Natural Area
CONSULTING MANAGEMENT SERVICES

Planning Solutions

Flora and Fauna Survey
148 Dale Road, Middle Swan

Natural Area Holdings Pty Ltd
[redacted]

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Executive Summary

Natural Area Consulting Management Services (Natural Area) was commissioned by Planning Solutions to undertake a detailed flora and basic fauna survey, including a black cockatoo habitat assessment at 148 Dale Road, Middle Swan. Findings from the survey will inform relevant stakeholders of the environmental values of the site, as well as provide supporting information for clearing permit applications and environmental approvals.

The survey activities identified:

- a total of 68 flora species being present, including 50 natives and 18 introduced (weed) species
- one vegetation type, Open *Corymbia calophylla* Woodland was identified
- vegetation condition ranged from Completely Degraded to Good, with majority (75.6%) of the site classed as Degraded
- no threatened or priority ecological communities (TEC/PEC) were identified during the survey
- no conservation significant flora was identified during the survey
- a high density of introduced grasses was identified throughout the site
- a total seven vertebrate fauna species were observed to be present, including five birds and two mammals
- very good quality foraging habitat for black cockatoos including 66 potential cockatoo habitat trees (DBH >500mm).

As the site contains more than 1 ha of quality black cockatoo foraging habitat, clearing of this area may trigger a referral to the Department of Agriculture, Water and the Environment for potential significant impacts to black cockatoos, according to EPBC Act referral guidelines. A pre-referral meeting can be undertaken to determine if the proposed action is deemed a 'controlled action', which will require assessment and approval under the EPBC Act.

Assessment against the ten Native Vegetation Clearing Principles found that clearing within the survey site may be at variance with two of the principles (Principles B and E).

Contents

1.0 Introduction

[redacted] commissioned Natural Area Consulting Management Services (Natural Area) to undertake biological surveys at 148 Dale Road, Middle Swan. Surveys included a detailed flora survey, and a basic fauna survey including a black cockatoo habitat assessment. Information gathered during the surveys will inform stakeholders of the environmental values of the site and submitted to Department of Water and Environmental Regulation (DWER) as supporting information for a clearing permit application.

1.1 Location

The proposed site is approximately 4 ha and is part of Nikola Estate in the Swan Valley. It is located in the suburb of Middle Swan within the City of Swan, approximately 25 km north-east from Perth Central Business District (CBD) (Figure 1).

1.2 Background and Planning Context

Viticulture has been the primary land-use of the Swan Valley (City of Swan, 2008), which promotes horticultural, recreational and tourism activities. The proposed expansion of viticulture through planting grapevines on the proposed site is in-line with both the *Swan Valley Planning Act 1995* and *City of Swan Local Planning Scheme No. 17*.

1.2.1 Swan Valley Planning Act 1995

This Act defines the boundaries of the Swan Valley planning area and prescribes planning and development objectives for the various parts of the area. The Act delineates three planning areas (A, B and C) and locates the subject site within Area B. The planning objectives for Area B include but are not limited to "*the protection of viticulture"* and *"The encouragement of traditional activities of the Swan Valley and industries associated with viticulture, horticulture and cottage industry provided that they are compatible with the rural character of the area."*

1.2.2 City of Swan Local Planning Scheme No. 17

The proposed site is within the Swan Valley Rural Zone, which objectives include:

a) *promote the core area of the Swan Valley primarily as a horticultural, recreational, tourism and landscape resource;*
b) *provide for limited rural living within the Swan Valley, subject to locational, design and landscaping requirements to enhance the character and amenity of the valley and to ensure compatibility with productive rural activities;*
c) *recognise the occurrence of high-quality horticultural soils and scarce plastic clays and to protect these resources from development which would jeopardise their current and future use;*
d) *ensure that the development and use of land accords with the planning objectives for Area B as specified in the Swan Valley Planning Act 1995.*

1.3 Scope

Activities undertaken by Natural Area included:

- desktop database searches to identify potential conservation significant flora and fauna species, along with any threatened or priority ecological communities
- detailed flora and vegetation survey to determine the extent of the vegetation condition and type, as well as recording flora species present, including the presence of any threatened or priority species
- basic fauna survey to record any opportunistic sightings and evidence of the presence of fauna
- black cockatoo assessment to record sightings of threatened black cockatoo species, presence of potential breeding hollows, location of habitat trees (diameter at breast height (DBH) >500 mm) or evidence of their presence
- reporting outcomes of the assessment activities.

1.4 Objectives

The main objective of the survey was to collect sufficient data to adequately inform a clearing permit application to DWER, as required by clearing provisions under the *Environmental Protection Act 1986* (EP Act) and *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Regulations).

Figure 1:
Site Location
Dale Road, Middle Swan

2.0 Site Characteristics

The characteristics of a site have a strong bearing on the flora, vegetation, fauna, and ecological communities present. Key characteristics of the proposed site are outlined in this section.

2.1 Regional Context

According to the Interim Biogeographical Regionalisation of Australia (IBRA) descriptions, the site is located within the Swan Coastal Plain. The Swan Coastal Plain comprises two major divisions, the Swan Coastal Plain 1 -Dandaragan Plateau and Swan Coastal Plain 2 - Perth Coastal Plain, with the survey area situated in the latter.

Swan Coastal Plain 2 is described as low-lying coastal plain with sands of colluvial and aeolian origin, as well as alluvial river flats and coastal limestone. The region is dominated by Banksia and/or Jarrah Woodland over sandy soils associated with the dune systems, with Melaleuca (Paperbark) in damp areas and Jarrah Woodland to the east where the Swan Coastal Plain rises (Mitchel et al, 2002).

2.2 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters. According to the Bureau of Meteorology (2021); Perth Airport WA, site number 009021, 2021, the region has an average:

- rainfall of 760.4 mm pa, with rain falling predominantly between May and August
- maximum mean temperature ranging from 18 ^{o}C in winter to 31.9 ^{o}C in summer, with a maximum recorded temperature of 46.7 ^{o}C
- minimum mean temperatures ranging from 8 ^{o}C in winter to 17.5 ^{o}C in summer, with a minimum recorded temperature of -1.3 ^{o}C
- predominant wind directions include morning easterlies and afternoon south-westerly sea breezes, with an average wind speed of 16.5 km/h and gusts of more than 100 km/h.

2.3 Topography and Soils

The site has a relatively flat topography ranging from 16 m AHD (Australian Height Datum) in the south, rising gently to 18 m AHD to the north (Figure 2). Karrakatta Grey Sand (Pinjarra) is the main soil type that spans majority of the site with the other two soil types occurring to the western section of the site (Department of Primary Industries and Regional Development, 2021). The three soil types and corresponding descriptions are shown in Table 1.

Table 1: Soil Types

Name	Symbol	Description
Karrakatta Grey Sand (Pinjarra)	213Pj_Ksg	Moderately deep light grey sand over yellow sand (sand dune)
Herne Sand (Pinjarra)	213PjHE_Hs	Grey to greyish-brown sand with NIL to few gravels over mottled clay
Herne Deep Sand (Pinjarra)	213PjHE_Hsd	Deep grey to greyish brown sand with NIL to few gravels over mottled clay

2.4 Vegetation Complex

The Guildford Complex, as described by Heddle *et al.* (1980), was the only vegetation complex identified to occur within the survey area. This complex contains mixed Marri-Wandoo-Jarrah Open Forests with *Eucalyptus rudis* and *Melaleuca rhaphiophylla* fringing woodland along the streams. Most of this area has been subjected to logging and clearing since European settlement. Other remnant plant species in the Guildford Complex includes *Banksia grandis, Kingia australis, Xanthorrhoea preissii* and species of *Hardenbergia* and *Hibbertia* (Heddle *et al*, 1980).

