ECOSPHERE
Ecological Solutions

Proposed Code Amendment:

Allotments 1, 2 & 3 (Plan Parcel D48966) White Hut Road, Stanley Flat

Ecological Assessment

18 April 2023

Document information and distribution

Document information	
Item	Detail
Project number	K21003
Document title	Proposed Code Amendment: Allotments 1, 2 & 3 (Plan Parcel D48966) White Hut Road, Stanley Flat
Client	URPS
Prepared by	Andrew Sinel and Imogen Marshall
Document status	Draft
Version number	2

Document distribution				
Authors	Document status	Version number	Date of issue	Issued to
Andrew Sinel, Imogen Marshall	Draft	1	28/03/2023	David Petruzella, Senior Consultant URPS
Andrew Sinel, Imogen Marshall	Draft	2	18/04/2023	David Petruzella, Senior Consultant URPS

Disclaimer
This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Ecosphere Ecological Solutions Pty Ltd and URPS. Ecosphere Ecological Solutions Pty Ltd accept no liability or responsibility whatsoever for or in respect of any use of or reliance upon this document by any third party. Unauthorised use of this report in any form is prohibited.

Executive Summary

The purpose of the code amendment is to rezone Allotments 1, 2 and 3 (Plan Parcel D48966) White Hut Road, Stanley Flat from 'Rural' to 'Rural Neighbourhood'. The project is proposed to support the future expansion of residential development in Clare. Allotments 1, 2 and 3 (the project area) covers a geographical extent of approximately 30 ha and is located 2km north-east of Clare and approximately 120km north-east of the Adelaide CBD. The allotments currently consist of an existing home and access road with the general landscape dominated by amenity planted vegetation, scattered native trees and agricultural paddocks, primarily utilised as cropping land.

One hundred and fifty-five scattered indigenous trees were mapped within the project area and immediately adjacent the site boundaries. Native vegetation was concentrated in the north-eastern corner of the project area and along the boundary fence lines with sparsely scattered paddock trees. No nationally threatened flora or fauna species were considered likely or possibly occurring within the project area. However, fauna species listed as conservation significant at state level were either recorded within the area or considered likely to occur and were likewise, primarily associated with the north-eastern extent of the project area.

There is no reason the proposal cannot proceed without co-existing with existing vegetation. However, it is recommended that development plans be refined to identify a layout which minimises the extent of clearance required and particularly focuses on avoidance of high-quality vegetation. Parcel boundary alignment should consider the legislative requirements under the *Native Vegetation Act 1991* for offsets around asset protection buffers for dwellings and boundary fences as a way to minimise clearance that may occur in the future. Individual allotments should have a provision for allowing dwelling and infrastructure construction to occur with up to a 20m asset protection buffer from existing native vegetation and a five-metre buffer from any new boundaries.

Additional potential cumulative impacts that must be considered for development of the project area include habitat loss and fragmentation to areas north-east of the project area and associated with adjoining road reserves, loss of hollow-bearing trees, invasive flora and fauna, light and noise pollution, increased stormwater runoff, dust and rubbish.

Acronyms and definitions

Abbreviation	Description
BDBSA	Biological Databases of South Australia
BoM	Bureau of Meteorology
DEW	Department for Environment and Water
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LSA Act	*Landscape South Australia Act 2019*
MNES	Matters of National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1972*
NV Act	*Native Vegetation Act 1991*
NVC	Native Vegetation Council
NV Regs	*Native Vegetation Regulations 2017*
NVIS	Native Vegetation Information System
PDI Act	*Planning Development and Infrastructure Act 2016*
PMST	Protected Matters Search Tool
SA	South Australia
TEC	Threatened Ecological Community
WONs	Weed of National Significance

Contents

List of Figures

List of Tables

1 Introduction

1.1 Project Overview

Ecosphere was engaged by URPS to prepare an ecological assessment report for a code amendment for allotments 1, 2 and 3 (Plan Parcel D48966) White Hut Road, Stanley Flat, SA (the project area). The planning and development code is proposed to change from 'Rural' to 'Rural Neighbourhood' and is planned to support the future expansion of residential development in Clare (Figure 1, 2 Figure 2).

The project area is approximately 30 hectares in area as shown in Figure 2. The land is currently utilised for cropping and grazing purposes. There is strong demand for land in the existing Rural Neighbourhood Zone which has resulted in demand exceeding supply. The Code Amendment is seeking to support 3,000 m^2 minimum allotment sizes, as per the abutting zone.

1.2 Project Location

The project area is located approximately 120km north-east of Adelaide and 2km north-east of Clare in the Clare and Gilbert Valleys Council area.

1.3 Objectives

The purpose of the ecological assessment is to determine the potential impacts to flora and fauna due to rezoning of the project area from 'Rural' to 'Rural Neighbourhood' which would allow for future residential development.

The scope of works includes a desktop review and flora and fauna survey of the project area to identify any vegetation of significance. The *Native Vegetation Act 1991* (NV Act) legislation applies in this locality.

The specific objectives of the ecological assessment were to:

- Conduct database searches to identify matters of Commonwealth and state environmental significance
- review any existing mapping data (e.g., vegetation communities, vegetation condition and aerial photographs)
- ground truth and confirm the outcomes and findings of the desktop study by conducting a field assessment
- collect vegetation data dependent on vegetation type and as required to fulfil legislative requirements under relevant Commonwealth and state Acts

- identify any flora species of Commonwealth or state conservation significance known to, or likely to, occur in the area
- identify any declared plants under the *Landscape South Australia Act 2019* (LSA Act) that may be significant
- conduct an opportunistic fauna assessment to determine if any native fauna species, or fauna habitat, of Commonwealth or state significance may be impacted upon by the Project.

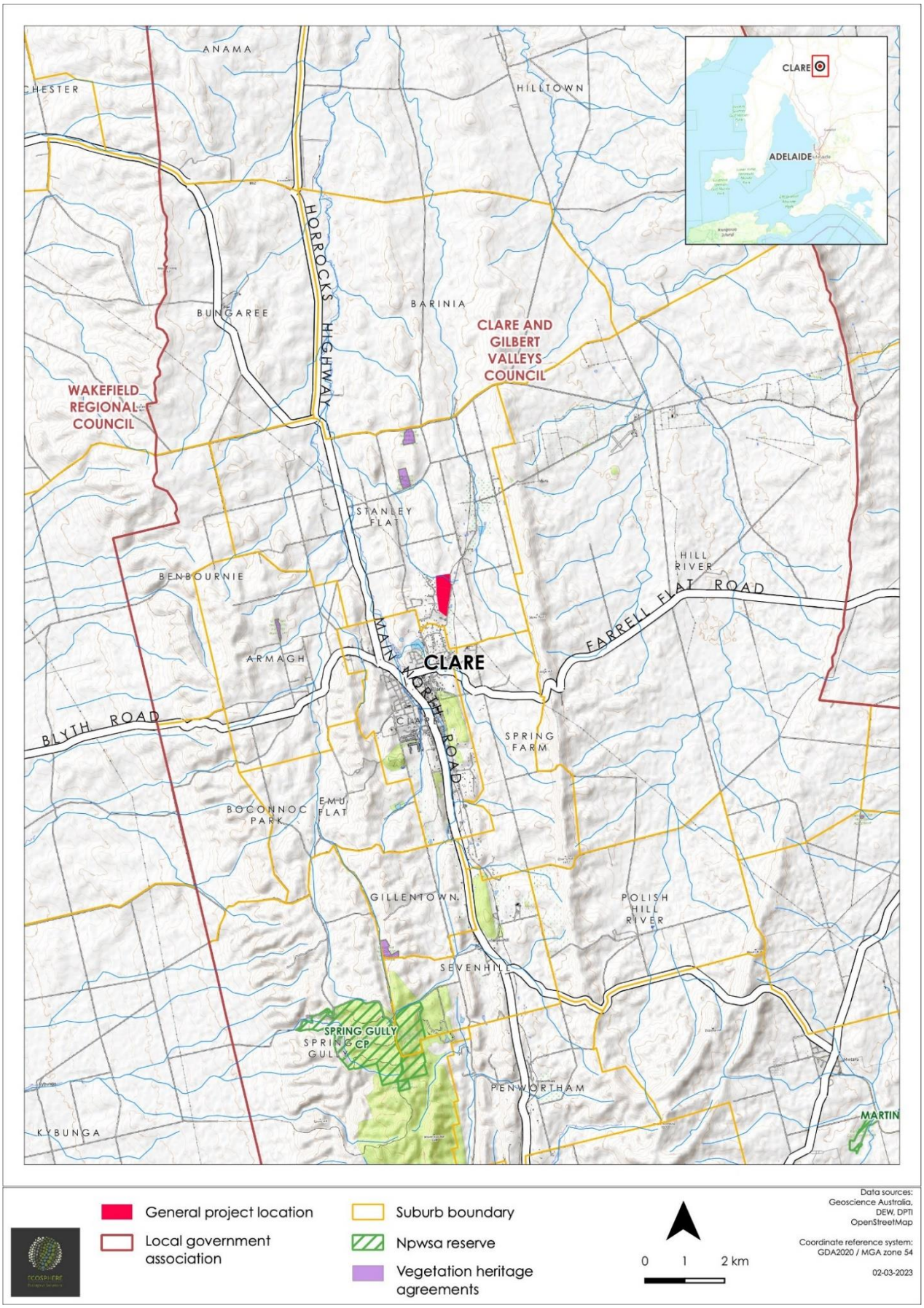


Figure 1. General location of the overall Study area.

Figure 2. Location of study area and specific project areas.

2 Background

2.1 Climate

The Clare High School weather station has records available for the previous 30 years. Clare experiences a mean maximum temperature of 30.3°C in January, with overnight mean minimum temperatures of 14.9°C. July has the coolest mean maximum and minimum temperatures with 12.9°C and 4.0°C respectively (Figure 3). Clare has an annual mean rainfall of 545.9 mm (BOM 2023). The field survey was undertaken during the hottest and driest period of the year. Therefore, the surveys may not be representative of seasonal variation as species richness and condition may improve during the cooler and wetter months of the year.

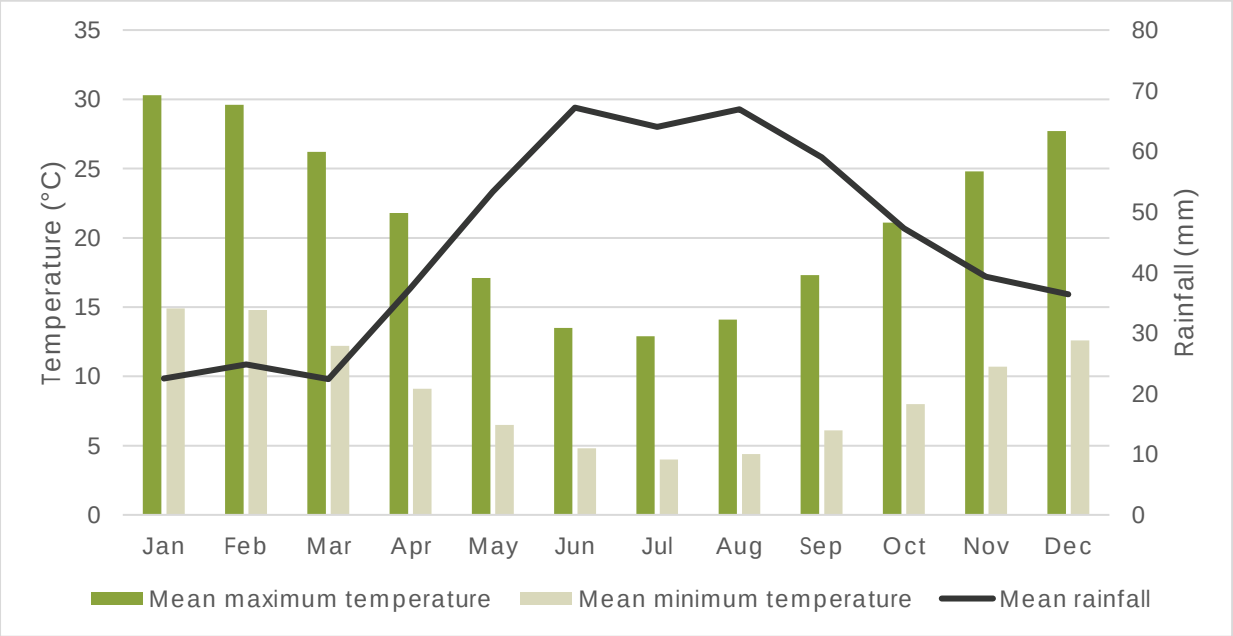


Figure 3. Average climatic conditions in Clare, SA (BOM, 2023).

2.2 Interim Biogeographical Regionalisation of Australia (IBRA)

The Interim Biogeographical Regionalisation of Australia (IBRA) was developed as a key tool for identifying land for conservation under Australia's Strategy for the National Reserve System 2009-2030 (DoEE 2012). IBRA identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation, and species information. The bioregions are further refined into subregions and environmental associations.

The site falls within the Flinders Lofty Block IBRA Bioregion, the Broughton Subregion, and the Clare Environmental association. Approximately 8% of the Clare association is mapped as remnant vegetation of which 3% is formally conserved and protected within National Parks and Wildlife reserves or private heritage agreements under the (NV Act).

2.3 NVIS mapping

Most of the project area consists of cleared agricultural/pastoral land. Patches of native vegetation exist in the north-eastern corner of the project area and in the surrounding areas.

The Native Vegetation Floristic Areas - NVIS - Statewide South Australian government vegetation mapping shows the patches on native vegetation within and surrounding the project area as Eucalypt woodlands. Specifically, the following vegetation description applies:

- *Eucalyptus leucoxylon ssp*., +/-*Eucalyptus odorata*, +/-*Amyema miquelii* mid woodland over *Acacia pycnantha*, *Acacia paradoxa* shrubs over *Acaena echinata* forbs.

