SUPPORTING INFORMATION
NATIVE VEGETATION CLEARING PERMIT APPLICATION
400 WATTLE AVE, NEERABUP

PREPARED FOR:

ABSOLUTE TIMBER SOLUTIONS

MARCH 2022

PREPARED BY:

Martinick Bosch Sell Pty Ltd
4 Cook Street
West Perth WA 6005
Ph: (08) 9226 3166
Email: info@mbsenvironmental.com.au
Web: www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

MARTINICK BOSCH SELL PTY LTD
ABN 60 102 614 479

MBS ENVIRONMENTAL

environmental and geoscience consultants

400 WATTLE AVE NEERABUP
NVCP SUPPORTING INFORMATION

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Company	Contact name	Copies	Date
[redacted]			

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EXECUTIVE SUMMARY

Absolute Timber Solutions are planning to clear 2 ha of native vegetation within the eastern portion of 400 Wattle Ave, Neerabup, within the City of Wanneroo. An assessment of site environmental values, including undertaking a detailed flora and vegetation survey and an assessment of black cockatoo habitat determined:

- There were 140 species from 51 families recorded in the detailed flora survey, of which there were 107 native species and 33 non-native (weed) species.
- No species are listed as declared rare flora under Section 19 of Subdivision 2 of Division 1 of the *Biodiversity Conservation Act* 2016 (WA).
- No are listed as Priority under the *Biodiversity Conservation Act* 2016 (WA).
- No species are listed as threatened under Schedule 1 of the EPBC Act.
- No flora species were identified as being of Local or Regional Significance.
- Two vegetation types were present, namely *Corymbia calophylla* and *Eucalyptus marginata* Open Woodland and *Melaleuca huegelii* and *Banksia sessilis* Open Heath, were present within the broader site, with the proposed clearing area being entirely within the *Corymbia calophylla* and *Eucalyptus marginata* Open Woodland.
- The *Banksia Woodlands of the Swan Coastal Plain* and *Tuart (*Eucalyptus gomphocephala*) Forests and Woodlands of the Swan Coastal Plain* threatened ecological communities listed under the EPBC Act were not present within the proposed clearing area or the broader Site.
- The presence of the *Melaleuca huegelii* and *Melaleuca systena* Shrublands threatened ecological community was confirmed within the broader site but not within the proposed clearing area.
- The opportunistic fauna assessment carried out during the detailed flora and vegetation survey did not record evidence of any conservation significant fauna species, with no evidence of black cockatoo foraging in the form of fresh or aged chewed Marri nuts or Banksia cones.
- The black cockatoo habitat assessment identified:
  - A total 55 trees with a diameter at breast height (DBH) of 500 mm (50 cm) or more. Of these, 32 were Marri, six were Jarrah, and 17 were dead stags whose species could not be determined. Twenty-one of DBH trees were located within the 2-ha area that will be subject to the clearing permit application; seven dead stags, four Jarrah, and 10 Marri.
  - Nine dead stags contained one or more large hollows (> 10 cm). Of these, there were six hollows with a chimney shape, six with a spout shape, and one with a side entry. No evidence of black cockatoo occupation was observed in any of them, with bees present in two. Six of the dead stags with large hollows are present in the proposed 2-ha clearing area.
  - Two Jarrahs contained one or more large hollows (> 10 cm), with one being a spout shape and the other with a side entrance; neither showed evidence of being occupied. An additional Jarrah contained a hollow that was too small to be used by black cockatoos for breeding (< 5 cm). One of the Jarrah with a large hollow is located within the proposed 2-ha clearing area.
  - Five Marris had one or more large hollows (> 10 cm), with one having a chimney shape, two having a spout shape, and three having a side entry. One of the trees with the side entry hollow was too small to be used by black cockatoos for breeding, as was an additional Marri with a hollow < 5 cm. Three of the Marri with large hollows and one with a hollow < 5 cm are located within the proposed 2-ha clearing area. None of the hollows showed evidence of occupancy by black cockatoos, with one being occupied by galahs.
  - Overall, there are ten trees with large hollows (> 10 cm) and one with a small hollow (< 5 cm) within the proposed 2-ha clearing area. While the large hollows have potential to be suitable for black cockatoos based on size, the inside of these hollows has not been inspected and may not be suitable.

- No hollows showed indication of use by black cockatoos in the form of scratching, droppings, or feathers.
- While there were species present that black cockatoos are known to feed on, there were no signs of foraging in the form fresh or aged chewed Marri nuts or Banksia cones were noted.
- There were no indications of use of the site for roosting in the form of droppings, clipped branches, or feathers.

The outcomes of these assessment activities indicate that the proposed clearing of 2 ha of native vegetation within the eastern portion of 400 Wattle Ave is unlikely to have a significant impact on flora, fauna, and/or ecological communities. The lack of foraging evidence or other usage by black cockatoos suggest that the site is not 'quality' habitat as defined in the DSEWPAC 2012 black cockatoo referral guidelines, thus any impact to endangered black cockatoos is unlikely to be significant, despite the presence of species used for foraging and trees with large hollows.

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1. INTRODUCTION

In June 2021 Martinick Bosch Sell Pty Ltd (MBS Environmental) was commissioned by Complex Land Solutions (CLS) on behalf of Absolute Timber Solutions (ATS) to prepare a native vegetation clearing permit (NVCP) application for the clearing of 2 ha of native vegetation within 400 Wattle Ave Neerabup; expanding on the preliminary investigations carried out by MBS in February 2021, along with additional supporting information to enable an effective assessment by the Department of Water and Environmental Regulation (DWER). Activities associated with the project included MBS carrying out a black cockatoo habitat assessment and engaged Natural Area Consulting Management Services to undertake a detailed flora and vegetation survey at the site, with outcomes contributing to the supporting information to be provided to DWER. The black cockatoo habitat assessment and the detailed flora and vegetation assessment were carried out over the entire site (8.6 ha), including the 2 ha that will be subject to the clearing permit application, to enable a clearer quantification of impacts within the area to be cleared and what will be retained within the broader site boundary.

1.1 LOCATION

The Wattle Ave site is located approximately 45 km north of the Perth Central Business District in the City of Wanneroo. Overall, the broader site is approximately 8.6 ha, with the 2 ha area of interest that will be subject to the clearing permit application (Figure 1). The site is surrounded by native bushland to the north, west, and south. Several Bush Forever sites are in proximity, including Bush Forever Site 293 to the immediate north, and Sites 455, 457 and 444 to the east (Government of Western Australia, 2000). The Barbagallo Raceway is located to the immediate east.

1.2 ASSESSMENT SCOPE AND OBJECTIVES

The preliminary assessment activities carried out by MBS (2021) identified several environmental values that would need further assessment to quantify expected impacts, and their significance within the 2 ha area located in the eastern portion of the site that will be cleared to support development in the first instance. Note that the assessment activities were carried out across the entire 8.6 ha broader site to enable the expected impacts to be contextualised beyond the clearing area boundary. Assessment activities carried out included:

- Providing an overview of site characteristics.
- Undertaking desktop database searches to identify site environmental values to identify opportunities and constraints, including:
  - NatureMap to gain an indication of flora and fauna species recorded in the area, along with their conservation status.
  - Protected Matters Search Tool Report to obtain an indication of conservation significant species listed under the *Environment Protection and Biodiversity Conservation Act* 1999 (Cwlth) (EPBC Act).
  - Department of Biodiversity, Conservation and Attractions (DBCA) Threatened and Priority flora, fauna, and ecological community databases to gain an indication of species and communities recorded within a minimum 5 km radius from the site.
  - Various Data WA Databases to describe current site characteristics; datasets included those for soils, contours, vegetation extent, wetlands, endangered cockatoo data.
- An environmental scientist and an assistant visiting the site to carry out a black cockatoo habitat and usage assessment.
- A botanist and an assistant visiting the site to undertake a detailed flora and vegetation assessment at the site that included the installation of three quadrats per vegetation type, as well as recording flora species presenting at the time and assessing vegetation type and condition; any other notable observations were recorded.

- Documenting outcomes in an assessment report.

384,300 384,400 384,500 384,600 384,700 384,800

6,496,500

6,496,400

6,496,300

N

Legend

Proposed Clearing Area

Overall Site Boundary

Scale: 1: 1,500
Original Size: A3
Source: Google Satellite
Grid: GDA94 / MGA zone 50 (EPSG:28350)

0 50 100 m

Absolute Timber Solutions
Supporting Information
Native Vegetation Clearing Permit Application

Figure 1

Location, 400 Wattle Ave, Neerabup

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Australia
t: +61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

\\mbssvr\working\Complex Land Solutions\ATS - 400 Wattle Ave Neerabup\GIS\Neerabup SSA.qgz 07/03/2022 Location

2. SITE CHARACTERISTICS

The flora, vegetation and fauna found at a particular location are directly influenced by several key factors, including:

- Climate.
- Soil type.
- Topography.
- Disturbance processes, such as land clearing and weed invasion.

Documenting the site characteristics provides the contextualisation for later discussion within the report, including assessment of the likely presence/absence of conservation significant flora, fauna, and ecological communities.

2.1 REGIONAL CONTEXT

According to Interim Biogeographical Regionalisation of Australia (IBRA) descriptions, Perth is located within the Swan Coastal Plain (SCP) region. The Swan Coastal Plain comprises two major divisions; the Swan Coastal Plain 1 - Dandaragan Plateau and Swan Coastal Plain 2 - Perth Coastal Plain (Mitchell, Williams, and Desmond, 2002), with the survey site situated in the latter. The SCP is a low lying coastal plain, mainly covered with woodlands dominated by Banksia or Tuart on sandy soils, *Casuarina obesa* on outwash plains, and paperbark in swampy areas (Mitchell *et al* 2002).

2.2 CLIMATE

The site experiences a warm Mediterranean climate (Mitchell *et al* 2002) characterised by dry summers and mild, wet winters. According to the Bureau of Meteorology (BOM, 2021) Perth Airport (Station ID 009021), the region has an average:

- Rainfall of 762.1 mm per annum, with rain falling predominantly between May and August.
- Maximum temperature ranging from 18^{o}C in winter to 32^{o}C in summer, with a maximum recorded temperature of 46.7^{o}C.
- Minimum 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 westerly sea breezes during the summer months, with an average wind speed of 14.2 km/h and gusts of more than 100 km/h.

2.3 VEGETATION

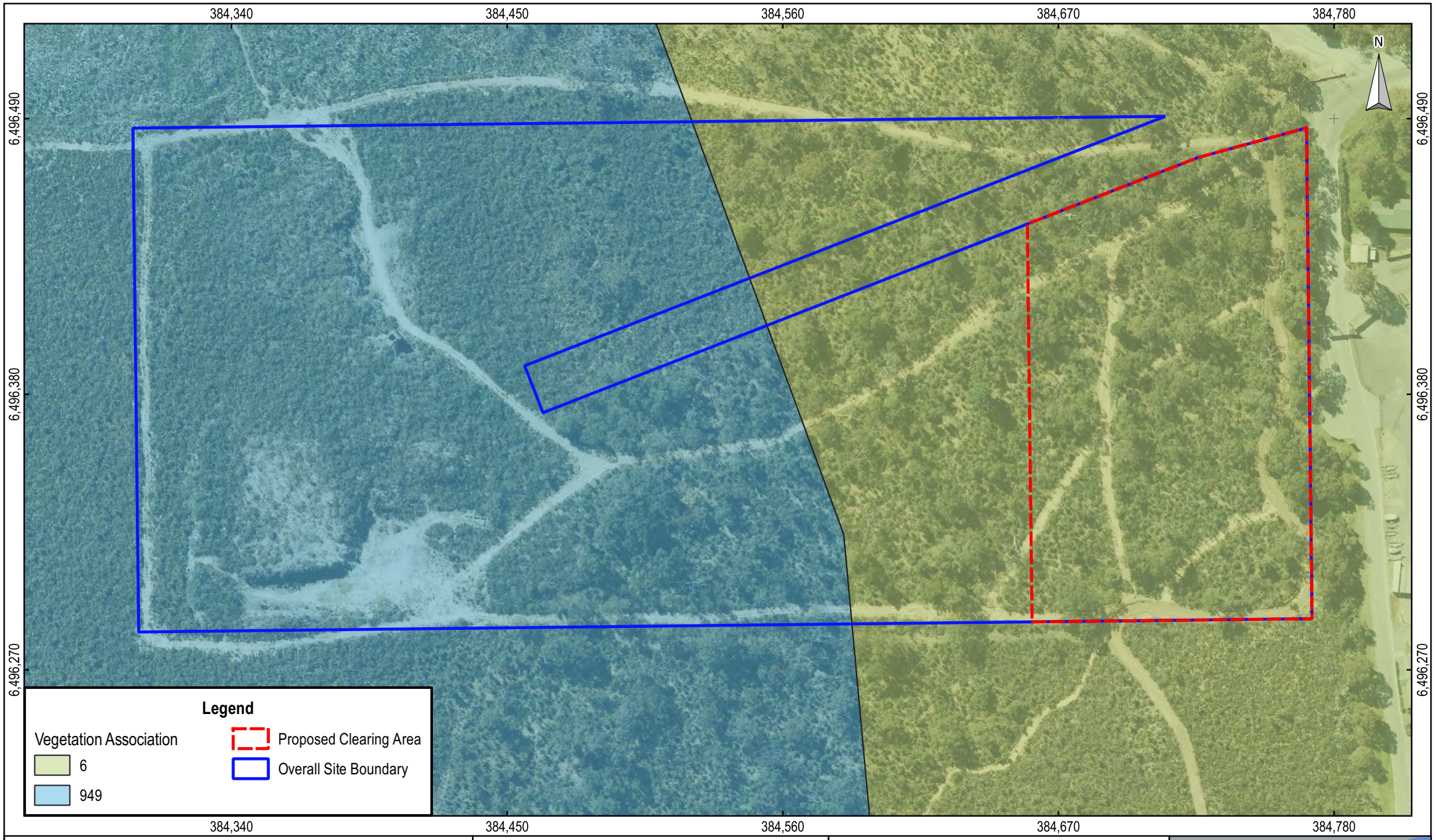
2.3.1 Vegetation Complex

According to Heddle, Loneragan and Havel (1980), the vegetation complex present at the site is the Cottesloe complex – Central and South that supports heaths on limestone outcrops, with the deeper sandy areas supporting woodlands with *Eucalyptus marginata* (Jarrah), *Corymbia calophylla* (Marri), and/or *Eucalyptus gomphocephala* (Tuart), with a variety of understorey species.

2.3.2 Vegetation Association

According to the Department of Biodiversity, Conservation and Attraction (2019), two vegetation associations are present within the Site; namely vegetation association 6 and 949. Their characteristics are summarised in Table 1 (noting that the information provided by the DBCA may not be current) and their indicative locations provided in

(Figure 2). The location of these associated broadly corresponding to the vegetation types identified by Natural Area Consulting Management Services during their spring flora and vegetation survey (Section 4.3).



Scale: 1: 2,000
Original Size: A4
Grid: GDA94 / MGA zone 50 (EPSG:28350)
0 50 100 m

Absolute Timber Solutions
PSA of Environmental Values at 400 Wattle Avenue East, Neerabup, Western Australia

Figure 2

Vegetation Associations 400 Wattle Ave Neerabup

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Australia
t: +61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

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Table 1: Vegetation Association Data

Vegetation Association	6	949
Description	Medium Woodland, Tuart and Jarrah	Low woodland, Banksia
Pre-European Extent (ha)	56,343.01	218,193.94
Current Extent (ha)	13,362.25	123,104.02
% Remaining	23.72	56.42
Pre-European Extent – City of Wanneroo (ha)	12,662.10	37,138.40
Current Extent – City of Wanneroo (ha)	2,777.67	17,196.34
% Remaining – City of Wanneroo	21.94	46.30
Proposed Area to be Cleared (ha)	2	0
% Current Extent (ha)	0.015	0
% Current Extent – City of Wanneroo (ha)	0.072	0

2.4 TOPOGRAPHY

The site is in an interdunal swale within the Spearwood Dune System, with the height decreasing from 96 m Australian Height Datum (AHD) in the west down to 72 m AHD in the east (Figure 3).

2.5 SOILS

According to the Natural Resource Information (NRInfo) Portal maintained by the Department of Primary Industries and Regional Development (WA) (2020), two soil types occur across the site; namely the 211Sp_Kls Karrakatta shallow soil phase and the Karrakatta sand yellow phase (Table 2, Figure 3). There are no known acid sulphate soils (ASS) within the site boundary.

Table 2: Soil Types

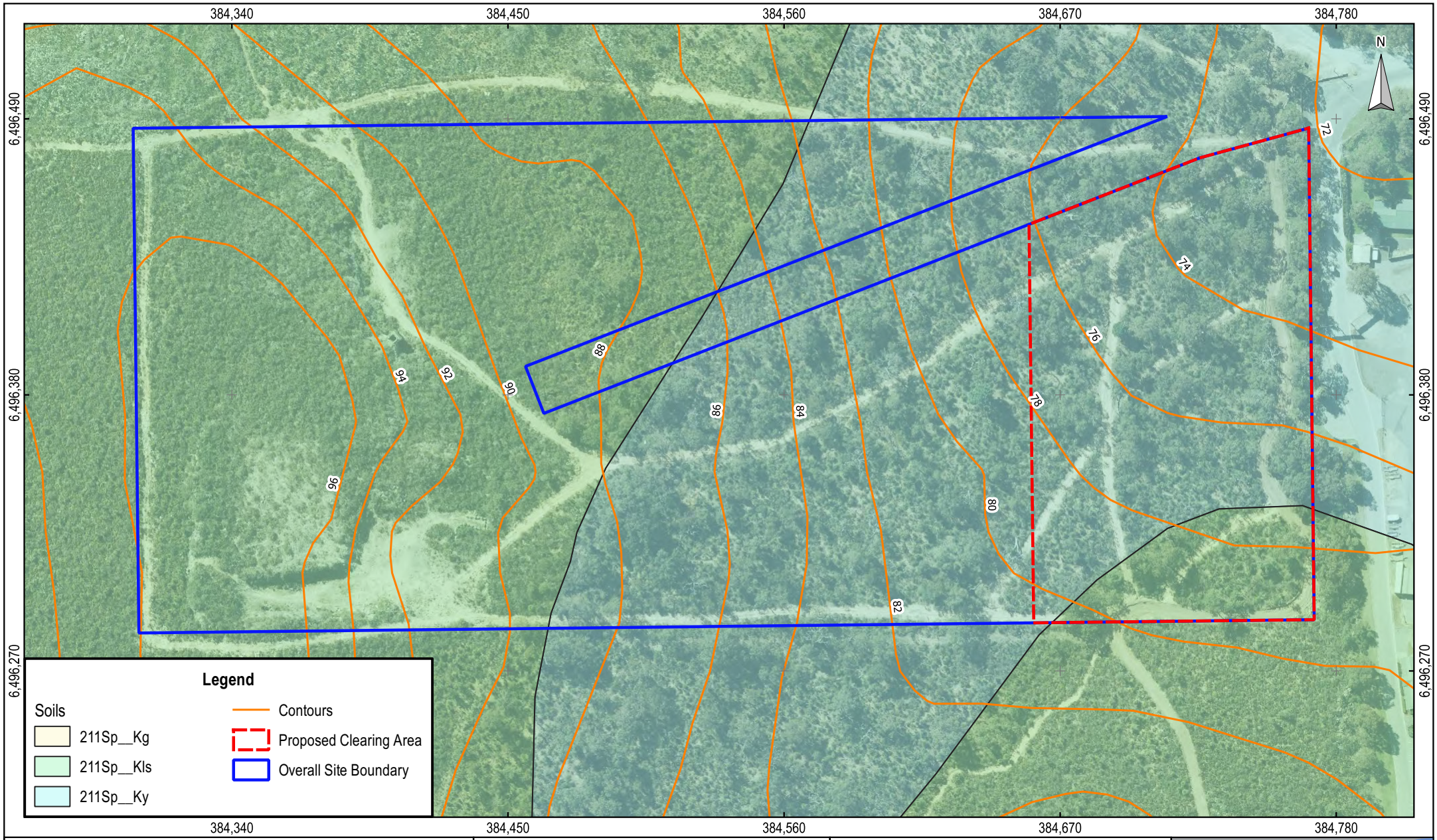
Symbol	Name	Description
211Sp__Kls	Karrakatta Shallow Soils Phase	Low hills and ridges, with bare limestone or shallow siliceous or calcareous sand over limestone.
211Sp__Ky	Karrakatta and Yellow Phase	Low hilly to gently undulating terrain. Yellow sand over limestone at 1-2 m.