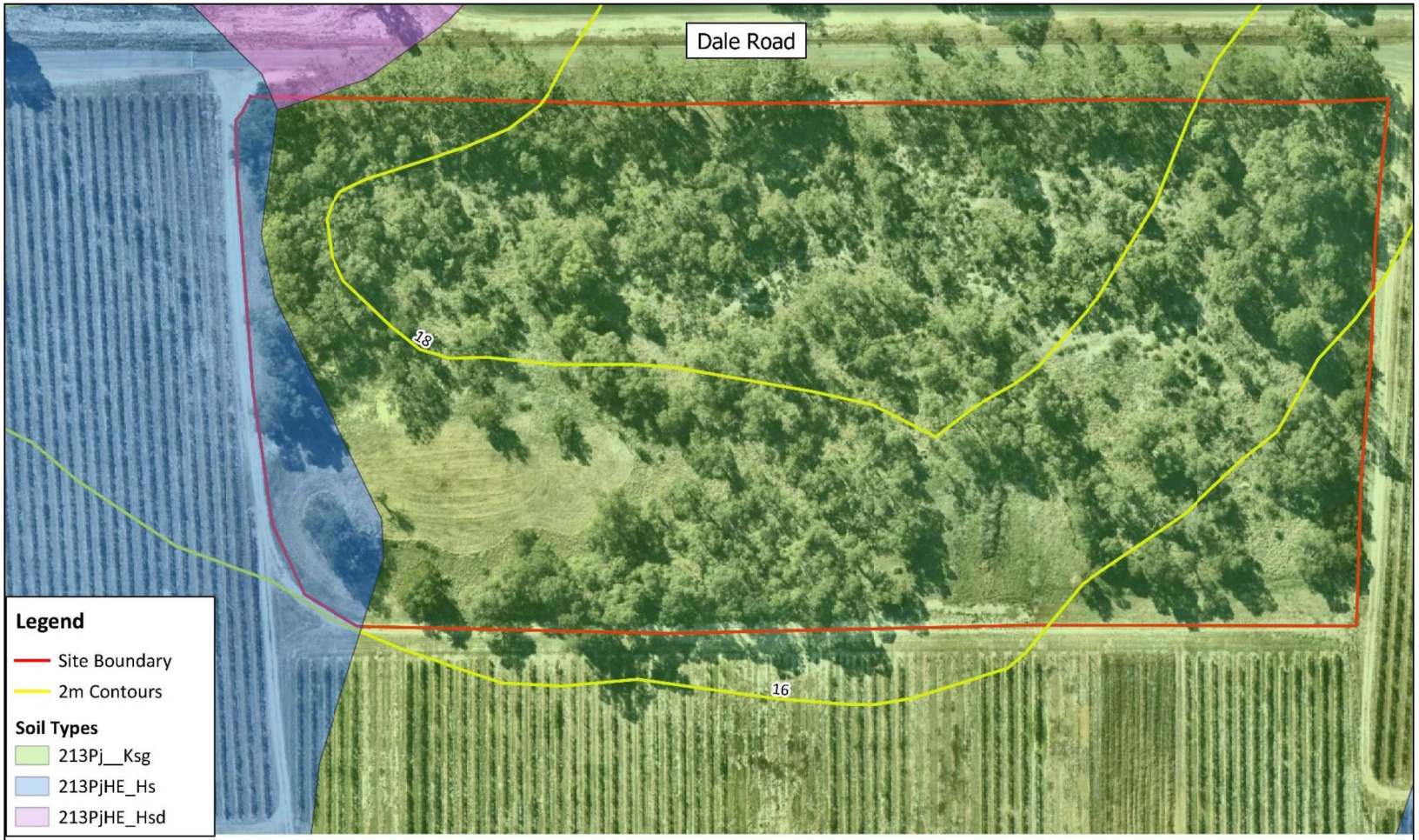

Figure 2:
Topography and Soils
Dale Road, Middle Swan

Client: Planning Solutions
Date: May 2021
Created by: J. Wei
Image Source: Nearmap, 2021
Datum: GDA 94

3.0 Methodology

The survey methodologies undertaken by Natural Area are described in this section.

3.1 Desktop and Literature Review

Desktop surveys were undertaken to determine:

- likely native and non-native flora and fauna species present
- current extent of native vegetation
- general floristic community types
- likely presence of threatened or priority flora and fauna species
- likely presence of any threatened or priority ecological communities.

The following databases were accessed to obtain relevant information:

- FloraBase (Department of Biodiversity, Conservation and Attractions, 2021a)
- NatureMap (Department of Biodiversity, Conservation and Attractions, 2021b) (Appendix 1)
- Protected Matters Search Tool (Department of Agriculture, Water and the Environment, 2021), (Appendix 2)
- National Map to determine to determine soil types, contours (Department of Primary Industries and Regional Development, 2021)
- DBCA threatened and priority flora and fauna database searches (Department of Biodiversity, Conservation and Attractions, 2021c and 2021d).

3.2 On-ground Flora Survey

Natural Area personnel [redacted] (Biologist) and [redacted] (Botanist) surveyed the site on 5 May 2021, with key GPS data recorded using Mappt software on a handheld Samsung tablet. Field activities included:

- walking the site and identifying flora species present, including targeting declared rare and priority species indicated as potentially present during desktop assessments
- assessing boundaries of vegetation type and vegetation condition across the site
- using a GPS to map significant species
- determining the presence of any further threatened or priority listed flora species and/or ecological communities listed under the *Biodiversity and Conservation Act 2016* (WA) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).
- three 10 m x 10 m quadrats were installed per vegetation type to record floristic presence and characterise vegetation units.

Flora and vegetation surveys were carried out in accordance with *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016). Unfamiliar species were recorded and photographed to enable later identification.

A photo was taken of each quadrat and the following data was collected using a modified recording sheet based on the NAIA templates developed for the Perth Biodiversity Project:

1. Vegetation type, which was determined using the structural classes described in Bush Forever Volume 2 (Government of Western Australia, 2000), which records dominant over, middle and understorey

species. A tablet device equipped with GPS mapping software was used to mark the change in vegetation type across the site. A description of the various structural classes is provided in Table 2.
2. Vegetation condition was assessed using the rating scale attributed to Keighery in Bush Forever Volume 2 (Government of Western Australia, 2000) (Table 3).
3. Aspect of the site.
4. Topography of the site.
5. Slope of the site.
6. Soil type.
7. Soil colour.
8. Gravel as a percentage of cover.
9. Rock as a percentage of cover.
10. Leaf litter as a percentage of cover.
11. Bare ground as a percentage of cover.
12. Drainage of the site.
13. Flora species present including percentage cover, height, habit and life form. Where species could not be identified in the field, samples were collected, or photographs taken for later identification. Additional species were recorded whilst the site was being traversed. Conservation significant species were targeted using the field reference guide compiled from the results of database searches.
14. Fauna sightings or evidence of fauna use within the sites.

3.2.1 Vegetation Type

The vegetation type was determined using the structural classes described in *Bush Forever Volume 2* (Government of Western Australia, 2000), and records dominant over, middle and understorey species (Table 2).

Table 2: Vegetation structural classes

Life Form/Height Class	**Canopy Percentage Cover**			
	100 – 70%	**70 – 30%**	**30 – 10%**	**10 – 2 %**
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Trees 10 – 30 m	Closed forest	Open forest	Woodland	Open woodland
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland
Tree Mallee	Closed tree mallee	Tree mallee	Open tree mallee	Very open tree mallee
Shrub Mallee	Closed shrub mallee	Shrub mallee	Open shrub mallee	Very open shrub mallee
Shrubs over 2 m	Closed tall scrub	Tall open scrub	Tall shrubland	Tall open shrubland
Shrubs 1 – 2 m	Closed heath	Open heath	Shrubland	Open shrubland
Shrubs under 1 m	Closed low heath	Open low heath	Low shrubland	Low open shrubland
Grasses	Closed grassland	Grassland	Open grassland	Very open grassland
Herbs	Closed herbland	Herbland	Open herbland	Very open herbland

Life Form/Height Class	Canopy Percentage Cover			
	100 – 70%	70 – 30%	30 – 10%	10 – 2 %
Sedges	Closed sedgeland	Sedgeland	Open sedgeland	Very open sedgeland

(Source: Government of Western Australia, 2000)

3.2.2 Vegetation Condition

Vegetation condition was assessed using the rating scale attributed to Keighery in *Bush Forever Volume 2* (Table 3) (Government of Western Australia, 2000).

Table 3: Vegetation condition ratings

Category		Description
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
6	Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

(Source: Government of Western Australia, 2000)

3.3 On-ground Fauna Survey

A basic fauna survey was undertaken in conjunction with other survey activities. The terrestrial vertebrate fauna surveys were carried out in accordance with *EPA Technical Guidance – Terrestrial vertebrate fauna surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2020). The fauna survey included recording opportunistic sightings of fauna species while traversing the survey area along with recording evidence of presence in the form of:

- scats
- tracks
- diggings

- burrows, dens and warrens
- runnels (vegetative tunnels)
- calls.

The black cockatoo habitat survey recorded:

- direct observations of threatened black cockatoo species
- location and species of potential habitat trees (trees with diameter at breast height (DBH) >500 mm)
- evidence of foraging in the form of chewed nuts
- potential nesting hollows
- a photograph of each habitat tree and its canopy.

3.4 Limitations

Several limitations associated with both desktop and on-ground flora and fauna surveys exist, including:

- survey was conducted outside of the optimal time of year for flora surveys in the Perth region
- database searches provide an indication of what flora species may be present, with on ground surveys required to confirm those present
- information on flora species provided on some databases include out-of-date species names, meaning that names need to be checked against latest taxonomic revisions
- herbarium records are largely limited to vouchered specimens
- plant species flower at different times and are not always able to be identified
- on-ground surveys indicate species present at the time of the assessment, some annual species such as orchids, may not be presenting during this time of the year
- not all species flower every year
- the differing databases are reliant on information submitted via various reporting mechanisms, so all records of a particular species or ecological community within a specified area may not be complete
- some fauna species are highly mobile and may utilise the survey area as part of their range but may not be present at the time of the survey
- certain fauna species are shy, cryptic or active at different times of the day and may avoid detection even though they are present within the site.

Despite these limitations, Natural Area estimates that 80 – 90% of flora species within the survey area were identified.

4.0 Flora Survey Results

Survey results from both desktop assessments and on-ground flora surveys are presented in this section.

4.1 Flora Desktop Survey

A review of the NatureMap report (Department of Biodiversity, Conservation and Attractions, 2021b) (Appendix 1) indicated the potential for 101 flora species to occur within 3 km of the proposed site, comprising:

- 63 dicotyledons
- 37 monocotyledons
- one pteridophyte (fern).

4.1.1 Significant Flora Species

Of the flora species identified, NatureMap indicated the potential for five conservation significant flora species listed under the *Biodiversity Conservation Act 2016* (WA) to occur within 3 km of the site (Department of Biodiversity, Conservation and Attractions, 2021b) (Table 4). The Protected Matters Search Tool (PMST) (Department of Agriculture, Water and the Environment, 2021) indicated the potential for 14 flora species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cwlth), to occur within a 3 km radius of the site (Table 4). A review of the DBCA's threatened and priority flora database indicated 38 species which have been previously recorded within a 5 km radius of the survey site (Department of Biodiversity, Conservation and Attractions, 2021c) (Table 4).

Of the 52 conservation significant species potentially found within the area, it was determined that local site conditions such as soil types, drainage may be suitable for 12 species (highlighted in green) (Table 4). Conservation code definitions for the state and commonwealth level are provided in Appendix 3.