3 Legislative requirements

A summary of key legislation relating to flora and fauna consideration and their relevance to the proposed project is provided in Table 1 below. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides protection for matters of national environmental significance. Any action that has, will have or is likely to have a significant impact on matters of national environmental significance requires referral under the EPBC Act.

Native vegetation in South Australia is protected under the NV Act and *Native Vegetation Regulations 2017* (NV Regs). Any proposed clearance of native vegetation in South Australia (unless exempt under the NV Regs) is to be assessed against the NV Act Principles of Clearance and requires approval from the Native Vegetation Council (NVC). The Project is considered to fall under Schedule 1 Part 5, Division, Regulation 12 (28) Mining and petroleum activities.

Native plants and animals in South Australia are protected under the *National Parks and Wildlife Act 1972* (NPW Act). Under this Act, it is an offence to take a native plant or protected animal without approval. Conservation significant flora and fauna species listed on Schedules 7, 8, or 9 of the NPW Act have historical database records from the proposed development site. The project area falls under the jurisdiction of the Northern and Yorke Landscape Management Region.

Table 1. Summary of relevant Commonwealth and state legislation.

Legislation	Summary	Relevance
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999	To protect 'matters of national environmental significance' (MNES): • World Heritage properties • National Heritage properties • wetlands of international importance (Ramsar wetlands) • listed threatened species and ecological communities • migratory species • Commonwealth marine areas • the Great Barrier Reef Marine Park • nuclear actions (including uranium mining). • a water resource, in relation to coal seam gas development and large coal mining development	Where an activity may trigger requirements of the EPBC Act, this legislation must be considered. Any action that has, will have, or is likely to have a significant impact on a matter of national environmental significance requires referral and approval. Significant penalties apply. To determine whether an action is likely to have a significant impact on a matter of national environmental significance, refer to the Significant Impact Guidelines (Commonwealth of Australia 2009) at: http://www.environment.gov.au/epbc/publications/pubs/nes-guidelines.pdf.
South Australia		
National Parks and Wildlife Act 1972	Allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters); provides for the protection of	A person must not "take" a native plant, protected animal or the eggs of a protected animal without approval (s.48A). Significant penalties apply.

Legislation	Summary	Relevance
	native flora and fauna; identifies flora and fauna species considered to be of conservation significance (under Schedules 7, 8, and 9 of the Act); and provides for the use of approved wildlife through a system of permits allowing certain actions, i.e. keeping and selling (s.58), harvesting (s.60G), farming (s.60C), hunting (s.68A), releasing (s.55) and undertaking scientific research (s.53) on/of native fauna species, and for the taking of plants (s.49).	To take a native plant means to remove the plant or part of the plant, from the place in which it is growing; or to damage the plant. To take a protected animal means to remove, hunt, catch, restrain, kill or injure an animal, or attempt to do so. A person may take non-prescribed plant species from private land with the consent of the owner; however, these species may also be covered under the *Native Vegetation Act 1991*. There are several non-complying activities in parks and reserves that result in penalty (parts 4-6).
Native Vegetation Act 1991	To preserve, enhance and manage the State's native vegetation; provide a regulatory framework to control clearance of vegetation; and provide incentives and assistance to landowners to encourage them to preserve and enhance native vegetation. The Act protects all native vegetation that naturally occurs, i.e., vegetation which has not been planted. This includes all naturally occurring local native plants, from small ground covers and native grasses to mallee scrub and tall trees. It does not cover planted trees. Approval is required for the clearance of native vegetation. Clearance is defined as: • the killing or destruction of native vegetation • the removal of native vegetation • the severing of branches, limbs, stems or trunks of native vegetation • the burning, poisoning and slashing of native vegetation • any other substantial damage to native vegetation including activities such as the draining for the reclamation of wetlands or flooding of land, grazing land where stock have been excluded for more than ten years.	Persons wanting to clear native vegetation must apply for a permit from the Native Vegetation Council (NVC) (ss.7,14), unless exempt under the regulations. The NVC will consider the impacts of the proposed clearance and may grant consent, refuse consent or grant consent subject to certain conditions (s.29). A net environment benefit is generally conditional on an approval being granted. Significant penalties apply if a person clears native vegetation without the permission of the NVC (s.26). The NVC can also take civil enforcement proceedings in the District Court for an order that the native vegetation be re-instated (s.31). The Act also provides the opportunity for landholders to enter into voluntary "Heritage Agreement(s)" to ensure vegetation on private land is protected for perpetuity (s.23).

4 Methods

4.1 Desktop assessment

The desktop study involved searching Commonwealth and state databases to identify threatened species, protected under the EPBC Act and NPW Act, either occurring or with the potential to occur within the Study area. This was achieved by undertaking database searches. Following field survey work, the desktop study was updated to reflect habitat assessments.

4.1.1 Protected Matters Search Tool (PMST) – *EPBC* Act

A PMST report was generated on 27th February 2023 to identify MNES under the *EPBC* Act, relevant to the project area (DAWE, 2023). The PMST is maintained by the Department of Agriculture Water and the Environment (DAWE) and was used to identify flora and fauna species or ecological communities of national environmental significance that may occur or likely to have suitable habitat within 5km of the Study area.

4.1.2 Biological Database of South Australia (BDBSA) – *NPW* Act

Threatened species listed under the EPBC Act and NPW Act were assessed using the Naturemaps Supertable, obtained through the general query tool on Naturemaps. The dataset was obtained on 27th February 2023 and was used to identify threatened species that have been recorded within 5km of the Study area (DEW 2020). Known records of threatened species listed under the EPBC Act were also identified within this search.

4.1.3 Assessment of the likelihood of occurrence

The likelihood of each threatened flora and fauna species occurring within the project area footprint was assessed. A likelihood of occurrence rating (Highly Likely / Known, Likely, Possible and Unlikely) was assigned to each threatened species identified in the desktop PMST and BDBSA search (Table 2).

Table 2. Criteria for the likelihood of occurrence of species within the project area.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is largely intact and falls within the known Project 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 species habitat which is largely intact.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area does not provide species habitat which is largely intact. Recorded within 20 -40 years, survey effort is considered adequate, habitat is present and intact, and species of similar habitat needs have been recorded in the area.

Likelihood	Criteria
Unlikely	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 within the previous 40 years despite suitable habitat being known to occur in the area. No records despite adequate survey effort.

4.1.4 Desktop study limitations

The content of the desktop study was derived from existing datasets and references from a range of sources. Flora and fauna records were sourced from the Protected Matters Database via the PMST and the BDBSA via Naturemaps. The BDBSA only includes verified flora and fauna records submitted to Department for Environment and Wildlife (DEW) or partner organisations. It is recognised that drawing conclusions can be unreliable within areas that have been underrepresented in terms of biological studies. It is possible, therefore, that significant species occur within the Study area that were not reflected by database records.

4.2 Field survey

The field survey was conducted on 9th March 2023 by NVC accredited ecologist Rob Kelman and ecologist Imogen Marshall. The field survey included a vegetation survey and passive fauna assessment.

4.2.1 Vegetation survey

NVC scattered tree assessment method is suitable for assessing scattered trees in the following instances:

- Individual scattered trees (i.e., canopy does not overlap). Spatial distribution of trees may vary from approach what would be considered their original distribution (pre-European) through to single isolated trees in the middle of a paddock or;
- Dead trees (when a dead tree is considered native vegetation) or;
- Clumps of trees (contiguous overlapping canopies) if the clump is small (~<0.1 ha) and;
- For both scattered trees and clumps;
    - the ground layer comprising wholly or largely of introduced species
    - some scattered colonising native species may be present, but represents <5% of the ground cover
    - the area around the trees consists of introduced pasture or crops.

4.2.2 Fauna

A focus of the on-ground fauna assessment was on avian species due to the availability of passive observations and low interference required as well as the overwhelming bias of avian species listed as threatened within the wider area. For more inconspicuous fauna species, opportunistic observations were recorded, or alternatively, the native vegetation within the project area buffer was assessed for fauna habitat value. Therefore, the likelihood of specific species occurring within the project footprint buffer was made based on the presence of suitable habitat and included:

- Reviewing previous field survey results and database records
- assessing the habitat value of the vegetation during the field survey to determine the fauna species likely to occur within the project area
- highlighting any areas of significant fauna value.

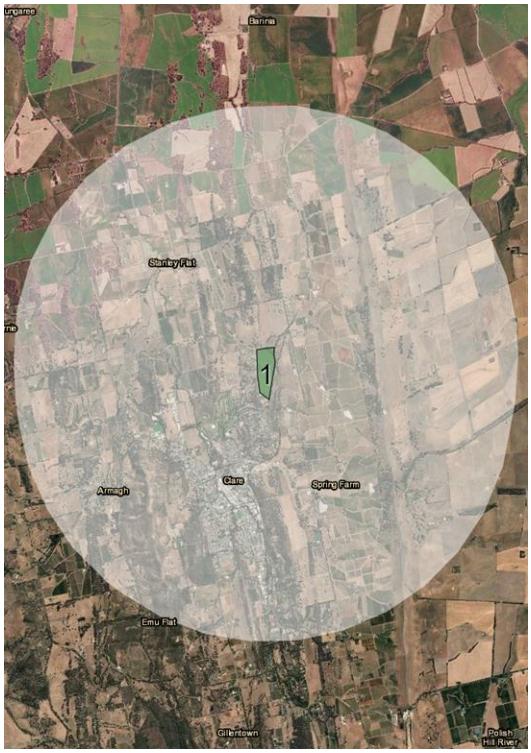
5 Results

5.1 Desktop study

5.1.1 Matters of National Significance

A total of 20 listed threatened species and 12 migratory species were identified by the EPBC Act PMST report as potentially occurring or having suitable habitat potentially occurring within 5km of the project area (Table 3) (DCCEEW 2023). The relevant MNES protected under the EPBC Act are discussed in detail below.

Table 3. EPBC Act PMST report summary results.

Search Area (5km Buffer)	Matters of National Environmental Significance	Identified within search area
	World Heritage Properties	0
	National Heritage Places	0
	Wetlands of International Importance (RAMSAR)	0
	Great Barrier Reef Marine Park	0
	Commonwealth Marine Area	0
	Listed Threatened Ecological Communities	2
	Listed Threatened Species	20
	Listed Migratory Species	12
	Other Matters Protected by the EPBC	
	Commonwealth Lands	1
	Commonwealth Heritage Places	0
	Listed Marine Species	18
	Whales and Other Cetaceans	0
	Critical Habitats	0
	Commonwealth Reserves Terrestrial	0
	Australian Marine Parks	0
	Habitat Critical to the Survival of Marine Turtles	0
	Extra Information	
	State and Territory Reserves	3
	Regional Forest Agreements	0
	Nationally Important Wetlands	0
	EPBC Act Referrals	4
	Key Ecological Features	0
	Biologically Important Areas	0
	Bioregional Assessments	0
	Geological and Bioregional Assessments	0

5.1.2 Threatened ecological communities.

Two Threatened Ecological Communities (TEC's) were highlighted by the PMST as potentially occurring within 5 km of the project area (Table 4). Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia are listed as Endangered under the EPBC Act. These communities were not observed within the project area during field investigations.

Table 4. Threatened Ecological Communities identified as potentially occurring within 5km of the project area by the PMST.

Threatened Ecological Community	EPBC Status	Likelihood of Occurrence in the project area
Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia	Critically Endangered	Not observed
Iron-grass Natural Temperate Grassland of South Australia	Critically Endangered	Not observed

5.1.3 Nationally threatened flora

Eleven flora species listed as threatened under the EPBC Act were identified in the PMST report as potentially occurring or having suitable habitat within the project area (Table 5). Two species of national conservation significance had historical records within 5 km of the project area, *Acacia glandulicarpa* (Hairy-pod Wattle, EPBC: VU SA: V) and *Euphrasia collina* ssp. *osbornii* (Osborn's Eyebright, EPBC: EN SA: E). Neither were present within the project area or considered likely to occur in the general area based on the historical land use.

5.1.4 State threatened flora.

Two flora species of state conservation significance had historical records within 5 km of the project site from the BDBSA (Table 5, Figure 4). *Dianella longifolia* var. *grandis* (Pale Flax-lily), and *Thelymitra grandiflora* (Great Sun-orchid). None of these species were observed within the project area during the field assessment.

A list of all flora species with historical records within 5 km of the project area is in shown Appendix 1.

Table 5. Threatened flora species listed under the *EPBC* Act and *NPW* Act identified within 5km of the project area.

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Habitat preferences	Likelihood of occurrence
Acacia glandulicarpa	Hairy-pod Wattle	VU	E	3, 5	16/06/2020	Eucalypt open forest and rocky hills in open scrub.	Unlikely
Acanthocladium dockeri	Spiny Everlasting, Spiny Daisy	CR	E	5		Grasslands.	Unlikely
Caladenia argocalla	White-beauty Spider-orchid	EN	E	5		Intact woodlands.	Unlikely
Caladenia tensa	Greencomb Spider-orchid,	EN		5		Intact woodlands.	Unlikely
Dianella longifolia var. grandis	Pale Flax-lily		R	3	8/10/1998	Grasslands and grassy woodlands.	Unlikely
Dodonaea procumbens	Trailing Hop-bush	VU	V	5		Woodland, low open forests, heathland and grasslands.	Unlikely
Euphrasia collina ssp. osbornii	Osborn's Eyebright	EN	E	3, 5	7/10/2020	Mallee scrub, forests, woodlands, and coastal heath.	Unlikely
Olearia pannosa subsp. pannosa	Silver Daisy-bush,	VU	V	5		Mallee and woodland communities.	Unlikely
Prasophyllum pallidum	Pale Leek-orchid	VU	R	5		Grassy woodlands.	Unlikely
Prasophyllum validum	Sturdy Leek-orchid,	VU	V	5		Dry woodlands.	Unlikely
Senecio macrocarpus	Large-fruit Fireweed,	VU	V	5		Sedgeland, herbland and low shrubland to low open woodland.	Unlikely
Swainsona pyrophila	Yellow Swainson-pea	VU	R	5		Mallee scrub.	Unlikely
Thelymitra grandiflora	Great Sun-orchid		R	3	7/10/2020	Intact forest and scrubland.	Unlikely

Source; 1- BDBSA, 2 - AoLA, 3 – NatureMaps 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others, 7 – field survey
NP&W Act; E= Endangered, V = Vulnerable, R= Rare
EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable

Figure 4. Threatened flora records within 5km of the project area.