2.6 WETLANDS

No wetlands or waterways are present within or close to the Wattle Avenue site.

2.7 BUSH FOREVER SITES

Several Bush Forever sites are in proximity to 400 Wattle Avenue, including Bush Forever Site 293 to the immediate north, and Sites 455, 457 and 444 to the east (Figure 4). Listing information for the Bush Forever Sites indicates the sites are representative of ecological communities of the area and contribute to maintaining ecological processes within those locations (Government of Western Australia, 2000).



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Grid: GDA94 / MGA zone 50 (EPSG:28350)
0 50 100 m

Absolute Timber Solutions
PSA of Environmental Values at 400 Wattle Avenue East, Neerabup, Western Australia

Figure 3

Soils and Contours
400 Wattle Ave Neerabup

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Australia
t: +61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

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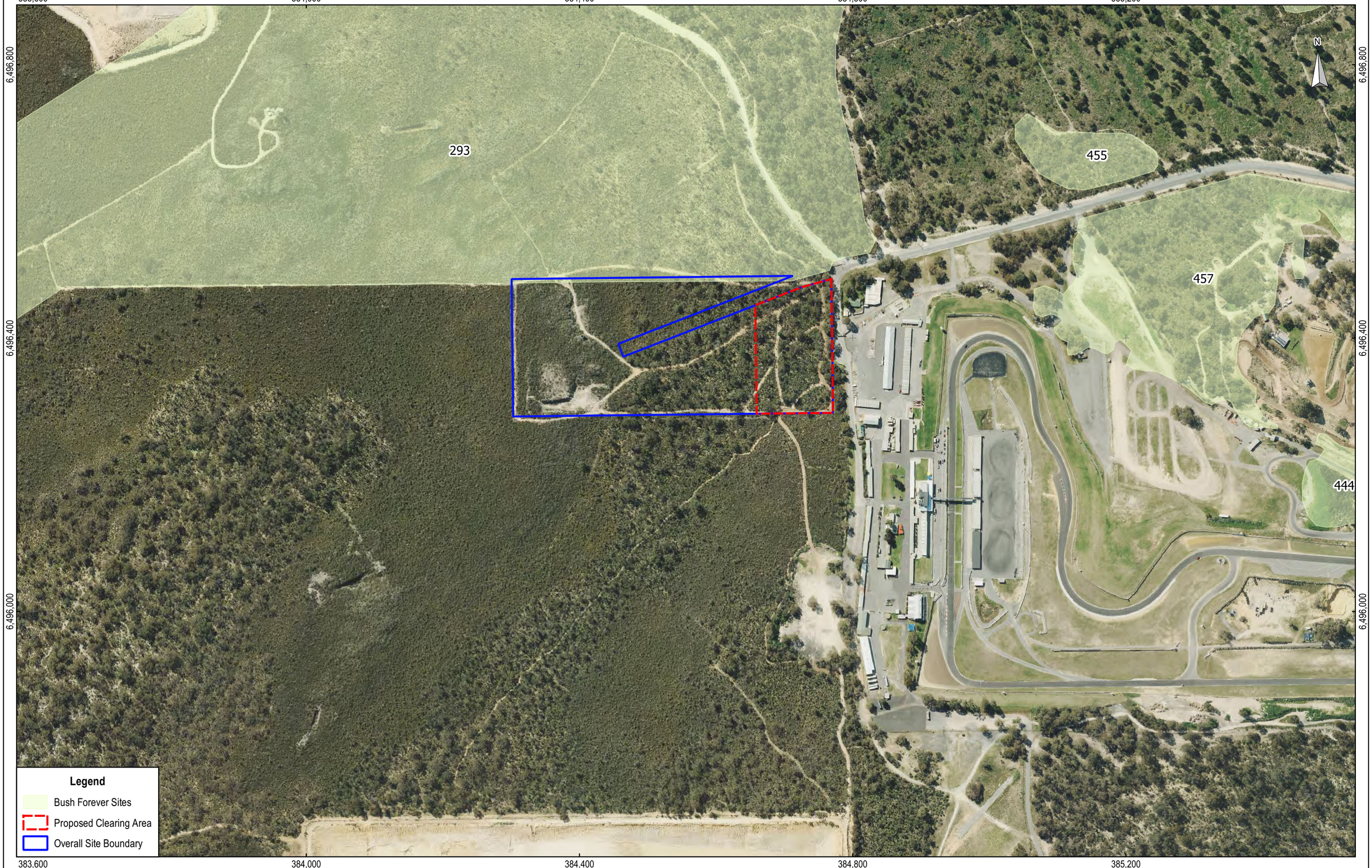
\\mbssvr\working\Complex Land Solutions\ATS - 400 Wattle Ave Neerabup\GIS\Neerabup SSA.qgz 07/03/2022 Soil and Contours



Scale: 1: 5,000
Original Size: A3
Source: Google Satellite
Grid: GDA94 / MGA zone 50 (EPSG:28350)
0 50 100 m

Absolute Timber Solutions
Supporting Information
Native Vegetation Clearing Permit Application

Figure 4

Bush Forever Sites in Proximity to 400 Wattle Ave Neerabup

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Australia
t: +61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

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3. FLORA AND VEGETATION SURVEY METHODOLOGY

The detailed flora and vegetation survey was carried out by consultant botanists employed by Natural Area Consulting Management Services (Natural Area) during spring. The survey was carried out in accordance with *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016). Survey activities included a desktop review of available literature and databases and was followed by a visit to the site on 30 September 2021.

3.1 DESKTOP LITERATURE REVIEW

The desktop literature review component of the flora and vegetation survey included reviewing documents provided by the client and information available in various online and other databases to determine species and ecological communities likely to be present, along with information relating to their conservation significance. The following references were reviewed during this process:

- NatureMap report (Department of Biodiversity, Conservation and Attractions (DBCA), 2021b) using a 5 km search radius to gain an indication of flora species previously recorded in the area, including those listed as threatened or priority species under the *Biodiversity Conservation Act 2016* (WA); a copy of the report is provided in Appendix 1
- Protected Matters Search Tool (PMST) report using a 5 km search radius (Department of Agriculture, Water, and the Environment, 2021) to gain an indication of those species that are listed as matters of national environmental significance (MNES) as threatened species under the Environment Protection and Biodiversity Conservation Act 1999 (Cwlth); a copy of the report is provided in Appendix 2.
- DBCA database searches (DBCA, 2021c, personal communication).
- Florabase (DBCA, 2022) was accessed to review habitat requirements for threatened and priority listed species to determine those with the greatest likelihood of being present based on the known site characteristics.

The above documents were used to develop the field summary sheet for the potential threatened and priority listed flora species listed under the *Biodiversity Conservation Act 2016* (WA) and/or the Environment Protection and Biodiversity Conservation Act 1999 (Cwlth) that could occur in the area that could present within the site. A copy of the summary sheet is provided in Appendix 3, with an explanation of conservation codes provided in Appendix 4.

3.2 ON-GROUND SURVEY METHODOLOGY

Botanist/zoologist Sharon Hynes and field assistant Shelley Hill from Natural Area were engaged by MBS Environmental on behalf of Absolute Timber Solutions to carry out the on-ground survey that occurred on 30 September 2021, with activities including:

- Setting up three (10 m x 10 m) quadrats in each of the two vegetation types present.
- Photographing each quadrat in the northwest corner and recording GPS coordinates using GDA94 datum.
- Recording landscape characteristics including soil type/colour, aspect, slope, surface rock, topography and drainage using a modified recording sheets based on the NAIA templates developed by the Western Australian Local Government Association (WALGA) for the Perth Biodiversity Project.
- Determining leaf litter depth, percentage cover, and percentage of bare ground.
- Recording percentage cover, height, and life form for each flora species in the quadrats.
- Recording vegetation type including dominant over, middle and understorey species (Table 3) and condition using the rating scale attributed to Keighery (Table 4) (Environmental Protection Authority, 2016).
- Use of GPS to map significant species and boundaries of differing vegetation type and condition.

- Recording evidence of disturbance, such as fire.
- For each flora species in the quadrats, the following was recorded:
  - percentage cover and height
  - habit and life form.
- Ground truthing the presence/absence of likely conservation significant flora species using the summary sheet prepared for the site (Appendix 3).

3.2.1 Vegetation Type

The vegetation type was determined using the structural classes provided in Environmental Protection Authority, (2016), and records dominant over storey, middle and understory species. A description of the various structural classes is provided in Table 3.

Table 3: 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
Sedges	Closed sedgeland	Sedgeland	Open sedgeland	Very open sedgeland

3.2.2 Vegetation Condition

Vegetation condition was assessed using the rating scale attributed to Keighery (Environmental Protection Authority, 2016). A description of the rating scale is provided in Table 4.

Table 4: Vegetation Condition Ratings (after Keighery)

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.

3.2.3 Flora Species

Flora species were identified on site within each of the quadrats and when the site was traversed; with a list of potential declared rare or priority flora species used to guide targeted searches for those species. Samples or photographs of unfamiliar species were taken to enable later identification from a range of references.

3.2.4 Statistical Analysis

Statistical analysis using PRIMER was undertaken to determine the floristic community types present on site with comparison to the Gibson *et al*. dataset (1994) from *A Floristic Survey of the Southern Swan Coastal Plain*. The Gibson *et al*. (1994) study included surveys of the plant communities within the Swan Coastal Plain, with 509 sites (quadrats) established and floristic data used to define the major regional community types (Government of Western Australia, 2000). The community types assigned by this dataset are commonly used in literature to describe conservation significant communities. This was completed to determine if the vegetation communities on site matched the descriptions of any threatened or priority ecological communities.

Taxa names from Gibson, Keighery, Keighery, Burbidge and Lyons (1994) that were no longer current were updated to match current taxa names. Quadrat data collected in the field was converted to present/absence (PA) data and added to the Gibson *et al*. (1994) dataset. A PA matrix was created and input into the statistical analysis package PRIMER (version 7) and resemblance matrices created to determine the similarities in species composition between quadrats. A hierarchical cluster analysis was performed and dendrograms plotted to visually ascertain the similarities between quadrats. This analysis gives the similarity between quadrats species composition as a percentage. As this information does not account for species abundance within community types (only species

diversity) the five most similar quadrats are assessed, and the most suitable community type determined using the descriptions of dominant species outlined in Gibson *et al.* (1994).
The threatened ecological community indicated to be on site by DBCA (2021) is SCP26a *Melaleuca huegelii – Melaleuca systena* shrublands on limestone ridges; which is listed as a threatened ecological community under the *Biodiversity Conservation Act 2016* (WA). The following criteria needs to be met for an ecological community to be considered this TEC:

- Occurs on massive limestone ridges mainly around Yanchep and south of Perth near Lake Clifton.
- Occurs within the Swan DBCA region.
- Occurs on limestone ridges associated with Tamala limestone located within the Cottesloe and Karrakatta soils of the Spearwood dune systems.
- Species rich thickets, heaths and scrubs dominated by Melaleuca huegelii, Melaleuca systena and Banksia sessilis.
- Common understorey species include Grevillea preissii and Acacia lasiocarpa.

3.3 SURVEY LIMITATIONS

The flora and vegetation survey was carried out in early spring; the optimal time for assessing flora on the Swan Coastal Plain. Despite this, several limitations inherent to survey activities remain and are summarised in Table 5.

Table 5: Summary of Survey Limitations

Potential Survey Limitation	Constrai nt	Comment
Season	No	The survey was carried out in September, during the main flowering period for flora on the Swan Coastal Plain and at a time when most of the significant flora species occurring in the general area should have been detectable and identifiable.
Access	No	The proposed clearing area was readily accessible.
Availability of local contextual information	No	Previous survey information was available, as was local information about the site and its characteristics.
Resources	No	Adequate resources were available.
Intensity of survey effort	No	Three quadrats per vegetation type present on site were installed and sampled.
Competency and experience	No	The surveyor has appropriate training with more than 10 years' experience in conducting botanical surveys in Western Australia, primarily on the Swan Coastal Plain, including within the Neerabup area.

In addition to the above, it should be noted that:

- Not all flora species present at a site flower each year.
- Individual plants may have been missed as they were outside the area traversed.
- Some species flower outside the spring season, with some having finished flowering and others yet to flower at the time of the survey.

Despite that, it is estimated that 80 – 90% of species present were identified.

4. FLORA AND VEGETATION SURVEY RESULTS

4.1 LITERATURE REVIEW

4.1.1 Flora Species

A review of the NatureMap (NM) report using a 5 km search radius (DBCA, 2021a) (Appendix 1) indicated the potential presence of 243 flora species of which there were 160 dicotyledons (26 non-native species), 82 monocotyledons (14 non-native species) and 1 gymnosperm (palm).

4.1.2 Conservation Significant Flora Species

A review of the NatureMap (DBCA, 2021b), PMST (DAWE, 2021), and DBCA threatened and priority flora and the DBCA WA Herbarium lists (DBCA, 2021c) indicated the potential for 42 threatened and priority species listed under the *Biodiversity Conservation Act 2016* (WA) (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth). A review of the habitat requirements for all the species listed indicate that the conditions present at the site are suitable for approximately 14 of the 42 conservation significant species, with soils and habitat unsuitable or unknown for the remainder. A summary of all conservation significant species is provided in Table 6. The NatureMap report is included as Appendix 1 and the PMST report as Appendix 2. A detailed description of the conservation significant species identified during the literature review is provided in Appendix 3 and an explanation of conservation codes in Appendix 4.

Table 6: Conservation Significant Flora Species

Species Name	Common Name	Conservation Code	
		WA	Commonwealth
Acacia benthamii		P2	
Adenanthos cygnorum subsp. chamaephyton		P3	
Andersonia gracilis	Slender Andersonia	T	En
Anigozanthos viridis subsp. terraspectans	Dwarf Green Kangaroo Paw	T	Vu
Austrostipa mundula		P3	
Baeckea sp. Limestone		P1	
Caladenia huegelii	Grand Spider Orchid	T	En
Calectasia elegans	Elegant Tinsel Lady	P2	
Conostylis bracteata		P2	
Conostylis pauciflora subsp. euryrhipis		P4	
Conostylis pauciflora subsp. pauciflora		P4	
Cyathochaeta teretifolia		P3	
Diuris micrantha	Dwarf Bee-orchid	T	En
Diuris purdiei	Purdie's Donkey-orchid	T	En
Drakaea elastica	Glossy-leafed Hammer Orchid	T	En

Species Name	Common Name	Conservation Code	
		WA	Commonwealth
Drakaea micrantha	Dwarf Hammer-orchid	T	Vu
Drosera patens		P1	
Drosera x sidjamesii		P1	
Eucalyptus argutifolia	Wabling Hill Mallee	T	Vu
Fabronia hampeana		P2	
Grevillea sp. Ocean Reef		P1	
Hibbertia helianthemoides		P4	
Hibbertia leptotheca		P3	
Jacksonia gracillima		P3	
Jacksonia sericea	Waldjumi	P4	
Lecania turicensis var. turicensis		P2	
Leucopogon maritimus		P1	
Leucopogon sp. Yanchep		P3	
Marianthus paralius		T	En
Melaleuca sp. Wanneroo		T	En
Pimelea calcicola		P3	
Pithocarpa corymbulosa		P3	
Poranthera moorokatta		P2	
Sarcozona bicarinate		P3	
Schoenus griffinianus		P4	
Stenanthemum sublineare		P2	
Stylidium longitubum	Jumping Jacks	P4	
Stylidium maritimum		P3	
Stylidium paludicola		P3	
Styphelia filifolia		P3	
Thelymitra variegata		P2	
Tripterococcus sp. Brachylobus		P4	

4.1.3 Ecological Communities

The PMST report (DAWE, 2021) indicates the likely presence of two threatened ecological communities (TECs):

- Banksia Woodlands of the Swan Coastal Plain.
- Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain.

In addition to the TECs identified on the PMST report, the DBCA (2021c) threatened and priority listed ecological community's database search outcomes identified the potential for *Melaleuca huegelii – Melaleuca systena* shrublands on limestone ridges (floristic community type SCP26a as originally described in Gibson *et al* (1994)).

4.2 FLORA AND VEGETATION SURVEY RESULTS

4.2.1 Flora Species

A total of 140 flora species (taxa) were recorded from 51 families during the field survey, including 107 native species with the most common being Asparagaceae, Fabaceae, Proteaceae and Orchidaceae.

