

**SUPPORTING INFORMATION
NATIVE VEGETATION CLEARING PERMIT
APPLICATION
190 FLYNN DRIVE, NEERABUP**

PREPARED FOR:



MAY 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



environmental and geoscience consultants

190 FLYNN DRIVE, NEERABUP NVCP SUPPORTING INFORMATION

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EXECUTIVE SUMMARY

██████████ is planning to clear 5 ha of native vegetation within the north-western portion of 190 Flynn Drive Neerabup, within the City of Wanneroo. In order to support the NVCP application, an assessment of site environmental values, including undertaking a detailed flora and vegetation survey and a review of habitat trees with a diameter at breast height (DBH) of 500 mm or more to assess their suitability for use for breeding by endangered black cockatoos such as the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*). Outcomes of the assessment process determined:

- A total of 148 species from 45 families were recorded in the detailed flora survey, of which there were 101 native species and 47 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 species 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.
- One vegetation type was present, namely *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.
- The opportunistic fauna assessment carried out during the detailed flora and vegetation survey observed Carnaby's Cockatoos foraging on grasses within the Site but did not record any additional evidence of them using the Site for foraging in the form of chewed Jarrah nuts or Banksia cones. This suggests that despite there being flora species, such as *Banksia attenuata* and *Hakea trifurcata*, black cockatoos are known to forage on, they are present in a low density meaning that is not 'quality' foraging habitat. It is probable that there are several with preferred foraging locations present in the vegetated areas nearby, including Mather Reserve to the west and Bush Forever sites 295 and 494 to the west and south across Flynn Drive that have a greater density of Banksia and other proteaceous flora species present.
- A 2010 record of Carnaby's Cockatoo within the site was in an area that has since been cleared.
- The assessment of habitat trees with a DBH of 500 mm or more identified 11 trees within the proposed clearing area. Of these, trees 7 and 10 contained a combined total of three hollows, with none of sufficient size to be used by black cockatoos for breeding.
- There was no evidence of roosting by black cockatoos, with the closest recorded roosting site being a minimum of 750 m from the Site.

The outcomes of these assessment activities indicate that the proposed clearing of 5 ha of native vegetation within 190 Flynn Drive Neerabup is unlikely to have a significant impact on flora, fauna, and/or ecological communities. 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. 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 preferred foraging species.

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- Appendix 2: Protected Matters Search Tool Report
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1. INTRODUCTION

IW Projects engaged Martinick Bosch Sell Pty Ltd (MBS Environmental, MBS) on behalf of [REDACTED] to prepare a Native Vegetation Clearing (Area) Permit (NVCP) application to clear approximately 5 ha of native vegetation at 190 Flynn Drive, Neerabup (the Site) and associated information to support that process. Accordingly, MBS contracted Natural Area Consulting Management Services (Natural Area) to carry out a detailed flora and vegetation survey of the Site, a basic fauna survey, and assessment of any use by conservation significant black cockatoos (Carnaby's Cockatoo, *Calyptorhynchus latirostris*; Forest Red-tailed Black Cockatoo, *Calyptorhynchus banksii naso*; and Baudin's Black Cockatoo, *Calyptorhynchus baudinii*), the outcomes of which have contributed to this report that provides Site contextual data as well as outcomes of the survey/assessment process to enable the Department of Water and Environmental Regulation (DWER) to assess likely impacts associated with the proposed clearing (Figure 1).

1.1 LOCATION

The Site is located approximately 30 km north of the Perth Central Business District in the City of Wanneroo. The Site has been progressively cleared over time with an area of disturbed native vegetation present to the north and part way down the western boundary (Figure 1); cleared portions of the site are occupied by various tenants with little or no native vegetation present. Mather Reserve is present to the west, market gardens to the north, a sand extraction site to the east, and Bush Forever Site 295 to the south across Flynn Drive (Figure 1, Figure 3).