5.1.5 Nationally threatened fauna

Nine fauna species listed as threatened under the *EPBC* Act were identified in the PMST report as potentially occurring or having suitable habitat within 5km of the project area (Table 6). This included 7 bird and 2 reptile species. No species of national conservation significance had historical records within 5 km of the project area. Migratory species

Twelve migratory species listed under the *EPBC* Act were highlighted as potentially present within 5 km of the project area. None were considered likely to occur within the project area.

5.1.6 State threatened fauna.

Four fauna species of state conservation significance had historical records from the NatureMaps BDBSA search within 5 km of the project area (Table 6). One species of state conservation significance was observed during the field surveys. White-winged Chough (*Corcorax melanorhamphos,* SA: R) were observed utilising the patch of scattered trees in the north-east corner of the project area as well as the amenity trees lining the access road and the adjacent paddocks. Another species of state conservation significance considered likely to utilise trees within the project area was the Common Brushtail Possum (*Trichosurus vulpecula*, SA: R).

A list of all fauna species with records within 5 km of the project area is shown in Appendix 2.

Table 6. Threatened fauna species listed under the EPBC Act and NPW Act identified within 5km of the project area.

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Habitat preferences	Likelihood of occurrence
Actitis hypoleucos	Common Sandpiper	Mi	R	5		Migratory wetlands species	Unlikely
Aprasia pseudopulchella	Flinders Ranges Worm-lizard	VU		5		Open woodland, native tussock grassland, riparian habitats and rocky isolates.	Unlikely
Apus pacificus	Fork-tailed Swift	Mi		5		Aerial species.	Unlikely
Botaurus poiciloptilus	Australasian Bittern	EN	E	5		Permanent freshwater and brackish swamps or lagoons that are densely vegetated.	Unlikely
Calidris acuminata	Sharp-tailed Sandpiper	Mi		5		Migratory wetlands species	Unlikely
Calidris ferruginea	Curlew Sandpiper	CR Mi	E	5		Intertidal mudflats of sheltered coasts.	Unlikely
Calidris melanotos	Pectoral Sandpiper	Mi	R	5		Coastal or near-coastal freshwater habitats.	Unlikely
Corcorax melanorhamphos	White-winged Chough		R	3, 4	09/03/2023	Open forests and woodlands with lots of leaf-litter and mud for nest building.	Known
Falco hypoleucos	Grey Falcon	VU	R	5		Arid/semi-arid Australia.	Unlikely
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Mi	R	5		Migratory wetlands species	Unlikely
Grantiella picta	Painted Honeyeater	VU	R	5		Dry open forests and woodlands	Unlikely
Motacilla cinerea	Grey Wagtail	Mi		5		Migratory terrestrial species	Unlikely
Motacilla flava	Yellow Wagtail	Mi		5		Migratory terrestrial species	Unlikely
Myiagra cyanoleuca	Satin Flycatcher	Mi	E	5		Migratory terrestrial species	Unlikely
Numenius madagascariensis	Far Eastern Curlew	CR Mi	E	5		Migratory wetlands species	Unlikely
Oxyura australis	Blue-billed Duck		R	3	17/05/2003	Deep permanent lakes and wetlands.	Unlikely
Pandion haliaetus	Osprey	Mi	E	5		Coastal areas and terrestrial wetlands.	Unlikely
Pedionomus torquatus	Plains-wanderer	CR	E	5		Sparse, treeless, lowland native grasslands.	Unlikely
Rostratula australis	Australian Painted Snipe	EN	E	5		Migratory wetlands species.	Unlikely
Tiliqua adelaidensis	Pygmy Blue-tongue Lizard	EN	E	5		Semi-arid grasslands and grassy woodlands.	Unlikely
Trichosurus vulpecula	Common Brushtail Possum		R	3	5/10/2015	Tree hollows and buildings.	Likely
Tringa nebularia	Common Greenshank	Mi		5		Migratory wetland species.	Unlikely
Turnix varius varius	Painted Buttonquail		R	3	18/08/1999	Forests and woodlands.	Unlikely

Source; 1- BDBSA, 2 - AoLA, 3 – NatureMaps, 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others, 7 – field survey.
NP&W Act; E= Endangered, V = Vulnerable, R= Rare
EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable

Figure 5. Threatened fauna records within 5km of the project area.

5.2 Field Assessment

The project area has an east-facing aspect with a moderate hill slope. Existing access to the allotments is from White Hut Road, a two-way sealed road (Figure 5). The road reserve is lined by scattered native trees (*E. leucoxylon* subsp. *pruinosa*) (Figure 5) as well as invasive species *Olea europaea* (Olive) and *Rosa canina* (Dog Rose). Two small dams were located within the project area, one in the wooded north-eastern corner of the project area and the other along the eastern boundary of the project area.

The surrounding land use consisted of agricultural and pastoral land (including vineyards) as well as rural development. The project area currently consists of an existing home and access road with amenity planted vegetation, scattered native trees concentrated in the north-eastern corner of the project area and along the site boundaries and agricultural paddocks used for cropping.

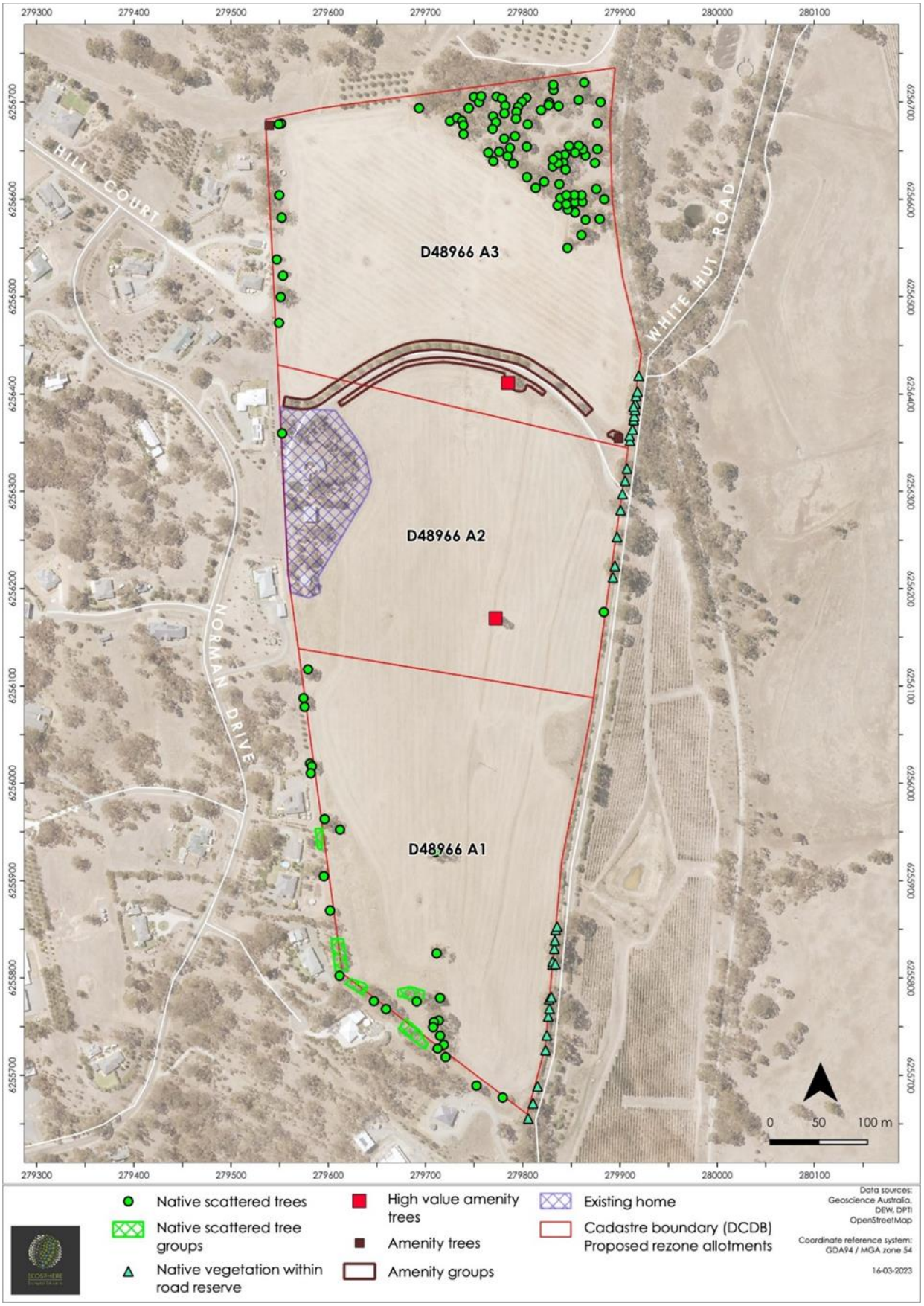


Figure 5. Vegetation identified within the project area and adjacent road reserve.

5.2.1 Native Vegetation

One hundred and fifty-five native scattered trees (112 individual trees and five groups of native trees) were identified across the three allotments (Table 7 & Figure 6). The highest density of trees was recorded in the north-eastern corner of the allotment with 76 native trees recorded (three *E. odorata*, 73 *E. leucoxylon* subsp. *pruinosa*) (Figure 7). The remaining native scattered trees and groups (all *E. leucoxylon* subsp. *pruinosa*) were mostly located in close proximity to the boundaries of the project area, particularly the southern boundary (Figure 8). The total biodiversity score for all trees assessed was 446.89 with biodiversity scores for individual trees and groups ranging from 0.17 to 8.80 (Table 7).

High habitat value trees were identified as those with a circumference greater than 2 m and a biodiversity score greater than 3.78 (the median value of all trees assessed). Figure 9 identifies trees with a circumference greater than 2 m or 3 m and Figure 10 identifies trees with the top 50% and top 25% of biodiversity scores. These figures should be used to inform subdivision planning and promote retention of high value trees within the project area. See photo file for representative photos of scattered trees and groups.

Table 7. Native Scattered Trees and Groups.

Map ID	Species	No. Individuals	Height (m)	Diameter (cm)	Circum. (cm)	Hollows	Dieback (%)	Total Biodiversity Score	Additional Comments
1	*Eucalyptus leucoxylon pruinosa*	1	16	62	194.8		20	3.47	*Amyema miquelii* present on tree.
2	*Eucalyptus leucoxylon pruinosa*	1	16	85	267.0	2 Small	25	4.55	
3	*Eucalyptus leucoxylon pruinosa*	1	18	95.5	300.0		20	4.85	*Amyema miquelii* present on tree.
4	*Eucalyptus leucoxylon pruinosa*	1	12.3	53.5	168.1		65	1.05	
5	*Eucalyptus leucoxylon pruinosa*	1	15.2	66.5	208.9		15	3.55	*Amyema miquelii* present on tree.
6	*Eucalyptus leucoxylon pruinosa*	1	19	120.57	378.8	1 Small	10	7.61	*Amyema miquelii* present on tree.
7	*Eucalyptus leucoxylon pruinosa*	1	11.5	68	213.6		15	2.27	
8	*Eucalyptus leucoxylon pruinosa*	1	19	73	229.3	1 Small	10	6.19	*Amyema miquelii* present on tree.
9	*Eucalyptus leucoxylon pruinosa*	1	19	45	141.4	1 Small	25	3.72	*Amyema miquelii* present on tree.
10	*Eucalyptus leucoxylon pruinosa*	1	7	18.5	58.1		15	0.35	
11	*Eucalyptus leucoxylon pruinosa*	1	17	77	241.9	1 Small	15	5.87	*Amyema miquelii* present on tree.
12	*Eucalyptus leucoxylon pruinosa*	1	6	12.78	40.1		5	0.30	
13	*Eucalyptus leucoxylon pruinosa*	1	15	57	179.1		20	2.49	*Amyema miquelii* present on tree.
14	*Eucalyptus leucoxylon pruinosa*	1	20	60	188.5		15	3.97	*Amyema miquelii* present on tree.
15	*Eucalyptus leucoxylon pruinosa*	1	11	36.07	113.3		20	1.09	
16	*Eucalyptus leucoxylon pruinosa*	1	20	86.35	271.3	1 Small	20	6.32	One stem was a stump with regrowth, *Amyema miquelii* present on tree.
17	*Eucalyptus leucoxylon pruinosa*	1	20	59	185.4	1 Small	15	4.47	
18	*Eucalyptus leucoxylon pruinosa*	1	18	46.5	146.1		25	3.30	
19	*Eucalyptus leucoxylon pruinosa*	1	20	39.5	124.1		15	3.30	
20	*Eucalyptus leucoxylon pruinosa*	1	10	66.5	208.9	1 Small	40	1.95	*Amyema miquelii* present on tree.
21	*Eucalyptus leucoxylon pruinosa*	1	14	33	103.7		15	1.33	
22	*Eucalyptus leucoxylon pruinosa*	1	21	75	235.6	1 Medium	15	6.10	*Amyema miquelii* present on tree.
23	*Eucalyptus leucoxylon pruinosa*	1	12	58	182.2	3 Small	5	3.77	
24	*Eucalyptus leucoxylon pruinosa*	1	11	20	62.8		60	0.33	
25	*Eucalyptus leucoxylon pruinosa*	1	18	91.5	287.5	1 Large, 3 Medium	30	6.83	*Amyema miquelii* present on tree.
26	*Eucalyptus leucoxylon pruinosa*	1	23	92	289.0	2 Small	30	6.09	*Amyema miquelii* present on tree.
27	*Eucalyptus leucoxylon pruinosa*	1	13	75	235.6	1 Large, 1 Small	20	4.20	*Amyema miquelii* present on tree.

