
Native Vegetation Council. 2024a. Native Vegetation Council Bushland Assessment Manual.
Native Vegetation Council. 2024b. Native Vegetation Council Scattered Tree Assessment Manual.
Nature Values Atlas. 2019. Species Profile: Anogramma leptophylla, Annual fern.
Plants of South Australia. 2024a. Corybas unguiculatus. Plants of South Australia.
Plants of South Australia. 2024b. Juncus homalocaulis. Plants of South Australia.
Plants of South Australia. 2024c. Species profile: Lomandra multiflora ssp. multiflora. Plants of South Australia.
Rix, E. 2022. The peregrine falcon's "remarkable" resurgence coming back from near extinction. ABC NEWS.
Seeds of SA. 2018a. Seeds of South Australia - Austrostipa tenufolia (Narrow-leaf Spear-grass). https://spapps.environment.sa.gov.au/SeedsOfSA/speciesinformation.html?rid=620.
Seeds of SA. 2018b. Species Profile: Eucalyptus fasciculosa, Pink Gum.
Seeds of SA. 2018c. Seeds of South Australia - Manna Gum (Euc. viminalis ssp. viminalis). https://spapps.environment.sa.gov.au/SeedsOfSA/speciesinformation.html?rid=1878.
Seeds of SA. 2019. Species Profile: Prasophyllum pallidum, Pale Leek-orchid.
Seeds of SA. 2021a. Species Profile: Austrostipa gibbosa, Swollen Spear-grass.
Seeds of SA. 2021b. Species Profile: Dianella longifolia var. grandis, Yellow-anther Flax-lily.
Seeds of SA. 2021c. Species Profile: Thelymitra batesii, Bate's Sun-orchid.
Seeds of SA. 2022. Species Profile: Wurmbea latifolia ssp. vanessae, Broad-leaf Nancy.
Thackway, R., and I. D. Cresswell. 1995. An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program. Version 4.0. Australian Nature Conservation Agency, Reserve Systems Unit, Canberra.
Threatened Species Scientific Committee. 2016. Pterostylis psammophila two-bristle greenhood. DCCEEW: Department of Climate Change, the Environment and Water.
VicFlora. 2018a. Species Profile – Hypolepis rugosula, Ruddy Ground-fern. https://vicflora.rbg.vic.gov.au/flora/taxon/5f30640a-3b29-4572-a97b-05f9b68d9622.
VicFlora. 2018b. Ptilotus erubescens, Hairy Tails. https://vicflora.rbg.vic.gov.au/flora/taxon/353693ee-4c81-43e6-a552-b06ec80e1956.
VicFlora. 2019. VicFlora – Maireana excavata. https://vicflora.rbg.vic.gov.au/flora/taxon/a3e05b08-47d7-4290-9410-98ff28c28b8d.
VicFlora. 2024, May 15. Prasophyllum australe.

APPENDIX A: INVASIVE SPECIES IDENTIFIED IN DESKTOP ASSESSMENT

SPECIES NAME	COMMON NAME
Invasive fauna	
Anas platyrhynchos platyrhynchos	Mallard
Carduelis carduelis britannica	European Goldfinch
Columba livia	Feral Pigeon
Passer domesticus domesticus	House Sparrow
Spilopelia chinensis	Spotted Dove
Sturnus vulgaris vulgaris	Common Starling
Turdus merula merula	Common Blackbird
Canis lupus familiaris	Feral Dog
Cervus dama	Fallow Deer
Felis catus	Domestic Cat (Feral Cat)
Lepus europaeus	European Brown Hare
Mus musculus	House Mouse
Oryctolagus cuniculus	Rabbit (European Rabbit)
Ovis aries	Sheep (Feral Sheep)
Vulpes vulpes	Fox (Red Fox)
Invasive flora	
Agave americana	Century Plant
Aira cupaniana	Small Hair-grass
Aira elegantissima	Delicate Hair-grass
Aira sp.	Hair-grass
Allium cepa	
Allium roseum	
Allium sp.	
Allium triquetrum	Three-cornered Garlic
Allium vineale	Crow Garlic
Anthoxanthum odoratum	Sweet Vernal Grass
Aphanes arvensis	Parsley Piert
Arctotheca calendula	Cape Weed
Arundo donax	Giant Reed
Asparagus asparagoides	Bridal Creeper
Asparagus officinalis	Asparagus
Asphodelus fistulosus	Onion Weed
Avellinia festucoides	Avellinia
Avena barbata	Bearded Oat
Avena sp.	Oat
Bellardia latifolia	Red Bartsia
Brachypodium distachyon	False Brome
Brassica sp.	
Brassica tournefortii	Wild Turnip
Briza maxima	Large Quaking-grass
Briza minor	Lesser Quaking-grass
Briza sp.	Quaking Grass
Bromus catharticus	Prairie Grass
Bromus diandrus	Great Brome
Callistemon viminalis ssp. viminalis	
Callitriche stagnalis	Common Water Starwort