Of the flora species recorded:

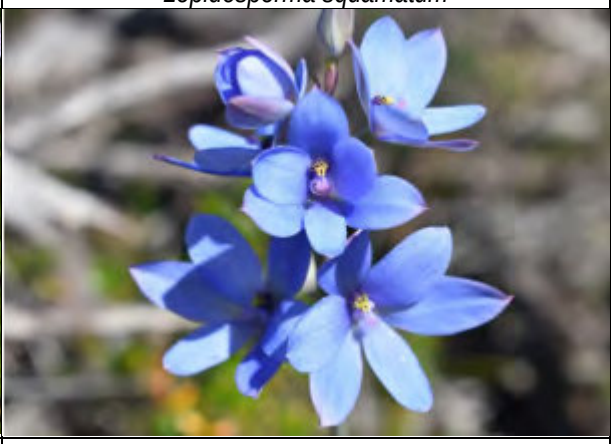
- No species are listed as declared rare flora under Section 19 of Subdivision 2 of Division 1 of the *Biodiversity Conservation Act* 2016 (WA).
- No priority species are listed under the *Biodiversity Conservation Act* 2016 (WA).
- No species are listed as threatened under Schedule 1 of the EPBC Act.
- No flora species were identified as being of Local or Regional Significance.

Examples of native flora species recorded during the survey are shown in Figure 5, and a complete flora species list is provided in Appendix 5.

Caladenia arenicola (Carousel Spider Orchid)

Lepidosperma squamatum

Pimelea ferruginea



Thelymitra crinita (Blue Lady Orchid)

Figure 5: Example Native Flora Species Recorded

(Source: Natural Area Consulting Management Services)

4.2.2 Introduced Flora (Weeds)

The survey identified 33 weed species within the survey area, representing 23.6% of total floristic diversity. Commonly represented were species of the Asteraceae and Poaceae families. One Declared Plant was identified within the survey site; the One-leaf Cape Tulip (*Moraea flaccida*).

Declared pests are listed on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management Act* 2007 (WA) (DPIRD, 2018). This classification requires the landowner/land manager to control the population to limit damage due to its presence (Department of Primary Industries and Regional Development, 2021).

4.3 VEGETATION TYPE

Natural Area identified two vegetation types within the site: *Corymbia calophylla* and *Eucalyptus marginata* Open Woodland occurring on lower elevations on deeper sands in the eastern portion of the site; and *Melaleuca systena* and *Banksia sessilis* Open Heath occurring on higher elevations on shallow sand over limestone in the western portion of the site. Vegetation types are described in Table 7 with their location shown in Figure 6.

Table 7: Vegetation Type

Vegetation Type	Description	Photograph
Corymbia calophylla and *Eucalyptus marginata* Open Woodland	An open woodland of *Corymbia calophylla* and *Eucalyptus marginata* trees over *Xanthorrhoea preissii* and mixed shrubland and an understorey of mixed native sedges and herbs including *Trachymene pilosa*, *Morelotia octandra* and *Panaetia lessonii*.	
Melaleuca systena and *Banksia sessilis* Open Heath	An open heath of *Melaleuca systena* and *Banksia sessilis* shrubs with other mixed lower shrubs over an understorey of *Desmocladus flexuosus*, *Trachymene pilosa* and other mixed native herbs and grasses.	

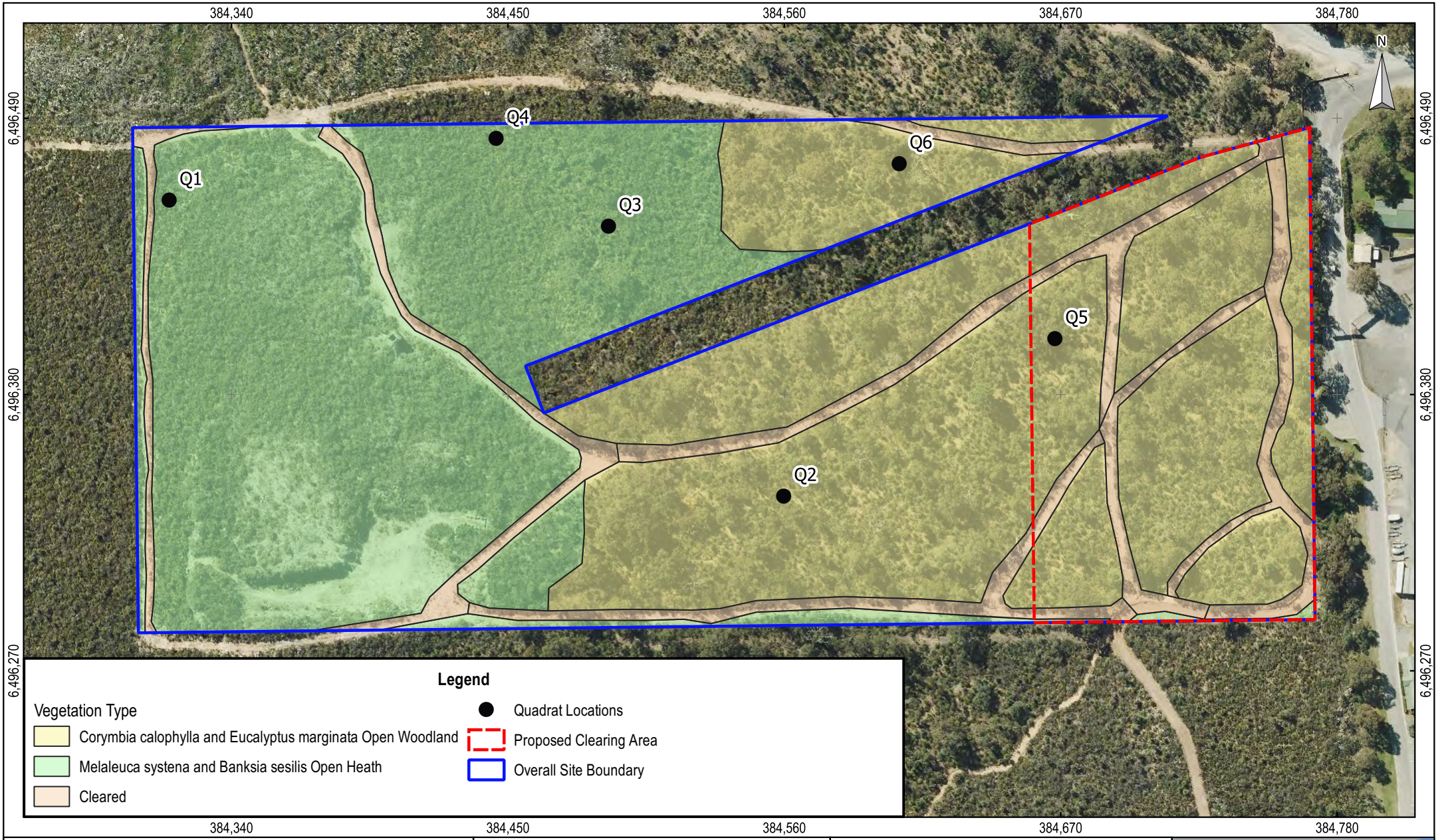
(Photographs: Natural Area Consulting Management Services)

4.4 VEGETATION CONDITION

Vegetation condition on site ranged from Completely Degraded to Excellent, with the majority of the site in Very Good condition (Table 8, Figure 7). Degraded areas were present along existing vehicle tracks in the proposed clearing area and in the southwest of the site where previous quarry works have been undertaken. Condition within the proposed clearing area is also provided in Table 8, with 62.5% of the site being in Very Good condition and 27.5% in a Degraded or Completely Degraded Condition.

Table 8: Vegetation Condition

Vegetation Condition	Pristine	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
Entire Site							
Area (ha)	0	3.2	3.7	0.5	0.2	1.2	8.8
Area (%)	0	36.4	42	5.7	2.3	13.6	100
Proposed 2 ha Clearing Area							
Area (ha)	0	0.18	1.25	0.02	0.16	0.39	2.0
Area (%)	0	9	62.5	1	8	19.5	100



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Original Size: A4
Grid: GDA94 / MGA zone 50 (EPSG:28350)
0 50 100 m

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Figure 6

Vegetation Type
As Identified by Natural Area
400 Wattle Ave Neerabup

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Australia
t: +61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

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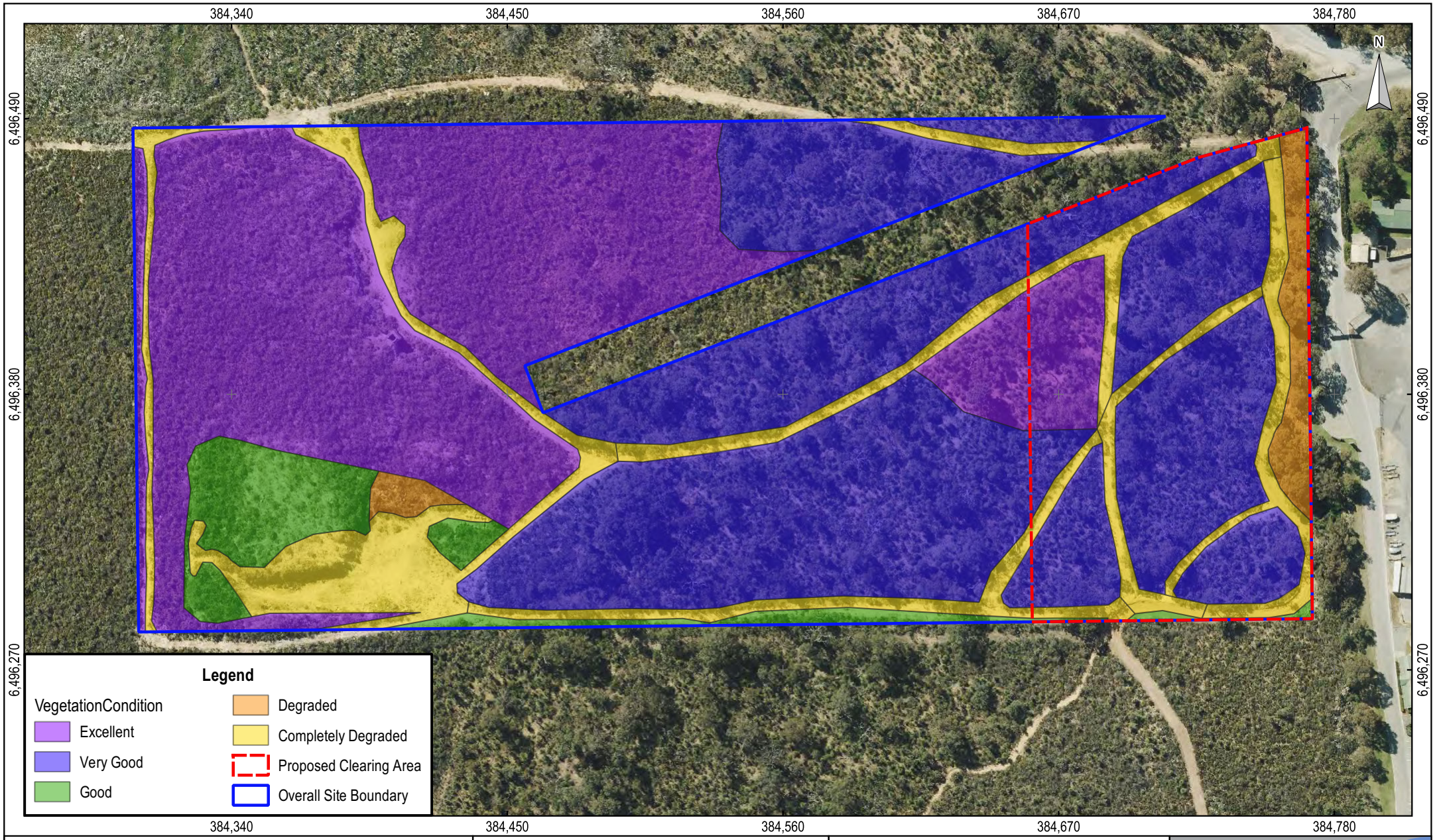

Scale: 1: 2,000
Original Size: A4
Grid: GDA94 / MGA zone 50 (EPSG:28350)
0 50 100 m

Absolute Timber Solutions
Supporting Information
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Figure 7

Vegetation Condition
As Determined by Natural Area
400 Wattle Ave Neerabup

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Australia
t: +61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

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4.5 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

The PMST (DAWE, 2021) and the DBCA (2021c) threatened and priority ecological community database search indicated the potential presence of two threatened ecological communities listed under the EPBC Act: Banksia Woodlands of the Swan Coastal Plain; and Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain. The flora and vegetation survey confirmed that neither of these ecological communities are present on site. The DBCA (2021c) threatened and priority ecological community database search also indicated the presence of the *Melaleuca huegelii – Melaleuca systena* open heath ecological community listed as threatened under the BC Act.

4.5.1 Banksia Woodlands of the Swan Coastal Plain

According to the Department of Environment and Energy (2016), the key diagnostic features used to confirm the presence/absence of the Banksia Woodlands TEC is the presence of *Banksia attenuata*, *Banksia menziesii*, *Banksia prionotes*, and/or *Banksia ilicifolia* as dominant species, with *Banksia littoralis* and *Banksia burdettii* occasionally being co-dominant. Several other tree species may be co-dominant in an emergent layer above the Banksia, including *Allocasuarina fraseriana*, *Corymbia calophylla* (Marri), *Eucalyptus marginata* (Jarrah) and *Eucalyptus gomphocephala* (Tuart). While four Banksia species including *Banksia attenuata* were recorded within the overall site, they were not the dominant species within the landscape. Accordingly, the absence of key indicators of this ecological community confirms its absence within the assessment area.

4.5.2 Tuart Forests and Woodlands of the Swan Coastal Plain

The key diagnostic feature of the Tuart TEC is the presence of Tuart (*Eucalyptus gomphocephala*), with none recorded on site. With the absence of Tuart within the survey area, it can be concluded that this ecological community is not present. Note that the DBCA (2021c) threatened and priority ecological community database search indicated that portions of the site, including the 2-ha proposed clearing area, are located within the buffer zone of known TEC locations in nearby areas.

4.5.3 *Melaleuca huegelii* and *Melaleuca systena* Shrublands

The DBCA (2021c) threatened and priority ecological community database search indicated the potential presence of the *Melaleuca huegelii and Melaleuca systena* Shrublands on Limestone Ridges TEC listed as threatened under the BC Act. A review of the *Melaleuca huegelii – Melaleuca systena shrublands of limestone ridges (Swan Coastal Plain Community type 26a-Gibson et al. 1994) Interim Recovery Plan 2004-2009,* determined that the *Melaleuca systena* and *Banksia sessilis* Open Heath vegetation type based on the assessment of species recorded in quadrats 1, 3, and 4, did meet the description and habitat requirements of this ecological community (Table 9).

Table 9: *Open Heath* Vegetation Comparison with SCP26a TEC Diagnostic Characteristics

Vegetation Type	Characteristics of SCP26a	Comments	Meet Criteria of TEC
Melaleuca systena and *Banksia sessilis* Open Heath	Occurs on massive limestone ridges mainly around Yanchep and south of Perth near Lake Clifton.	Vegetation type found on limestone ridges towards Yanchep north of Perth.	Yes, meets main diagnostic characteristics for the TEC.
	Occurs within the Swan DBCA region.	Site found within the Swan DBCA region.	

Vegetation Type	Characteristics of SCP26a	Comments	Meet Criteria of TEC
	Occurs on limestone ridges associated with Tamala limestone within the Cottesloe, Karrakatta soils of the Spearwood dune systems.	Occurs on Karrakatta soils.	
	Species rich thickets, heaths and scrubs dominated by *Melaleuca huegelii*, *Melaleuca systena* and *Banksia sessilis*.	Vegetation type present is dominated by *Melaleuca systena* and *Banksia sessilis* with *Melaleuca huegelii* present.	
	Common understorey includes *Grevillea preissii* and *Acacia lasiocarpa*.	*Grevillea preissii* not found on site but *Acacia lasiocarpa* was common on site.	

The results of flora quadrats 1, 3 and 4 at Wattle Ave E were compared to the Gibson *et al*. 1994 data as desktop assessments indicated an threatened ecological community (PEC). The highest similarity of the *Melaleuca systena* and *Banksia sessilis* Open Heath was 49.1% similarity to Gibson quadrat Yan-2, which was classified as SCP26a *Melaleuca huegelii – Melaleuca systena* shrublands on limestone ridges; a threatened ecological community under the *Biodiversity Conservation Act 2016* (WA) (Table 10). These results are also plotted in a dendrogram shown in Figure 8, however the use of group averages over all quadrats does not adequately represent the similarities to certain Gibson quadrats. Differences may be attributed to weed species and annuals presenting at the time of surveys, with dominant species for all quadrats consistent with that of the TEC description.

Table 10: Quadrat Comparison with SCP26a

Quadrat	Similarity with SCP26a	Comments
Q1	34.78%	Average 31.7% similarity which is high for variable vegetation communities and considered significant; thus is considered to be the SCP26a community *Melaleuca huegelii – Melaleuca systena* shrublands on limestone ridges (a TEC for WA) as the dominant species. The habitat requirements match this community description.
Q3	25.24%	
Q4	35.05%	

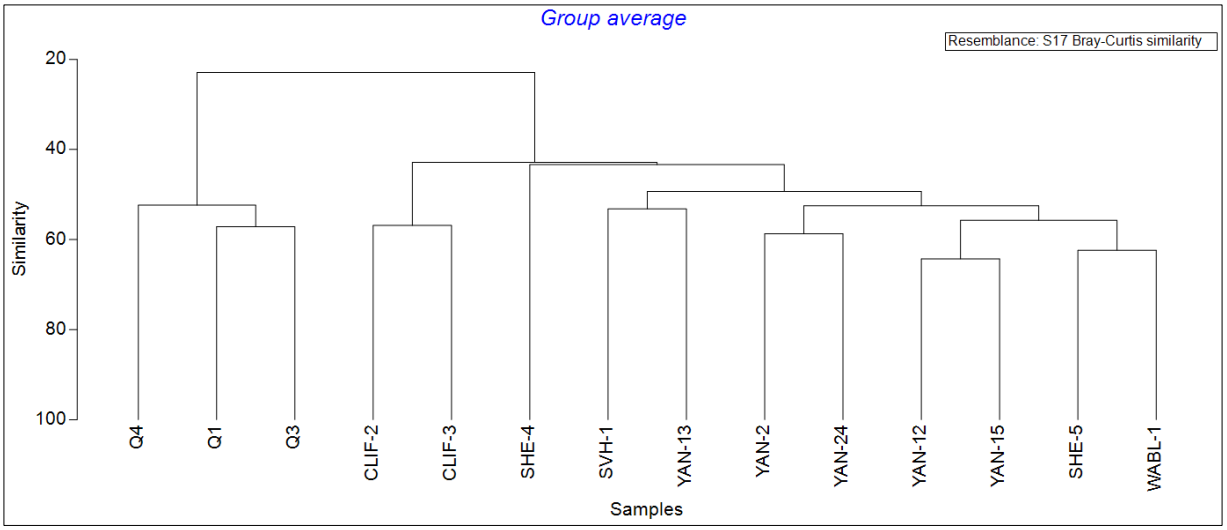


Figure 8: Dendrogram of the Similarities of the Site Quadrats to Gibson *et al.* Data

5. FAUNA ASSESSMENT METHODOLOGY

5.1 LITERATURE REVIEW

The literature review process focused on accessing various publicly available and paid database searches to identify fauna species that could potentially utilise the site or nearby areas for habitat, including:

- A review of the NatureMap (NM) report using a 5 km search radius (DBCA, 2021a) (Appendix 1).
- A review of the PMST report using a 5 km search radius (DAWE, 2021) (Appendix 2).
- A DBCA threatened and priority listed fauna database search (DBCA, 2021b).