Map ID	Species	No. Individuals	Height (m)	Diameter (cm)	Circum. (cm)	Hollows	Dieback (%)	Total Biodiversity Score	Additional Comments
28	*Eucalyptus leucoxylon pruinosa*	1	14	65	204.2	1 Large	20	4.09	
29	*Eucalyptus leucoxylon pruinosa*	1	21	118	370.7	2 Small	15	7.33	*Amyema miquelii* present on tree.
30	*Eucalyptus leucoxylon pruinosa*	1	21	105	329.9	1 Large, 2 Small	15	7.80	*Amyema miquelii* present on tree.
31	*Eucalyptus leucoxylon pruinosa*	1	10	67	210.5		15	2.03	
32	*Eucalyptus leucoxylon pruinosa*	1	21	91	285.9	1 Small	10	6.81	*Amyema miquelii* present on tree.
33	*Eucalyptus leucoxylon pruinosa*	1	21	139	436.7	3 Medium, 1 Small	15	8.80	High habitat value, *Amyema miquelii* present on tree.
34	*Eucalyptus leucoxylon pruinosa*	1	22	83.5	262.3		15	4.76	*Amyema miquelii* present on tree.
35	*Eucalyptus leucoxylon pruinosa*	1	18	67	210.5		15	4.22	*Amyema miquelii* present on tree.
36	*Eucalyptus leucoxylon pruinosa*	1	11	24	75.4		10	0.60	
37	*Eucalyptus leucoxylon pruinosa*	1	5	11	34.6		35	0.17	
38	*Eucalyptus leucoxylon pruinosa*	1	20	140.07	440.0	3 Medium, 2 Small	25	8.38	*Amyema miquelii* present on tree.
39	*Eucalyptus leucoxylon pruinosa*	1	14	46	144.5		20	2.09	
40	*Eucalyptus leucoxylon pruinosa*	1	18	68.5	215.2	1 Small	15	4.83	*Amyema miquelii* present on tree.
41	*Eucalyptus leucoxylon pruinosa*	1	20	63.5	199.5		15	4.09	*Amyema miquelii* present on tree.
42	*Eucalyptus leucoxylon pruinosa*	1	16	68	213.6		15	3.78	*Amyema miquelii* present on tree.
43	*Eucalyptus leucoxylon pruinosa*	1	12	31	97.4		15	1.10	
44	*Eucalyptus leucoxylon pruinosa*	1	20	64.5	202.6	1 Small	15	4.67	*Amyema miquelii* present on tree.
45	*Eucalyptus leucoxylon pruinosa*	1	22	65.5	205.8	1 Small	10	4.86	*Amyema miquelii* present on tree.
46	*Eucalyptus leucoxylon pruinosa*	1	22	78.5	246.6		15	4.64	
47	*Eucalyptus leucoxylon pruinosa*	1	22	80.15	251.8	2 Small	15	6.35	*Amyema miquelii* present on tree.
48	*Eucalyptus leucoxylon pruinosa*	1	22	99.02	311.1	1 Small	10	7.02	
49	*Eucalyptus leucoxylon pruinosa*	1	19	89.4	280.9	1 Large	35	6.58	Dead stump attached, *Amyema miquelii* present on tree.
50	*Eucalyptus leucoxylon pruinosa*	1	16	75.5	237.2	1 Small	15	4.57	*Amyema miquelii* present on tree.
51	*Eucalyptus leucoxylon pruinosa*	1	18	100	314.2	2 Small	5	7.25	*Amyema miquelii* present on tree.
52	*Eucalyptus leucoxylon pruinosa*	1	10	51.5	161.8		10	1.35	*Amyema miquelii* present on tree.
53	*Eucalyptus leucoxylon pruinosa*	1	22	91	285.9	1 Medium, 2 Small	20	7.21	*Amyema miquelii* present on tree.
54	*Eucalyptus leucoxylon pruinosa*	1	18	91.15	286.4		15	5.89	*Amyema miquelii* present on tree.
55	*Eucalyptus leucoxylon pruinosa*	1	6	14	44.0		60	0.16	*Amyema miquelii* present on tree.

Map ID	Species	No. Individuals	Height (m)	Diameter (cm)	Circum. (cm)	Hollows	Dieback (%)	Total Biodiversity Score	Additional Comments
56	*Eucalyptus leucoxylon pruinosa*	1	18	58	182.2		10	4.03	
57	*Eucalyptus leucoxylon pruinosa*	1	17	39	122.5		20	2.37	
58	*Eucalyptus leucoxylon pruinosa*	1	20	64.5	202.6	1 Medium, 1 Small	15	6.32	
59	*Eucalyptus leucoxylon pruinosa*	1	9	44.5	139.8	1 Small	20	1.27	
60	*Eucalyptus leucoxylon pruinosa*	1	9	39.5	124.1	2 Small	20	1.19	
61	*Eucalyptus Odorata*	1	15	50.99	160.2		30	3.32	
62	*Eucalyptus Odorata*	1	16	62.01	194.8		20	3.92	
63	*Eucalyptus Odorata*	1	12	35	110.0	1 Small	15	3.28	
64	*Eucalyptus leucoxylon pruinosa*	1	22	96	301.6	1 Large	15	6.75	*Amyema miquelii* present on tree.
65	*Eucalyptus leucoxylon pruinosa*	1	22	93.5	293.7		15	5.95	*Amyema miquelii* present on tree.
66	*Eucalyptus leucoxylon pruinosa*	1	21	73	229.3	1 Small	10	6.19	
67	*Eucalyptus leucoxylon pruinosa*	1	22	135.5	425.7	2 Medium, 3 Small	15	8.70	*Amyema miquelii* present on tree.
68	*Eucalyptus leucoxylon pruinosa*	1	22	78.5	246.6	1 Small	10	6.46	*Amyema miquelii* present on tree.
69	*Eucalyptus leucoxylon pruinosa*	1	15	72	226.2		5	3.93	*Amyema miquelii* present on tree.
70	*Eucalyptus leucoxylon pruinosa*	1	22	93	292.2	2 Small	25	6.30	
71	*Eucalyptus leucoxylon pruinosa*	1	7	31	97.4		15	0.49	
72	*Eucalyptus leucoxylon pruinosa*	1	17	84	263.9	1 Small	20	5.92	*Amyema miquelii* present on tree.
73	*Eucalyptus leucoxylon pruinosa*	1	20	55	172.8		15	3.81	
74	*Eucalyptus leucoxylon pruinosa*	1	20	90.5	284.3	4 Medium	5	7.82	
75	*Eucalyptus leucoxylon pruinosa*	1	10	48.5	152.4	1 Small	20	1.42	
76	*Eucalyptus leucoxylon pruinosa*	1	20	76.5	240.3		15	4.56	*Amyema miquelii* present on tree.
77	*Eucalyptus leucoxylon pruinosa*	1	5	17	53.4		10	0.29	
78	*Eucalyptus leucoxylon pruinosa*	1	4	7	22.0		5	0.20	
79	*Eucalyptus leucoxylon pruinosa*	1	7	11	34.6		10	0.29	
80	*Eucalyptus leucoxylon pruinosa*	1	15	96	301.6		25	3.96	*Amyema miquelii* present on tree.
81	*Eucalyptus leucoxylon pruinosa*	1	10	32	100.5		5	1.05	
82	*Eucalyptus leucoxylon pruinosa*	1	10	34	106.8		5	1.10	
83	*Eucalyptus leucoxylon pruinosa*	1	16	152.9	480.3	1 Small	10	7.73	*Amyema miquelii* present on tree.
84	*Eucalyptus leucoxylon pruinosa*	1	7	28.32	89.0		5	0.50	

Map ID	Species	No. Individuals	Height (m)	Diameter (cm)	Circum. (cm)	Hollows	Dieback (%)	Total Biodiversity Score	Additional Comments
85	*Eucalyptus leucoxylon pruinosa*	1	15	116	364.4	3 Large, 3 Medium, 4 Small	15	6.96	*Amyema miquelii* present on tree.
86	*Eucalyptus leucoxylon pruinosa*	1	16	141	443.0	3 Medium, 9 Small	35	7.20	*Amyema miquelii* present on tree.
87	*Eucalyptus leucoxylon pruinosa*	1	10	96.7	303.8	6 Small	20	3.94	*Amyema miquelii* present on tree.
88	*Eucalyptus leucoxylon pruinosa*	1	11	54	169.6		15	1.43	
89	*Eucalyptus leucoxylon pruinosa*	1	11	54	169.6		5	2.06	
90	*Eucalyptus leucoxylon pruinosa*	1	12	38	119.4		10	1.33	
91	*Eucalyptus leucoxylon pruinosa*	1	11	42	131.9		10	1.32	
92	*Eucalyptus leucoxylon pruinosa*	1	12	56	175.9		10	2.17	
93	*Eucalyptus leucoxylon pruinosa*	1	12	131	411.5	2 Large, 5 Small	20	6.10	*Amyema miquelii* present on tree.
94	*Eucalyptus leucoxylon pruinosa*	1	8	28.43	89.3		5	0.55	
95	*Eucalyptus leucoxylon pruinosa (Group)*	6	6 to 7	19	59.7		5	2.13	Along boundary fence.
96	*Eucalyptus camaldulensis*	1	8	24	75.4		5	0.49	
97	*Eucalyptus leucoxylon pruinosa*	1	10	42.2	132.6		10	1.23	
98	*Eucalyptus leucoxylon pruinosa (Group)*	8	8 to 9	41.5	130.4		10	8.37	*Amyema miquelii* present on tree.
99	*Eucalyptus leucoxylon pruinosa*	1	11	59.5	186.9		15	2.02	
100	*Eucalyptus leucoxylon pruinosa (Group)*	5	8 to 9	21	66.0		15	2.05	
101	*Eucalyptus leucoxylon pruinosa*	1	12	144.56	454.1		10	4.48	*Amyema miquelii* present on tree.
102	*Eucalyptus leucoxylon pruinosa*	1	14	82	257.6		5	4.00	*Amyema miquelii* present on tree.
103	*Eucalyptus leucoxylon pruinosa (Group)*	10	12	20	62.8		5	6.22	
104	*Eucalyptus leucoxylon pruinosa*	1	9	86	270.2	2 Small	15	2.56	*Amyema miquelii* present on tree.
105	*Eucalyptus leucoxylon pruinosa*	1	16	103	323.6	2 Small	5	6.60	*Amyema miquelii* present on tree.
106	*Eucalyptus leucoxylon pruinosa*	1	9	109.02	342.5	2 Large, 5 Small	10	4.17	3 stems (2 alive, 1 dead), *Amyema miquelii* present on tree.
107	*Eucalyptus leucoxylon pruinosa*	1	14	94.85	298.0		15	3.96	*Amyema miquelii* present on tree.
108	*Eucalyptus leucoxylon pruinosa*	1	18	90.43	284.1	3 Small	15	6.61	*Amyema miquelii* present on tree.
109	*Eucalyptus leucoxylon pruinosa*	1	10	73.6	231.2		15	2.17	
110	*Eucalyptus leucoxylon pruinosa (Group)*	14	7 to 9	18.5	58.1		10	5.64	

Map ID	Species	No. Individuals	Height (m)	Diameter (cm)	Circum. (cm)	Hollows	Dieback (%)	Total Biodiversity Score	Additional Comments
111	*Eucalyptus leucoxylon pruinosa*	1	10	72	226.2	1 Medium, 1 Small	30	2.55	*Amyema miquelii* present on tree.
112	*Eucalyptus leucoxylon pruinosa*	1	10	48	150.8		10	1.31	*Amyema miquelii* present on tree.
113	*Eucalyptus leucoxylon pruinosa*	1	12	62	194.8	1 Small	10	3.30	*Amyema miquelii* present on tree.
114	*Eucalyptus leucoxylon pruinosa*	1	12	24	75.4		5	1.02	
115	*Eucalyptus leucoxylon pruinosa*	1	11	50	157.1		10	1.43	
116	*Eucalyptus leucoxylon pruinosa*	1	13	38.9	122.2		15	1.40	
117	*Eucalyptus leucoxylon pruinosa*	1	5	13.04	41.0		5	0.27	

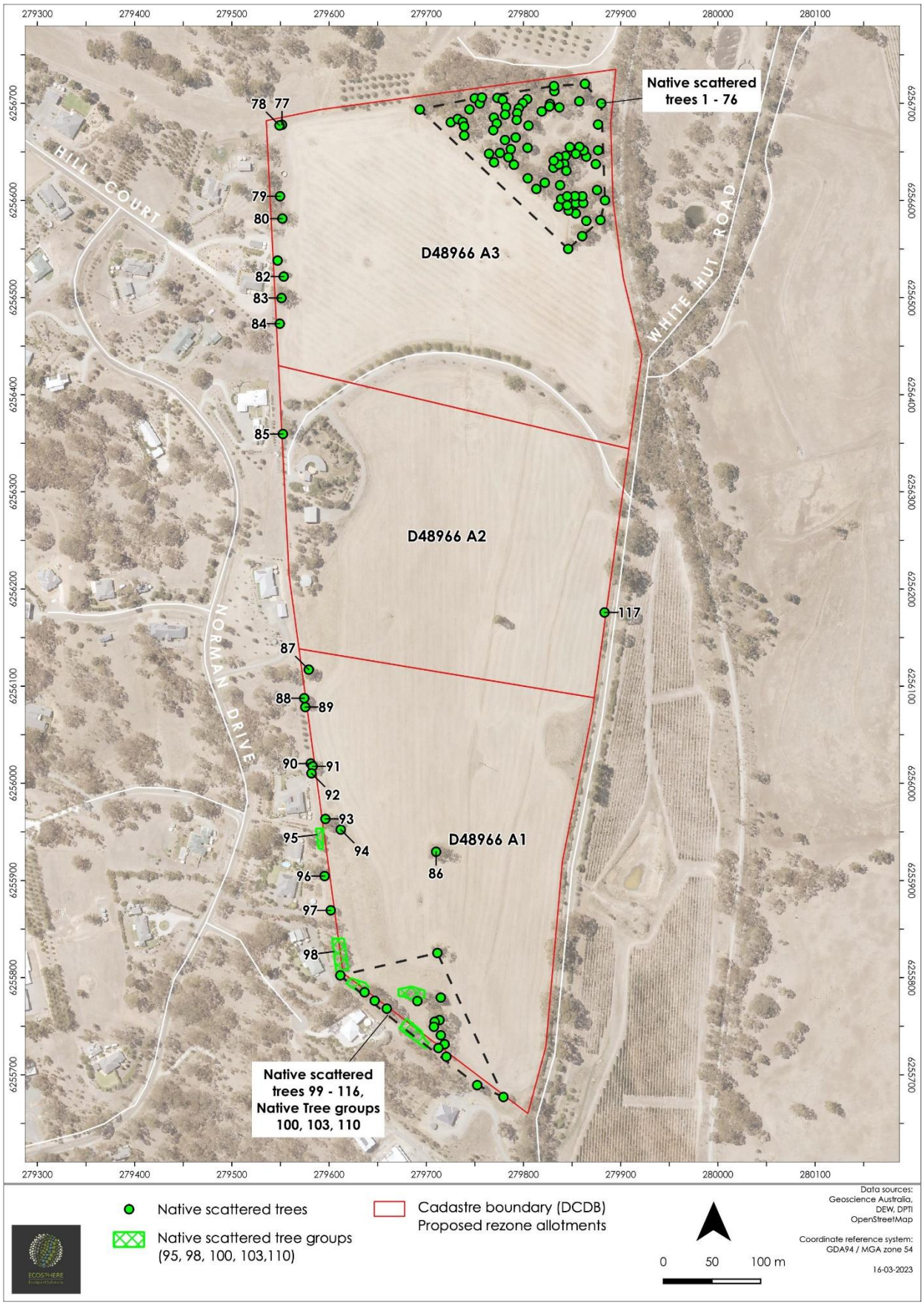


Figure 6. Native scattered trees and groups in the project area.