Table 4: Conservation significant species potentially occurring on site

Species	Common Name	Cons. Code	NatureMap	PMST	DBCA Database Search
Acacia aphylla	Leafless Rock Wattle	VU			X
Acacia benthamii		P2			X
Acacia drummondii subsp. *affinis*		P3			X
Acacia oncinophylla subsp. *oncinophylla*		P3			X
Andersonia gracilis		EN		X	
Anigozanthos humilis subsp. *chrysanthus*	Golden Catspaw	P4			X
Anigozanthos viridis subsp. *terraspectans*	Dwarf Green Kangaroo Paw	VU		X	
Anthocercis gracilis	Slender Tailflower	VU			X

Species	Common Name	Cons. Code	NatureMap	PMST	DBCA Database Search
Beaufortia purpurea		P3			X
Bolboschoenus fluviatilis		P1			X
Byblis gigantea	Rainbow Plant	P3			X
Caladenia huegelii	Grand Spider Orchid	EN/ CR		X	X
Calothamnus accedens		P4			X
Carex tereticaulis		P3			X
Calytrix breviseta subsp. breviseta					X
Conospermum undulatum		VU			X
Cyathochaeta teretifolia		P3	X		X
Darwinia pimelioides		P4	X		X
Diplolaena andrewsii		EN		X	X
Diuris drummondii	Tall Donkey Orchid	VU		X	
Diuris purdiei	Purdie's Donkey Orchid	EN		X	
Drakaea elastica	Glossy-leaved Hammer Orchid	EN		X	
Drosera occidentalis	Western Sundew	P4			X
Eleocharis keigheryi		VU		X	
Eucalyptus x balanites	Cadda Road Mallee	EN		X	
Grevillea christineae		EN		X	
Grevillea curviloba		EN		X	
Grevillea manglesii subsp. *dissectifolia*		P3			X
Halgania corymbosa		P3			X
Hydrocotyle striata		P1			X
Isopogon autumnalis	Autumn Isopogon	P3	X		
Meionectes tenuifolia		P3	X		
Jacksonia sericea	Waldjumi	P4			X
Lepyrodia curvescens		P2			X
Levenhookia preissii	Preiss's Stylewort	P1			X
Macarthuria keigheryi		EN			X

Species	Common Name	Cons. Code	NatureMap	PMST	DBCA Database Search
Persoonia sulcata		P4			X
Pithocarpa corymbulosa	Corymbose Pithocarpa	P3			X
Senecio leucoglossus		P4			X
Schoenus capillifolius		P3			X
Schoenus griffinianus		P4			X
Schoenus sp. Waroona		P3			X
Stachystemon exilis	Slender Stachystemon	P1			X
Stylidium longitubum	Jumping Jacks	P4			X
Synaphea sp. Fairbridge Farm		CR		X	
Tetratheca pilifera		P3			X
Thelymitra dedmaniarum	Cinnamon Sun Orchid	EN		X	
Thelymitra stellata	Star Orchid	EN		X	
Thysanotus anceps		P3			X
Thysanotus brachiatus		P2			X
Thysanotus glaucus		P4	X		X
Verticordia lindleyi subsp. *lindleyi*		P4			X

4.1.2 Threatened and Priority Ecological Communities

A review of the PMST report indicated the potential for two threatened ecological communities to occur within 3 km of the site (Table 5).

Table 5: Potential Threatened Ecological Communities within survey site

Name	Status	Presence
Banksia Woodland of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Tuart (*Eucalyptus gomphocephala)* Woodlands and Forest of the Swan Coastal Plain ecological community	Critically Endangered	Community may occur within area

4.2 Flora On-ground Survey

The flora survey confirmed the presence of 68 flora species from 26 families, including 50 natives, and 18 introduced (weeds). Two of the Western Australian native species recorded *Eucalyptus caesia* and *Eucalyptus erythrocorys* are not native to the Swan Coastal Plain Region and were likely introduced via planting in the site. Photos of some of the flora species recorded on site are illustrated in Figure 3. No significant flora was identified during the survey. A complete flora list detailing the all the species observed on site with their corresponding families and common names are listed in Appendix 5. Three quadrats were set up across the site to determine floristic and vegetation structure compositions. Data for the three quadrats are outlined in Appendix 4.

*Madrid Brome (*Bromus madritensis)*

*Bulge Lily (*Watsonia meriana)*

**Soursob *(Oxalis pes-caprae)*

Hypolaena exsulca

Lepidosperma scabrum

Eucalyptus erythrocorys

Figure 3: Photos of flora recorded within surveyed site. *Denotes introduced species

4.2.1 Vegetation Type

The survey confirmed the presence of one vegetation type, Open *Corymbia calophylla* Woodland (Figure 4 and 5). This vegetation community is comprised of *Corymbia calophylla* (Marri) over a middle storey of *Xanthorrhoea preissii* and an under storey of *Ehrharta calycina* (Perennial Veldt) and other introduced herbs.

Figure 4: Open *Corymbia calophylla* Woodland

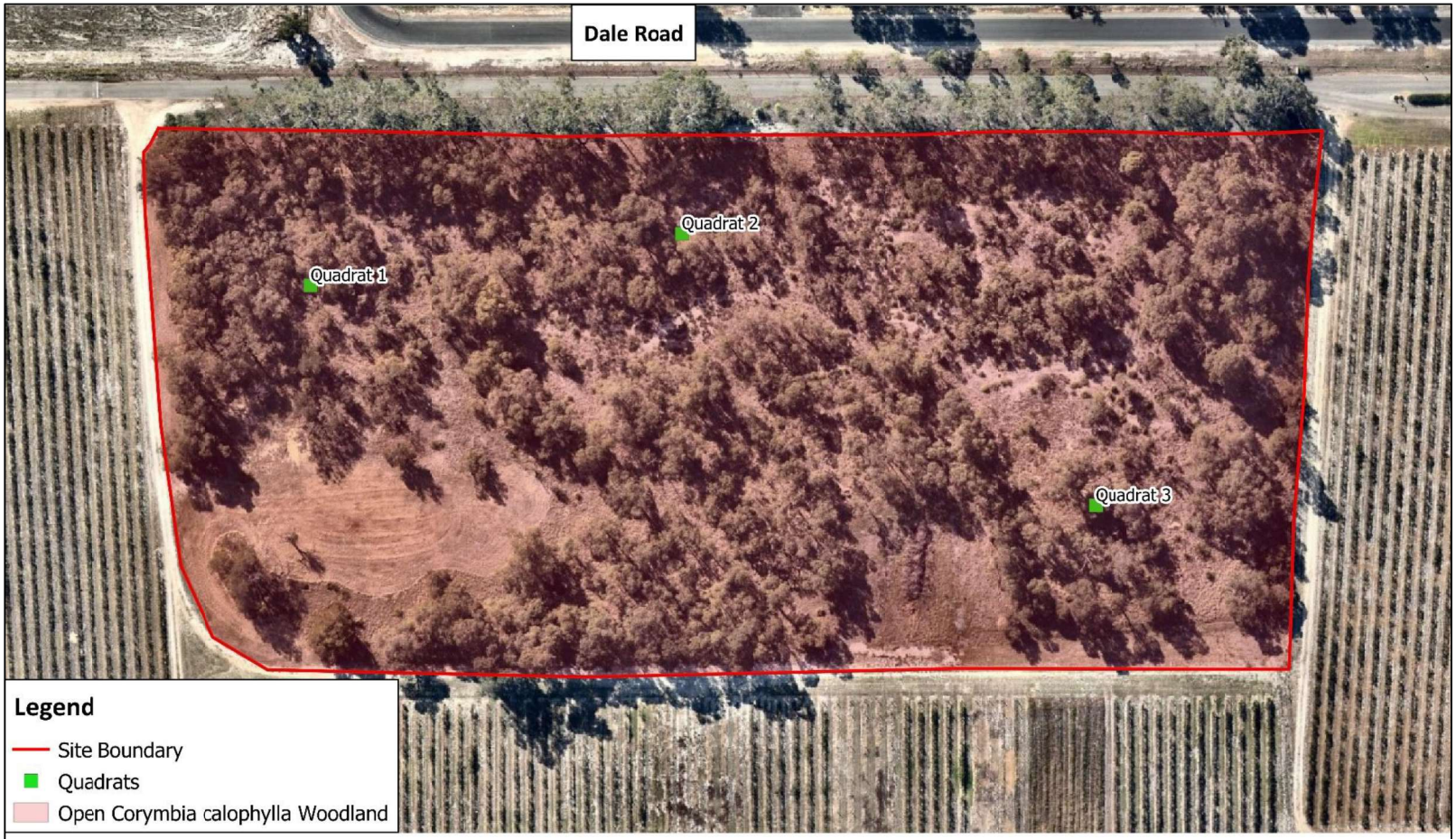

Figure 5:
Vegetation Type
Dale Road. Middle Swan

Client: Planning Solutions
Date: May 2021
Created by: T. Brebner
Image Source: Nearmap, 2021
Datum: GDA 94

4.2.2 Vegetation condition

Vegetation condition across the site ranges from Completely Degraded to Good (Table 6, Figure 6), with most of the site classed as Degraded, as it has been historically grazed by cattle (Yukich, 2021).

Table 6: Vegetation Condition across the survey site

Vegetation condition	Pristine	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
Area (ha)	0	0	0	0.279	3.171	0.740	4.19
Area (%)	0	0	0	6.7%	75.6	17.7	100

Completely Degraded

Degraded

Good

Figure 6: Examples of the vegetation condition

Figure 7:

Vegetation Condition
Dale Road Middle Swan

4.2.3 Threatened and Priority Ecological Communities

The desktop survey identified the potential for two TECs to potentially occur within the survey site. They include the endangered Banksia Woodlands of the Swan Coastal Plain ecological community and the critically endangered Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community. It is unlikely that the latter TEC occurs within the survey area as no Tuarts (*Eucalyptus gomphocephala)* were recorded on site. Presence of Tuarts are a key diagnostic characteristic of this critically endangered TEC.

An assessment against the key diagnostic characteristics of the Banksia Woodlands of the Swan Coastal Plain ecological community was undertaken (Department of Agriculture, Water and the Environment, 2016). (Table 7).