5.2 BASIC FAUNA ASSESSMENT

During the detailed flora and vegetation assessment, the Natural Area Botanist/Zoologist Sharon Hynes carried out a basic fauna assessment recording opportunistic sightings of fauna species present, or evidence of their presence in the form of:

- Scats.
- Tracks.
- Diggings.
- Burrows, dens, and warrens.
- Runnels (vegetative tunnels).
- Calls.

5.3 BLACK COCKATOO HABITAT ASSESSMENT

During July 2021, Senior Environmental Scientist Dr Kirsi Kauhanen and Environmental Scientist Kat Partridge visited the Site to carry out a black cockatoo habitat assessment. The assessment was carried out in accordance with the EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species – Carnaby's Cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's Cockatoo (vulnerable) *Calyptorhynchus baudinii,* and Forest Red-tailed Black Cockatoo (vulnerable) *Calyptorhynchus banksia naso* (Department of Sustainability, Environment, Water, Population, and Communities, 2012). Habitat was assessed for:

- Presence and condition of feeding habitat in the form of known preferred species such as Banksia and Marri (Eucalypt woodlands and forest, and proteaceous woodland and heath).
- Evidence of feeding, such as the presence of chewed Marri nuts, or Banksia cones.
- Location of trees with a diameter at breast height (DBH) of 500 mm (50 cm) or more.
- Location of trees with hollows, with consideration of the size and orientation of hollows and their suitability as breeding habitat. Three types of hollow entry are recognised:
  - Chimney, where the hollow faces directly upwards in the end of the trunk.
  - Spout, where the hollow entry is at the end of a broken branch.
  - Side entry, where the hollow entry is directly into the side of the trunk or a branch with no protrusions.
- Evidence of hollows being used for breeding through observation of scratching around the hollow, presence of guano, or other indicators of use.
- Evidence of communal night roosting sites through observation of droppings, feathers, and/or branch clippings.

6. FAUNA ASSESSMENT RESULTS

6.1 LITERATURE REVIEW RESULTS

6.1.1 Fauna Species

A review of the NatureMap Report using a 5 km search radius (DBCA,2021a) indicated the potential presence of: 190 fauna species, of which there were:

- 5 amphibians.
- 110 birds.
- 26 invertebrates.
- 12 mammals.
- 37 reptiles.

6.1.2 Conservation Significant Fauna

Of the species listed on the NatureMap report, seven are listed as threatened or priority species under the BC Act. The PMST report (DAWE, 2021) (Appendix 2) indicated five conservation significant terrestrial fauna species, noting that marine species have not been considered due to the lack of suitable habitat within the Site boundary. Of these five species, two were additional to those listed on the NatureMap Report.

A search of the DBCA threatened and priority fauna database was carried out, with 22 terrestrial and aquatic species recorded, including:

- Eleven birds.
- Four mammals.
- Five invertebrates.
- One reptile
- One shellfish.

Of the recorded species, only the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) has been recorded within the Site (during 2010) and within 2 km of the Site boundary.

A summary of the most likely conservation significant species that could utilise the Site for habitat is provided in Table 11, noting that marine and migratory species have been excluded. As previously specified, the NatureMap report is included as Appendix 1, the PMST report as Appendix 2, and the explanation of conservation codes is provided in Appendix 4.

A review of the Black Cockatoo Breeding Sites – Buffered (DBCA-063) dataset available via DataWA indicates the site is located more than 3 km from known breeding sites (DBCA, 2019a). A review of the Black Cockatoo Roosting Sites – Buffered (DBCA-064) dataset indicates that black cockatoos are known to roost in proximity to the Site (DBCA, 2019b), with the breeding site buffer extending into the Site.

Table 11: Conservation Significant Fauna Species

Species	Common Name	BCA	EPBC	Likelihood
Birds				
Calyptorhynchus Banksii naso	Forest Red-tailed Black Cockatoo	T	V	Y, known in Perth metropolitan area
Calyptorhynchus latirostris	Carnaby's Cockatoo	T	E	Y, recorded within the site in 2010
Falco peregrinus	Peregrine Falcon	S		Y, known in Perth metropolitan area
Mammals				
Dasyurus geoffroii	Chuditch	T	V	Unlikely, likely to be locally extinct
Isoodon fusciventer	Quenda, Southern Brown Bandicoot	P4		Y, recorded in Neerabup
Notamacropus irma	Western Brush Wallaby	P4		Y, recorded in Neerabup
Invertebrates				
Austrosaga spinifer	Spiny Katydid	P2		
Hesperocolletes douglasi	Douglas' Broad-headed Bee	T	CE	Recorded in BF Site 295 to the south
Hylaeus globuliferus	Woolybush Bee	P3		
Synemon gratiosa	Graceful Sunmoth	P4		Recorded in bushland to the south

The NatureMap report (DBCA 2021b) and the PMST report (DAWE 2021) indicated the potential presence of black cockatoos listed as endangered under the BC Act and the EPBC Act. A review of flora species indicates the likely presence of preferred foraging species as well as species that are known to develop hollows over time that can potentially be used for nesting. The site is located within known roosting areas, as indicated by DBCA datasets available through DataWA (2021).

6.2 FAUNA SURVEY RESULTS

Botanist/zoologist Sharon Hynes and field assistant Shelley Hill from Natural Area Consulting Management Services also carried out an opportunistic fauna survey in conjunction with the flora and vegetation survey. The fauna survey included recording opportunistic sightings of fauna species while traversing the survey area, along with evidence of their presence in the form of:

- Scats.
- Feeding residue.
- Tracks.
- Diggings.
- Burrows, dens, and warrens.
- Runnels (vegetative tunnels).
- Calls.

A total of six bird species and one invertebrate species were identified during the basic fauna survey (Table 12). Scat evidence of the presence of the Red Fox (*Vulpes vulpes*) which is listed as a declared pest species under the *Biosecurity and Agriculture Management Act* 2017 (WA) was also identified. Black cockatoo species were not observed during the basic fauna survey, with no evidence of feeding in the form of fresh or aged chewed Marri nuts or Banksia cones noted.

Table 12: Fauna Observations within the site

Genus	Species	Common Name
Birds		
Cacatuidae	*Cacatua tenuirostris*	Long-billed Corella
Artamidae	*Gymnorhina tibicen*	Australian Magpie
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
Mammals		
Canidae	**Vulpes vulpes*	Red Fox
Invertebrate		
Apidae	**Apis mellifera*	European Honeybee

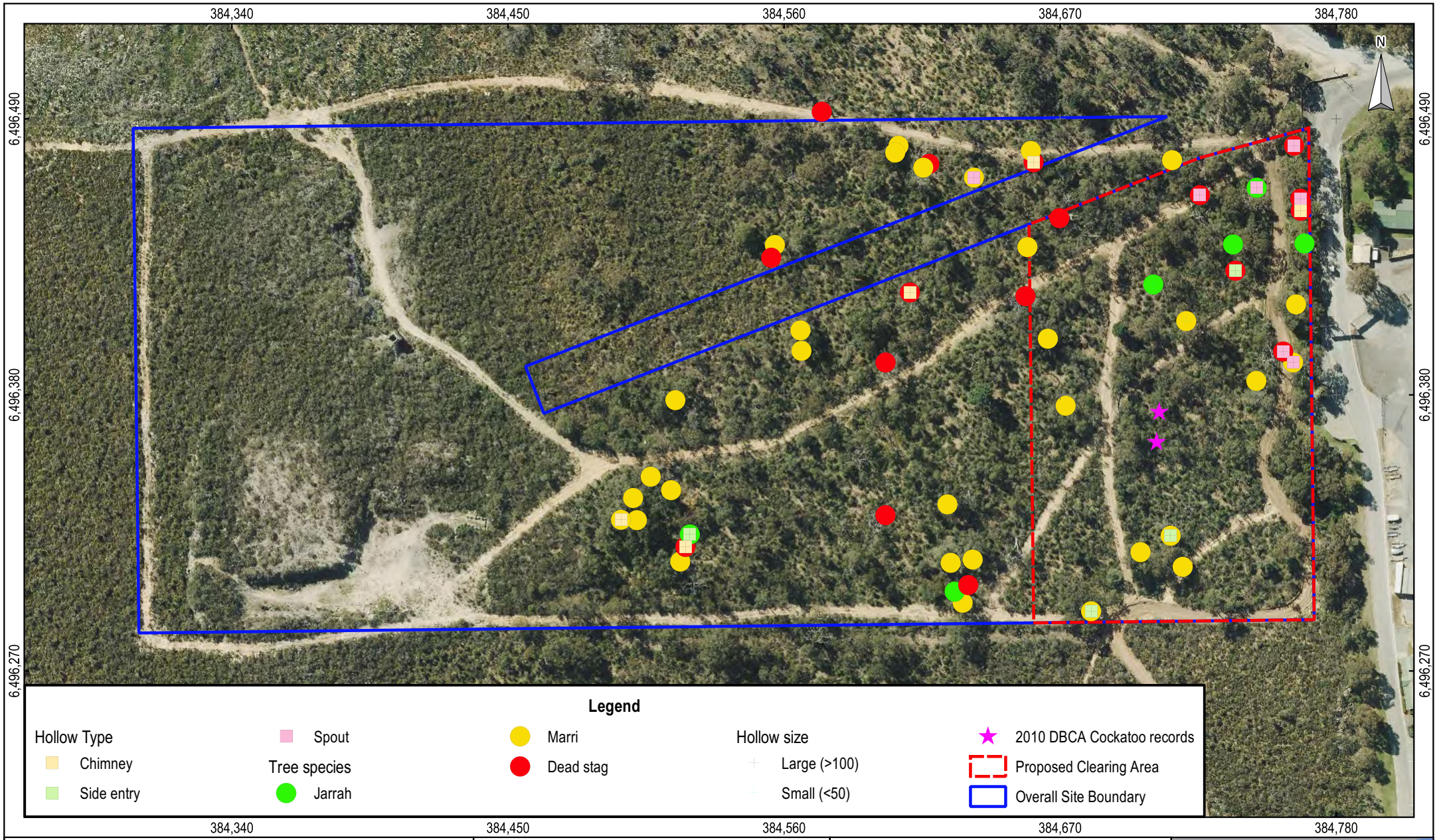
* Denotes introduced species

6.3 BLACK COCKATOO HABITAT SURVEY

A black cockatoo habitat survey was carried out by MBS Environmental Senior Environmental Scientist Dr Kirsi Kauhanen with assistance in the field by Environmental Scientist Kat Partridge on 15 July 2021 within the broader site boundary, including the 2 ha assessment area that will be the subject of the clearing permit. The survey identified (Figure 9):

- A total 55 trees with a diameter at breast height (DBH) of 500 mm (50 cm) or more. Of these, 32 were Marri, six were Jarrah, and 17 were dead stags whose species could not be determined. Twenty-one trees with a DBH > 500 mm were located within the 2 ha area that will be subject to the clearing permit application; seven dead stags, four Jarrah, and 10 Marri.
- Nine dead stags contained one or more large hollows (> 10 cm). Of these, there were six hollows with a chimney shape, six with a spout shape, and one with a side entry. No evidence of black cockatoo occupation was observed in any of them, with bees present in two. Six of the dead stags with large hollows are present in the proposed 2 ha clearing area.
- Two Jarrahs contained one or more large hollows (> 10 cm), with one being a spout shape and the other with a side entrance; neither showed evidence of being occupied. An additional Jarrah contained a hollow that was too small to be used by black cockatoos for breeding (< 5 cm). One of the Jarrah with a large hollow is located within the proposed 2 ha clearing area.
- Five Marris had one or more large hollows (> 10 cm), with one having a chimney shape, two having a spout shape, and three having a side entry. One of the Marris with the side entry hollow was too small to be used by black cockatoos for breeding, as was an additional Marri with a hollow < 5 cm. Three of the Marri with large hollows and one with a hollow < 5 cm are located within the proposed 2 ha clearing area. None of the hollows showed evidence of occupancy by black cockatoos, with one being occupied by galahs.

- Overall, there are ten trees with large hollows (> 10 cm) and one with a small hollow (< 5 cm) within the proposed 2 ha clearing area. While the large hollows have potential to be suitable for black cockatoos based on size; the inside of these hollows has not been inspected and may not be suitable.
- No hollows showed indication of use by black cockatoos in the form of scratching, droppings, or feathers.
- While there were species present that black cockatoos are known to feed on, there were no signs of foraging in the form fresh or aged chewed Marri nuts or Banksia cones were noted.
- There were no indications of use of the site for roosting in the form of droppings, clipped branches, or feathers.



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Original Size: A4
Grid: GDA94 / MGA zone 50 (EPSG:28350)
0 50 100 m

Absolute Timber Solutions
Supporting Information
Native Vegetation Clearing Permit Application

Figure 9

Black Cockatoo Habitat Assessment
400 Wattle Ave Neerabup

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Australia
t: +61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

\\mbssvr\working\Complex Land Solutions\ATS - 400 Wattle Ave Neerabup\GIS\Neerabup SSA.qgz 07/03/2022 F9 Black Cockatoos

7. IMPLICATIONS OF RESULTS

7.1 FLORA

The detailed flora and vegetation survey carried out by Natural Area did not identify the presence of any threatened or priority flora species listed under the BC Act or the EPBC Act. The survey was carried out by a botanist/zoologist with more than 10 years' experience carrying out flora and vegetation surveys on the Swan Coastal Plain, within the southwest of Western Australia and in other Western Australian locations. Accordingly, the proposed clearing of 2 ha of the site is unlikely to impact on conservation significant flora species.

7.2 VEGETATION

Vegetation condition across the site is primarily Very Good – Excellent, with patches of vegetation in Good, Degraded, and completely Degraded condition. Within the proposed 2 ha clearing area, vegetation condition was primarily Very Good (1.25 ha) and Excellent (0.19 ha), with 0.54 ha in a Degraded or Completely Degraded condition. Table 13 summarises the vegetation across the site and within the 2 ha proposed clearing permit area.

Table 13: Vegetation Condition within the Site and the Proposed Clearing Area

Vegetation Condition	Pristine	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
Entire Site							
Area (ha)	0	3.2	3.7	0.5	0.2	1.2	8.8
Area (%)	0	36.4	42	5.7	2.3	13.6	100
Proposed 2 ha Clearing Area							
Area (ha)	0	0.19	1.25	0.02	0.15	0.39	2.0
Area (%)	0	9.5	62.5	1	7.5	19.5	100
Condition within the Proposed 2 ha Clearing Area as a Percentage of the Entire Site							
Area (%)	0	2.16	14.2	0.23	1.7	4.9	23.19

7.3 THREATENED ECOLOGICAL COMMUNITIES

The presence of the *Melaleuca huegelii – Melaleuca systena* Shrublands on Limestone Ridges ecological community listed as threatened under the BC Act was confirmed in the western portion of the overall site. However, it is not present in the proposed 2 ha clearing area, so will not be impacted by the proposed clearing (Figure 6).

In addition, it was confirmed that the Banksia Woodlands of the Swan Coastal Plain and the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological communities were not present within the site, or the proposed 2 ha clearing area based on the absence of key diagnostic features. Accordingly, there will be no impacts to those communities as a result of the proposed clearing.

7.4 SIGNIFICANT FAUNA

The basic fauna assessment did not identify the presence of any significant fauna species utilising the site. There was no evidence of the presence of the Western Brush Wallaby (*Notamacropus irma*) in the form of scats or tracks, or the presence of Quenda (*Isoodon fusciventer*) in the form of tracks, scats, or vegetative runnels.

The cockatoo habitat assessment and the detailed flora and vegetation assessment noted there were species that are known preferred foraging species, including the *Corymbia calophylla* (Marri), the *Eucalyptus marginata* (Jarrah),

and the *Banksia sessilis* (Parrot Bush). However, there were no signs of usage by black cockatoos in the form of chewed Marri nuts or Banksia cones noted during the cockatoo habitat assessment or the basic fauna assessment. The absence of evidence of usage suggests that the despite the presence of suitable foraging species and trees with potentially suitable hollows, there are other sites within the broader area that are preferred by the black cockatoos.

An assessment of the risk of significant impacts to black cockatoos is provided in Table 14 using Table 3 of the Referral Guidelines (DSEWPaC, 2012). It is noted that whilst there is more than 1 ha of vegetation known to contain flora species that black cockatoos forage on and that there are some hollows present of a sufficient size and orientation that could be used for breeding, the lack of evidence of foraging, in particular, may suggest that the habitat within the Site is not preferred. This creates a level of uncertainty regarding the need for a referral to the Department of Agriculture, Water and Environment for an assessment of matters of national environmental significance listed under the EPBC Act. Under the Act, it is up to the proponent to decide whether to refer a proposal for assessment based on an assessment of the site values, and any discussion with Departmental officers will not provide a definitive indication of the need for any referral. While the site assessment activities noted the presence of preferred black cockatoo foraging species within the proposed clearing area and broader site, the lack of evidence of any usage suggests the Site is probably not 'quality' foraging habitat, as defined in Table 3 of the guidelines, and thus does not warrant a referral to the Department of Agriculture, Water, and the Environment under the EPBC Act.