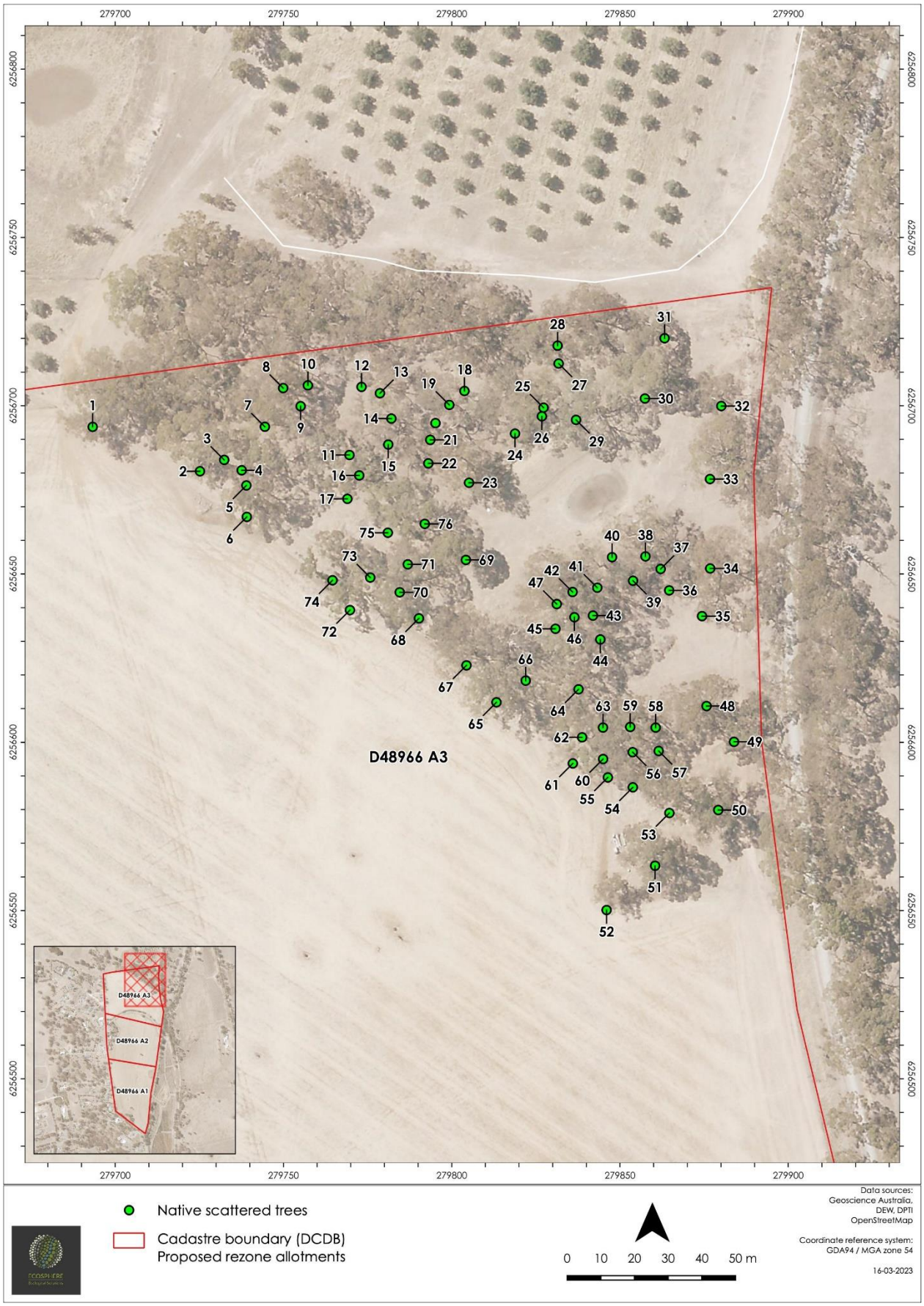


Figure 7. Native scattered trees in the North-east corner of the project area.

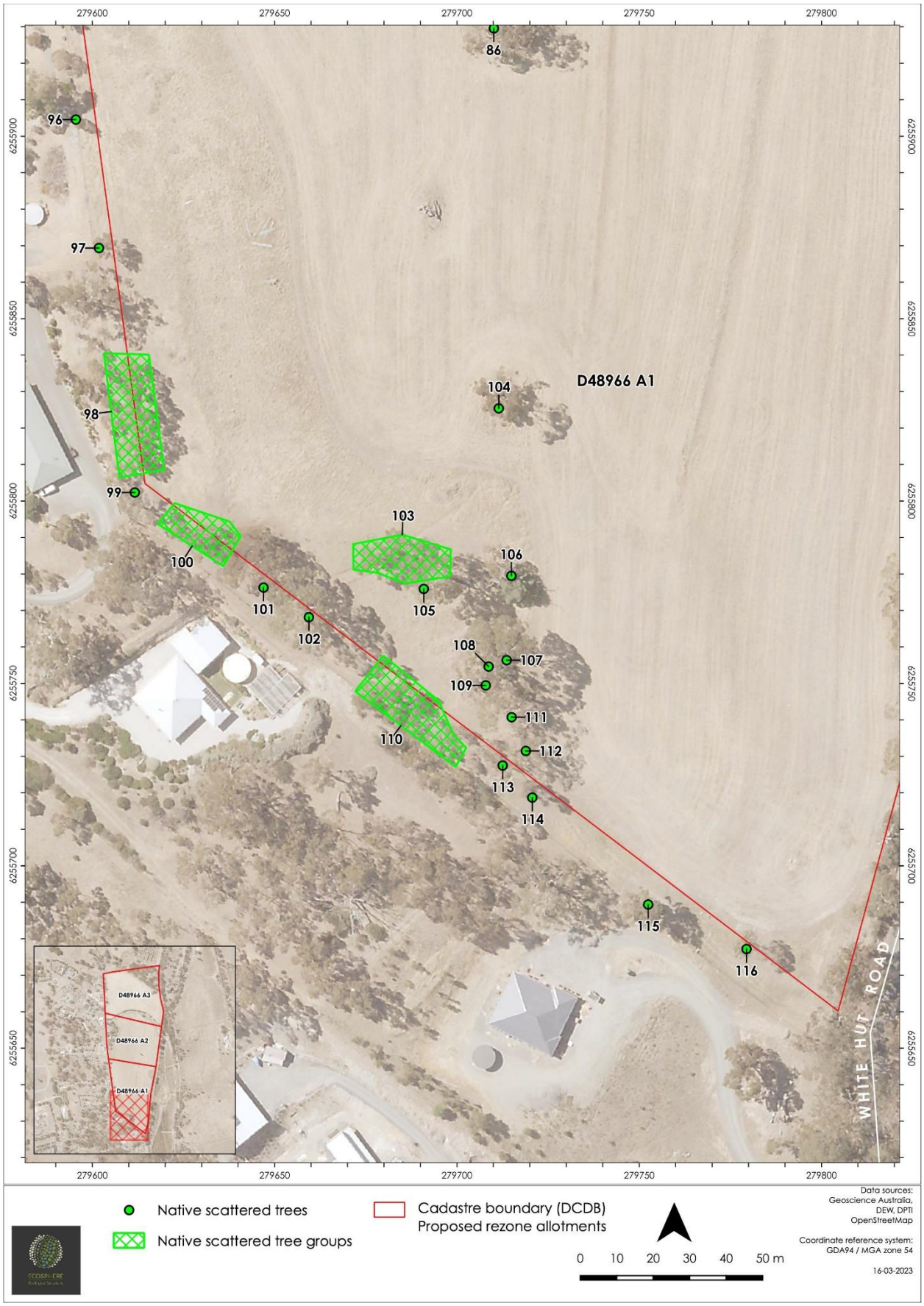


Figure 8. Native scattered trees and groups in the southern boundary of the project area.

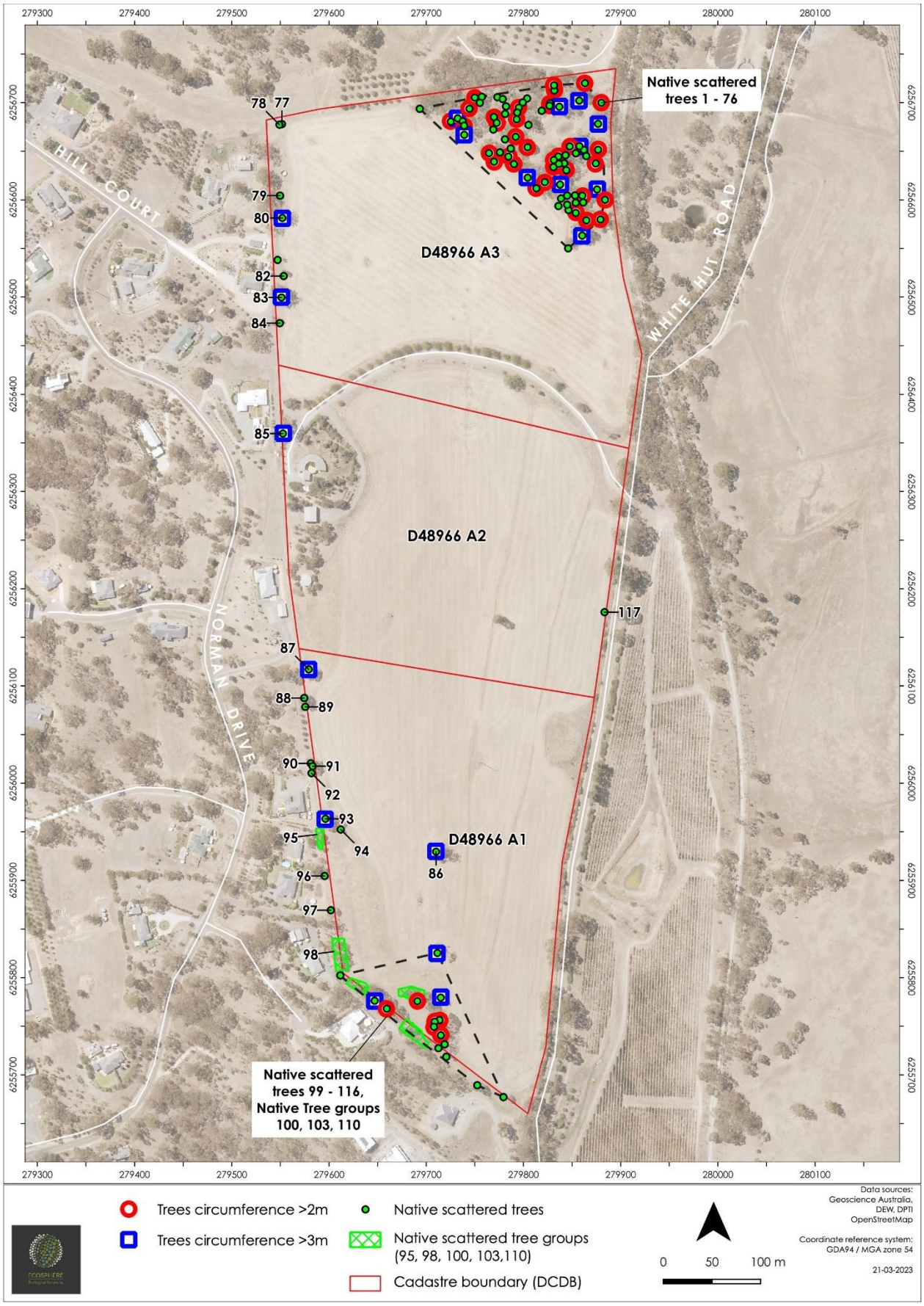


Figure 9. Native trees identified with circumferences greater than 2m and 3m.