Table 7: Criteria for Banksia Woodlands of the Swan Coastal Plain TEC

Key Diagnostic Characteristics	Survey site
Location and Physical environment Primarily occurs in the Swan Coastal Plain IBRA bioregion	Located on the Swan Coastal Plain
Soils and Landforms Typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean, and Spearwood sands and occasionally on Quindalup sands	Occurs mainly on Karrakatta Grey Sand (Pinjarra)
The structure of the ecological community is a low woodland to forest with these features: ▪ distinctive upper sclerophyllous layer of low trees (occasionally large shrubs more than 2 m tall), typically dominated or co-dominated by one or more of the *Banksia* species identified below ▪ emergent trees of medium or tall (>10 m) height *Eucalyptus* or *Allocasuarina* species may sometimes be present above the Banksia canopy ▪ highly species-rich understorey that consists of a layer of sclerophyllous shrubs of various heights; and a herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs, that sometimes includes grasses. The development of a ground layer may vary depending on the density of the shrub layer and disturbance history.	No distinctive upper layer of *Banksia* sp. was identified. *Allocasuarina fraseriana* and *Corymbia calophylla* were the dominant upper canopy species. The sclerophyllous layer consists of five of the six key species of families and has a total of 25 species present. The herbaceous ground layer contains four of the six key families and has a total of 21 species.
Composition ▪ The canopy is most commonly dominated or co-dominated by *Banksia attenuata* (candlestick banksia, slender banksia) and/or *B. menziesii* (firewood banksia). Other Banksia species that dominate in some examples of the ecological community are *B. prionotes* (Acorn Banksia) or *B. ilicifolia* (Holly-leaved Banksia)	*Banksia attenuata* and *Banksia menziesii* was identified onsite. However, they were in low density and not considered to be the dominant species.

Key Diagnostic Characteristics	Survey site
▪ The patch must include at least one of the following diagnostic species: - *Banksia attenuata* (Candlestick Banksia) - *Banksia menziesii* (Firewood Banksia) - *Banksia prionotes* (Acorn Banksia) - *Banksia ilicifolia* (Holly-leaved Banksia); AND ▪ If present, the emergent tree layer often includes *Corymbia calophylla* (Marri*), E. marginata* (Jarrah), or less commonly *Eucalyptus gomphocephala* (Tuart) ▪ Other trees of a medium height that may be present, and may be codominant with the *Banksia* species across a patch, include *Eucalyptus todtiana* (Blackbutt, Pricklybark), *Nuytsia floribunda* (Western Australian Christmas tree), *Allocasuarina fraseriana* (Western Sheoak), *Callitris arenaria* (Sandplain cypress), *Callitris pyramidalis* (Swamp Cypress) and *Xylomelum occidentale* (Woody Pear)	
Contra-indicators ▪ Patches clearly dominated by *Banksia littoralis* are not part of the Banksia Woodlands ecological community but indicates a different, dampland community is present. ▪ Patches clearly dominated by *Bankia burdettii* are not part of the Banksia Woodlands ecological community but indicates a tall shrubland and not the Banksia Woodlands ecological community. ▪ FCT 20c – Eastern shrublands and woodlands, corresponds with a separate EPBC ecological community listing, Shrublands and Woodlands of the eastern Swan Coastal Plain. Occurrences of this FCT should be considered under that separate listing.	No *Banksia littoralis* or *Banksia burdettii* were identified during the survey.
Condition To be considered a TEC a patch should be identified as at least Good condition	Only 0.279 ha of the site is classed to be in Good condition
Minimum Patch Size ▪ 'Pristine' – no minimum patch size applies. ▪ 'Excellent' – 0.5 ha or 5,000 m2 (e.g., 50 m x 100 m) ▪ 'Very Good' – 1 ha or 10,000 m2 (e.g., 100 m x 100 m) ▪ 'Good' – 2 ha or 20,000 m2 (e.g., 200 m x 100 m)	Site only 0.279 ha of Good condition patch, with the remaining vegetation classed as Degraded (3.171 ha) and Completely Degraded (0.74 ha)

5.0 Fauna Survey Results

Survey results from both desktop assessments and on-ground fauna surveys are presented in this section.

5.1.2 Black Cockatoo Habitat

There is potential for the three threatened black cockatoos and their habitat to occur on site including, the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) listed as endangered under the *Environment Protection and Biodiversity Conservation Act (EPBC) Act 1999* (Cwlth), the Forest Red-tailed Black Cockatoo *(Calyptorhynchus banksia naso*) and the Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) listed as vulnerable; all are listed as threatened under the *Biodiversity Conservation Act 2016* (WA).

According to NationalMap, five black cockatoo roost sites have been recorded within 5 km of the survey site, with a roost site within 1 km from the survey area (Department of Biodiversity, Conservation and Attractions, 2019a). Closest confirmed Carnaby's cockatoo breeding areas (buffered) occur just 1 km to the east (Department of Biodiversity, Conservation and Attractions, 2018).

5.1 Fauna Desktop Survey

A review of the NatureMap report (Department of Biodiversity, Conservation and Attractions, 2021b) (Appendix 1) indicated the potential for 166 fauna species to occur within 3 km of the proposed site, comprising:

- 11 amphibians
- 104 birds
- 3 fishes
- 29 invertebrates
- four mammals
- 15 reptiles.

5.1.1 Significant Fauna Species

Of the fauna species identified, NatureMap indicated the potential for 12 conservation significant fauna species listed under the *Biodiversity Conservation Act 2016* (WA) to occur within 3 km of the site (Department of Biodiversity, Conservation and Attractions, 2021b). The Protected Matters Search Tool (PMST) (Department of Agriculture, Water and the Environment, 2021) indicated the potential for nine fauna species listed as Matters of National Environmental Significance, under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cwlth), to occur within a 3 km radius of the site. Threatened, Specially Protected and Priority fauna data from the from Department of Biodiversity, Conservation and Attractions' database indicated 10 species which have been previously recorded within a 5 km radius of the survey site (Department of Biodiversity, Conservation and Attractions, 2021d).

Of the 18 conservation significant species identified as potentially occurring within the site, it was determined that three fauna species are likely to occur, based on local site conditions such as habitat, resource availability and location (highlighted in green). Conservation code definitions for the state and commonwealth level are provided in Appendix 3.

Table 8: Conservation significant species

Lifeform	Species	Common Name	Cons Code	NatureMap	PMST	DBCA Database Search
Bird	*Anous tenuirostris subsp. melanops*	Australian Lesser Noddy	EN	X		
Mammal	*Bettongia penicillata*	Woylie	CR		X	
Bird	*Botaurus poiciloptilus*	Australian Bittern	EN		X	
Bird	Calidris ferruginea	Curlew Sandpiper	VU		X	
Bird	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo	VU	X	X	X
Bird	*Calyptorhynchus baudinii*	Baudin's Cockatoo	EN	X	X	X

Lifeform	Species	Common Name	Cons Code	NatureMap	PMST	DBCA Database Search
Bird	*Calyptorhynchus latirostris*	Carnaby's Cockatoo	EN	X	X	X
Mammal	*Dasyurus geoffroii*	Western Quoll, Chuditch	VU	X		X
Mammal	*Falsistrellus mackenziei*	Western Falsistrelle	P4	X		X
Fish	*Geotria australis*	Pouched Lamprey	P3	X		X
Mammal	*Isoodon fusciventer*	Quenda	P5	X		X
Bird	*Leipoa ocellata*	Mallefowl	VU		X	
Bird	*Numenius madagascariensis*	Far Eastern Curlew (Eastern Curlew)	VU		X	
Bird	*Plegadis falcinellus*	Glossy Ibis	IA	X		X
Bird	Rostratula benghalensis	Australian Painted Snipe	EN		X	
Bird	*Sterna bergii*	Crested Tern	IA	X		X
Invertebrate	*Synemon gratiosa*	Graceful Sunmoth	P4	X		X
Bird	*Tringa hypoleucos*	Common Sandpiper	IA	X		

5.2 Fauna on-ground Survey

The basic fauna survey confirmed the presence of seven vertebrate fauna species, including five birds and two mammals. Four of the species are non-native introduced species, including the Rabbit (*Oryctolagus cuniculus*) and the Red Fox (*Vulpes vulpes*), which are C3 Declared Pest under the *Biosecurity and Agriculture Management Act 2007*. (Table 9, Figure 8).

Table 9: Fauna observed within survey area

Lifeform	Species	Common Name	Comments
Bird	*Platycercus zonarius*	Twenty-eight Parrot	Observed roosting
Bird	*Corvus coronoides*	Australian Raven	Observed roosting
Bird	*Cracticus tibicen*	Australian Magpie	Observed roosting
Bird	**Dacelo novaeguineae*	Laughing Kookaburra	Observed roosting
Mammal	**Oryctolagus cuniculus*	Rabbit	Evidence of diggings
Bird	**Trichoglossus moluccanus*	Rainbow Lorikeet	Numerous >10 observed roosting
Mammal	**Vulpes vulpes*	Red Fox	Evidence. Dens and prints

*Platycercus zonarius (*Twenty-eight Parrot)

**Trichoglossus moluccanus* (Rainbow Lorikeet)

Evidence of birds nesting

**Vulpes vulpes* (Red Fox). Den and prints

Figure 8: Fauna observations

5.2.1 Black Cockatoo Habitat Assessment

A total of 66 potential habitat trees with diameter at breast height (DBH) greater than 500 mm were recorded on site (Table 10, Figure 9). None of the trees exhibited any hollows large enough to accommodate black cockatoo breeding, with five Marris (*Corymbia calophylla*) exhibiting small hollows, which may have the potential to develop into larger black cockatoo breeding hollows in the future. Small may currently provide breeding habitat for other small bird species in the area. No direct observation of any of the three threatened black cockatoos were observed on site. No obvious feeding evidence in the form of chewed Marri nuts were recorded on site.