SPECIES NAME	COMMON NAME
Carduus sp.	Thistle
Carthamus lanatus	Saffron Thistle
Carthamus sp.	
Cenchrus clandestinus	Kikuyu
Cenchrus longisetus	Feather-top
Cenchrus macrourus	African Feather-grass
Cenchrus setaceus	Fountain Grass
Cerastium balearicum	Chickweed
Cerastium glomeratum	Common Mouse-ear Chickweed
Cerastium pumilum	Chickweed
Chamaecytisus palmensis	Tree Lucerne
Chrysanthemoides monilifera ssp. monilifera	Boneseed
Cirsium vulgare	Spear Thistle
Convolvulus arvensis	Field Bindweed
Corymbia ficifolia	Red-flowering Gum
Corymbia maculata	Spotted Gum
Cotula coronopifolia	Water Buttons
Crassula natans var. minor	Water Crassula
Crataegus sp.	Hawthorn
Cucumis sp.	Melon
Cynara cardunculus ssp. flavescens	Artichoke Thistle
Cynodon dactylon (NC)	Couch
Cynodon dactylon var. dactylon	Couch
Cynosurus echinatus	Rough Dog's-tail Grass
Cynosurus sp.	Dog's-tail Grass
Cytisus sp.	Broom
Dactylis glomerata	Cocksfoot
Disa bracteata	South African Weed Orchid
Dittrichia graveolens	Stinkweed
Echium plantagineum	Salvation Jane
Ehrharta calycina	Perennial Veldt Grass
Ehrharta longiflora	Annual Veldt Grass
Ehrharta sp.	Veldt Grass
Eragrostis barrelieri	Pitted Love-grass
Eragrostis cilianensis	Stink Grass
Eragrostis curvula	African Love-grass
Eragrostis trichophora	Hairyflower Lovegrass
Erica arborea	Tree Heath
Erica cruenta	
Erigeron sumatrensis	Tall Fleabane
Erodium botrys	Long Heron's-bill
Eucalyptus botryoides	Southern Mahogany
Eucalyptus cinerea	
Eucalyptus globulus	Tasmanian Blue Gum
Euphorbia peplus	Petty Spurge
Ferraria crispa ssp. crispa	Black Flag
Foeniculum vulgare	Fennel
Fraxinus angustifolia ssp. angustifolia	Narrow-leaved Ash
Fraxinus angustifolia ssp. oxycarpa	Desert Ash
Freesia leichtlinii	Freesia
Fumaria capreolata	White-flower Fumitory
Fumaria sp.	Fumitory