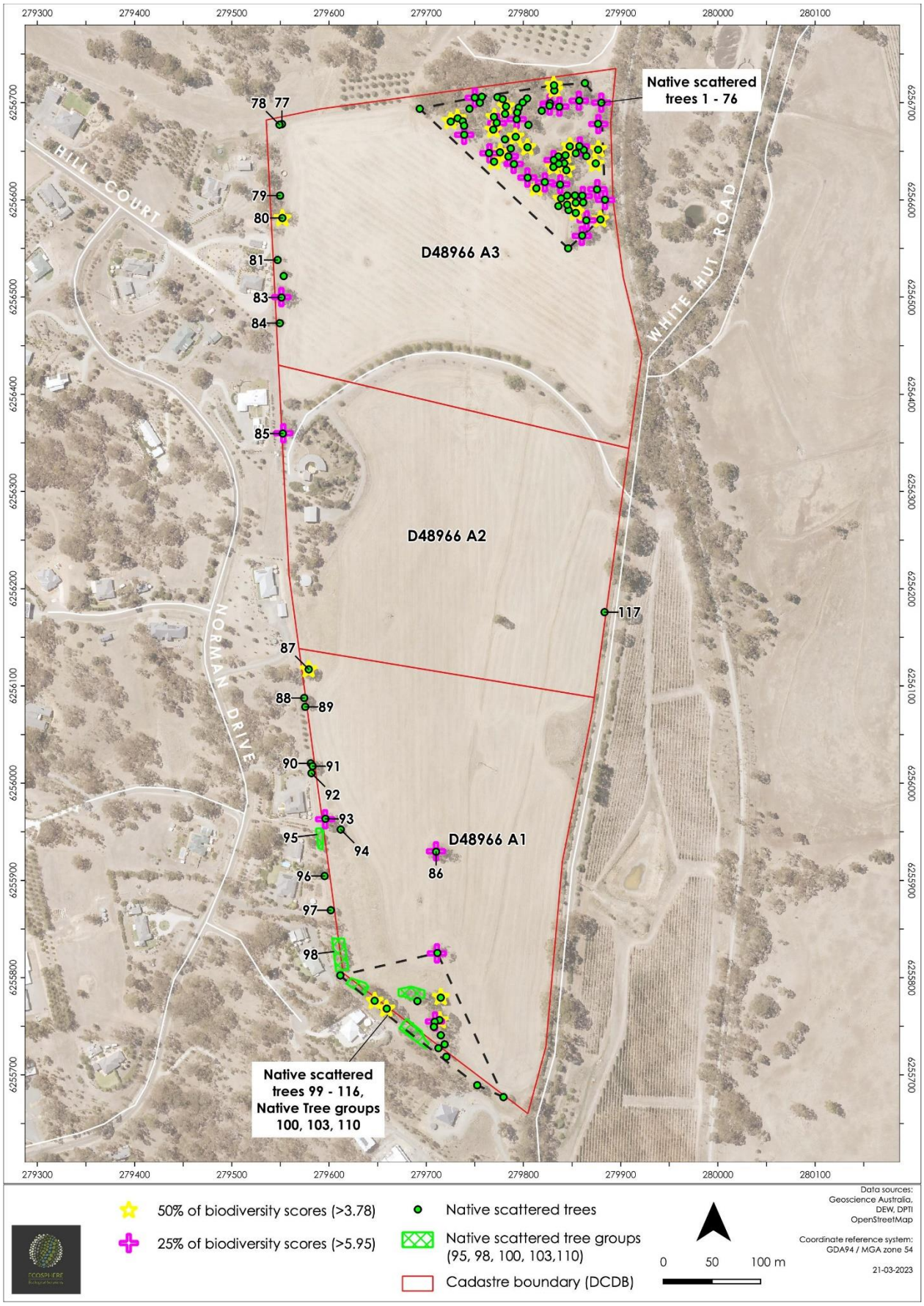


Figure 10. Native trees assessed with the highest 50% and 25% of biodiversity scores.

5.2.2 Amenity Vegetation

Seven amenity trees and groups were identified within the project footprint (excluding the existing home) (Table 8, Figure 11). Two rows of amenity trees, as well as an additional amenity planted *Allocasuarina verticillata* (Drooping She-oak) and singular *Melaleuca sp.* (Paperbark) were identified lining the access road to the existing home. A further three scattered amenity trees were identified within the project area. Two of these trees were considered high value amenity trees, a planted *Eucalyptus camaldulensis* (River Red Gum) with a circumference of 2.7m and a planted non-indigenous *Eucalyptus* sp. with a circumference of 4.5m (Figure 11).

Table 8. Amenity trees and groups

Map ID	Description
1	Amenity planted non-indigenous *Eucalyptus* sp.
2	Amenity plantings of various non-indigenous species along northern edge of access road.
3	Group of amenity planted *Allocasuarina verticillata.*
4	Amenity planted *Melaleuca* sp.
5	Amenity plantings of various non-indigenous species along southern edge of access road.
6	Amenity planted non-indigenous *Eucalyptus* sp. (circumference 449cm, height 13m).
7	Planted *Eucalyptus camaldulensis* (circumference 270cm, height 15m).

Figure 11. Amenity vegetation within the project area.

5.2.3 Exotic flora species

Four declared weeds and one weed of national significance (WoNS) were identified in the project area and associated road reserve (Table 9). *Lycium ferocissimum* (African Boxthorn), *Marrubium vulgare* (Horehound), *Echium plantagineum* (Salvation Jane) and *Olea europaea* (Olive) were present within the allotment footprints in low densities. *Olea europaea* and *Rosa canina* (Dog Rose) were present in high densities along the road reserve.

Table 9. Exotic flora species present in the project footprint.

Scientific Name	Common Name	Status
Echium plantagineum	Salvation Jane	Declared
Lycium ferocissimum	African Boxthorn	Weed of National Significance (WoNS)
Marrubium vulgare	Horehound	Declared
Olea europaea	Olive	Declared
Rosa canina	Dog Rose	Declared

5.2.4 Fauna species

Fourteen fauna species were opportunistically observed within the project footprint. This included thirteen bird species and one mammal species (Table 10).

Table 10. Fauna species observed on site.

Scientific Name	Common Name
Birds	
Chenonetta jubata	Maned Duck
Columba livia	Feral Pigeon
Corcorax melanorhamphos	White-winged Chough (SA:R)
Dacelo novaeguineae	Laughing Kookaburra
Eolophus roseicapilla	Galah
Grallina cyanoleuca	Magpie Lark
Gymnorhina tibicen	Australian Magpie
Manorina flavigula	Noisy Miner
Ocyphaps lophotes	Crested Pigeons
Phaps chalcoptera	Common Bronzewing
Platycercus elegans	Crimson Rosella
Psephotus haematonotus	Red-rumped Parrot
Sturnus vulgaris	Common Starling
Mammals	
Macropus fuliginosus	Western Grey Kangaroo

6 Discussion

The purpose of the report is to determine the impact on native flora and fauna of rezoning the project area from 'Rural' to 'Rural Neighbourhood'.

The project area consists of agricultural paddocks with an existing dwelling, amenity plantings and patches of native vegetation. Native vegetation covers 8.6% of the project area and is mostly confined to the north-eastern corner of the project area and along the site boundaries, particularly the southern boundary. Given the close proximity to the township and residential suburbs of Clare, rezoning of the project area is unlikely to have significant detrimental impacts to native flora and fauna in the wider area if project refinements to retain native vegetation and reduce disturbance to native fauna are implemented.

Project refinement

To reduce the impacts on native vegetation the following refinements should be implemented:

- Identify a layout which minimises the extent of clearance. The native vegetation regulations require that a new dwelling/building and associated infrastructure must be situated in a location that avoids and minimises loss of native vegetation. In the case of subdivisions, regulation requires that all areas for the dwelling (and associated clearance) are considered before divisions are made. Asset protection zones associated with the development must also be considered when planning layouts to minimise clearance and thinning of native vegetation. Asset protection zones include vegetation within 10m of dwellings for maintenance, within 20m of dwellings for fire protection and within 5m of new and existing fence lines. Therefore, subdivisions must be planned in a way that provides areas for the construction of a dwelling, associated infrastructure and asset protection zones within each allotment without the need for clearance.

- Avoid high quality vegetation. High value trees have been identified as those with a circumference greater than 2m (see Figure 9) and with an above average biodiversity score (see Figure 10). A dense patch (approximately 2ha) of high values trees is present in the north-eastern corner of the project area. It is recommended that the native vegetation in this corner of the project area be retained.

- Avoid native vegetation along the road reserve. Native vegetation along the road reserve has been mapped in Figure 5. New access roads into the allotment should utilise existing gaps in the native vegetation of the road reserve to avoid habitat loss and fragmentation of the road corridor.

Cumulative impact considerations

The direct and indirect cumulative impacts of rezoning for future residential development that should also be considered include:

- Habitat fragmentation. The project area is located in the Clare Environmental Association which has 8% remnancy with 3% of vegetation protected. Remnancy within the project area is approximately 8.6%. Loss of native vegetation within the project area directly contributes to habitat loss and fragmentation within the wider association, particularly with continued development in the area. Increased retention of native vegetation is directly linked to improved biodiversity outcomes (Barth et al., 2015). Therefore, consideration should be given towards maintaining large patches of vegetation, such as the approximately 2ha patch of trees in the north-eastern corner of the project area. Larger tracts of vegetation (such as native vegetation along the road reserve) should also be maintained as important habitat corridors. The retention of isolated high value trees and smaller patches of native vegetation (as seen along the boundary fence lines) can also be important for maintaining connectivity between the larger tracts of remnant vegetation and should be retained where possible (Gibbons & Boak, 2002).

- Loss of hollow-bearing trees. 51 of the 155 trees surveyed had hollows. Hollows typically form in living trees that are more than 80 – 120 years old (Gibbons & Lindenmayer, 2002). Hollows are critical for the nesting, roosting and feeding habits of many species, particularly native birds and mammals. Loss of hollow-bearing trees would lead to a significant decrease in habitat value of the area. Therefore, consideration must be given to the retention of hollow-bearing trees (see Table 7).

- Increased abundance of invasive species. Urban development promotes the establishment of invasive species such as starlings, house sparrows, blackbirds and feral pigeons. These species are attracted to the resources available in urbanised environments and compete with native species for resources such as nesting hollows and food resources. Urban development also promotes the establishment of invasive predators such as cats, dogs and foxes which directly increase predation risk for native species. These may be pets or wild animals attracted to resources in the urbanised environment.

- Increased invasion risk from weeds. Although exotic flora has already established within the cleared paddocks of the project area, urbanisation promotes increased establishment of invasive flora through garden plants which can easily spread via waterways/stormwater runoff.

- Light disturbance. Increased light pollution at night in the form of household light as well as streetlights may have detrimental effects on species such as bats, nightjars and owls. Consideration must be given during the implementation of lighting to minimise negative impacts. The Australian Bat Society recommends using long wavelength (orange/red) globes, installing shields on streetlights to direct illumination downwards and installing lights as close to the ground as possible to reduce penetration of light into adjacent habitats (ABSC, 2012).

- Noise Disturbance. Increased traffic and construction noise can negatively affect native species by masking the calls of vocal species and deterring species from foraging or nesting near urban environments (Newport et al., 2014). Consideration should be given toward maintaining habitat refuges, particularly for species such as the White-winged Chough (SA:R) which were observed onsite. Consideration should also be given to minimising excessive noise during the construction phase.

- Construction/development associated impacts. Further impacts associated with the construction of residential developments includes increased stormwater runoff, dust and rubbish accumulation. Considerations should be made in the planning phase of development to mitigate these impacts.

6.1 Summary

The project area consists of agricultural paddocks with an existing dwelling, amenity plantings and patches of native vegetation. The layout of the development should utilise previously cleared areas and avoid native vegetation, particularly trees of high habitat value. Access to the development should utilise existing gaps between native vegetation within the road reserve. Cumulative impacts which must be considered include habitat loss and fragmentation, loss of hollow-bearing trees, increased establishment of exotic flora and fauna, light and noise disturbance as well as increased stormwater runoff, dust and rubbish.

7 References

Australian Bat Society Conference (ABSC) (2012). Why bats need dark skies. Online Resource viewed 21 March 2023. https://www.ausbats.org.au/uploads/4/4/9/0/44908845/abs_bats_need_dark_skies_web.pdf

Barth, B. J., FitzGibbon, S. I. and Wilson, R. S. (2015). New urban developments that retain more remnant trees have greater bird diversity. Landscape and Urban Planning, 136, 122-129.

Department of Agriculture Water and the Environment (2023). Protected Matters Search Tool. Online Resource viewed 27 February 2023. http://www.environment.gov.au/epbc/protected-matters-search-tool. http://www.environment.gov.au/epbc/protected-matters-search-tool

Department of the Environment and Energy (DotEE) (2012). Interim Biogeographic Regionalisation for Australia v. 7 (IBRA) [ESRI shapefile]. Available at: http://intspat01.ris.environment.gov.au/fed/catalog/search/resource/details.page?uuid=%7B3C182B5A-C081-4B56-82CA-DF5AF82F86DD%7D

Department for Environment and Water (2023). BDBSA Supertable overview. Online Resource viewed 27 February 2023. http://www.environment.sa.gov.au/Science/Information_data/Biological_databases_of_South_Australia

Gibbons, P. and Boak, M. (2002). The value of paddock trees for regional conservation in an agricultural landscape. Ecological Management & Restoration, 3(3), 205-210.

Gibbons, P. and Lindenmayer, D. (2002). Tree hollows and wildlife conservation in Australia. CSIRO publishing.

Newport, J., Shorthouse, D. J. and Manning, A. D. (2014). The effects of light and noise from urban development on biodiversity: Implications for protected areas in Australia. Ecological Management & Restoration, 15(3), 204-214.