Table 10: Fauna habitat trees

Species	Status	No Hollows	Small Hollows	Total
Marri (*Corymbia calophylla*)	Alive	44	4	48

Species	Status	No Hollows	Small Hollows	Total
	Dead		1	1
			Total	**49**
Jarrah (*Eucalyptus marginata*)	Alive	1		1
Sheoak (*Allocasuarina fraseriana*)	Alive	15		15
	Dead	1		1
			Total	**16**
Combined Total				**66**

A scoring tool, based on the *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo* (Commonwealth of Australia, 2017), considers key attributes of foraging habitat for each of the three black cockatoo species. This scoring tool assigns a habitat score between one and ten, with a score of ten representing the maximum possible score and very high quality of foraging habitat. Contextual adjustors (attributes that improve or reduce functionality of foraging habitat) such as tree species composition, availability of nesting hollows, distances from known breeding and roosting sites, were considered and used to evaluate habitat quality. The scoring matrix was applied to the survey area, with foraging habitat deemed to be very high quality for all three species (Table 11).

Table 11: Black cockatoo habitat scoring tool

Forest Red-tail Black Cockatoo foraging habitat		**Score**
Impact area contains native eucalypt *Corymbia calophylla* woodland. *Corymbia calophylla* is the dominant tree species, which is a known foraging resource for black cockatoos.		7
Context adjustors: attributes improving/ reducing functionality of foraging habitat	Primarily contains Marri	+2
	Contains 66 trees with potential to be used for breeding (DBH ≥ 500 mm)	+2
	Is within black cockatoo roosting sites- Buffered (DBCA-064)	+1
	No clear evidence of feeding debris	-2
	Is >12 km from a known breeding location	-1
	Final Score	**9**
Carnaby's Cockatoo foraging habitat		**Score**
Impact area contains native eucalypt *Corymbia calophylla* woodland. *Corymbia calophylla* is the dominant tree species, which is a known foraging resource for black cockatoos.		7
Context adjustors: attributes improving/ reducing functionality of foraging habitat	Is within the Swan Coastal Plain (important foraging area)	+3
	Primarily contains Marri	+2
	Contains 66 trees with potential to be used for breeding (DBH ≥ 500 mm)	+2

	No clear evidence of feeding debris	-2
	Final Score	**10**

Baudin's Cockatoo foraging habitat		**Score**
Impact area contains native eucalypt *Corymbia calophylla* woodland. *Corymbia calophylla* is the dominant tree species, which is a known foraging resource for black cockatoos.		7
Context adjustors: attributes improving/ reducing functionality of foraging habitat	Is within the known foraging area	+3
	Primarily contains Marri	+2
	Contains 66 trees with potential to be used for breeding (DBH ≥ 500 mm)	+2
	Is within black cockatoo roosting sites- Buffered (DBCA-064)	+1
	No clear evidence of feeding debris	-1
	Is >12 km from a known breeding location	-1
	Final Score	**10**

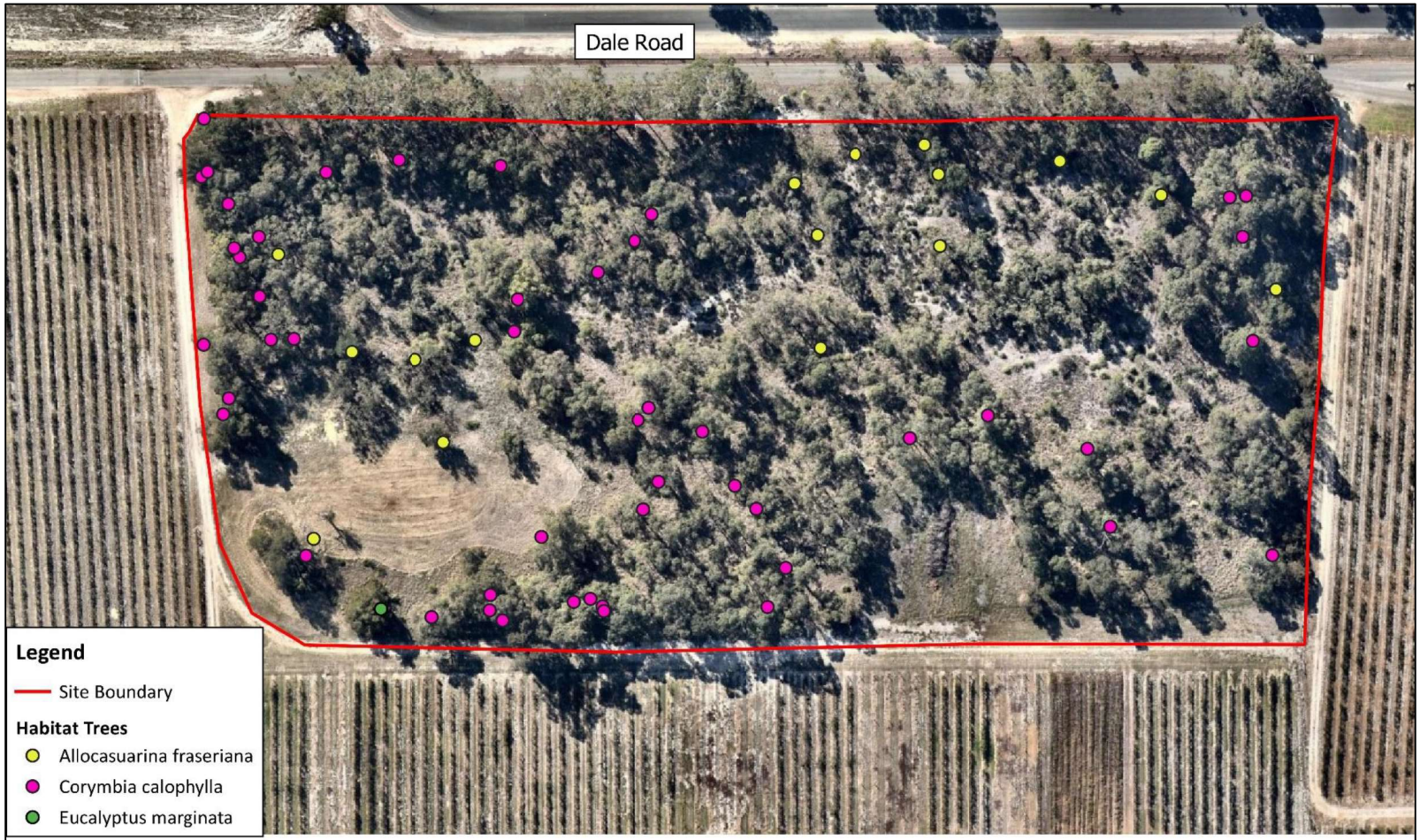

Figure 9:
Habitat Trees
Dale Road, Middle Swan

6.0 Results and Discussion

6.1 Flora and Vegetation

A total of 68 flora species (taxa) were recorded from 26 families during the field survey, including 18 introduced (weeds) and 50 native species. Two of the Western Australian native species recorded *Eucalyptus caesia* and *Eucalyptus erythrocorys* are not native to the Swan Coastal Plain Region and were likely introduced via planting in the site. However, these species can still act as food for threatened black cockatoos. Flora species are represented across several families with Myrtaceae having eight species, Proteaceae and Fabaceae having seven species each. There were no declared pests or Weeds of National Significance (WoNS) identified within the survey area, most of the weeds were Poaceae (seven species), with a high density of Perennial Veldt (*Ehrharta calycinus*) throughout the site.

The vegetation condition within the survey area ranged from Completely Degraded to Good, with only a small percentage (6.7%) of the survey area being classified as Good, with the majority (75.6%) classified as Degraded. The two Completely Degraded areas were completely devoid of native vegetation and had a high concentration of introduced grasses (*Ehrharta calycina* and *Cynodon dactylon*), as well as Soursob (O*xalis pes-caprae*).

6.1.1 Significant Flora

No threatened or priority flora species were identified during the May 2021 survey. Due to the timing of the flora and vegetation survey taking place outside the optimal time of year (spring) the potential presence of some conservation significant flora cannot be ruled out as they were either dormant or not flowering (e.g., threatened orchid species).

6.1.2 Threatened Ecological Communities

No threatened TECs or PECs were identified on site during the May 2021 survey. The survey site does not meet the key diagnostic characteristics or minimum condition thresholds for it to be considered part of the Endangered Banksia Woodlands of the Swan Coastal Plain or Critically Endangered Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological communities.

6.2 Fauna

Due to the nature of the site, with surrounding areas cleared for agriculture and history of grazing, the middle and understorey vegetation structure is limited and therefore habitat for most native terrestrial fauna is reduced. The large number of mature trees within the site has the potential to provide suitable habitat for avian species as seen from several old nests through the site.

Potential black cockatoo habitat is present in the form of 66 mature *Corymbia callophylla* within the site. While no clear evidence of feeding and no suitable breeding hollows was observed, the area is classified as very good foraging quality as it satisfies several requirements based on the black cockatoo referral guidelines (Commonwealth of Australia, 2017), including containing preferred foraging species and proximity to known roosting and breeding locations.

The presence of the introduced Rainbow Lorikeet (*Trichoglossus moluccanus*), which are known to aggressively protect feeding and nesting resources (Government of Western Australia, 2007) may be a contributing factor to the exclusion of native bird species, including the threatened black cockatoos, within the site. In addition, the Rabbit (*Oryctolagus cuniculus*) and the Red Fox (*Vulpes vulpes*), which are C3 declared pest under the *Biosecurity and Agriculture Management Act 2007*, are recorded on site as evidenced from diggings and den sites. As these two species are declared pests, it requires control by landowners and managers to reduce the harmful impacts of these species.

As the site contains more than 1 ha of quality black cockatoo foraging habitat, clearing of this area may trigger a referral to the federal environment minister for potential significant impact black cockatoo, according to EPBC Act referral guidelines for threatened black cockatoos. A pre-referral meeting can be undertaken with the Department of Agriculture, Water and the Environment to determine if the proposed action is deemed a 'controlled action' therefore requires assessment and approval under the EPBC Act.