SPECIES NAME	COMMON NAME
Galium aparine	Cleavers
Galium divaricatum	Slender Bedstraw
Galium murale	Small Bedstraw
Gazania sp.	Gazania
Genista monspessulana	Montpellier Broom
Geranium molle	Soft Geranium
Gladiolus undulatus	Wild Gladiolus
Gomphocarpus cancellatus	Broad-leaf Cotton-bush
Grevillea lavandulacea ssp. lavandulacea X Grevillea rosmarinifolia ssp. rosmarinifolia	Hybrid Grevillea
Hakea teretifolia	
Holcus lanatus	Yorkshire Fog
Holcus sp.	Fog
Hordeum glaucum	Blue Barley-grass
Hordeum sp. (NC)	Barley-grass
Hypochaeris glabra	Smooth Cat's Ear
Hypochaeris radicata	Rough Cat's Ear
Hypochaeris sp.	Cat's Ear
Iris albicans	Flag Iris
Iris sp.	Iris
Isolepis levynsiana	Tiny Flat-sedge
Isolepis marginata	Little Club-rush
Isolepis trachysperma	Grassy Club-rush
Juncus articulatus	Jointed Rush
Juncus capitatus	Dwarf Rush
Lactuca serriola (NC)	Prickly Lettuce
Lagurus ovatus	Hare's Tail Grass
Lathyrus sp.	
Leontodon saxatilis	Lesser Hawkbit
Ligustrum vulgare	European Privet
Logfia gallica	Narrow Cudweed
Lolium rigidum	Wimmera Ryegrass
Lolium sp.	Ryegrass
Lupinus cosentinii	Blue Lupin
Lupinus sp.	Lupin
Lycium ferocissimum	African Boxthorn
Lysimachia arvensis	Pimpernel
Malus pumila	Apple
Malva parviflora	Small-flower Marshmallow
Marrubium vulgare	Horehound
Medicago polymorpha	Burr-medic
Medicago sp.	Medic
Melaleuca armillaris ssp. armillaris	Bracelet Honey-myrtle
Mentha pulegium	Pennyroyal
Mesembryanthemum crystallinum	Common Ice-plant
Moenchia erecta	Erect Chickweed
Molineriella minuta	Small Hair-grass
Moraea miniata	Two-leaf Cape Tulip
Moraea setifolia	Thread Iris
Moraea sp.	Thread Iris
Moraea vegeta	Thread Iris
Myosotis discolor	Changing Forget-me-not

SPECIES NAME	COMMON NAME
Narcissus sp.	Narcissus
Narcissus tazetta	Polyanthus Narcissus
Oenothera sp.	Evening Primrose
Oenothera speciosa	Rose Evening Primrose
Oenothera stricta ssp. stricta	Common Evening Primrose
Olea europaea	Olive
Opuntia monacantha	Drooping Prickly Pear
Opuntia stricta	Erect Prickly Pear
Oxalis brasiliensis	Brazil Wood-sorrel
Oxalis flava	Finger-leaf Oxalis
Oxalis pes-caprae	Soursob
Oxalis purpurea	One-o'clock
Paspalum dilatatum	Paspalum
Pentameris airoides ssp. airoides	False Hair-grass
Pentameris pallida	Pussy Tail
Petrorhagia dubia	Velvet Pink
Petrorhagia sp.	Pink
Phalaris aquatica	Phalaris
Phalaris minor	Lesser Canary-grass
Phalaris sp.	Canary Grass
Phyllopodium cordatum	N/A
Pinus halepensis	Aleppo Pine
Pinus radiata	Radiata Pine
Pinus sp.	Pine
Piptatherum miliaceum	Rice Millet
Plantago bellardii	Hairy Plantain
Plantago coronopus ssp. coronopus	Bucks-horn Plantain
Plantago lanceolata var.	Ribwort
Plantago lanceolata var. lanceolata	Ribwort
Poa annua	Winter Grass
Poa bulbosa	Bulbous Meadow-grass
Polygonum aviculare	Wireweed
Polypogon sp.	Beard-grass
Prunus cerasifera	Cherry-plum
Prunus domestica ssp. domestica	Plum
Prunus sp.	Plum
Pseudognaphalium luteoalbum	Jersey Cudweed
Pyracantha coccinea	
Quercus ilex	
Ranunculus muricatus	Pricklefruit Buttercup
Ranunculus trichophyllus	Water Buttercup
Rhamnus alaternus	Blowfly Bush
Romulea minutiflora	Small-flower Onion-grass
Romulea rosea var. australis	Common Onion-grass
Romulea sp.	Onion-grass
Rosa canina	Dog Rose
Rosa sp.	Wild Rose/Briar
Rubus anglocandicans	
Rubus sp.	Blackberry
Rumex acetosella	Sorrel
Rumex conglomeratus	Clustered Dock
Rumex crispus	Curled Dock