8 Appendices

Appendix 1. Flora Species List

Scientific Name	Common Name	Date of Last Record
Acacia acinacea	Wreath Wattle	7/10/2020
Acacia glandulicarpa	Hairy-pod Wattle	16/06/2020
Acacia paradoxa	Kangaroo Thorn	7/10/2020
Acacia pycnantha	Golden Wattle	7/10/2020
Acacia rigens	Nealie	7/11/2001
Acacia sp.	Wattle	14/11/2001
Acacia victoriae ssp. victoriae	Elegant Wattle	21/04/2008
Acaena echinata	Sheep's Burr	7/10/2020
Acaena sp.	Sheep's Burr	15/11/2001
Acer sp.	Maple	7/11/2001
Acianthus pusillus	Mosquito Orchid	26/10/2003
Acrotriche affinis	Ridged Ground-berry	26/10/2003
Agave americana var. (NC)	Century Plant	9/11/2001
Aira cupaniana	Small Hair-grass	7/10/2020
Aira sp.	Hair-grass	8/10/1998
Allium triquetrum	Three-cornered Garlic	25/09/2013
Allocasuarina verticillata	Drooping Sheoak	7/10/2020
Amphibromus nervosus	Veined Swamp Wallaby-grass	15/11/1997
Amphipogon strictus	Spreading Grey-beard Grass	8/10/1998
Amyema miquelii	Box Mistletoe	7/10/2020
Anthosachne scabra	Native Wheat-grass	7/10/2020
Arctotheca calendula	Cape Weed	7/10/2020
Arthropodium sp.	Vanilla-lily	23/11/2001
Arthropodium strictum	Common Vanilla-lily	7/10/2020
Asparagus asparagoides (NC)	Bridal Creeper	7/11/2001
Asparagus asparagoides f. asparagoides	Bridal Creeper	7/10/2020
Asperula conferta	Common Woodruff	7/10/2020
Austrostipa blackii	Crested Spear-grass	28/09/2007
Austrostipa elegantissima	Feather Spear-grass	22/11/2001
Austrostipa mollis	Soft Spear-grass	7/10/2020
Austrostipa nodosa	Tall Spear-grass	26/10/2003
Austrostipa scabra ssp. falcata	Slender Spear-grass	7/10/2020
Austrostipa scabra ssp. scabra	Rough Spear-grass	7/10/2020

Scientific Name	Common Name	Date of Last Record
Austrostipa semibarbata	Fibrous Spear-grass	7/10/2020
Austrostipa setacea	Corkscrew Spear-grass	28/09/2007
Austrostipa sp.	Spear-grass	15/11/2001
Avena barbata	Bearded Oat	7/10/2020
Avena barbata/fatua	Wild Oat	8/10/1998
Briza maxima	Large Quaking-grass	7/10/2020
Briza minor	Lesser Quaking-grass	7/10/2020
Bromus diandrus	Great Brome	25/09/2013
Bromus diandrus (NC)	Great Brome	21/04/2008
Bulbine bulbosa	Bulbine-lily	7/10/2020
Bursaria spinosa ssp. spinosa	Sweet Bursaria	7/10/2020
Caesia calliantha	Blue Grass-lily	7/10/2020
Caladenia latifolia	Pink Caladenia	8/10/1998
Caladenia leptochila (NC)	Narrow-lip Spider-orchid	8/10/1998
Callistemon rugulosus var. rugulosus (NC)	Scarlet Bottlebrush	14/11/2001
Callistemon sp.	Bottlebrush	9/11/2001
Callitris gracilis	Southern Cypress Pine	7/10/2020
Calostemma purpureum	Pink Garland-lily	7/10/2020
Caryophyllaceae sp.	Pink Family	7/10/2020
Casuarinaceae sp.	Sheoak Family	23/11/2001
Cenchrus clandestinus	Kikuyu	9/01/2003
Cerastium glomeratum	Common Mouse-ear Chickweed	11/09/2012
Cerastium sp.	Chickweed	8/10/1998
Chamaecytisus palmensis	Tree Lucerne	25/09/2013
Chamaescilla corymbosa var. corymbosa	Blue Squill	7/10/2020
Cheilanthes austrotenuifolia	Annual Rock-fern	7/10/2020
Chrysocephalum apiculatum	Common Everlasting	7/10/2020
Chrysocephalum apiculatum (NC)	Common Everlasting	14/11/2001
Chrysocephalum semipapposum	Clustered Everlasting	7/10/2020
Cichorium intybus	Chicory	20/01/2011
Cirsium vulgare	Spear Thistle	8/10/1998
Clematis flammula		22/04/2010
Comesperma volubile	Love Creeper	26/10/2003
Compositae sp.	Daisy Family	23/11/2001
Convolvulus arvensis	Field Bindweed	20/01/2011
Convolvulus erubescens (NC)	Australian Bindweed	8/10/1998
Corybas incurvus	Slaty Helmet-orchid	2/09/2001
Craspedia glauca (NC)	Billy-buttons	8/10/1998

Scientific Name	Common Name	Date of Last Record
Craspedia variabilis	Billy-buttons	7/10/2020
Crassula closiana	Stalked Crassula	7/10/2020
Crassula sp.	Crassula/Stonecrop	7/10/2020
Crataegus monogyna	Hawthorn	20/01/2011
Cydonia oblonga	Quince	23/12/2015
Cymbonotus preissianus	Austral Bear's-ear	7/10/2020
Cynara cardunculus ssp. flavescens	Artichoke Thistle	9/01/2003
Cynodon dactylon (NC)	Couch	9/01/2003
Cynodon dactylon var. dactylon	Couch	21/04/2008
Cynodon sp.	Couch	14/11/2001
Cynosurus echinatus	Rough Dog's-tail Grass	8/10/1998
Cyperus congestus	Dense Flat-sedge	9/11/2001
Cyperus eragrostis	Drain Flat-sedge	16/12/2008
Cyrtostylis reniformis	Small Gnat-orchid	7/10/2020
Cytisus scoparius	English Broom	9/11/2001
Danthonia sp. (NC)	Wallaby-grass	15/11/2001
Daucus glochidiatus	Native Carrot	7/10/2020
Daviesia leptophylla	Narrow-leaf Bitter-pea	7/10/2020
Dianella longifolia var. grandis	Pale Flax-lily	8/10/1998
Dianella revoluta var. revoluta	Black-anther Flax-lily	7/10/2020
Dichanthium sericeum ssp. sericeum	Silky Blue-grass	18/12/2008
Dichelachne crinita	Long-hair Plume-grass	7/10/2020
Dillwynia hispida	Red Parrot-pea	7/10/2020
Dittrichia graveolens	Stinkweed	21/04/2008
Dodonaea viscosa ssp.	Sticky Hop-bush	14/11/2001
Drosera auriculata	Tall Sundew	7/10/2020
Drosera glanduligera	Scarlet Sundew	8/10/1998
Drosera macrantha ssp. planchonii	Climbing Sundew	8/10/1998
Drosera peltata (NC)	Pale Sundew	8/10/1998
Drosera whittakeri	Scented Sundew	7/10/2020
Echium plantagineum	Salvation Jane	11/09/2012
Ehrharta longiflora	Annual Veldt Grass	7/10/2020
Ehrharta sp.	Veldt Grass	9/11/2001
Elymus scaber var. scaber (NC)	Native Wheat-grass	8/10/1998
Epilobium hirtigerum	Hairy Willow-herb	10/12/2009
Eragrostis cilianensis	Stink Grass	21/04/2008
Eragrostis curvula	African Love-grass	21/04/2008

Scientific Name	Common Name	Date of Last Record
Erigeron karvinskianus	Bony-tip Fleabane	1/04/2003
Eriochilus cucullatus (NC)	Parson's Bands	8/10/1998
Erodium cicutarium	Cut-leaf Heron's-bill	9/09/2012
Erodium moschatum	Musky Herons-bill	11/09/2012
Eucalyptus calycogona var. calycogona (NC)	Square-fruit Mallee	7/11/2001
Eucalyptus camaldulensis ssp.	River Red Gum	21/04/2008
Eucalyptus camaldulensis var. camaldulensis (NC)	River Red Gum	8/10/1998
Eucalyptus globulus	Tasmanian Blue Gum	2/06/2005
Eucalyptus goniocalyx (NC)	Long-leaf Box	15/11/1997
Eucalyptus goniocalyx ssp. goniocalyx	Long-leaf Box	7/10/2020
Eucalyptus leucoxylon ssp.	South Australian Blue Gum	21/04/2008
Eucalyptus leucoxylon ssp. pruinosa	Inland South Australian Blue Gum	7/10/2020
Eucalyptus odorata	Peppermint Box	7/10/2020
Eucalyptus odorata (NC)	Peppermint Box	15/11/2001
Eucalyptus sp.		21/04/2008
Euphorbia lathyris	Caper Spurge	1/03/1999
Euphorbia maculata	Eyebane	25/11/2008
Euphrasia collina ssp. osbornii	Osborn's Eyebright	7/10/2020
Exocarpos cupressiformis	Native Cherry	7/10/2020
Foeniculum vulgare	Fennel	9/01/2003
Freesia leichtlinii	Freesia	14/11/2001
Fumaria capreolata	White-flower Fumitory	9/09/2012
Fumaria sp.	Fumitory	7/10/2020
Galium gaudichaudii (NC)	Rough Bedstraw	8/10/1998
Galium gaudichaudii ssp. gaudichaudii	Rough Bedstraw	7/10/2020
Galium migrans (NC)	Loose Bedstraw	15/11/1997
Galium murale	Small Bedstraw	7/10/2020
Genista monspessulana	Montpellier Broom	7/10/2020
Geranium retrorsum	Grassland Geranium	8/10/1998
Geranium solanderi	Austral Geranium	7/10/2020
Gladiolus tristis	Evening-flower Gladiolus	23/09/2012
Gladiolus undulatus	Wild Gladiolus	7/10/2020
Gladiolus watsonius	Red Afrikander	15/09/2012
Glossodia major	Purple Cockatoo	8/10/1998
Gonocarpus elatus	Hill Raspwort	7/10/2020
Gonocarpus sp.	Raspwort	9/11/2001
Gonocarpus tetragynus	Small-leaf Raspwort	8/10/1998

Scientific Name	Common Name	Date of Last Record
Goodenia albiflora	White Goodenia	7/11/2001
Goodenia blackiana	Native Primrose	7/10/2020
Goodenia pinnatifida	Cut-leaf Goodenia	7/10/2020
Gramineae sp.	Grass Family	23/11/2001
Hackelia suaveolens	Sweet Hound's-tongue	7/10/2020
Heliotropium europaeum	Common Heliotrope	20/03/2012
Hibbertia exutiacies	Prickly Guinea-flower	7/10/2020
Hibbertia sp.	Guinea-flower	14/11/2001
Homeria sp.	Cape Tulip	9/11/2001
Hyalosperma demissum	Dwarf Sunray	7/10/2020
Hydrocotyle callicarpa	Tiny Pennywort	7/10/2020
Hydrocotyle laxiflora	Stinking Pennywort	7/10/2020
Hypericum perforatum ssp. veronense	St John's Wort	7/10/2020
Hypochaeris glabra	Smooth Cat's Ear	7/10/2020
Hypochaeris radicata	Rough Cat's Ear	8/10/1998
Iris albicans	Flag Iris	25/09/2013
Isoetopsis graminifolia	Grass Cushion	7/10/2020
Ixia polystachya	Variable Ixia	25/11/2008
Juncus aridicola	Inland Rush	15/11/1997
Juncus sp.	Rush	15/11/2001
Juncus subsecundus	Finger Rush	8/10/1998
Kennedia prostrata	Scarlet Runner	7/10/2020
Lactuca serriola (NC)	Prickly Lettuce	9/01/2003
Lactuca serriola f. integrifolia	Prickly Lettuce	26/03/2012
Lactuca serriola f. serriola	Prickly Lettuce	21/04/2008
Lagenophora gunniana	Coarse Bottle-daisy	7/10/2020
Lamium amplexicaule var. amplexicaule	Deadnettle	9/09/2012
Lavandula stoechas ssp. stoechas	Topped Lavender	7/10/2020
Lepidium africanum	Common Peppercress	11/09/2012
Lepidosperma curtisiae	Little Sword-sedge	7/10/2020
Leptorhynchos squamatus ssp. squamatus	Scaly Buttons	7/10/2020
Levenhookia dubia	Hairy Stylewort	7/10/2020
Ligustrum vulgare	European Privet	25/09/2013
Limonium sinuatum	Notch-leaf Sea-lavender	11/09/2012
Linum strictum ssp. strictum	Upright Yellow Flax	26/10/2003
Lolium sp.	Ryegrass	11/11/1998
Lomandra densiflora	Soft Tussock Mat-rush	7/10/2020

Scientific Name	Common Name	Date of Last Record
Lomandra nana	Small Mat-rush	7/10/2020
Lomandra sororia	Sword Mat-rush	8/10/1998
Lomandra sp.	Mat-rush	23/11/2001
Luzula meridionalis	Common Wood-rush	7/10/2020
Lycium ferocissimum	African Boxthorn	7/11/2001
Lysimachia arvensis	Pimpernel	7/10/2020
Lythrum hyssopifolia	Lesser Loosestrife	8/10/1998
Malva parviflora	Small-flower Marshmallow	14/11/2001
Marrubium vulgare	Horehound	14/11/2001
Melaleuca lanceolata	Dryland Tea-tree	21/04/2008
Melaleuca sp.	Tea-tree	15/11/2001
Microseris walteri	Yam Daisy	7/10/2020
Microtis arenaria	Notched Onion-orchid	1/10/2000
Microtis frutetorum		26/10/2003
Microtis sp.	Onion-orchid	7/10/2020
Microtis sp. Short-leaf (R.J.Bates 54342)		9/10/1999
Minuria leptophylla	Minnie Daisy	8/10/1998
Misopates orontium	Lesser Snapdragon	25/11/2008
Moraea flaccida	One-leaf Cape Tulip	7/10/2020
Moraea setifolia	Thread Iris	9/11/2001
Neurachne alopecuroidea	Fox-tail Mulga-grass	7/10/2020
Not naturalised in SA sp.		9/01/2003
Olea europaea ssp.	Olive	21/04/2008
Olea europaea ssp. europaea	Olive	8/10/1998
Ophioglossum lusitanicum	Austral Adder's-tongue	8/10/1998
Oxalis perennans/exilis	Native Oxalis	7/10/2020
Oxalis pes-caprae	Soursob	7/10/2020
Oxalis purpurea	One-o'clock	7/10/2020
Panicum capillare var. brevifolium	Witch-grass	9/01/2003
Paspalum dilatatum	Paspalum	20/01/2011
Phalaris aquatica	Phalaris	9/01/2003
Phalaris sp.	Canary Grass	7/10/2020
Phragmites australis	Common Reed	9/11/2001
Phyllangium divergens	Wiry Mitrewort	7/10/2020
Pigea floribunda	Shrub Spade Flower	8/10/1998
Pimelea humilis	Low Riceflower	7/10/2020
Pinus halepensis	Aleppo Pine	21/04/2008