Table 14: Assessment of Impact Risk to Black Cockatoos

Referral Guideline Descriptors	MBS Comment
High Risk of Significant Impacts: Referral Recommended	
Clearing of known nesting tree.	• No known nesting trees identified in the black cockatoo habitat survey. • Site is located more than 3 km from known breeding areas.
Clearing or degradation of any part of a vegetation community known to contain breeding habitat.	• Vegetation community does not contain known breeding habitat. • Site is located more than 3 km from known breeding areas.
Clearing of more than 1 ha of quality foraging habitat.	• Approximately 1.5 ha of vegetation in the proposed clearing area is in Very Good or Excellent Condition. • While Jarrah and Marri trees are present within the proposed clearing area and the broader site, there was no evidence of usage by black cockatoos in the form of new or aged chewed Marri nuts or Banksia cones during the habitat assessment or the basic fauna assessment.
Clearing or degradation (including pruning the top canopy) of a known night roosting site.	• The black cockatoo habitat assessment determined that there is no evidence of the site being used as a night roosting site.

Referral Guideline Descriptors	MBS Comment
Creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging, or roosting).	• The proposed clearing will not create a gap of greater than 4 km between patches of black cockatoo habitat. • There is no evidence of the site being used for breeding, foraging, or roosting. • There is extensive vegetation remaining within the region, including the Banksia Woodlands TEC which is known to include flora species that are known to be preferred foraging species for black cockatoos.
Uncertainty: Referral Recommended or Contact the Department	
Degradation (such as through altered hydrology or fire regimes) of more than 1 ha of foraging habitat. Significance will depend on the level and extent of degradation and quality of the habitat.	• While the proposal will result in the clearing of 2 ha of vegetation with known foraging species, there is no evidence of feeding at the site in the form of new or aged chewed Marri nuts or Banksia cones. • The proposed clearing area is located on deeper, sandy soils, thus there is not expected to be any changes to hydrology. • Fire regimes are not expected to be impacted by the proposed clearing.
Clearing or disturbance in areas surrounding black cockatoo breeding, foraging or night roosting habitat that has the potential to degrade habitat through introduction of invasive species, edge effects, hydrological changes, increased human visitation or fire.	• The proposed clearing area is not located in a known black cockatoo breeding, foraging, or night roosting habitat area. • Edge effects are likely to be minimised as a discrete clearing area is proposed along the eastern portion of the site.
Actions that do not directly affect the listed species but have the potential for indirect impacts such as increasing competitors for nest hollows.	• No evidence of usage at the site by black cockatoos. • Several identified hollows occupied by bees and other bird species.
Actions with the potential to introduce known plant diseases such as Phytophthora spp. to an area where the pathogen was not previously known.	Unlikely, as the proposed clearing area is a discrete portion of the site along the eastern boundary.
Low Risk of Significant Impacts: Referral May Not be Required	
Actions that do not affect black cockatoo habitat or individuals.	• Proposed clearing will affect potential black cockatoo habitat. • Impacts to individuals are not expected due to lack of evidence of usage.
Actions whose impacts occur outside the modelled distribution of the three black cockatoos.	The proposed clearing area is located within the modelled distribution area of the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*).

7.5 ASSESSMENT AGAINST CLEARING PRINCIPLES

Clearing applications are assessed against the ten clearing principles outlined in Schedule 5 of the *Environmental Protection Act* 1986 (EP Act). The principles aim to ensure that potential impacts resulting from the removal of native vegetation can be assessed in an integrated way and apply to all lands throughout WA. The principles address the four main environmental areas of biodiversity significance, land degradation, conservation estate and ground and surface water quality. MBS' assessment using currently available information regarding present and previous activities at the site indicate that the proposed clearing is unlikely to be at variance with any of the clearing principles (Table 15).

Table 15: Assessment against Native Vegetation Clearing Principles

Principle	Description	MBS Assessment
A.	Native vegetation should not be cleared if it comprises a high level of biological diversity.	The proposed clearing may be at variance with this Principle: • The detailed flora and vegetation survey identified a total of 140 flora species across the entire 400 Wattle Ave site, of which 107 were native species and 33 were introduced species (weeds). • The proposed 2 ha clearing area is within the area defined by Natural Area as *Corymbia calophylla* and *Eucalyptus marginata* Open Woodland, or the area of Vegetation Association 6. • Based on the Natural Area quadrat data for quadrats 2, 5, and 6, 70 flora species were recorded, of which 52 were native and 18 non-native (weed) species.
B.	Native vegetation should not be cleared if it comprises the whole or a 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: • While there are preferred foraging species present within the proposed clearing area, there are locations within the remaining portion of 400 Wattle Ave and beyond the overall site with a greater variety of preferred foraging species, such as Banksia and Hakea. • The proposed clearing area includes 1.46 ha of vegetation in 'Good' or better condition, assessment of the presence/usage of the site by endangered black cockatoos indicated they did not appear to be utilising the site for foraging, roosting, or nesting. • This absence suggests that the habitat cannot be described as significant, thus the proposed clearing is not likely to be at variance within this principle.
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: • The detailed flora and vegetation survey carried out by Natural Area did not identify any conservation significant flora species on site, including within the proposed 2 ha clearing area. • Similarly, the DBCA threatened and priority flora database searches did not record any conservation significant species within the proposed clearing area or the broader site; with the closest record being more than 1300 m northwest from the proposed clearing boundary.

Principle	Description	MBS Assessment
D.	Native vegetation should not be cleared if it comprises the whole or a part of or is necessary for the maintenance of a Threatened Ecological Community (TEC).	The proposed clearing is not likely to be at variance with this principle: • The detailed flora and vegetation survey carried out by Natural Area confirmed that the *Banksia Woodlands of the Swan Coastal Plain* and the *Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain* were not present within the proposed clearing area of the broader site, noting that the designated buffer applied to external patches of the Tuart TEC extend into the site boundary. • The presence of the *Melaleuca huegelii – Melaleuca systena* Shrublands on Limestone Ridges in the western portion of the broader site was confirmed during the survey but is not present within the proposed clearing area.
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: • The clearing will occur in vegetation association 6, which as of 2018, there was 2,777.67 ha remaining within the City of Wanneroo, or 21.94% of the pre-European extent. • The clearing of 2 ha represents 0.072% of the pre-European extent remaining within the City of Wanneroo. • An additional 3 ha of this vegetation association will remain within the remainder of the Site and in areas to the north, east and south beyond the broader site boundary.
F.	Native vegetation should not be cleared if it is growing in, or in association with an environment associated with a watercourse or wetland.	The proposed clearing of native vegetation is not likely to be at variance with this principle as there are no watercourses or wetland areas within or in proximity to the site.
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 vegetation will be retained around the site; acting as a wind buffer.
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 it will not result in edge effects or other impacts to nearby Bush Forever sites.
I.	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality	The proposed clearing is not likely to be at variance with this principle as there are no wetlands or watercourses on site and the indicative depth to groundwater is 42 m below ground level (DWER, 2022).

Principle	Description	MBS Assessment
	of surface or underground water.	
J.	Native vegetation should not be cleared if clearing the vegetation is likely to cause or exacerbate the incidence of flooding.	The proposed clearing is not likely to be at variance with this principle as there are no wetlands or watercourses on site.

7.6 AVOIDANCE AND MITIGATION

The Wattle Ave Site is owned by the Proponent, thus provides the option of using available land within their ownership, hence this solution represents the best location for the storage area. The vegetation present on the Site means that clearing is the only option. A review of Site conditions indicates that the proposed clearing area represents the best clearing option for the following reasons:

- It is close to the property entry off Wattle Ave, eliminating the need for additional clearing to enable access to the Site.
- The proposed 2 ha clearing area represents an appropriate spatial area to enable the ready loading, unloading, movement, and storage of timber and other equipment on site.
- The proposed Site includes areas that are in a Degraded or Completely Degraded condition associated with the proliferation of informal tracks.

7.6.1 Avoidance Measures

The location of the proposed 2 ha clearing area avoids impacts to:

- The *Melaleuca huegelii – Melaleuca systena* Shrublands on Limestone Ridges threatened ecological community listed under the BC Act that is present approximately 250 m to the west within the broader property boundary.
- Various Banksia Woodland priority and/or threatened ecological communities listed under the BC Act and/or the EPBC Act based on the key diagnostic features of those communities being absent within the site; the closest patch of this community type is more than 750 m to the east.
- The Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community, which is not present within the Site.
- Retention of 6.8 ha of vegetation within the remainder of the Site, with approximately 5.5 ha in an Excellent or Very Good condition.
- The flora and vegetation survey carried out by Natural Area in spring 2021 indicated there were no conservation significant flora species present within the entire 8.8 ha Site, thus no species will be impacted by the proposed clearing.

7.6.2 Impact Minimisation Measures

The black cockatoo assessment carried out by MBS Environmental determined:

- There were 55 trees within the broader site that had a diameter of > 500 mm, of which 21 were located within the proposed 2 ha clearing area.
- Ten trees within the proposed clearing area had hollows, with all being a suitable size for usage by black cockatoos, however, it is not known if they were suitable for nesting as they were not inspected. An additional six trees with large hollows will be retained within the remaining 6.8 ha of the overall Site.

- No evidence of usage by black cockatoos for nesting or roosting in the form of scratching, droppings of feathers were recorded.
- No evidence of foraging by black cockatoos in the form of fresh or aged Marri nuts or Banksia cones was noted by either MBS Environmental in July 2021 or Natural Area in September 2021 within the site, suggesting that the site is not frequented by black cockatoos.

Based on the outcomes of the black cockatoo assessment, the proposed clearing of 2 ha of vegetation within the site suggest that impacts to black cockatoos are likely to be minimal.

8. REFERENCES

Biodiversity Conservation Act 2016 (WA)

Bureau of Meteorology, (2021), *Climate Data Online*, Accessed October 2021 via: http://www.bom.gov.au/climate/data/.

Department of Agriculture, Water and the Environment (DAWE), (2021) *Protected Matters Search Tool*, 5 km search radius, Accessed February 2022 via: https://www.environment.gov.au/epbc/protected-matters-search-tool.

Department of Biodiversity, Conservation and Attractions (DBCA), (2019a), *Black Cockatoo Breeding Sites – Buffered* (DBCA-063), accessed February 2022 via: https://catalogue.data.wa.gov.au/dataset/black-cockatoo-breeding-sites-buffered.

Department of Biodiversity, Conservation and Attractions (DBCA), (2019b), *Black Cockatoo Roosting Sites – Buffered* (DBCA-064), accessed February 2022 via: https://catalogue.data.wa.gov.au/dataset/black-cockatoo-roosting-sites-buffered.

Department of Biodiversity, Conservation and Attractions (DBCA), (2021a), *Conservation Codes for Western Australian plants and animals*, accessed February 2023 via: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation%20code%20definitions.pdf..

Department of Biodiversity, Conservation and Attractions (DBCA), (2022), *Florabase*, accessed January 2022 via: https://florabase.dpaw.wa.gov.au/.

Department of Biodiversity, Conservation and Attractions (DBCA), (2021b), *NatureMap Report*, 5 km search radius, http://naturemap.dpaw.wa.gov.au/default.aspx. accessed February 2021.

Department of Biodiversity, Conservation and Attractions (DBCA), (2019c), 2018 Statewide Vegetation Statistics (formerly CAR Reserve Analysis): Full Report, accessed February 2022 via: https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

Department of Biodiversity, Conservation and Attractions (DBCA), (2021c), *Threatened and Priority Flora, Fauna, and Ecological Community database searches*, Personal Communication.

Department of Sustainability, Environment, Water, Population and Communities, (2012), *EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species: Carnaby's Cockatoo (Endangered)* Calyptorhynchus latirostris*, Baudin's Cockatoo (Vulnerable*) Calyptorhynchus baudinii*, Forest Red-tailed Black Cockatoo (Vulnerable)* Calyptorhynchus banksii naso, accessed February 2022 via: https://www.awe.gov.au/sites/default/files/documents/referral-guidelines-wa-black-cockatoo.pdf.

Department of the Environment and Energy, (2016), *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (s 266B) Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community, accessed February 2022 via: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf.

Department of Water and Environmental Regulation (DWER), (2022), Perth Groundwater Map, accessed February 2022 via: https://maps.water.wa.gov.au/Groundwater/.

Environmental Protection Act 1986 (WA)

Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)

Environmental Protection Authority (EPA), (2016), Technical Guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment*, accessed September 2021 via: https://www.epa.wa.gov.au/policies-guidance/technical-guidance-flora-and-vegetation-surveys-environmental-impact-assessment.

Environmental Protection Authority (EPA), (2020), *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*, accessed September 2021 via: https://www.epa.wa.gov.au/policies-guidance/technical-guidance-terrestrial-vertebrate-fauna-surveys-environmental-impact.

Gibson, N., Keighery, B., Keighery, G., Burbidge, A., and Lyons, M., (1994), *A Floristic Survey of the Southern Swan Coastal Plain*, unpublished report prepared for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.).

Government of Western Australian, (2000), *Bush Forever, Volume 2*, Government of Western Australia, Perth, Western Australia.

Heddle, E.M., Lonergan, O.W. & Havel, J.J. (1980). Vegetation of the Darling System. In: *Atlas of Natural Resources, Darling System, Western Australia*, Department of Conservation and Environment, Perth.

Mitchell, D., Williams, K., and Desmond, A., (2002), Swan Coastal Plain2 (SWA2 – Swan Coastal Plain Subregion), accessed February 2022 via: https://www.dpaw.wa.gov.au/images/documents/about/science/projects/waaudit/swan_coastal_plain02_p606-623.pdf.

WA Herbarium, (2022), *Florabase*, accessed March 2022 via: https://florabase.dpaw.wa.gov.au/.

APPENDICES

APPENDIX 1: NATUREMAP SPECIES REPORT

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 20/02/2021

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115° 46' 55" E,31° 39' 43" S
Buffer	5km
Group By	Species Group