1.2 ASSESSMENT SCOPE AND OBJECTIVES

The major objectives of the assessment activities were to document current site environmental values in terms of flora, vegetation, and fauna, with a particular emphasis on conservation significant species and ecological communities, with outcomes informing the clearing permit application and approval process. Accordingly, the scope of works carried out by MBS and its subconsultants included:

- Reviewing various databases and datasets to obtain an indication of site characteristics, including:
 - NatureMap species reports to gain an indication of flora and fauna species recorded in the area, along with their conservation status.
 - Protected Matters Search Tool (PMST) 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 datasets available from Data WA, including soils, wetlands, and black cockatoo habitat data.
- A botanist and an assistant engaged by MBS Environmental carrying out a detailed flora and vegetation survey at the site, including the installation of quadrats as well as recording flora species presenting at the time and assessing vegetation type and condition.
- Assessing the potential presence of designated threatened or priority listed ecological communities.
- Reassessing habitat trees identified by PGV Environmental in 2012 to determine if there has been changes, such as the loss of trees, presence of additional hollows, or use of previously identified hollows.
- Undertaking a basic fauna reconnaissance survey recording observations or indicators of presence during the broader site assessment activities.
- Documenting outcomes in an assessment report, including as assessment of outcomes against the ten clearing principles.



Legend

- Proposed Clearing Boundary
- Lot Boundary

Scale 1 : 2 200
 Original Size A3
 Source NearMap August 2021
 Grid GDA94 / MGA zone 50 (EPSG 28350)

0 50 100 m

NVCP Support ng Informat on
 190 Flynn Drive
 Neerabup

Figure 1

Location and Proposed Clearing Area

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



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°C in winter to 32°C in summer, with a maximum recorded temperature of 46.7°C.
- Minimum temperatures ranging from 8°C in winter to 17.5°C in summer, with a minimum recorded temperature of -1.3°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) and the DBCA (2018), the vegetation complex that would have been present at the site prior to the majority being cleared is the Karrakatta Complex – Central and South. This vegetation complex is characterised by an open Tuart-Jarrah-Marri Forest, with common species typically including *Banksia attenuata*, *Banksia menziesii*, *Jacksonia sternbergiana*, *Acacia cyclops*, *Acacia saligna*, and *Grevillea thelemanniana*. The degraded nature of the Site means that the vegetative structure associated with this Complex is no longer intact.

2.3.2 Vegetation Association

According to the Department of Biodiversity, Conservation and Attractions (2019f), one vegetation association is present within the Site, namely vegetation association 6 which is a medium Woodland of Tuart and Jarrah, with characteristics summarised in Table 1, noting that the information provided by the DBCA may not be current.

Table 1: Vegetation Association Data

Vegetation Association	6
Description	Medium Woodland, Tuart and Jarrah
Pre-European Extent (ha)	56,343.01
Current Extent (ha)	13,362.25
% Remaining	23.72
Pre-European Extent – City of Wanneroo (ha)	12,662.10
Current Extent – City of Wanneroo (ha)	2,777.67
% Remaining – City of Wanneroo	21.94
Proposed Area to be Cleared (ha)	5
% Current Extent (ha)	0.04
% Current Extent – City of Wanneroo (ha)	0.18

2.4 TOPOGRAPHY

Being located within the Spearwood Dune System within the Swan Coastal Plain, the Site has a variable topography that ranges from 54 m Australian Height Datum (AHD) in the northwest and 64 m AHD in the southwest to a maximum 70 m AHD along the eastern boundary (Figure 2) (Department of Primary Industries and Regional Development (DPIRD), 2019a).

2.5 SOILS

According to DPIRD (2019b), one soil type is present within and surrounding the site, namely the 211Sp-Ky Karrakatta and Yellow Phase, which is described as low hilly to gently undulating terrain, with yellow sand over limestone at 1 – 2 m.

2.6 WETLANDS

There are no wetlands or waterways present within 190 Flynn Drive, with the closest being more than 1 km to the northeast (DBCA, 2019d).

2.7 GROUNDWATER

A review of the Groundwater Map (DWER, 2022) indicates that the depth to groundwater at the Site is 28 m below ground level (mbgl).