Scientific Name	Common Name	Date of Last Record
Pinus sp.	Pine	23/11/2001
Piptatherum miliaceum	Rice Millet	26/03/2012
Plantago gaudichaudii	Narrow-leaf Plantain	8/10/1998
Plantago lanceolata var.	Ribwort	22/11/2001
Plantago lanceolata var. lanceolata	Ribwort	11/09/2012
Plantago major	Greater Plantain	21/01/2011
Plantago varia	Variable Plantain	7/10/2020
Poa annua	Winter Grass	11/09/2012
Poa crassicaudex	Thick-stem Tussock-grass	7/10/2020
Pogonolepis muelleriana	Stiff Cup-flower	7/10/2020
Prunus cerasifera	Cherry-plum	23/12/2015
Prunus dulcis	Almond	23/12/2015
Prunus sp.	Plum	21/04/2008
Pseudognaphalium luteoalbum	Jersey Cudweed	8/10/1998
Pterostylis nana	Dwarf Greenhood	8/10/1998
Pterostylis pusilla	Small Rusty-hood	9/10/1999
Pultenaea largiflorens	Twiggy Bush-pea	7/10/2020
Pultenaea sp.	Bush-pea	14/11/2001
Ranunculus lappaceus	Native Buttercup	8/10/1998
Ranunculus repens	Creeping Buttercup	18/02/2010
Rhagodia parabolica	Mealy Saltbush	7/10/2020
Romulea minutiflora	Small-flower Onion-grass	11/09/2012
Romulea rosea var. australis	Common Onion-grass	7/10/2020
Romulea sp.	Onion-grass	8/10/1998
Rosa canina	Dog Rose	23/12/2015
Rosa rubiginosa	Sweet Briar	2/06/2005
Rosa sp.	Wild Rose/Briar	23/11/2001
Rubus anglocandicans		20/01/2011
Rubus leucostachys	Blackberry	10/12/2009
Rubus parvifolius	Native Raspberry	21/04/2008
Rubus rubritinctus		20/01/2011
Rubus sp.	Blackberry	23/11/2001
Rumex conglomeratus	Clustered Dock	11/09/2012
Rumex sp.	Dock	14/11/2001
Rytidosperma caespitosum	Common Wallaby-grass	7/10/2020
Rytidosperma caespitosum (NC)	Common Wallaby-grass	26/10/2003
Rytidosperma erianthum	Hill Wallaby-grass	7/10/2020

Scientific Name	Common Name	Date of Last Record
Rytidosperma pilosum	Velvet Wallaby-grass	15/11/1997
Rytidosperma setaceum	Small-flower Wallaby-grass	26/10/2003
Rytidosperma sp.	Wallaby-grass	8/10/1998
Salvia verbenaca var.	Wild Sage	14/11/2001
Santalum acuminatum	Quandong	9/11/2001
Scabiosa atropurpurea	Pincushion	21/04/2008
Scaevola albida	Pale Fanflower	7/10/2020
Scaevola albida var. albida	Pale Fanflower	8/10/1998
Schinus molle	Pepper-tree	14/11/2001
Schoenus apogon	Common Bog-rush	11/09/2012
Senecio glossanthus	Annual Groundsel	7/10/2020
Senecio quadridentatus	Cotton Groundsel	7/10/2020
Senecio tenuiflorus (NC)	Woodland Groundsel	8/10/1998
Setaria clementii	Clement's Paspalidium	26/03/2012
Setaria verticillata	Whorled Pigeon-grass	26/03/2012
Sherardia arvensis	Field Madder	8/10/1998
Siloxerus multiflorus	Small Wrinklewort	7/10/2020
Sisymbrium sp.	Wild Mustard	11/11/1998
Solanum nigrum	Black Nightshade	23/11/2001
Sonchus oleraceus	Common Sow-thistle	7/10/2020
Sonchus oleraceus (NC)	Common Sow-thistle	9/01/2003
Sparaxis tricolor	Tricolor Harlequin Flower	25/09/2013
Spartium junceum	Spanish Broom	20/01/2011
Stackhousia monogyna (NC)	Creamy Candles	26/10/2003
Stackhousia sp.	Candles	26/10/2003
Stackhousia subterranea	Creamy Candles	7/10/2020
Stellaria media	Chickweed	11/09/2012
Styphelia humifusa	Cranberry Heath	7/10/2020
Symphyotrichum subulatum	Aster-weed	8/10/1998
Thelymitra antennifera	Lemon Sun-orchid	7/10/2020
Thelymitra bracteata	Slender Sun-orchid	1/10/2001
Thelymitra grandiflora	Great Sun-orchid	7/10/2020
Thelymitra luteocilium	Yellow-tuft Sun Orchid	8/10/1998
Thelymitra nuda		26/10/2003
Thelymitra nuda (NC)	Scented Sun-orchid	26/10/2003
Thelymitra pauciflora (NC)	Slender Sun-orchid	8/10/1998
Thelymitra rubra	Salmon Sun-orchid	7/10/2020

Scientific Name	Common Name	Date of Last Record
Themeda triandra	Kangaroo Grass	7/10/2020
Thysanotus patersonii	Twining Fringe-lily	7/10/2020
Trifolium angustifolium	Narrow-leaf Clover	26/10/2003
Trifolium campestre	Hop Clover	8/10/1998
Trifolium dubium	Suckling Clover	8/10/1998
Trifolium sp.	Clover	14/11/2001
Trifolium subterraneum	Subterranean Clover	8/10/1998
Triptilodiscus pygmaeus	Small Yellow-heads	7/10/2020
Ulex europaeus	Gorse	9/01/2003
Unidentified sp.		15/11/2001
Vicia sp.	Vetch	23/11/2001
Vinca major	Blue Periwinkle	7/10/2020
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy	7/10/2020
Vittadinia gracilis	Woolly New Holland Daisy	14/11/2001
Vittadinia sp.	New Holland Daisy	8/10/1998
Wahlenbergia communis	Tufted Bluebell	1/11/1999
Wahlenbergia gracilenta	Annual Bluebell	7/10/2020
Wahlenbergia stricta ssp. stricta	Tall Bluebell	7/10/2020
Watsonia meriana cv. Bulbillifera (NC)	Bulbil Watsonia	7/11/2001
Wurmbea dioica ssp.	Early Nancy	7/10/2020
Wurmbea dioica ssp. dioica (NC)	Early Nancy	26/10/2003

Appendix 2. Fauna Species List

Scientific Name	Common Name	Date of Last Record
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	23/06/2006
Acanthiza nana	Yellow Thornbill	25/10/2003
Acanthorhynchus tenuirostris halmaturinus	Eastern Spinebill (KI, MLR, southern FR)	15/06/2007
Accipiter fasciatus fasciatus	Brown Goshawk	29/09/2008
Acrocephalus australis australis	Australian Reed Warbler	25/10/2003
Aegotheles cristatus cristatus	Australian Owlet-nightjar	15/01/2007
Anas gracilis gracilis	Grey Teal	17/05/2010
Anas platyrhynchos platyrhynchos	Mallard	17/05/2003
Anas superciliosa	Pacific Black Duck	17/05/2010
Anthochaera carunculata	Red Wattlebird	29/09/2008
Aquila audax audax	Wedge-tailed Eagle	20/02/2022
Artamus cyanopterus	Dusky Woodswallow	19/04/2006
Austronomus australis	White-striped Free-tailed Bat	26/11/2011

Scientific Name	Common Name	Date of Last Record
Aythya australis	Hardhead	17/05/2003
Barnardius zonarius	Australian Ringneck	29/09/2008
Cacatua sanguinea gymnopis	Little Corella	17/05/2003
Caligavis chrysops samueli	Yellow-faced Honeyeater (MLR, southern FR)	29/09/2008
Carassius auratus	Goldfish	15/05/2002
Chalinolobus gouldii	Gould's Wattled Bat	26/11/2011
Chalinolobus morio	Chocolate Wattled Bat	26/11/2011
Chenonetta jubata	Maned Duck	17/05/2010
Cincloramphus mathewsi	Rufous Songlark	29/09/2008
Climacteris picumnus picumnus	Brown Treecreeper	30/07/2006
Colluricincla harmonica	Grey Shrikethrush	15/06/2007
Columba livia	Feral Pigeon	24/10/2003
Coracina novaehollandiae	Black-faced Cuckooshrike	29/09/2008
Corcorax melanorhamphos	White-winged Chough	28/01/2021
Corvus mellori	Little Raven	23/05/2007
Crinia signifera	Common Froglet	14/09/2005
Ctenotus spaldingi	Eastern Striped Skink	26/10/2003
Cygnus atratus	Black Swan	17/05/2003
Dacelo novaeguineae novaeguineae	Laughing Kookaburra	1/12/2006
Delma molleri	Gulfs Delma	25/10/2003
Dicaeum hirundinaceum hirundinaceum	Mistletoebird	29/09/2008
Egretta novaehollandiae	White-faced Heron	25/10/2003
Elanus axillaris	Black-shouldered Kite	26/10/2003
Elseyornis melanops	Black-fronted Dotterel	17/05/2003
Eolophus roseicapilla	Galah	15/06/2007
Falco longipennis murchisonianus	Australian Hobby	17/05/2003
Felis catus	Domestic Cat (Feral Cat)	24/10/2003
Fulica atra australis	Eurasian Coot	25/10/2003
Gallinula tenebrosa tenebrosa	Dusky Moorhen	15/05/2010
Gambusia holbrooki	Eastern Gambusia	15/05/2002
Gavicalis virescens	Singing Honeyeater	29/09/2008
Geopelia placida placida	Peaceful Dove	29/09/2008
Glossopsitta concinna	Musk Lorikeet	20/02/2022
Grallina cyanoleuca cyanoleuca	Magpielark	27/12/2006
Gymnorhina tibicen	Australian Magpie	29/09/2008
Hirundo neoxena neoxena	Welcome Swallow	23/06/2006
Lampropholis guichenoti	Garden Skink	26/10/2003

Scientific Name	Common Name	Date of Last Record
Lerista bougainvillii	Bougainville's Skink	26/10/2003
Limnodynastes dumerilii	Banjo Frog	30/09/2004
Limnodynastes tasmaniensis	Spotted Marsh Frog	9/09/2005
Litoria ewingii	Brown Tree Frog	15/09/1996
Macropus fuliginosus	Western Grey Kangaroo	20/02/2022
Manorina melanocephala	Noisy Miner	27/12/2006
Melithreptus brevirostris	Brown-headed Honeyeater	1/12/2006
Menetia greyii	Dwarf Skink	26/10/2003
Merops ornatus	Rainbow Bee-eater	24/10/2003
Morethia boulengeri	Common Snake-eye	26/10/2003
Mormopterus sp.		26/11/2011
Ocyphaps lophotes lophotes	Crested Pigeon	27/12/2006
Oxyura australis	Blue-billed Duck	17/05/2003
Pachycephala rufiventris rufiventris	Rufous Whistler	15/06/2007
Pardalotus punctatus	Spotted Pardalote	23/05/2007
Pardalotus striatus substriatus	Striated Pardalote	29/09/2008
Parvipsitta porphyrocephala	Purple-crowned Lorikeet	1/12/2006
Passer domesticus domesticus	House Sparrow	15/06/2007
Petrochelidon ariel	Fairy Martin	1/12/2006
Petroica goodenovii	Red-capped Robin	15/06/2007
Phalacrocorax sulcirostris	Little Black Cormorant	17/05/2003
Phaps chalcoptera	Common Bronzewing	15/06/2007
Phylidonyris novaehollandiae novaehollandiae	New Holland Honeyeater (mainland SA)	15/06/2007
Platycercus elegans	Crimson Rosella	29/09/2008
Podargus strigoides	Tawny Frogmouth	15/01/2007
Pogona sp.		26/10/2003
Poliocephalus poliocephalus	Hoary-headed Grebe	25/10/2003
Psephotus haematonotus	Red-rumped Parrot	14/09/2005
Psephotus haematonotus haematonotus	Red-rumped Parrot (eastern SA except NE)	29/09/2008
Ptilotula penicillata	White-plumed Honeyeater	29/09/2008
Rhipidura albiscapa	Grey Fantail	15/06/2007
Rhipidura leucophrys leucophrys	Willie Wagtail	15/06/2007
Smicrornis brevirostris	Weebill	29/09/2008
Strepera versicolor	Grey Currawong	23/05/2007
Sturnus vulgaris vulgaris	Common Starling	15/06/2007
Tachyglossus aculeatus	Short-beaked Echidna	2/12/2016
Tadorna tadornoides	Australian Shelduck	13/05/2006

Scientific Name	Common Name	Date of Last Record
Tiliqua rugosa	Sleepy Lizard	26/10/2003
Todiramphus sanctus sanctus	Sacred Kingfisher	23/10/2003
Tribonyx ventralis	Black-tailed Nativehen	25/10/2003
Trichoglossus moluccanus moluccanus	Rainbow Lorikeet	17/05/2003
Trichosurus vulpecula	Common Brushtail Possum	5/10/2015
Turdus merula merula	Common Blackbird	29/09/2008
Turnix varius varius	Painted Buttonquail	18/08/1999
Vanellus miles	Masked Lapwing	17/05/2003
Vespadelus sp.		26/11/2011
Vulpes vulpes	Fox (Red Fox)	24/10/2003
Zosterops lateralis	Silvereye	15/06/2007