Species Group	Species	Records
Alga	2	2
Amphibian	5	25
Bird	110	1058
Dicotyledon	160	339
Fungus	3	5
Gymnosperm	1	2
Invertebrate	26	108
Mammal	12	36
Monocotyledon	82	185
Reptile	37	168
Slime Mould	4	5
TOTAL	**442**	**1933**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Alga					
1.	27392	*Dictyota dichotoma var. intricata*			
2.	42785	*Sirophysalis trinodis*			
Amphibian					
3.	25400	*Crinia insignifera (Squelching Froglet)*			
4.	25410	*Heleioporus eyrei (Moaning Frog)*			
5.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
6.	25420	*Myobatrachus gouldii (Turtle Frog)*			
7.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Bird					
8.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
9.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
10.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
11.	24262	*Acanthiza inornata (Western Thornbill)*			
12.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
13.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
14.	25536	*Accipiter fasciatus (Brown Goshawk)*			
15.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
16.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
17.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
18.	24316	*Anas superciliosa (Pacific Black Duck)*			
19.	24561	*Anthochaera carunculata (Red Wattlebird)*			
20.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
21.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
22.	24285	*Aquila audax (Wedge-tailed Eagle)*			
23.	41324	*Ardea modesta (great egret, white egret)*			
24.	24340	*Ardea novaehollandiae (White-faced Heron)*			
25.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
26.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
27.		*Barnardius zonarius*			
28.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
29.	25715	*Cacatua roseicapilla (Galah)*			
30.	25716	*Cacatua sanguinea (Little Corella)*			
31.	24727	*Cacatua sanguinea subsp. westralensis (Little Corella)*			
32.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
33.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
34.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
35.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
		Cockatoo)		T	
36.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
37.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
38.		*Chroicocephalus novaehollandiae*			
39.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
40.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
41.	24613	*Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)*			
42.	24399	*Columba livia (Domestic Pigeon)*	Y		
43.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
44.	25592	*Corvus coronoides (Australian Raven)*			
45.	24417	*Corvus coronoides subsp. perplexus (Australian Raven)*			
46.	25701	*Coturnix ypsilophora (Brown Quail)*			
47.	25595	*Cracticus tibicen (Australian Magpie)*			
48.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
49.	25596	*Cracticus torquatus (Grey Butcherbird)*			
50.	24424	*Cracticus torquatus subsp. torquatus (Grey Butcherbird)*			
51.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
52.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
53.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
54.	24470	*Dromaius novaehollandiae (Emu)*			
55.		*Elanus axillaris*			
56.		*Eolophus roseicapillus*			
57.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
58.	24368	*Eurostopodus argus (Spotted Nightjar)*			
59.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
60.	25623	*Falco longipennis (Australian Hobby)*			
61.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
62.	25727	*Fulica atra (Eurasian Coot)*			
63.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
64.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
65.	25530	*Gerygone fusca (Western Gerygone)*			
66.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
67.	24443	*Grallina cyanoleuca (Magpie-lark)*			
68.	24295	*Haliastur sphenurus (Whistling Kite)*			
69.	47965	*Hieraaetus morphnoides (Little Eagle)*			
70.	24491	*Hirundo neoxena (Welcome Swallow)*			
71.	24367	*Lalage tricolor (White-winged Triller)*			
72.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
73.	25661	*Lichmera indistincta (Brown Honeyeater)*			
74.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
75.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
76.	25654	*Malurus splendens (Splendid Fairy-wren)*			
77.	24552	*Malurus splendens subsp. splendens (Splendid Fairy-wren)*			
78.	24583	*Manorina flavigula (Yellow-throated Miner)*			
79.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
80.	24598	*Merops ornatus (Rainbow Bee-eater)*			
81.		*Microcarbo melanoleucos*			
82.	25693	*Microeca fascinans (Jacky Winter)*			
83.	24738	*Neophema elegans (Elegant Parrot)*			
84.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
85.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
86.	24624	*Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)*			
87.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
88.	25682	*Pardalotus striatus (Striated Pardalote)*			
89.	48061	*Petrochelidon nigricans (Tree Martin)*			
90.	48066	*Petroica boodang (Scarlet Robin)*			
91.	24659	*Petroica goodenovii (Red-capped Robin)*			
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.	24747	*Platycercus spurius (Red-capped Parrot)*			
98.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
99.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
100.	25703	*Podargus strigoides (Tawny Frogmouth)*			
101.	25722	*Polytelis anthopeplus (Regent Parrot)*			
102.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
103.		*Purpureicephalus spurius*			
104.	48096	*Rhipidura albiscapa (Grey Fantail)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
105.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
106.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
107.	30948	*Smicrornis brevirostris (Weebill)*			
108.	25597	*Strepera versicolor (Grey Currawong)*			
109.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
110.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
111.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
112.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
113.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
114.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
115.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
116.	25762	*Tyto alba (Barn Owl)*			
117.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
Dicotyledon					
118.	15470	*Acacia barbinervis subsp. borealis*			
119.	3237	*Acacia benthamii*		P2	
120.	3282	*Acacia cyclops (Coastal Wattle)*			
121.	3409	*Acacia lasiocarpa (Panjang)*			
122.	11611	*Acacia lasiocarpa var. lasiocarpa*			
123.	3502	*Acacia pulchella (Prickly Moses)*			
124.	3525	*Acacia rostellifera (Summer-scented Wattle)*			
125.	3527	*Acacia saligna (Orange Wattle, Kudjong)*			
126.	30032	*Acacia saligna subsp. saligna*			
127.	3584	*Acacia truncata*			
128.	3602	*Acacia willdenowiana (Grass Wattle)*			
129.	6205	*Actinotus leucocephalus (Flannel Flower)*			
130.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
131.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
132.	6311	*Andersonia heterophylla*			
133.	12724	*Anthotium junciforme*			
134.	20283	*Astartea scoparia (Common Astartea)*			
135.	6323	*Astroloma ciliatum (Candle Cranberry)*			
136.	6331	*Astroloma microcalyx (Native Cranberry)*			
137.	6334	*Astroloma pallidum (Kick Bush)*			
138.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
139.	11386	*Banksia leptophylla var. melletica*			
140.	1834	*Banksia menziesii (Firewood Banksia)*			
141.	32077	*Banksia sessilis var. cygnorum*			
142.	7046	*Bellardia trixago (Bellardia)*	Y		
143.	17665	*Boronia purdieana subsp. purdieana*			
144.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
145.	11187	*Brassica barrelieri subsp. oxyrrhina (Smooth-stem Turnip)*	Y		
146.	3000	*Brassica tournefortii (Mediterranean Turnip)*	Y		
147.	2848	*Calandrinia corrigioloides (Strap Purslane)*			
148.	5426	*Calothamnus quadrifidus (One-sided Bottlebrush, Kwowdjard)*			
149.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
150.	7909	*Carduus pycnocephalus (Slender Thistle)*	Y		
151.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
152.	2957	*Cassytha racemosa (Dodder Laurel)*			
153.	2889	*Cerastium glomeratum (Mouse Ear Chickweed)*	Y		
154.	2483	*Chenopodium album (Fat Hen)*	Y		
155.	7937	*Cirsium vulgare (Spear Thistle, Scotch Thistle)*	Y		
156.	4552	*Comesperma confertum*			
157.	4554	*Comesperma flavum*			
158.	15511	*Conospermum boreale*			
159.	1876	*Conospermum incurvum (Plume Smokebush)*			
160.	1885	*Conospermum triplinervium (Tree Smokebush)*			
161.	6348	*Conostephium pendulum (Pearl Flower)*			
162.	17104	*Corymbia calophylla (Marri)*			
163.	3137	*Crassula colorata (Dense Stonecrop)*			
164.	4802	*Cryptandra mutila*			
165.	6218	*Daucus glochidiatus (Australian Carrot)*			
166.	19747	*Daviesia decurrens subsp. decurrens*			
167.	3824	*Daviesia nudiflora*			
168.	3845	*Daviesia triflora*			
169.	4746	*Diplopeltis huegelii*			
170.	48751	*Drosera drummondii*			
171.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
172.	3106	*Drosera macrantha (Bridal Rainbow)*			
173.	48710	*Drosera micrantha*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
174.	3118	*Drosera pallida (Pale Rainbow)*			
175.	31233	*Drosera patens*		P1	
176.	30712	*Drosera x sidjamesii*		P1	
177.	15446	*Eryngium pinnatifidum subsp. pinnatifidum*			
178.	13091	*Eucalyptus argutifolia (Wabling Hill Mallee)*		T	
179.	5615	*Eucalyptus decipiens (Limestone Marlock, Moit)*			
180.	5649	*Eucalyptus foecunda (Narrow-leaved Red Mallee)*			
181.	5659	*Eucalyptus gomphocephala (Tuart, Duart)*			
182.	5708	*Eucalyptus marginata (Jarrah, Djara)*			
183.	20808	*Eucalyptus petiolaris*	Y		
184.	13541	*Eucalyptus petrensis*			
185.	7323	*Galium murale (Small Goosegrass)*	Y		
186.	20473	*Gastrolobium ebracteolatum*			
187.	20483	*Gastrolobium linearifolium*			
188.	16311	*Gazania linearis*	Y		
189.	4339	*Geranium molle (Dove's Foot Cranesbill)*	Y		
190.	6143	*Glischrocaryon aureum (Common Popflower)*			
191.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
192.	15839	*Grevillea preissii subsp. preissii*			
193.	12824	*Grevillea vestita subsp. vestita*			
194.	2175	*Hakea lissocarpha (Honey Bush)*			
195.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
196.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
197.	3016	*Heliophila pusilla*	Y		
198.	16933	*Hemiandra glabra*			
199.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
200.	45534	*Hibbertia hypericoides subsp. hypericoides*			
201.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
202.	43280	*Hibbertia sericosepala*			
203.	11461	*Hibbertia spicata subsp. leptotheca*		P3	
204.	6222	*Homalosciadium homalocarpum*			
205.	12859	*Hovea trisperma var. trisperma*			
206.	5216	*Hybanthus calycinus (Wild Violet)*			
207.	6232	*Hydrocotyle hispidula*			
208.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
209.	3992	*Isotropis cuneifolia (Granny Bonnets)*			
210.	14783	*Jacksonia calcicola*			
211.	4027	*Jacksonia sericea (Waldjumi)*		P4	
212.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
213.	4044	*Kennedia prostrata (Scarlet Runner)*			
214.	15498	*Kunzea glabrescens (Spearwood)*			
215.	5850	*Leptospermum laevigatum (Coast Teatree)*	Y		
216.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
217.	7677	*Levenhookia stipitata (Common Stylewort)*			
218.	6456	*Lysinema ciliatum (Curry Flower)*			
219.	5920	*Melaleuca huegelii (Chenille Honeymyrtle)*			
220.	33022	*Melaleuca sp. Wanneroo (G.J. Keighery 16705)*		T	
221.	18598	*Melaleuca systena*			
222.	8106	*Millotia tenuifolia (Soft Millotia)*			
223.	16693	*Minuartia mediterranea*	Y		
224.	6192	*Myriophyllum drummondii*			
225.	36177	*Ornduffia albiflora*			
226.	4343	*Pelargonium capitatum (Rose Pelargonium)*	Y		
227.	4346	*Pelargonium littorale*			
228.	2258	*Persoonia comata*			
229.	2299	*Petrophile linearis (Pixie Mops)*			
230.	2301	*Petrophile macrostachya*			
231.	2309	*Petrophile serruriae*			
232.	4675	*Phyllanthus calycinus (False Boronia)*			
233.	5232	*Pimelea argentea (Silvery Leaved Pimelea)*			
234.	5237	*Pimelea calcicola*		P3	
235.	5243	*Pimelea ferruginea*			
236.	8175	*Podolepis gracilis (Slender Podolepis)*			
237.	8177	*Podolepis lessonii*			
238.	4691	*Poranthera microphylla (Small Poranthera)*			
239.	42022	*Poranthera moorokatta*		P2	
240.	11260	*Ptilotus drummondii var. drummondii (Pussytail)*			
241.	2742	*Ptilotus manglesii (Pom Poms, Mulamula)*			
242.	8195	*Quinetia urvillei*			
243.	11341	*Rhagodia baccata subsp. baccata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
244.	13312	*Rhodanthe pyrethrum*			
245.	7603	*Scaevola canescens (Grey Scaevola)*			
246.	13182	*Scaevola repens var. repens*			
247.	2910	*Silene nocturna (Mediterranean Catchfly)*	Y		
248.	8230	*Sonchus asper (Rough Sowthistle)*	Y		
249.	9367	*Sonchus hydrophilus (Native Sowthistle)*			
250.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
251.	4207	*Sphaerolobium medium*			
252.	4828	*Spyridium globulosum (Basket Bush)*			
253.	4713	*Stachystemon axillaris (Leafy Stachystemon)*			
254.	4733	*Stackhousia monogyna*			
255.	2918	*Stellaria media (Chickweed)*	Y		
256.	2316	*Stirlingia latifolia (Blueboy)*			
257.	25831	*Stylidium araeophyllum (Stilt Walker)*			
258.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
259.	7745	*Stylidium junceum (Reed Triggerplant)*			
260.	7756	*Stylidium longitubum (Jumping Jacks)*		P4	
261.	13127	*Stylidium maritimum*		P3	
262.	7806	*Stylidium utricularioides (Pink Fan Triggerplant)*			
263.	4256	*Templetonia retusa (Cockies Tongues)*			
264.	5105	*Thomasia triphylla*			
265.	6280	*Trachymene pilosa (Native Parsnip)*			
266.	4292	*Trifolium campestre (Hop Clover)*	Y		
267.	4295	*Trifolium dubium (Suckling Clover)*	Y		
268.	4297	*Trifolium glomeratum (Cluster Clover)*	Y		
269.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
270.	44444	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4	
271.	1141	*Trithuria submersa*			
272.	8254	*Urospermum picroides (False Hawkbit)*	Y		
273.	8255	*Ursinia anthemoides (Ursinia)*	Y		
274.	15432	*Verticordia densiflora var. densiflora*			
275.	4322	*Vicia sativa (Common Vetch)*	Y		
276.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
277.	6289	*Xanthosia huegelii*			
Fungus					
278.		*Hexagonia vesparia*			
279.		*Phytophthora cinnamomi*			
280.		*Poronia erici*			
Gymnosperm					
281.	85	*Macrozamia riedlei (Zamia, Djiridji)*			
Invertebrate					
282.		*Aname mainae*			
283.		*Araneus cyphoxis*			
284.		*Araneus senicaudatus*			
285.		*Austracantha minax*			
286.		*Australomimetus ovidi*			
287.	33973	*Austrosaga spinifer (spiny katydid (Swan Coastal Plain), bush cricket (Swan Coastal Plain))*		P2	
288.		*Cormocephalus aurantiipes*			
289.		*Cormocephalus novaehollandiae*			
290.		*Cormocephalus rubriceps*			
291.		*Cormocephalus turneri*			
292.		*Eriophora biapicata*			
293.	33977	*Hylaeus globuliferus (woolybush bee)*		P3	
294.		*Idiommata blackwalli*			
295.		*Isopeda leishmanni*			
296.		*Lampona cylindrata*			
297.		*Latrodectus hasseltii*			
298.		*Maratus pavonis*			
299.		*Nephila edulis*			
300.		*Oecobius navus*			
301.		*Ommatoiulus moreletii*			
302.		*Oratemnus curtus*			
303.		*Pholcus phalangioides*			
304.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
305.		*Urodacus novaehollandiae*			
306.		*Venator immansueta*			
307.		*Venatrix pullastra*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Mammal					
308.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
309.	24041	*Felis catus (Cat)*	Y		
310.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
311.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
312.	24223	*Mus musculus (House Mouse)*	Y		
313.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
314.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
315.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
316.	24245	*Rattus rattus (Black Rat)*	Y		
317.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
318.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
319.	24040	*Vulpes vulpes (Red Fox)*	Y		
Monocotyledon					
320.	1208	*Acanthocarpus preissii*			
321.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
322.	17237	*Austrostipa elegantissima*			
323.	17240	*Austrostipa flavescens*			
324.	231	*Avellinia michelii*	Y		
325.	233	*Avena barbata (Bearded Oat)*	Y		
326.	740	*Baumea arthrophylla*			
327.	244	*Briza maxima (Blowfly Grass)*	Y		
328.	245	*Briza minor (Shivery Grass)*	Y		
329.	249	*Bromus diandrus (Great Brome)*	Y		
330.	11038	*Caladenia bicalliata*			
331.	1592	*Caladenia flava (Cowslip Orchid)*			
332.	1595	*Caladenia hirta (Sugar Candy Orchid)*			
333.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
334.	45757	*Calectasia elegans (Elegant Tinsel Lily)*		P2	
335.	43241	*Carex thecata*			
336.	1162	*Cartonema philydroides*			
337.	1125	*Centrolepis drummondiana*			
338.	1132	*Centrolepis mutica*			
339.	1134	*Centrolepis polygyna (Wiry Centrolepis)*			
340.	1280	*Chamaescilla corymbosa (Blue Squill)*			
341.	17833	*Chordifex microcodon*			
342.	1418	*Conostylis aculeata (Prickly Conostylis)*			
343.	11826	*Conostylis aculeata subsp. aculeata*			
344.	1427	*Conostylis candicans (Grey Cottonhead)*			
345.	1443	*Conostylis pauciflora (Dawesville Conostylis)*			
346.	1454	*Conostylis setigera (Bristly Cottonhead)*			
347.	16245	*Cyathochaeta teretifolia*		P3	
348.	10916	*Cyrtostylis huegelii*			
349.	17663	*Desmocladus asper*			
350.	299	*Deyeuxia quadriseta (Reed Bentgrass)*			
351.	1259	*Dianella revoluta (Blueberry Lily)*			
352.	1287	*Dichopogon capillipes*			
353.	11049	*Diuris corymbosa*			
354.	1635	*Diuris longifolia (Common Donkey Orchid)*			
355.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
356.	349	*Ehrharta longiflora (Annual Veldt Grass)*	Y		
357.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
358.	1645	*Epiblema grandiflorum (Babe-in-a-cradle)*			
359.	376	*Eragrostis curvula (African Lovegrass)*	Y		
360.	1646	*Eriochilus dilatatus (White Bunny Orchid)*			
361.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
362.	439	*Hemarthria uncinata (Matgrass)*			
363.	1070	*Hypolaena exsulca*			
364.	910	*Isolepis cernua (Nodding Club-rush)*			
365.	20019	*Lachnagrostis filiformis*			
366.	467	*Lagurus ovatus (Hare's Tail Grass)*	Y		
367.	28342	*Landoltia punctata (Thin Duckweed)*			
368.	925	*Lepidosperma angustatum*			
369.	945	*Lepidosperma squamatum*			
370.	946	*Lepidosperma striatum*			
371.	1080	*Leptocarpus scariosus*			
372.	1090	*Lepyrodia muirii*			
373.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
374.	1228	*Lomandra hermaphrodita*			
375.	1231	*Lomandra maritima*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
376.	1234	*Lomandra nigricans*			
377.	1239	*Lomandra preissii*			
378.	1246	*Lomandra suaveolens*			
379.	955	*Mesomelaena pseudostygia*			
380.	485	*Microlaena stipoides (Weeping Grass)*			
381.	1478	*Phlebocarya ciliata*			
382.		*Pterostylis aff. nana*			
383.	17267	*Pterostylis brevisepala*			
384.	12217	*Pterostylis sanguinea*			
385.	1698	*Pterostylis vittata (Banded Greenhood)*			
386.	1556	*Romulea rosea (Guildford Grass)*	Y		
387.	973	*Schoenus asperocarpus (Poison Sedge)*			
388.	982	*Schoenus clandestinus*			
389.	985	*Schoenus discifer*			
390.	992	*Schoenus grandiflorus (Large Flowered Bogrush)*			
391.	997	*Schoenus lanatus (Woolly Bog-rush)*			
392.	1006	*Schoenus odontocarpus*			
393.	1018	*Schoenus subfascicularis*			
394.	1023	*Schoenus tenellus*			
395.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
396.	1036	*Tetraria octandra*			
397.	1338	*Thysanotus manglesianus (Fringed Lily)*			
398.	1343	*Thysanotus patersonii*			
399.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
400.	724	*Vulpia myuros (Rat's Tail Fescue)*	Y		
401.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			
Reptile					
402.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
403.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
404.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
405.	24980	*Christinus marmoratus (Marbled Gecko)*			
406.	24918	*Crenadactylus ocellatus subsp. ocellatus (Clawless Gecko)*			
407.	30893	*Cryptoblepharus buchananii*			
408.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
409.	25027	*Ctenotus australis*			
410.	25039	*Ctenotus fallens*			
411.	25087	*Cyclodomorphus celatus (Western Slender Blue-tongue)*			
412.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
413.	24999	*Delma grayii*			
414.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
415.	25251	*Echiopsis curta (Bardick)*			
416.	25119	*Hemiergis quadrilineata*			
417.	25131	*Lerista distinguenda*			
418.	25133	*Lerista elegans*			
419.	25165	*Lerista praepedita*			
420.	25005	*Lialis burtonis*			
421.	25184	*Menetia greyii*			
422.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
423.	25191	*Morethia lineoocellata*			
424.	25192	*Morethia obscura*			
425.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
426.	25252	*Notechis scutatus (Tiger Snake)*			
427.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
428.	25511	*Pseudonaja affinis (Dugite)*			
429.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
430.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
431.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
432.	24943	*Strophurus spinigerus subsp. inornatus*			
433.	24942	*Strophurus spinigerus subsp. spinigerus*			
434.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
435.	25519	*Tiliqua rugosa*			
436.	25204	*Tiliqua rugosa subsp. aspera*			
437.	25207	*Tiliqua rugosa subsp. rugosa*			
438.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
Slime Mould					
439.	39079	*Physarum viride*			
440.	39094	*Trichia affinis*			
441.	39098	*Trichia favoginea*			
442.	39100	*Trichia persimilis*			

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

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 REPORT

Australian Government

Department of Agriculture, Water and the Environment

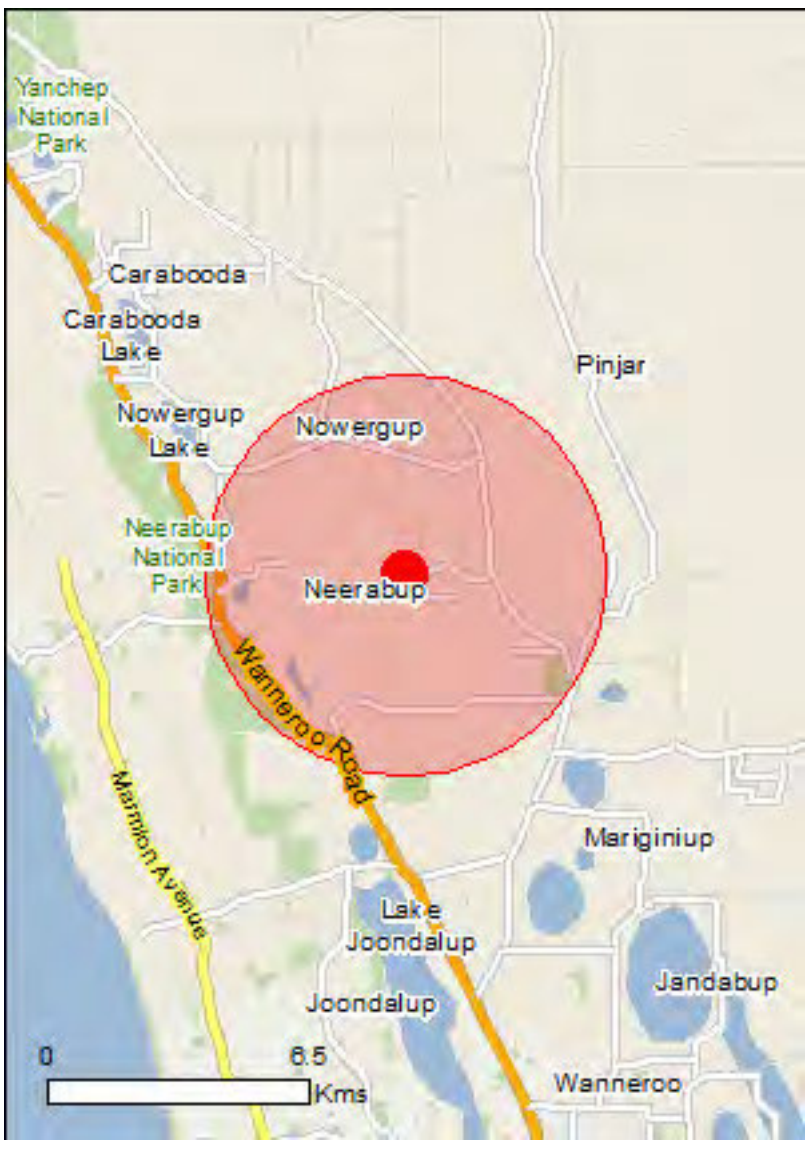
EPBC Act Protected Matters Report

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: 04/02/21 16:30:28



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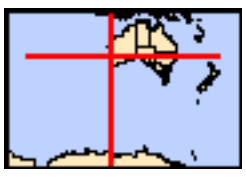
Coordinates