SPECIES NAME	COMMON NAME
Salix sp.	Willow
Salvia sp.	Sage
Salvia verbenaca var.	Wild Sage
Sanguisorba minor ssp. muricata	Sheep's Burnet
Schinus molle	Pepper-tree
Senecio linearifolius var. linearifolius	
Senecio pterophorus	African Daisy
Sherardia arvensis	Field Madder
Silene nocturna	Mediterranean Catchfly
Silene sp.	Catchfly
Silene vulgaris	Bladder Campion
Silybum marianum	Variegated Thistle
Sixalix atropurpurea	Pincushion
Solanum nigrum	Black Nightshade
Sonchus oleraceus	Common Sow-thistle
Sorghum halepense	Johnson Grass
Sparaxis tricolor	Tricolor Harlequin Flower
Stellaria media	Chickweed
Symphyotrichum subulatum	Aster-weed
Taraxacum officinale (NC)	Dandelion
Taraxacum sp.	Dandelion
Tolpis barbata	Yellow Hawkweed
Tordylium apulum	Hartwort
Trifolium angustifolium	Narrow-leaf Clover
Trifolium arvense var. arvense	Hare's-foot Clover
Trifolium campestre	Hop Clover
Trifolium dubium	Suckling Clover
Trifolium sp.	Clover
Trifolium subterraneum	Subterranean Clover
Ulex europaeus	Gorse
Verbascum sp.	Mullein
Vicia sativa ssp.	Common Vetch
Vicia sp.	Vetch
Vinca major	Blue Periwinkle
Vitis vinifera	Grape Vine
Vulpia ciliata	Fringed Fescue
Vulpia myuros f.	Fescue
Vulpia sp.	Fescue
Watsonia meriana var. bulbillifera	Bulbil Watsonia
Watsonia sp.	Watsonia
Zaluzianskya divaricata	Spreading Night-phlox