Scale 1:2200
 Original Size A3
 Source NearMap August 2021
 Grid GDA94 / MGA zone 50 (EPSG 28350)

NVCP Support ng Informat on
 190 Flynn Drive
 Neerabup

Figure 2
Site Contours

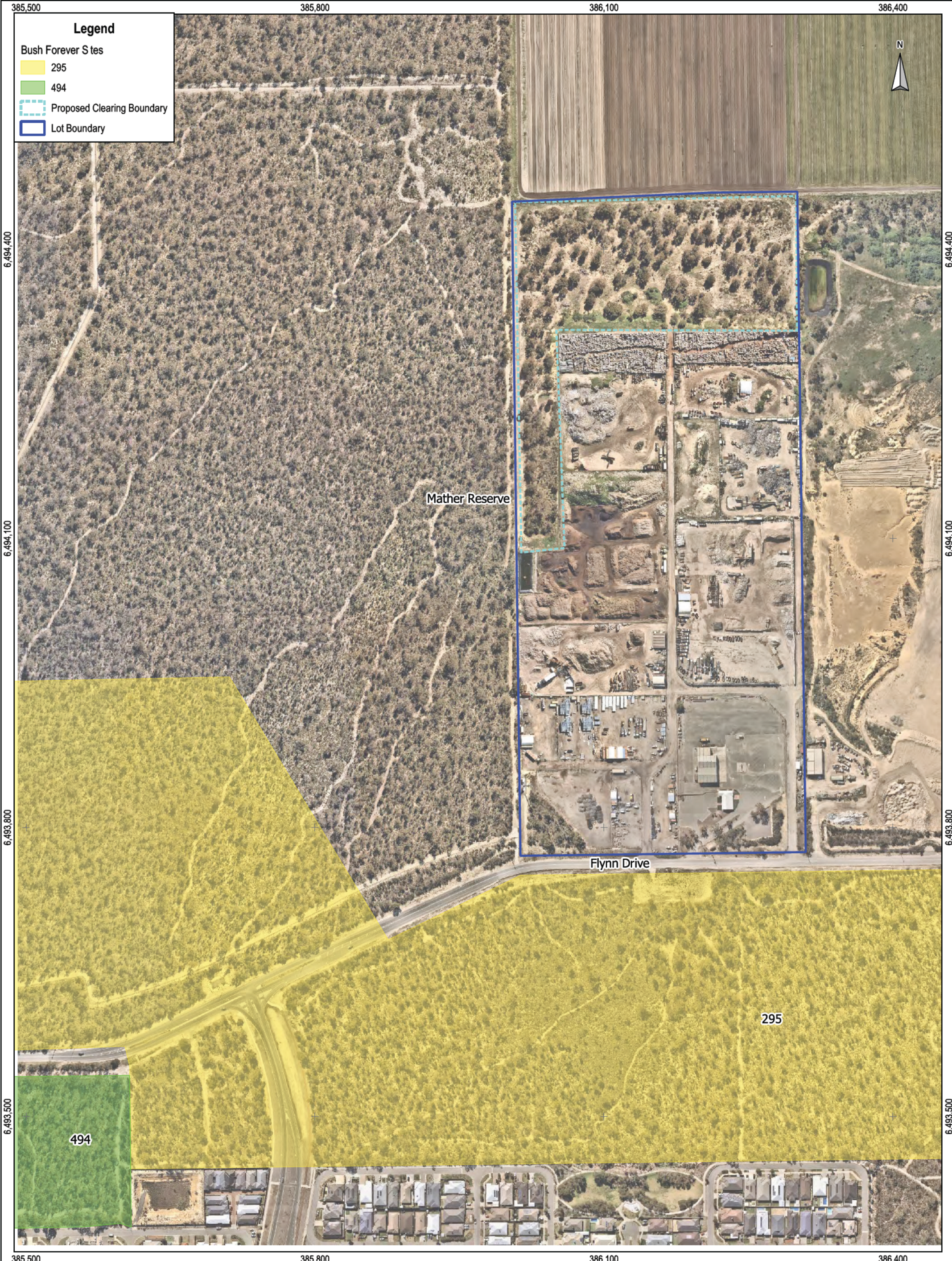
Martinick Bosch Sell Pty Ltd
 4 Cook St
 West Perth WA 6005
 Australia
 t +61 8 9226 3166
 info@mbsenvironmental.com.au
 www.mbsenvironmental.com.au

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2.8 BUSH FOREVER SITES

While there are no Bush Forever sites within 190 Flynn Drive, there are three within 1200 m of 190 Flynn Drive. The closest is Bush Forever Site 295 across Flynn Drive to the south, with Site 494 approximately 500 m to the southeast (Figure 3), and Site 382 approximately 1200 m to the northeast. Listing information for Bush Forever Site 295 (Government of Western Australia, 2000) indicates:

- The presence of a priority 3 listed native bee (*Hylaeus globuliferus*), which was recorded in Bush Forever Sites 295 and 494 to the west and south (Figure 3).
- Inclusion of these sites was associated with a negotiated planning solution that would enable landowners to have some usage of their land whilst also providing for retention of remnant bushland within the Perth metropolitan area.
- The sites are representative of ecological communities.