Buffer: 5.0Km



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:	19
Listed Migratory Species:	10

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	15
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:	1
Regional Forest Agreements:	None
Invasive Species:	34
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 likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely 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 likely to 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
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Insects		
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Mammals		

Name	Status	Type of Presence
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may 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 may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to 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
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat known to occur within area
Melaleuca sp. Wanneroo (G.J. Keighery 16705) [89456]	Endangered	Species or species habitat known 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		
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 likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		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 likely to 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 -

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 likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known 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 likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur

Name	Threatened	Type of Presence 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 likely to occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	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
Neerabup	WA

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
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

Name	Status	Type of Presence
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
Felis catus Cat, House Cat, Domestic Cat [19]		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
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		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

Name	Status	Type of Presence
		area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		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
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 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

-31.66167 115.78222

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.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

APPENDIX 3: CONSERVATION SIGNIFICANT FLORA SUMMARY

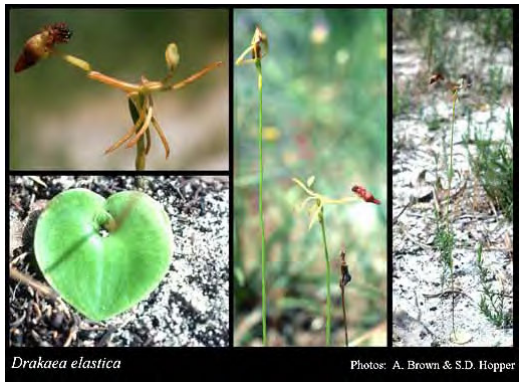
Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
			P2	Shrub, ca 1 m high. Fl. yellow.	Sand, typically on limestone breakaways.	Aug to Sep	Y	Soils, habitat suitable
			P3	Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Fl. white-cream-pink-green/green.	Grey sand, lateritic gravel.	Jul or Sep to Dec or Jan	N	Soils not suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
		En	T	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple.	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Sep to Nov	N	Soils, habitat not suitable
	Dwarf Green Kangaroo Paw	Vu	T	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. green/yellow-green.	Grey sand, clay loam. Winter-wet depressions.	Aug to Sep	N	Soils, habitat not suitable
Austrostipa mundula			P3				N	Recorded in City of Joondalup, records appear to be confined to the immediate coastal strip

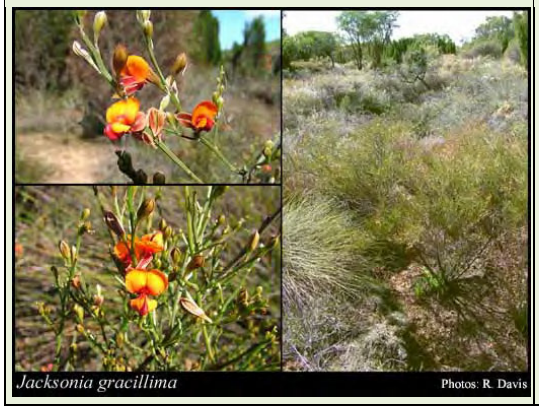
Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
Baeckea sp. *Limestone*			P1	Shrub 0.5 – 1.0 m	Limestone soils	Sep - Nov	P	Potentially, recorded in Joondalup, Wanneroo, and Gingin; known observation in a Banksia Woodland within the same vegetation complex and 211Sp-Kls Karrakatta Shallow Soil Phase
	Grand Spider Orchid	En	T	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red.	Grey or brown sand, clay loam	Sep to Oct	N	Soils, habitat not suitable
Calectasia elegans	Elegant Tinsel Lily		P2				U	Unknown, Recorded within City of Wanneroo
Conostylis bracteata			P3	Rhizomatous, tufted or shortly proliferous perennial, grass-like or herb, 0.2-0.45 m high. Fl. Yellow.	Sand, limestone. Consolidated sand dunes.	Aug to Sep	Y	Soils, habitat suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
			P4	Rhizomatous, stoloniferous perennial, grass-like or herb, 0.06-0.18 m high. Fl. Yellow.	White, grey or yellow sand. Consolidated dunes.	Aug to Oct	P	Potentially, soils are suitable, but recorded locations appear to be confined to immediate coastal strip.
Conostylis pauciflora subsp. *pauciflora*			P4	Rhizomatous, stoloniferous perennial, grass-like or herb, 0.1-0.35 m high. Fl. yellow	Grey sand, limestone. Hillslopes, consolidated dunes.	Aug to Oct.	Y	Soils, habitat suitable
Cyathochaeta teretifolia			P3	Mud. Freshwater: ponds, rivers, claypans	Grey sand, sandy clay. Swamps, creek edges		N	Soils, habitat not suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
	Dwarf Bee Orchid	VU	T	Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown	Brown loamy clay. Winter-wet swamps, in shallow water.	Sep to Oct	N	Soil types and habitat are unsuitable
	Purdie's Donkey-Orchid	EN	T	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow	Grey-black sand, moist. Winter-wet swamps	Sep to Oct	N	Soil types and habitat are unsuitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
	Glossy-leaved Hammer Orchid	En	T	White or grey sand. Low-lying situations adjoining winter-wet swamps	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow	Oct to Nov	N	Soils, habitat not suitable
		Vu	T	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow	White-grey sand	Sep to Oct	N	Typically associated in proximity to wetland areas
Drosera patens			P1	Fibrous-rooted, rosetted perennial, herb, to 0.05 m high. Fl. white	Sandy soils. Margins of winter-wet depressions, swamps and lakes.	Dec or Feb	N	Soils, habitat not suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
Drosera x sidjamesii			P1	Fibrous-rooted perennial, herb, to 0.06 m high. Fl. green-pink	Peaty sand. Along lake margins close to winter high-water line.	Nov to Dec or Jan to Mar	N	Soils, habitat not suitable
	Wabling Hill Mallee	Vu	T	(Mallee), 1.5-4 m high, bark smooth. Fl. white	Shallow soils over limestone. Slopes or gullies of limestone ridges, outcrops.	Mar to Apr.	Y	Soils, habitat suitable; potentially identifiable from bark and nuts
Fabrionia hampeana			P2				U	Unknown, recorded in City of Wanneroo
Grevillea sp. *Ocean Reef*			P1				P	Potentially, recorded in City of Joondalup, in coastal dunes rather than inland areas
Hibbertia helianthemoides			P4	Spreading to erect, low or prostrate shrub, to 0.3 m high. Fl. yellow	Clayey sand over sand-stone or loam over quartzite.	Jul or Sep to Oct.	N	Soils, habitat not suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
					Hills and scree slopes.			
Hibbertia leptotheca			P3				P	Potentially, recorded within Shire of Gingin and City of Wanneroo; tends to be in coastal areas such as secondary dunes.
			P3	Prostrate, spreading or scrambling, shrub, spindly shrub (broom-like).		Oct - Nov	P	Known from similar locations

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
	Waldjumi		P4	Low spreading shrub, to 0.6 m high. Fl. orange	Calcareous & sandy soils.	Usually Dec or Jan to Feb.	Y	Soils, habitat suitable, Known of it to flower earlier than Dec.
Lecania turicensis var. *turicensis*			P2				U	Unknown, recorded in City of Wanneroo, records appear to be in immediate coastal strip.
			P3	Erect shrub, 0.15-1 m high, to 0.6 m wide. Fl. white/pink	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	Apr to Jun or Sep	Y	Soils, habitat suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
Marianthus paralius		En	T	Almost prostrate, eventually scandent, woody shrub. Fl. red	White sand over limestone. Low coastal cliffs.	Sep to Nov	Y	Soils, habitat suitable
Melaleuca sp. *Wanneroo*		Vu	T				P	Potential, recorded in Shire of Gingin and City of Wanneroo
			P3	Erect to spreading shrub, 0.2-1 m high. Fl. pink	Sand. Coastal limestone ridges.	Sep to Nov.	Y	Soils, habitat suitable
			P3	Erect to scrambling perennial, herb, 0.5-1 m high. Fl. white	Gravelly or sandy loam. Amongst granite outcrops.	Jan to Apr.	N	Soils, habitat not suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
 *Poranthera moorokatta*			P2	Very small, < 5 cm high	Grey sandy soils at one of my sites	Sep - Nov	U	Poorly known, recorded in other surveys sites personnel have been involved with.
Sarcozona bicarinata			P3	Shrub, ca 0.1 m high. Fl. white	White sand.	Aug	N	Soils not suitable
Schoenus griffinianus			P4	Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high	White sand.	Sep to Oct.	N	Soils not suitable
Stenanthemum sublineare			P2	Erect shrub, to 0.1 m high. Fl. green,	Littered white sand. Coastal plain.	Oct to Dec	P	Potentially, within coastal plain but site is not white sand

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
	Jumping Jacks		P4	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink	Sandy clay, clay. Seasonal wetlands.	Oct to Dec	N	Soils, habitat not suitable
			P3	Caespitose perennial, herb, 0.3-0.7 m high, Leaves tufted, linear to narrowly oblanceolate, 10-40 cm long, 1-5.5 mm wide, apex acute to mucronate, margin involute, glabrous. Membranous scale leaves present at base of mature leaves. Scape glandular throughout.	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	Sep to Nov	Y	Soils, habitat suitable

Species	Common Name	EPBC 1999 (Cwlth)	BC Act 2016 (WA)	Description	Habitat	Flowers	Likely (Y/N)	Comment
				Inflorescence paniculate. Fl. white/purple				
Styphelia filifolia			P3				U	Unknown, recorded in Shire of Gingin and City of Wanneroo
	Queen of Sheba		P2	Tuberous, perennial, herb, 0.1-0.35 m high. Fl. orange & red & purple & pink	Sandy clay, sand, laterite.	Jun to Sep	N	Soils, habitat not suitable
Tripterococcus sp. *Brachylobus*			P4				U	Recorded within Shire of Gingin and City of Wanneroo

Note for Likelihood: Y = likely, N = not likely to be present , P = potentially likely to be present, U = Unknown likelihood of presence due to insufficient information

APPENDIX 4: CONSERVATION CODE DESCRIPTIONS

Appendix 4 Table 1: : Western Australia Conservation Codes

Conservation Code	Name	Description
T	Threatened	Flora or fauna that is listed by the Minister as threatened in the category of critically endangered, endangered, or vulnerable under Section 19(1) of the BC Act.
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 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.

Conservation Code	Name	Description
P2	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.
P3	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.
P4	Priority Four	Rare or near threatened and other species in need of monitoring.

(Source: Department of Biodiversity, Conservation and Attractions, 2021a)

Appendix 4 Table 2: 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: Australian Government, 2021)

APPENDIX 5: FLORA SPECIES

Family	Species Name	Common Name
Fabaceae	*Acacia lasiocarpa*	Panjang
Fabaceae	*Acacia pulchella*	Prickly Moses
Fabaceae	*Acacia rostellifera*	Summer-scented Wattle
Fabaceae	*Acacia saligna*	Orange Wattle
Asparagaceae	*Acanthocarpus preissii*	
Poaceae	**Aira cupaniana*	
Casuarinaceae	*Allocasuarina humilis*	Dwarf Sheoak
Haemodoraceae	*Anigozanthos manglesii*	Mangles Kangaroo Paw
Asteraceae	**Arctotheca calendula*	Cape Weed
Asphodelaceae	**Asphodelus fistulosus*	Onion Weed
Poaceae	*Austrostipa flavescens*	
Proteaceae	*Banksia attenuata*	Slender Banksia
Proteaceae	*Banksia dallanneyi*	Couch Honeypot
Proteaceae	*Banksia grandis*	Bull Banksia
Proteaceae	*Banksia sessilis*	Parrot Bush
Poaceae	**Briza maxima*	Blowfly Grass
Poaceae	**Briza minor*	Shivery Grass
Colchicaceae	*Burchardia congesta*	
Orchidaceae	*Caladenia arenicola*	Carousel Spider Orchid
Orchidaceae	*Caladenia flava*	Cowslip Orchid
Orchidaceae	*Caladenia flava subsp. flava*	
Montiaceae	*Calandrinia liniflora*	Parakeelya
Myrtaceae	*Calothamnus quadrifidus*	One-sided Bottlebrush
Lauraceae	*Cassytha flava*	Dodder Laurel
Cyperaceae	*Chaetospora curvifolia*	
Polygalaceae	*Comesperma calymega*	Blue-spike Milkwort
Ericaceae	*Conostephium pendulum*	
Haemodoraceae	*Conostylis aculeata*	Prickly Conostylis
Haemodoraceae	*Conostylis setigera*	Bristly Cottonhead
Myrtaceae	*Corymbia calophylla*	Marri
Asteraceae	*Craspedia sp. Yalgorup National Park*	
Crassulaceae	**Crassula glomerata*	
Rutaceae	*Cyanothamnus ramosus*	
Apiaceae	*Daucus glochidiatus*	Australian Carrot
Fabaceae	*Daviesia divaricata*	Marno
Restionaceae	*Desmocladus flexuosus*	
Hemerocallidaceae	*Dianella revoluta*	Blueberry Lily
Sapindaceae	*Diplopeltis huegelii*	

Family	Species Name	Common Name
Asteraceae	**Dittrichia graveolens*	Stinkwort
Orchidaceae	*Diuris corymbosa*	Common Donkey Orchid
Orchidaceae	*Diuris magnifica*	
Droseraceae	*Drosera erythrorhiza*	Red Ink Sundew
Droseraceae	*Drosera macrantha*	Bridal Rainbow
Poaceae	**Ehrharta calycina*	Perennial Veldt Grass
Poaceae	**Ehrharta longiflora*	Annual Veldt Grass
Orchidaceae	*Elythranthera brunonis*	Purple Enamel Orchid
Orchidaceae	*Eriochilus dilatatus*	White Bunny Orchid
Geraniaceae	**Erodium botrys*	Long Storksbill
Myrtaceae	*Eucalyptus decipiens*	Redheart
Myrtaceae	*Eucalyptus marginata*	Jarrah
Euphorbiaceae	**Euphorbia terracina*	Geraldton Carnation Weed
Iridaceae	**Freesia alba x leichtlinii*	Freesia
Rubiaceae	**Galium murale*	Small Goosegrass
Iridaceae	**Gladiolus caryophyllaceus*	Wild Gladiolus
Fabaceae	*Gompholobium tomentosum*	Hairy Yellow Pea
Haemodoraceae	*Haemodorum paniculatum*	Mardja
Proteaceae	*Hakea lissocarpha*	Honey Bush
Proteaceae	*Hakea prostrata*	Harsh Hakea
Proteaceae	*Hakea ruscifolia*	Candle Hakea
Proteaceae	*Hakea trifurcata*	Two-leaf Hakea
Fabaceae	*Hardenbergia comptoniana*	Native Wisteria
Brassicaceae	**Heliophila pusilla*	
Lamiaceae	*Hemiandra glabra*	
Dilleniaceae	*Hibbertia huegelii*	
Dilleniaceae	*Hibbertia hypericoides*	Yellow Buttercups
Dilleniaceae	*Hibbertia racemosa*	Stalked Guinea Flower
Fabaceae	*Hovea trisperma*	Common Hovea
Violaceae	*Hybanthus calycinus*	Wild Violet
Asteraceae	**Hypochaeris glabra*	Smooth Cats-ear
Asteraceae	**Hypochaeris radicata*	Flat Weed
Fabaceae	*Isotropis cuneifolia*	Granny Bonnets
Fabaceae	*Jacksonia calcicola*	
Fabaceae	*Jacksonia furcellata*	Grey Stinkwood
Fabaceae	*Jacksonia sternbergiana*	Stinkwood
Fabaceae	*Kennedia prostrata*	Scarlet Runner
Asteraceae	*Lagenophora huegelii*	

Family	Species Name	Common Name
Asteraceae	**Leontodon rhagadioloides*	Cretan Weed
Cyperaceae	*Lepidosperma calcicola*	
Cyperaceae	*Lepidosperma scabrum*	
Cyperaceae	*Lepidosperma squamatum*	
Ericaceae	*Leucopogon australis*	Spike Beard-heath
Ericaceae	*Leucopogon parviflorus*	Coast Beard-heath
Ericaceae	*Leucopogon polymorphus*	
Stylidiaceae	*Levenhookia stipitata*	Common Stylewort
Asparagaceae	*Lomandra caespitosa*	Tufted Mat Rush
Asparagaceae	*Lomandra hermaphrodita*	
Asparagaceae	*Lomandra maritima*	
Primulaceae	**Lysimachia arvensis*	Pimpernel
Zamiaceae	*Macrozamia riedlei*	Zamia
Myrtaceae	*Melaleuca huegelii*	Chenille Honeymyrtle
Myrtaceae	*Melaleuca systena*	
Cyperaceae	*Mesomelaena pseudostygia*	
Asteraceae	*Millotia myosotidifolia*	
Fabaceae	*Mirbelia spinosa*	
Iridaceae	**Moraea flaccida*	One-leaf Cape Tulip
Cyperaceae	*Morelotia octandra*	
Loranthaceae	*Nuytsia floribunda*	Christmas Tree
Rubiaceae	*Opercularia vaginata*	Dog Weed
Orobanchaceae	**Orobanche minor*	Lesser Broomrape
Iridaceae	*Orthrosanthus laxus*	Morning Iris
Asteraceae	*Panaetia lessonii*	
Geraniaceae	**Pelargonium capitatum*	Rose Pelargonium
Proteaceae	*Persoonia saccata*	Snottygobble
Proteaceae	*Petrophile axillaris*	
Caryophyllaceae	**Petrorhagia dubia*	
Phyllanthaceae	*Phyllanthus calycinus*	False Boronia
Thymelaeaceae	*Pimelea ferruginea*	
Pinaceae	**Pinus pinaster*	Pinaster Pine
Poaceae	*Poa drummondii*	Knotted Poa
Asteraceae	*Podotheca gnaphalioides*	Golden Long-heads
Orchidaceae	*Pterostylis vittata*	Banded Greenhood
Orchidaceae	*Pyrorchis nigricans*	Red Beaks
Iridaceae	**Romulea rosea*	Guildford Grass
Goodeniaceae	*Scaevola repens*	