APPENDIX B: HISTORICAL AERIAL IMAGERY

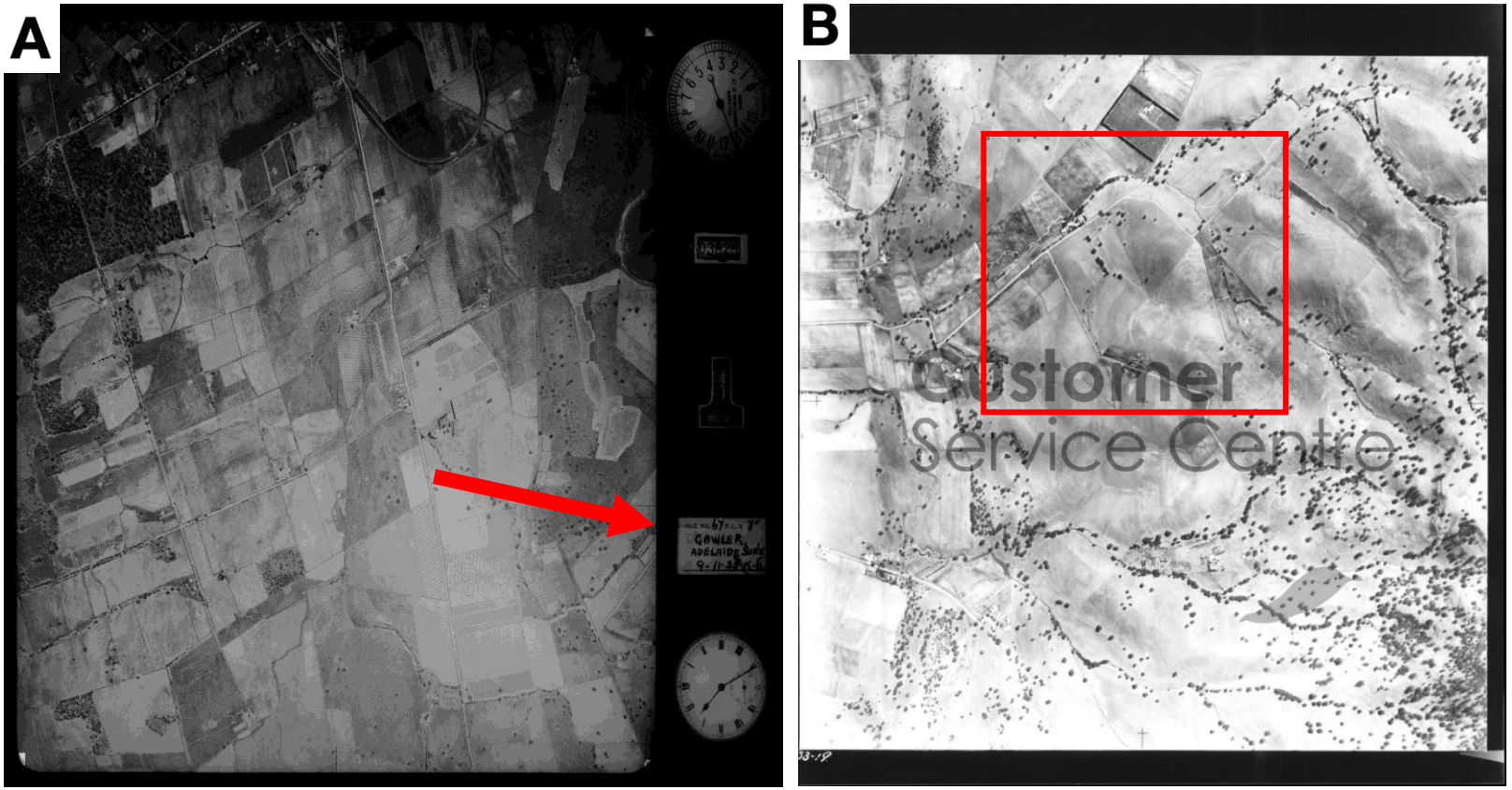


Figure 16: Historical aerial imagery of the project area. A) is from 1935 the project area is a few hundred meters out of view, in the direction of the arrow. Nevertheless, the extent of clearance that had already occurred is evident. B) is from 1949, showing the cleared site, with only the remnant River Red Gums remaining. It can be inferred that the site was cleared before 1949. Images sourced in 2024 from: https://apps.environment.sa.gov.au/MapFinder/.