Natural Area recommends retaining as much of the remnant bushland as practicable for the proposed land use, as the site is classified as good foraging habitat for black cockatoos, based on referral guidelines (Commonwealth of Australia, 2017). It is understood that a 25 m setback from the existing fence-line in the northern section of the site will not be cleared. As such, a total of 2.6 ha of remnant bushland is proposed to be cleared (Figure 10). This excludes existing cleared areas as well as the linear strip of vegetation in the northern section of the site. The 25 m setback from the existing fencing will see the retention of approximately 0.8 ha of remnant bushland) and 16 potential cockatoo habitat trees, including 10 *Corymbia callophylla* and six *Allocasuarina fraseriana* (Figure 11).

The contraction of the proposed clearing area, to retain vegetation including potential black cockatoo habitat trees, may help mitigate some of the impacts associated with land clearing.

Figure 10:
Proposed Clearing
Dale Road, Middle Swan

Client: Planning Solutions
Date: June 2021
[redacted]
Image Source: Nearmap, 2021
Datum: GDA 94

0 50 100 m N

Figure 11:
Habitat Trees Retained
Dale Road, Middle Swan

7.0 Assessment Against Clearing Principles

An assessment against the ten Native Vegetation Clearing Principles was undertaken to determine the environmental significance of clearing vegetation within the proposed site. The assessment considers the likely environmental impacts and assists in determining the significance of the native vegetation in accordance with the requirements of the *Environmental Protection Act 1986.* Assessment against these clearing principles found that clearing within the survey site may be at variance to two of the principles (Table 12).

Table 12: Native vegetation clearing principles and assessment

Clearing Principles		Assessment
A	Native vegetation should not be cleared if it comprises a high level of biological diversity.	The proposed clearing is not likely to be at variance with this principle: ▪ vegetation condition is mostly Degraded – Good (0.279 ha) – Degraded (3.171 ha) – Completely Degraded (0.74 ha) ▪ 0.8 ha of remnant bushland in the northern sections is proposed to be retained (25 m from existing fence-line) ▪ contains 68 flora species from 26 families, including 50 natives, and 18 introduced (weeds).
B	Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	The proposed clearing may be at variance with this principle: ▪ contains potential black cockatoo habitat including 66 habitat trees and presence of *Corymbia calophylla* trees which black cockatoos are known to forage on ▪ 50 potential habitat trees will be within the proposed clearing envelope and will be affected by the proposed works ▪ in close proximity to confirmed foraging and breeding sites ▪ no suitable nesting hollows for black cockatoos were observed ▪ no clear evidence of feeding ▪ no direct observations of black cockatoos during site survey.
C	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	The proposed clearing is not likely to be at variance with this principle: ▪ no threatened or priority flora species were recorded within the three sites.
D	Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the	The proposed clearing is not likely to be at variance with this principle: ▪ no threated or priority communities were recorded to be within any of the three sites.

Clearing Principles		Assessment
	maintenance of, a threatened ecological community.	
E	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	The proposed clearing may be at variance with this principle: ▪ Guildford vegetation complex, as identified on site, has been previously extensively cleared, with only has 5.87% of pre-European extent remaining (WALGA, 2013) ▪ 10.68% (427 ha) of the remaining pre-European extent occurs within the City of Swan (WALGA, 2010).
F	Native vegetation should not be cleared if it is growing in or in association with a watercourse or wetland.	The proposed clearing is not likely to be at variance with this principle as the site is not growing in or in association with a watercourse or wetland.
G	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The proposed clearing is not likely to be at variance with this principle as surrounding areas has been previously cleared for agriculture and proposed clearing is unlikely to cause further land degradation.
H	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The proposed clearing is not likely to be at variance with this principle as surround areas are currently cleared for agriculture.
I	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration	The proposed clearing is not likely to be at variance with this principle as no surface water courses were identified within the survey site.

Clearing Principles		Assessment
	in the quality of surface or underground water.	
J	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding.	The proposed clearing is not likely to be at variance with this principle: ▪ soils within the three sites are sandy and porous with no wetlands, watercourses or areas subject to inundation. ▪ clearing of native vegetation is not likely to increase the intensity of flooding.

8.0 References

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Appendix 1: NatureMap

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 29/04/2021

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 00' 32" E,31° 51' 09" S
Buffer 3km
Group By Species Group