Family	Species Name	Common Name
Cyperaceae	*Schoenus clandestinus*	
Caryophyllaceae	**Silene gallica*	French Catchfly
Solanaceae	**Solanum nigrum*	Black Berry Nightshade
Asteraceae	**Sonchus oleraceus*	Common Sowthistle
Asparagaceae	*Sowerbaea laxiflora*	Purple Tassels
Celastraceae	*Stackhousia monogyna*	
Proteaceae	*Stirlingia latifolia*	Blueboy
Stylidiaceae	*Stylidium calcaratum*	Book Triggerplant
Stylidiaceae	*Stylidium dichotomum*	Pins-and-needles
Stylidiaceae	*Stylidium neurophyllum*	Coastal Plain Triggerplant
Stylidiaceae	*Stylidium rigidulum*	
Stylidiaceae	*Stylidium scariosum*	
Orchidaceae	*Thelymitra crinita*	Blue Lady Orchid
Asparagaceae	*Thysanotus manglesianus*	Fringed Lily
Asparagaceae	*Thysanotus patersonii*	
Asparagaceae	*Thysanotus sparteus*	
Apiaceae	*Trachymene pilosa*	
Hemerocallidaceae	*Tricoryne elatior*	
Fabaceae	*Trifolium campestre*	Hop Clover
Rhamnaceae	*Trymalium ledifolium*	
Asteraceae	*Urospermum picroides*	False Hawkbit
Asteraceae	*Ursinia anthemoides*	Ursinia
Poaceae	*Vulpia myuros*	Rat's Tail Fescue
Campanulaceae	*Wahlenbergia capensis*	Cape Bluebell
Xanthorrhoeaceae	*Xanthorrhoea preissii*	Grass Tree
Apiaceae	*Xanthosia huegelii*	

** Denotes introduced species (weeds)*

APPENDIX 6: QUADRAT DATA

Quadrat No.:	WAE-Q1
Survey Date:	30/09/2020
Personnel:	SH, SNH
Latitude:	384315.14
Longitude:	6496457.41
Location:	Wattleup Ave
Topography:	Ridge line
Aspect:	North-west
Slope:	1-3%
Soil:	Brown sandy loam
Gravel	0%
Rock:	5%
Leaf Litter:	20%, 0.5 cm
Bare Ground:	2%
Drainage:	Well
Condition:	Excellent

Notes: Melaleuca systena shrubland/heath

Native Species	Height (m)	Cover (%)	Non-native Species	Height (m)	Cover (%)
Acacia lasiocarpa	1	7	* *Briza minor*	0.1	0.1
Acanthocarpus preissii	0.2	0.5	**Aira cupaniana*	0.1	0.1
Allocasuarina humilis	0.5	0.5	**Briza maxima*	0.1	0.1
Austrostipa flavescens	0.3	0.1	**Freesia alba x leichtlinii*	0.2	0.1
Banksia dallanneyi	0.1	0.5	**Gladiolus caryophyllaceus*	0.5	0.1
Banksia sessilis	2	30	**Hypochaeris glabra*	0.1	0.1
Burchardia congesta	0.5	0.1	**Lysimachia arvensis*	0.1	0.1
Caladenia flava	0.1	0.1	**Ursinia anthemoides*	0.1	0.1
Calandrinia liniflora	0.1	0.1			
Calothamnus quadrifidus	0.5	1			
Cassytha flava	1	1			
Conostylis aculeata	0.3	0.5			
Desmocladus flexuosus	0.1	5			
Dianella revoluta	0.1	0.1			
Diplopeltis huegelii	0.4	0.5			
Diuris corymbosa	0.3	0.1			
Eriochilus dilatatus	0.1	0.1			
Hakea lissocarpha	1.5	2			
Hakea trifurcata	1.5	1			
Hardenbergia comptoniana	1	0.5			
Hemiandra glabra	0.4	0.5			
Hibbertia hypericoides	0.5	10			

Native Species	Height (m)	Cover (%)	Non-native Species	Height (m)	Cover (%)
Hybanthus calycinus	0.3	0.1			
Jacksonia calcicola	0.5	6			
Leucopogon parviflorus	0.5	0.1			
Leucopogon polymorphus	0.5	1			
Levenhookia stipitata	0.1	0.1			
Lomandra maritima	0.2	1			
Melaleuca huegelii	1.5	0.5			
Melaleuca systena	1	20			
Mesomelaena pseudostygia	0.5	0.5			
Millotia myosotidifolia	0.1	0.1			
Opercularia vaginata	0.3	2			
Petrophile axillaris	0.5	0.5			
Phyllanthus calycinus	0.5	2			
Podotheca gnaphalioides	0.1	0.1			
Schoenus clandestinus	0.1	0.1			
Sowerbaea laxiflora	0.2	0.1			
Stackhousia monogyna	0.3	0.1			
Stylidium dichotomum	0.1	0.1			
Stylidium rigidum	0.1	0.1			
Thysanotus patersonii	0.3	0.1			
Thysanotus sparteus	0.4	0.1			
Trachymene pilosa	0.1	2			
Trymalium ledifolium	0.5	6			
Xanthosia huegelii	0.1	0.1			
Xanthorrhoea preissii	3	1			

*Note: *denotes introduced species.*

Quadrat No.:	WAE-Q2
Survey Date:	30/09/2020
Personnel:	SH, SNH
Latitude:	384559.69
Longitude:	6496339.54
Location:	Wattleup Ave
Topography:	Mid slope
Aspect:	East
Slope:	1-3%
Soil:	Brown sandy loam
Gravel	0%
Rock:	1%
Leaf Litter:	10%, 3 cm
Bare Ground:	20%
Drainage:	Well
Condition:	Very Good

Notes: Eucalyptus marginata (Jarrah) open woodland

Native Species	Height (m)	Cover (%)	Native Species	Height (m)	Cover (%)
Acacia saligna	2	3	*Macrozamia riedlei*	1.5	6
Banksia grandis	1	0.5	*Mesomelaena pseudostygia*	0.5	0.5
Caladenia arenicola	0.3	0.1	*Morelotia octandra*	0.4	5
Caladenia flava	0.1	0.1	*Opercularia vaginata*	0.1	0.1
Comesperma calymega	0.3	0.1	*Panaetia lessonii*	0.1	4
Conostylis aculeata	0.3	0.5	*Phyllanthus calycinus*	0.5	0.5
Craspedia sp. Yalgorup National Park	0.1	0.1	*Pyrorchis nigricans*	0.1	0.1
Daucus glochidiatus	0.1	0.1	*Scaevola repens*	0.2	0.1
Desmocladus flexuosus	0.1	0.1	*Stylidium calcaratum*	0.1	2
Diuris magnifica	0.1	0.1	*Stylidium dichotoma*	0.1	0.1
Drosera macrantha	0.5	0.1	*Thelymitra crinita*	0.1	0.1
Eucalyptus marginata	15	20	*Trachymene pilosa*	0.1	0.1
Gompholobium tomentosum	0.3	2	*Tricoryne elatior*	0.1	0.1
Haemodorum paniculatum	0.8	0.5	*Xanthorrhoea preissii*	2	60
Hakea ruscifolia	1	0.5	**Aira cupaniana*	1	0.1
Hardenbergia comptoniana	0.3	0.5	**Briza maxima*	0.3	0.1
Isotropis cuneifolia	0.1	0.1	**Briza minor*	0.1	0.1
Jacksonia furcellata	2	10	**Crassula glomerata*	0.1	0.1
Jacksonia sternbergiana	1.5	10	**Hypochaeris glabra*	0.1	2
Kennedia prostrata	0.1	0.1	**Lysimachia arvensis*	0.1	0.1
Lagenophora huegelii	0.2	0.1	**Petrorhagia dubia*	0.4	0.1
Leucopogon australis	0.3	0.1	**Trifolium campestre*	0.1	0.1
Lomandra caespitosa	0.1	0.1			

*Note: *denotes introduced species.*

Quadrat No.:	WAE-Q3
Survey Date:	30/09/2020
Personnel:	SH, SNH
Latitude:	384489.98
Longitude:	6496447.03
Location:	Wattleup Ave
Topography:	Mid slope
Aspect:	East
Slope:	1-3%
Soil:	Brown loam
Gravel	0%
Rock:	4%
Leaf Litter:	10%, 1 cm
Bare Ground:	2%
Drainage:	Well
Condition:	Excellent

Notes: Melaleuca systena

Native Species	Height (m)	Cover (%)	Native Species	Height (m)	Cover (%)
Acacia pulchella	0.1	0.1	*Leucopogon polymorphus*	0.5	1
Allocasuarina humilis	1	1	*Melaleuca systena*	1	6
Banksia dallanneyi	0.1	0.1	*Mesomelaena pseudostygia*	0.5	3
Banksia sessilis	2	11	*Morelotia octandra*	0.5	1
Burchardia congesta	0.5	0.1	*Opercularia vaginata*	0.1	0.1
Caladenia arenicola	0.3	0.1	*Poa drummondii*	0.3	0.1
Caladenia flava	0.1	0.1	*Schoenus clandestinus*	0.1	0.5
Calothamnus quadrifidus	1.5	2	*Stylidium calcaratum*	0.1	2
Cassytha flava	0.5	2	*Stylidium dichotoma*	0.1	0.1
Conostylis aculeata	0.1	0.1	*Stylidium neurophyllum*	0.3	0.1
Conostylis setigera	0.1	0.1	*Thelymitra crinita*	0.1	0.1
Daucus glochidiatus	0.1	0.1	*Trachymene pilosa*	0.1	2
Desmocladus flexuosus	0.2	0.5	*Xanthorrhoea preissii*	2	10
Dianella revoluta	0.1	0.1	*Xanthosia huegelii*	0.1	0.1
Drosera erythrorhiza	0.1	0.1			
Hakea lissocarpha	0.5	1			
Hakea trifurcata	1.5	2			
Hemiandra glabra	0.3	0.1	Weed Species	Height (m)	Cover (%)
Hibbertia hypericoides	0.5	15	**Aira cupaniana*	0.1	0.1
Hovea trisperma	0.1	0.5	**Briza maxima*	0.1	0.1
Hypochaeris glabra	0.1	0.1	**Gladiolus caryophyllaceus*	0.1	0.1
Jacksonia calcicola	0.5	0.5	*Ursinia anthemoides	0.1	0.1
Lagenophora huegelii	0.2	0.1	*Wahlenbergia capensis	0.1	0.1
Lepidosperma calcicola	0.3	0.1			

*Note: *denotes introduced species.*

Quadrat No.:	WAE-Q4
Survey Date:	30/09/2020
Personnel:	SH, SNH
Latitude:	384445.24
Longitude:	6496481.99
Location:	Wattleup Ave
Topography:	Upper slope
Aspect:	NW
Slope:	1-3%
Soil:	Brown loam
Gravel	0%
Rock:	2%
Leaf Litter:	1%
Bare Ground:	1%
Drainage:	Well
Condition:	Excellent

Notes: Melaleuca systena and Banksia sessilis

Native Species	Height (m)	Cover (%)	Native Species	Height (m)	Cover (%)
Acacia pulchella	1	2	*Stylidium calcaratum*	0.1	0.1
Austrostipa flavescens	0.4	0.1	*Thysanotus manglesianus*	1	0.5
Banksia dallanneyi	0.5	0.5	*Thysanotus sparteus*	0.5	0.1
Banksia sessilis	2	15	*Trachymene pilosa*	0.1	0.5
Burchardia congesta	0.3	0.1	*Xanthorrhoea preissii*	1	0.5
Caladenia arenicola	0.2	0.1			
Calothamnus quadrifidus	1.5	2			
Cassytha flava	0.5	0.1			
Conostylis aculeata	0.3	0.5	Non-native Species	Height (m)	Cover (%)
Conostylis setigera	0.1	0.1	**Aira cupaniana*	0.1	0.1
Daucus glochidiatus	0.1	0.1	**Briza maxima*	0.1	2
Desmocladus flexuosa	0.3	5	**Ehrharta calycina*	0.3	0.1
Dianella revoluta	0.3	0.5	**Ehrharta longiflora*	0.2	0.1
Gompholobium tomentosum	0.2	1	**Gladiolus caryophyllaceus*	0.5	0.1
Hakea lissocarpha	1.5	3	**Hypochaeris glabra*	0.1	3
Hibbertia hypericoides	0.5	15	**Hypochaeris radicata*	0.1	0.1
Melaleuca systena	1	5	**Lysimachia arvensis*	0.1	2
Mesomelaena pseudostygia	0.5	3	**Petrorhagia dubia*	0.3	0.1
Opercularia vaginata	0.3	0.1	**Sonchus oleraceus*	0.1	0.1
Panaetia lessonii	0.1	1.5	**Trifolium campestre*	0.1	1
Phyllanthus calycinus	0.1	0.1	**Ursinia anthemoides*	0.1	1
Podotheca gnaphalioides	0.1	0.1	**Vulpia myuros*	0.1	0.1
Schoenus clandestinus	0.1	0.1			

*Note: *denotes introduced species.*

Quadrat No.:	WAE-Q5
Survey Date:	30/09/2020
Personnel:	SH, SNH
Latitude:	384667.65
Longitude:	6496402.25
Location:	Wattleup Ave
Topography:	Lower slope
Aspect:	East
Slope:	1-3%
Soil:	Brown loam
Gravel	0%
Rock:	0%
Leaf Litter:	80%, 2 cm
Bare Ground:	1%
Drainage:	Well
Condition:	Excellent

Notes: Corymbia calophylla (Marri) woodland

Native Species	Height (m)	Cover (%)	Native Species	Height (m)	Cover (%)
Caladenia arenicola	0.1	0.1	*Xanthorrhoea preissii*	2	50
Caladenia flava	0.1	0.1			
Caladenia flava subsp. flava	0.1	0.1			
Conostephium pendulum	0.2	0.1			
Conostylis aculeata	0.2	0.5			
Corymbia calophylla	20	50			
Daucus glochidiatus	0.1	0.1			
Daviesia divaricata	0.2	0.5			
Diuris corymbosa	0.4	0.1			
Gompholobium tomentosum	0.2	1			
Haemodorum paniculatum	0.3	0.1	Non-native Species	Height (m)	Cover (%)
Hardenbergia comptoniana	0.5	0.5	**Briza maxima*	0.2	0.5
Hibbertia huegelii	0.3	0.5	**Ehrharta longiflora*	0.1	0.1
Isotropis cuneifolia	0.1	0.1	**Freesia alba x leichtlinii*	0.1	0.1
Kennedia prostrata	0.1	1	**Galium murale*	0.1	0.5
Lagenophora huegelii	0.1	15	**Gladiolus caryophyllaceus*	1	0.1
Lomandra caespitosa	0.2	0.1	**Moraea flaccida*	0.5	0.5
Macrozamia riedlei	1	4	**Petrorhagia dubia*	0.3	0.1
Morelotia octandra	0.3	3	**Romulea rosea*	0.1	0.1
Nuytsia floribunda	3	3	**Silene gallica*	0.1	0.1
Orthrosanthus laxus	0.5	3	**Trifolium campestre*	0.1	1
Phyllanthus calycinus	1	20	**Urospermum picroides*	0.2	1
Schoenus clandestinus	0.1	0.1			
Thelymitra crinita	0.1	0.1			
Trachymene pilosa	0.1	0.1			

*Note: *denotes introduced species.*

Quadrat No.:	WAE-Q6
Survey Date:	30/09/2020
Personnel:	SH, SNH
Latitude:	384605.68
Longitude:	6496471.92
Location:	Wattleup Ave
Topography:	Lower slope
Aspect:	East
Slope:	1-3%
Soil:	Brown loam
Gravel	0%
Rock:	0%
Leaf Litter:	70%,
Bare Ground:	1%
Drainage:	Well
Condition:	Very good

Notes: Corymbia calophylla (Marri) woodland

Native Species	Height (m)	Cover (%)	Native Species	Height (m)	Cover (%)
Banksia attenuata	4	5	*Trachymene pilosa*	0.1	0.1
Banksia grandis	4	4	*Xanthorrhoea preissii*	2	60
Caladenia arenicola	0.3	0.1			
Conostylis aculeata	0.4	0.5			
Conostylis setigera	1	0.1			
Corymbia calophylla	20	30			
Daucus glochidiatus	0.1	0.1			
Gompholobium tomentosum	0.3	0.1			
Haemodorum paniculatum	1	2			
Jacksonia furcellata	2	1			
Lagenophora huegelii	0.1	0.1			
Lomandra caespitosa	0.3	0.1	Non-native Species	Height (m)	Cover (%)
Lomandra hermaphrodita	0.1	0.1	**Briza maxima*	0.2	0.5
Macrozamia riedlei	1.5	7	**Gladiolus caryophyllaceus*	0.5	0.1
Morelotia octandra	0.3	5	**Heliophila pusilla*	0.1	0.1
Nuytsia floribunda	5	0.5	**Hypochaeris glabra*	0.1	0.1
Opercularia vaginata	0.1	0.1	**Moraea flaccida*	0.5	0.5
Orthrosanthus laxus	0.5	0.5	**Romulea rosea*	0.1	0.1
Panaetia lessonii	0.1	0.5	**Urospermum picroides*	0.1	0.1
Phyllanthus calycinus	0.34	1	**Ursinia anthemoides*	0.1	0.1
Podotheca gnaphalioides	0.1	0.1			
Pterostylis vittata	1	0.1			
Schoenus clandestinus	0.1	1			
Thelymitra crinita	0.1	0.1			
Thysanotus manglesianus	0.1	0.1			

*Note: *denotes introduced species.*