APPENDIX C: ADDITIONAL SITE IMAGES

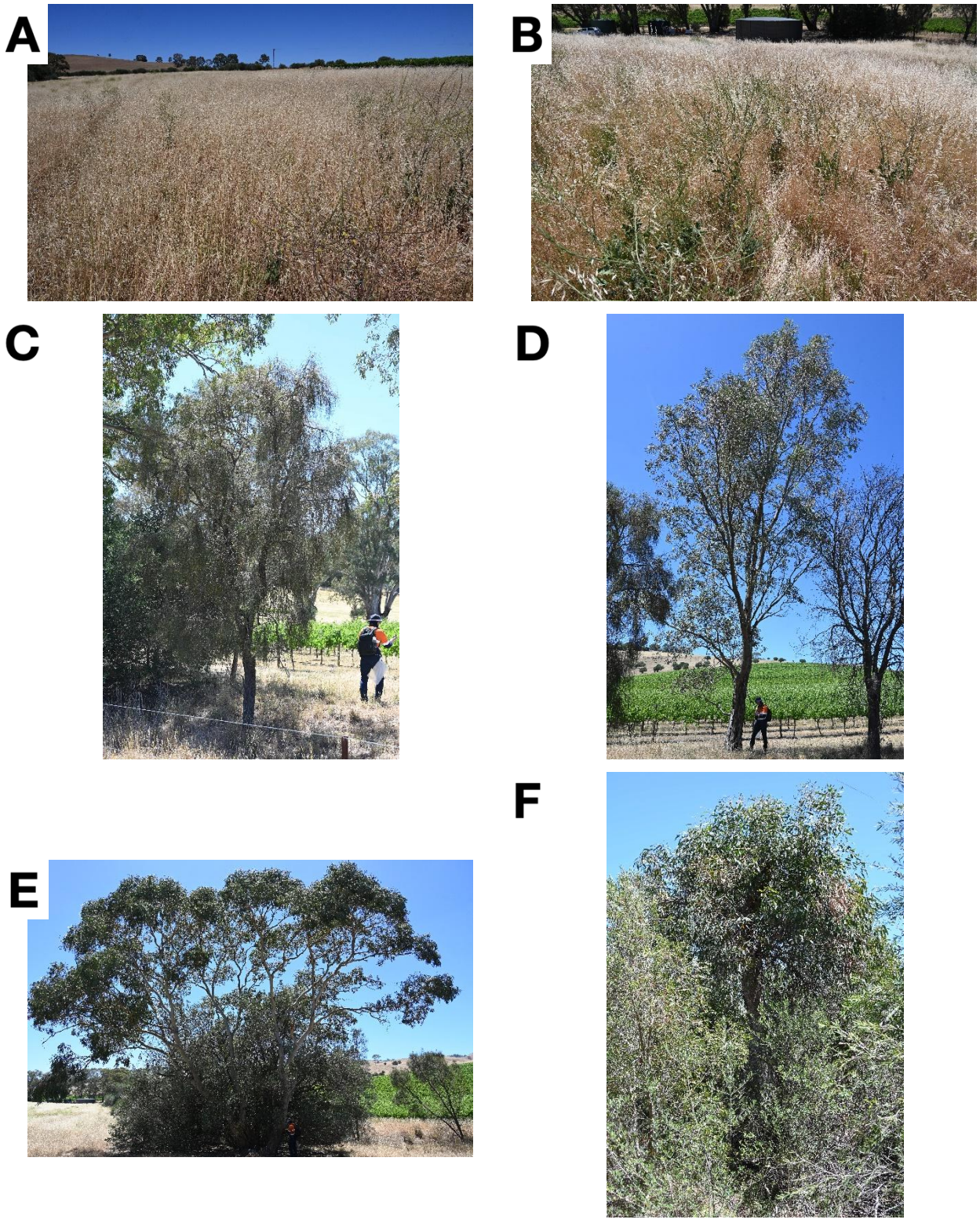
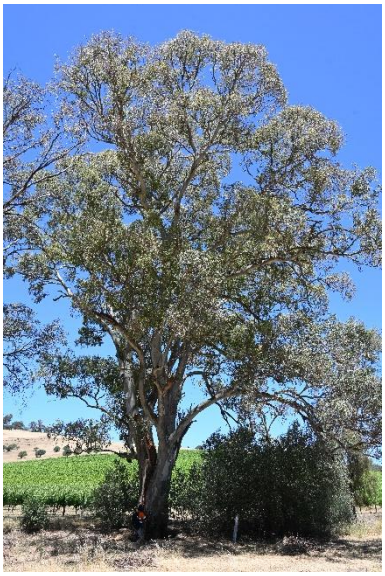


Figure 17: Images A) and B) are over the southern paddock, C) shows a young Drooping Sheoak, D) is of a relatively healthy South Australia Blue Gum, E) and F) are of South Australian Blue Gums in competition with European Olive.

A

B



C

D

E

F

Figure 18: Image A) captures the erosional banks, B), C), D) and E) are large old River Red Gums and F) shows a Western Grey Kangaroo (Macropus fuliginosus) and her joey.