Species Group	Species	Records
Amphibian	11	228
Bird	104	2715
Dicotyledon	63	73
Fish	3	3
Fungus	1	1
Gymnosperm	1	1
Invertebrate	29	42
Mammal	4	9
Monocotyledon	37	44
Pteridophyte (Fern)	1	1
Reptile	15	31
TOTAL	**269**	**3148**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25398	*Crinia georgiana (Quacking Frog)*			
2.	25399	*Crinia glauerti (Clicking Frog)*			
3.	25400	*Crinia insignifera (Squelching Froglet)*			
4.	25401	*Crinia pseudinsignifera (Bleating Froglet)*			
5.	25409	*Heleioporus barycragus (Hooting Frog)*			
6.	25410	*Heleioporus eyrei (Moaning Frog)*			
7.	25412	*Heleioporus psammophilus (Sand Frog)*			
8.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
9.	25388	*Litoria moorei (Motorbike Frog)*			
10.	25426	*Neobatrachus pelobatoides (Humming Frog)*			
11.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Bird					
12.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
13.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
14.	24262	*Acanthiza inornata (Western Thornbill)*			
15.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
16.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
17.	25536	*Accipiter fasciatus (Brown Goshawk)*			
18.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
19.	24312	*Anas gracilis (Grey Teal)*			
20.	24313	*Anas platyrhynchos (Mallard)*			
21.		*Anas platyrhynchos subsp. domesticus*			
22.	24315	*Anas rhynchotis (Australasian Shoveler)*			
23.	24316	*Anas superciliosa (Pacific Black Duck)*			
24.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
25.	24506	*Anous tenuirostris subsp. melanops (Australian Lesser Noddy)*		T	
26.	24561	*Anthochaera carunculata (Red Wattlebird)*			
27.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
28.	41324	*Ardea modesta (great egret, white egret)*			
29.	24341	*Ardea pacifica (White-necked Heron)*			
30.	24318	*Aythya australis (Hardhead)*			
31.		*Barnardius zonarius*			
32.	25713	*Cacatua galerita (Sulphur-crested Cockatoo)*			
33.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
34.	25716	*Cacatua sanguinea (Little Corella)*			
35.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*	Y		
36.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
37.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
38.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
39.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)*		T	
40.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
41.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
42.	24288	*Circus approximans (Swamp Harrier)*			
43.	24399	*Columba livia (Domestic Pigeon)*	Y		
44.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
45.	24416	*Corvus bennetti (Little Crow)*			
46.	25592	*Corvus coronoides (Australian Raven)*			
47.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
48.	25595	*Cracticus tibicen (Australian Magpie)*			
49.	25596	*Cracticus torquatus (Grey Butcherbird)*			
50.	24322	*Cygnus atratus (Black Swan)*			
51.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
52.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
53.		*Egretta novaehollandiae*			
54.		*Elanus axillaris*			
55.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
56.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
57.		*Eolophus roseicapillus*			
58.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
59.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)*			
60.	25623	*Falco longipennis (Australian Hobby)*			
61.	24474	*Falco longipennis subsp. longipennis (Australian Hobby)*			
62.	25727	*Fulica atra (Eurasian Coot)*			
63.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
64.	24401	*Geopelia cuneata (Diamond Dove)*			
65.	25530	*Gerygone fusca (Western Gerygone)*			
66.	24443	*Grallina cyanoleuca (Magpie-lark)*			
67.	24295	*Haliastur sphenurus (Whistling Kite)*			
68.	47965	*Hieraaetus morphnoides (Little Eagle)*			
69.	25734	*Himantopus himantopus (Black-winged Stilt)*			
70.	24491	*Hirundo neoxena (Welcome Swallow)*			
71.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
72.	25661	*Lichmera indistincta (Brown Honeyeater)*			
73.	25654	*Malurus splendens (Splendid Fairy-wren)*			
74.	24583	*Manorina flavigula (Yellow-throated Miner)*			
75.	47997	*Melanodryas cucullata (Hooded Robin)*			
76.	24598	*Merops ornatus (Rainbow Bee-eater)*			
77.		*Microcarbo melanoleucos*			
78.	25693	*Microeca fascinans (Jacky Winter)*			
79.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
80.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
81.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
82.	24693	*Pachyptila desolata (Antarctic Prion)*			
83.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
84.	24625	*Pardalotus punctatus subsp. punctatus (Spotted Pardalote)*			
85.	25682	*Pardalotus striatus (Striated Pardalote)*			
86.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
87.	48061	*Petrochelidon nigricans (Tree Martin)*			
88.	24659	*Petroica goodenovii (Red-capped Robin)*			
89.	25697	*Phalacrocorax carbo (Great Cormorant)*			
90.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
91.	25699	*Phalacrocorax varius (Pied Cormorant)*			
92.	24409	*Phaps chalcoptera (Common Bronzewing)*			
93.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
94.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
95.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
96.	25720	*Platycercus icterotis (Western Rosella)*			
97.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
98.	25703	*Podargus strigoides (Tawny Frogmouth)*			
99.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
100.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
101.		*Purpureicephalus spurius*			
102.	48096	*Rhipidura albiscapa (Grey Fantail)*			
103.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
104.	30948	*Smicrornis brevirostris (Weebill)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
105.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
106.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
107.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
108.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
109.	48597	*Thalasseus bergii (Crested Tern)*		IA	
110.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
111.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
112.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
113.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
114.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
115.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
Dicotyledon					
116.	15466	*Acacia applanata*			
117.	17858	*Acacia dealbata*	Y		
118.	18597	*Acacia longifolia subsp. sophorae*	Y		
119.	15481	*Acacia pulchella var. glaberrima*			
120.	3541	*Acacia sessilis*			
121.	2655	*Amaranthus albus (Tumbleweed)*	Y		
122.	2383	*Amyema preissii (Wireleaf Mistletoe)*			
123.	20283	*Astartea scoparia (Common Astartea)*			
124.	2471	*Atriplex prostrata (Hastate Orache)*	Y		
125.	25788	*Billardiera fraseri (Elegant Pronaya)*			
126.	4717	*Callitriche stagnalis (Common Starwort)*	Y		
127.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
128.	1742	*Casuarina obesa (Swamp Sheoak, Kuli)*			
129.	4792	*Cryptandra arbutiflora (Waxy Cryptandra)*			
130.	7462	*Dampiera pedunculata*			
131.	5523	*Darwinia pimelioides*		P4	
132.	41026	*Dasymalla teckiana*			
133.	13950	*Eremaea asterocarpa subsp. asterocarpa*			
134.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
135.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
136.	2969	*Fumaria capreolata (Whiteflower Fumitory)*	Y		
137.	3933	*Gastrolobium villosum (Crinkle-leaved Poison)*			
138.	33620	*Glischrocaryon angustifolium*			
139.	2197	*Hakea prostrata (Harsh Hakea)*			
140.	2203	*Hakea ruscifolia (Candle Hakea)*			
141.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
142.	8024	*Helichrysum leucopsideum*			
143.	5172	*Hibbertia stellaris (Orange Stars)*			
144.	5173	*Hibbertia subvaginata*			
145.	29775	*Isopogon drummondii*		P3	
146.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
147.	4010	*Jacksonia floribunda (Holly Pea)*			
148.	4045	*Kennedia stirlingii (Bushy Kennedia)*			
149.	17461	*Kunzea micrantha subsp. micrantha*			
150.	38323	*Lavandula stoechas subsp. stoechas*	Y		
151.	6360	*Leucopogon australis (Spiked Beard-heath)*			
152.	6374	*Leucopogon conostephioides*			
153.	6397	*Leucopogon glaucifolius*			
154.	6439	*Leucopogon pulchellus (Beard-heath)*			
155.	9289	*Lobelia anceps (Angled Lobelia)*			
156.	9356	*Logfia gallica*	Y		
157.	33638	*Meionectes tenuifolia*		P3	
158.	5922	*Melaleuca lanceolata (Rottnest Teatree, Moonah)*			
159.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
160.	6139	*Oenothera glazioviana (Evening Primrose)*	Y		
161.	16983	*Persicaria maculosa*	Y		
162.	2273	*Persoonia saccata (Snottygobble)*			
163.	5264	*Pimelea spectabilis (Bunjong)*			
164.	13300	*Rhodanthe citrina*			
165.	7636	*Scaevola platyphylla (Broad-leaved Fanflower)*			
166.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
167.	4205	*Sphaerolobium linophyllum*			
168.	4828	*Spyridium globulosum (Basket Bush)*			
169.	25829	*Stylidium neurophyllum (Coastal Plain Triggerplant)*			
170.	2321	*Synaphea acutiloba (Granite Synaphea)*			
171.	5080	*Thomasia foliosa*			
172.	6280	*Trachymene pilosa (Native Parsnip)*			
173.	13479	*Trymalium ledifolium var. rosmarinifolium*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
174.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
175.	17285	*Vicia sativa subsp. cordata*	Y		
176.	17042	*Vitis vinifera*	Y		
177.	6289	*Xanthosia huegelii*			
178.	44861	*Xerochrysum macranthum*			
Fish					
179.	34028	*Galaxias occidentalis (Western Minnow)*			
180.	34030	*Geotria australis (Pouched Lamprey)*		P3	
181.		*Nannoperca vittata*			
Fungus					
182.	38755	*Amanita ochroterrea*			
Gymnosperm					
183.	92	*Callitris canescens*			
Invertebrate					
184.		*Acariformes sp.*			
185.		*Arachnura higginsi*			
186.		*Backobourkia brounii*			
187.		*Ceratopogonidae sp.*			
188.		*Corixidae sp.*			
189.		*Dytiscidae sp.*			
190.		*Glossiphoniidae sp.*			
191.		*Hemicorduliidae sp.*			
192.		*Holocnemus pluchei*			
193.		*Isopeda leishmanni*			
194.		*Latrodectus hasseltii*			
195.		*Leptoceridae sp.*			
196.		*Libellulidae sp.*			
197.		*Lycosa godeffroyi*			
198.		*Lymnaeidae sp.*			
199.		*Missulena granulosa*			
200.		*Missulena occatoria*			
201.		*Notiasemus glauerti*			
202.		*Oligochaeta sp.*			
203.		*Oniscidae sp.*			
204.		*Orthocladiinae sp.*			
205.		*Physidae sp.*			
206.		*Planorbidae sp.*			
207.		*Richardsonianidae sp.*			
208.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
209.		*Synothele durokoppin*			
210.		*Talitridae sp.*			
211.		*Tanypodinae sp.*			
212.		*Urodacus novaehollandiae*			
Mammal					
213.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
214.	24189	*Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)*		P4	
215.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
216.	24245	*Rattus rattus (Black Rat)*	Y		
Monocotyledon					
217.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
218.	17234	*Austrostipa compressa*			
219.	739	*Baumea acuta (Pale Twig-rush)*			
220.	747	*Baumea rubiginosa*			
221.	1383	*Burchardia bairdiae*			
222.	17685	*Chaetanthus aristatus*			
223.	12035	*Conostylis caricina subsp. caricina*			
224.	11283	*Corynotheca micrantha var. micrantha*			
225.	17618	*Cyathochaeta equitans*			
226.	16245	*Cyathochaeta teretifolia*		P3	
227.	40660	*Cycnogeton huegelii*			
228.	815	*Cyperus tenellus (Tiny Flatsedge)*	Y		
229.	17691	*Desmocladus fasciculatus*			
230.	17838	*Dielsia stenostachya*			
231.	353	*Eleusine indica (Crowsfoot Grass)*	Y		
232.	1464	*Haemodorum brevisepalum*			
233.	1468	*Haemodorum laxum*			
234.	1472	*Haemodorum simplex*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
235.	1475	*Haemodorum spicatum (Mardja)*			
236.	1526	*Hesperantha falcata*	Y		
237.	452	*Hyparrhenia hirta (Tambookie Grass)*	Y		
238.	1070	*Hypolaena exsulca*			
239.	20200	*Isolepis cernua var. setiformis*			
240.	1534	*Ixia polystachya (Variable Ixia)*	Y		
241.	11922	*Juncus kraussii subsp. australiensis*			
242.	28342	*Landoltia punctata (Thin Duckweed)*			
243.	930	*Lepidosperma costale*			
244.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
245.		*Lepidosperma sp.*			
246.	1080	*Leptocarpus scariosus*			
247.	19180	*Moraea miniata (Two-leaf Cape Tulip)*	Y		
248.	30472	*Patersonia occidentalis var. occidentalis*			
249.	48356	*Schoenoplectus tabernaemontani*			
250.	17409	*Schoenus variicellae*			
251.	1334	*Thysanotus glaucus*		P4	
252.	1351	*Thysanotus sparteus*			
253.	1251	*Xanthorrhoea brunonis*			
Pteridophyte (Fern)					
254.	42902	*Azolla rubra*			
Reptile					
255.	25241	*Antaresia stimsoni subsp. stimsoni (Stimson's Python)*			
256.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
257.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
258.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
259.	30893	*Cryptoblepharus buchananii*			
260.	25049	*Ctenotus labillardieri*			
261.	24999	*Delma grayii*			
262.	25115	*Hemiergis initialis subsp. initialis*			
263.	25005	*Lialis burtonis*			
264.	25184	*Menetia greyii*			
265.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
266.	25261	*Pseudechis australis (Mulga Snake)*			
267.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
268.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
269.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix 2: Protected Matters Search Tool

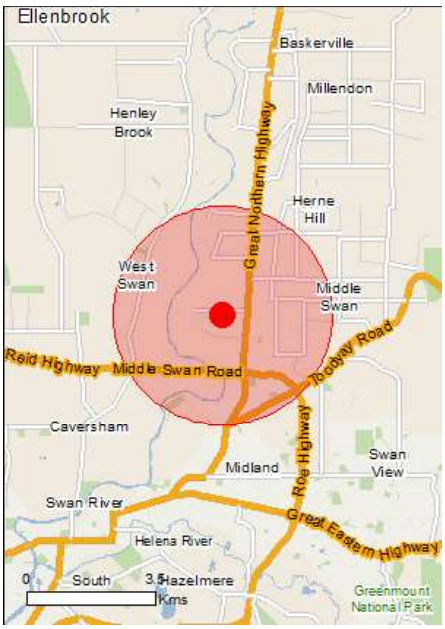
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 29/04/21 15:27:42



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Coordinates
Buffer: 3.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	25
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Regional Forest Agreements:	1
Invasive Species:	40
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Diplolaena andrewsii [6601]	Endangered	Species or species habitat likely to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat may occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat likely to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Defence - RAAF CAVERSHAM

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Swan River	WA
Unnamed WA1919/893	WA
Unnamed WA33618	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.85239 116.00883

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix 3: Conservation Codes

Western Australia

Conservation Code	Name	Description
T	Threatened	Flora or fauna that is rare or likely to become extinct, ranked according to their level of threat using IUCN Red List criteria (Schedules 1-3 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice)
CR	Critically endangered	Species considered to be facing an extremely high risk of extinction within the wild in the immediate future
EN	Endangered	Species considered to be facing a very high risk of extinction in the wild in the near future
VU	Vulnerable	Species considered to be facing a high risk of extinction in the wild in the medium-term future
EX	Extinct Species	Species where 'there is no reasonable doubt that the last member of the species has died (Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice)
EW	Extinct in the Wild	Species that are known to only survive in cultivation, in captivity, or as a naturalised population well outside its past range; and it has not been recorded in its known or expected habitat at appropriate seasons anywhere in its past range, despite surveys over a timeframe appropriate to its life cycle and form
MI	Migratory Species	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth (Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice)
CD	Conservation Dependent	Species of special conservation interest (conservation dependent fauna), being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened (Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice)
OS	Specially Protected	Fauna otherwise in need of special protection to ensure their conservation (Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice)
P	Priority Species	Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or

Conservation Code	Name	Description
		flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.
P1	Priority One	Poorly known species – Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either very small or on lands not managed for conservation, such as road verges, urban areas, farmland, active mineral lease and under threat of habitat destruction or degradation.
2	Priority Two	Poorly known species – Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, such as national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves and similar.
3	Priority Three	Poorly known species – Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat
4	Priority Four	Rare or near threatened and other species in need of monitoring.