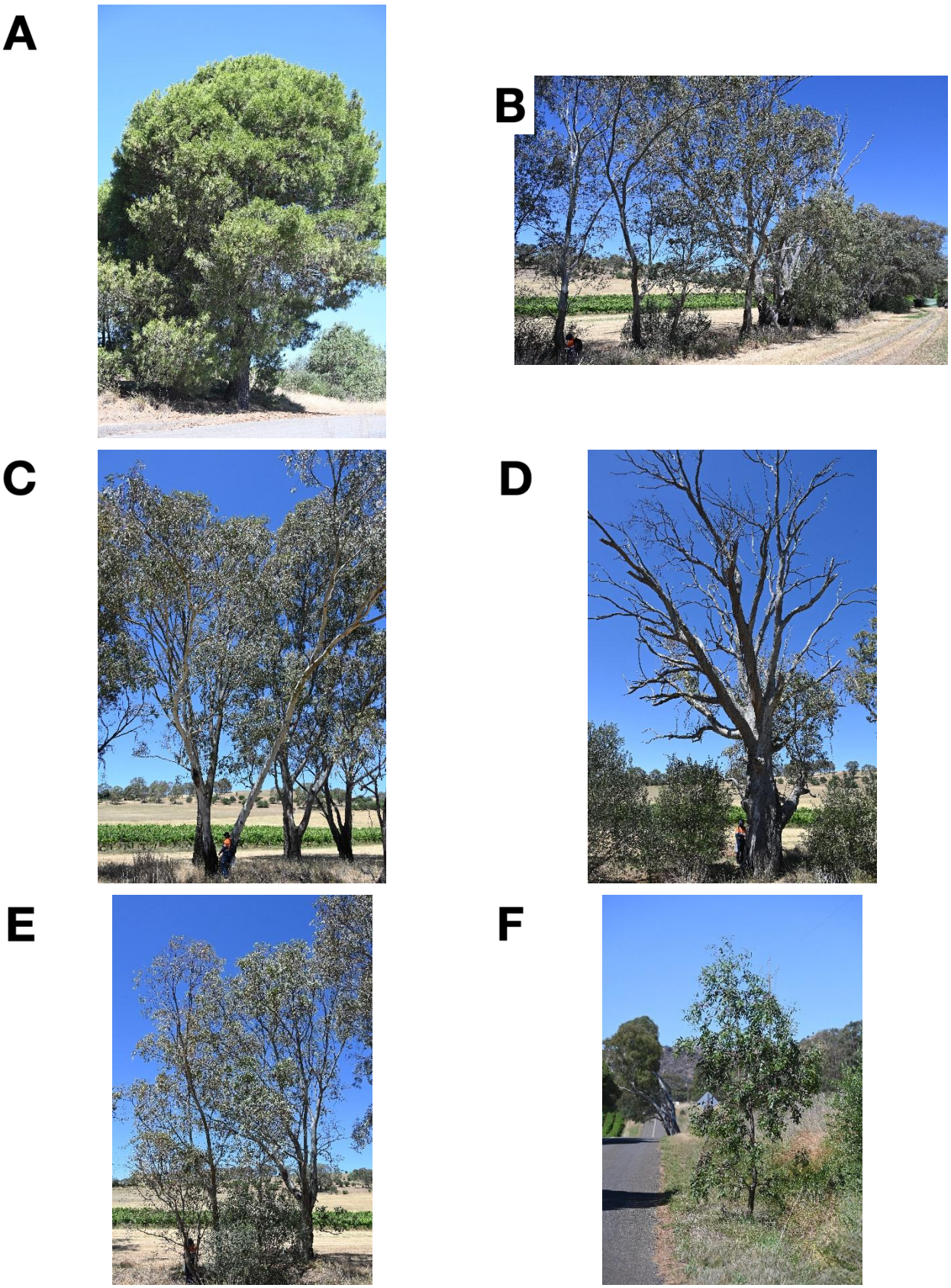


Figure 19: Image A) is of an invasive Declared plant in SA, Aleppo Pine (Pinus halepensis), B), C), D) and E) are of varying age and condition River Red Gums, and F) is a regenerating South Australian Blue Gum

succession
ecology

Succession Ecology Pty. Ltd.

ABN: 56 605 880 028

1/938 South Road
Edwardstown, SA 5039

Ph: 08 8166 2648

admin@successionecology.com.au

www.successionecology.com.au