(Source: Department of Biodiversity, Conservation and Attractions, 2019b)

Commonwealth

Category	Description
Critically Endangered	Species facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Species facing a very high risk of extinction in the wild in the near future
Vulnerable	Species facing a high risk of extinction in the wild in the medium term

(Source: Department of Agriculture, Water, and the Environment, 2020)

Appendix 4: Quadrat Data

*Denotes weed species.

Quadrat No:	1 (10 x 10 m)
Survey Date:	05/05/2021
Personnel:	TB, JW
Latitude:	-31.85219111
Longitude:	116.00765213
Location:	148 Dale Road
Topography:	Plain
Aspect:	0
Slope:	0
Soil:	Grey sand
Rock:	0
Leaf Litter:	30%
Bare Ground:	0
Drainage:	Well
Condition	Good

Notes: Corymbia Open Woodland

Species	Height (m)	Cover (%)
**Ehrharta calycina*	80	0.5
**Gladiolus caryophyllaceus*	0.1	0.1
**Hypochaeris glabra*	0.1	1
**Oxalis pes-caprae*	0.5	4
Ammothryon grandiflorum	0.5	0.1
Banksia dallanneyi	0.5	5
Burchardia congesta	0.1	0.1
Corymbia calophylla	80	8
Desmocladus fasciculatus	0.5	2
Hibbertia hypericoides	0.5	1
Hypolaena exsulca	0.5	0.5
Jacksonia sternbergiana	2	2
Lepidosperma scabrum	0.5	0.5
Lomandra hermaphrodita	0.5	0.5
Lyginia barbata	0.5	0.1
Nuytsia floribunda	4	1
Xanthorrhoea preissii	10	1.5

Quadrat No:	2 (10 x 10 m)
Survey Date:	05/05/2021
Personnel:	TB, JW
Latitude:	-31.85207690
Longitude:	116.00868176
Location:	148 Dale Road
Topography:	Plain
Aspect:	0
Slope:	0
Soil:	Grey sand
Rock:	0
Leaf Litter:	50%
Bare Ground:	1%
Drainage:	Well
Condition	Good

Notes: Corymbia Open Woodland

Species	Height (m)	Cover (%)
**Ehrharta calycina*	40	0.5
**Hypochaeris glabra*	0.5	0.1
**Watsonia meriana*	0.5	0.5
Acacia huegelii	0.5	0.5
Acacia willdenowiana	1	0.1
Ammothryon grandiflorum	1	0.5
Anigozanthos manglesii	0.5	0.5
Banksia dallanneyi	0.5	0.5
Bossiaea eriocarpa	1	0.5
Conostylis aculeata	0.5	0.5
Corynotheca micrantha	1	0.5
Corymbia calophylla	50	10
Drosera macrantha	0.1	0.5
Gompholobium tomentosum	1	1
Haemodorum laxum	0.1	1
Hypolaena exsulca	5	0.5
Lepidosperma scabrum	1	0.5
Lyginia imberbis	1	0.5
Mesomelaena pseudostygia	20	0.5
Patersonia occidentalis	1	0.5
Petrophile linearis	2	0.5
Thysanotus sp	0.1	0.5
Xanthorrhoea brunonis	2	0.5

Quadrat No:	3 (10 x 10 m)
Survey Date:	05/05/2021
Personnel:	TB, JW
Latitude:	-31.85272764
Longitude:	116.00921801
Location:	148 Dale Road
Topography:	Plain
Aspect:	South West
Slope:	1-3%
Soil:	Grey sand
Rock:	0
Leaf Litter:	30%
Bare Ground:	0
Drainage:	Well
Condition	Degraded

Notes: Corymbia Open Woodland

Species	Height (m)	Cover (%)
**Ehrharta calycina*	50	1
**Oxalis pes-caprae*	30	0.1
Corynotheca macrantha	1	0.5
Corymbia calophylla	70	10
Lomandra caespitosa	0.1	0.1
Petrophile linearis	0.5	0.5
Xanthorrhoea preissii	10	1

Appendix 5: Flora List

*Denotes introduced (weed species), #denotes species native to WA but not native to the Perth Region

Family	Species	Common Name
Poaceae	**Aira caryophyllea*	Silvery Hairgrass
Poaceae	**Arundo donax*	Giant Reed
Poaceae	**Bromus madritensis*	Madrid Brome
Poaceae	**Cynodon dactylon*	Couch
Poaceae	**Ehrharta calycinus*	Perennial Veldt Grass
Poaceae	**Ehrharta longiflora*	Annual Veldt Grass
Poaceae	**Eragrostis curvula*	African Lovegrass
Asteraceae	**Erigeron sumatrensis*	
Geraniaceae	**Erodium botrys*	Long Storksbill
Iridaceae	**Gladiolus caryophyllaceus*	Wild Gladiolus
Asteraceae	**Hypochaeris glabra*	Smooth Cats-ear
Fabaceae	**Lupinus cosentinii*	
Malvaceae	**Malva parviflora*	Marshmallow
Onagraceae	**Oenothera glazioviana*	Evening Primrose
Oleaceae	**Olea europaea*	Olive
Orobanchaceae	**Orobanche minor*	Lesser Broomrape
Oxalidaceae	**Oxalis pes-caprae*	Soursob
Geraniaceae	**Pelargonium capitatum*	Rose Pelargonium
Asteraceae	**Sonchus oleraceus*	Common Sow thistle
Iridaceae	**Watsonia meriana*	Bulbil Watsonia
Fabaceae	*Acacia huegelii*	
Fabaceae	*Acacia iteaphylla*	
Fabaceae	*Acacia willdenowiana*	Grass Wattle
Casuarinaceae	*Allocasuarina fraseriana*	Sheoak
Casuarinaceae	*Allocasuarina humilis*	Dwarf Sheoak
Haemodoraceae	*Anigozanthos manglesii*	Mangles Kangaroo Paw
Hemerocallidaceae	*Arnocrinum preissii*	
Myrtaceae	*Baeckea* sp.	
Proteaceae	*Banksia attenuata*	Slender Banksia
Proteaceae	*Banksia dallanneyi*	Couch Honeypot

Family	Species	Common Name
Proteaceae	*Banksia menziesii*	Firewood Banksia
Fabaceae	*Bossiaea eriocarpa*	Common Brown Pea
Colchicaceae	*Burchardia congesta*	
Myrtaceae	*Callistemon phoeniceus*	Lesser Bottlebrush
Myrtaceae	*Calytrix flavescens*	Summer Star Flower
Ericaceae	*Conostephium pendulum*	Pearl Flower
Haemodoraceae	*Conostylis aculeata*	Prickly Conostylis
Myrtaceae	*Corymbia calophylla*	Marri
Cyperaceae	*Corynotheca micrantha*	Hexagon Zigzag Lily
Restionaceae	*Desmocladus fasciculatus*	
Droseraceae	*Drosera macrantha*	Bridal Rainbow
Myrtaceae	*#Eucalyptus caesia*	Caesia
Myrtaceae	*Eucalyptus marginata*	Jarrah
Myrtaceae	*#Eucalyptus erythrocorys*	Illyarrie
Fabaceae	*Gompholobium tomentosum*	Hairy Yellow Pea
Haemodoraceae	*Haemodorum laxum*	
Proteaceae	*Hakea prostrata*	Harsh Hakea
Proteaceae	*Hakea ruscifolia*	Candle Hakea
Dilleniaceae	*Hibbertia hypericoides*	Yellow Buttercups
Restionaceae	*Hypolaena exsulca*	
Fabaceae	*Jacksonia sternbergiana*	Stinkwood
Cyperaceae	*Lepidosperma costale*	
Cyperaceae	*Lepidosperma scabrum*	
Ericaceae	*Leucopogon australis*	Spiked Beard-heath
Asparagaceae	*Lomandra preissii*	
Asparagaceae	*Lomandra caespitosa*	
Asparagaceae	*Lomandra hermaphrodita*	
Anarthriaceae	*Lyginia barbata*	
Anarthriaceae	*Lyginia imberbis*	
Zamiaceae	*Macrozamia fraseri*	Cycad
Cyperaceae	*Mesomelaena pseudostygia*	
Loranthaceae	*Nuytsia floribunda*	Christmas Tree

Family	Species	Common Name
Rubiaceae	*Opercularia vaginata*	Dog Weed
Iridaceae	*Patersonia occidentalis*	Purple Flag
Proteaceae	*Petrophile linearis*	Pixie Mops
Cyperaceae	*Ammothryon grandiflorum*	Large Flowered Bogrush
Myrtaceae	*Scholtzia involucrata*	Spiked Scholtzia
Proteaceae	*Stirlingia latifolia*	Blueboy
Asparagaceae	*Thysanotus* sp.	
Myrtaceae	*Verticordia densiflora*	Compacted Feather flower
Xanthorrhoeaceae	*Xanthorrhoea brunonis*	
Xanthorrhoeaceae	*Xanthorrhoea preissii*	Grass Tree