Scale 1:3500
 Original Size A3
 Source NearMap August 2021
 Grid GDA94 / MGA zone 50 (EPSG 28350)

0 50 100 m

NVCP Supporting Information
 190 Flynn Drive
 Neerabup

Figure 3
Location of Closest Bush Forever Sites

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 a consultant botanist employed by Natural Area during spring 2021. 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 21 October 2021.

3.1 DESKTOP AND LITERATURE REVIEW

The desktop and 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 preliminary site characteristics. A summary of sources reviewed are:

- DBCA (2021e) threatened and priority flora, fauna, and ecological community database searches.
- FloraBase (WA Herbarium, 2022) to obtain information relating to various flora species.
- *Flora, Vegetation and Vertebrate Fauna Assessment Lot 5 Flynn Drive Neerabup* (ATA Environmental, 2007).
- *Lot 190 Flynn Drive – Environmental Assessment* (PGV Environmental, 2012).
- NatureMap report using a 3 km search buffer (DBCA, 2021c).
- Protected Matters Search Tool (PMST) report using a 3 km search buffer (Department of Agriculture, Water, and the Environment (DAWE), 2021).
- Various electronic datasets available via DataWA, including:
 - *2 metre Contours* (DPIRD-072) (DPIRD), 2019a).
 - *Geomorphic Wetland, Swan Coastal Plain* (DBCA-019) (DBCA, 2021d).
 - *Soil Landscape Mapping – Best Available* (DPIRD-027) (DPIRD, 2019b).
 - *Vegetation Complexes – Swan Coastal Plain* (DBCA-046) (DBCA, 2018)

A summary sheet outlining the potential conservation significant flora species was prepared using the NatureMap (DBCA, 2021e, PMST report (DAWE, 2021), and the DBCA threatened and priority flora database searches (DBCA, 2021g) to guide the on-ground survey activities.

3.2 ON-GROUND SURVEY METHODOLOGY

3.2.1 Field Assessment

Lead Botanist Sharon Hynes and field assistant Ryan Woodhouse from Natural Area Consulting Management Services were engaged by MBS Environmental on behalf of [REDACTED] to carry out the on-ground survey on 21 October 2021, with activities including:

- Setting up three (10 m x 10 m) quadrats in the single vegetation type present.
- For each flora species in the quadrats, the following was recorded:
 - Percentage cover and height.
 - Habit and life form.
- Photographing each quadrat in the north-west corner and recording GPS coordinates using GDA94 datum.

- Recording landscape characteristics including soil types and colour, aspect, slope, presence of surface rock, topography and drainage using a modified recording sheets based on the NAIA templates developed by WALGA for the Perth Biodiversity Project.
- Determining leaf litter depth, percentage cover, and percentage of bare ground.
- Recording vegetation type including dominant over, middle and understorey species (Table 2) and condition using the rating scale attributed to Keighery (Table 3) (Environmental Protection Authority, 2016).
- Reviewing the presence/absence of likely significant flora species.
- Recording evidence of disturbance, such as clearing and fire.

3.2.2 Vegetation Type

The vegetation type was determined using the structural classes provided in Environmental Protection Authority (2016), and records dominant over, middle, and understorey species. A description of the various structural classes is provided in Table 2.

Table 2: Vegetation Structural Classes

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

3.2.3 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 3.

Table 3: 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.

3.2.4 Flora Species

Flora species (native and introduced) were recorded on observation within each quadrat and when the remainder of the site was traversed, with a list of potential declared rare or priority flora species used to guide targeted searches for those species. The collection of samples or photographs taken of unfamiliar species to enable later identification from a range of references.

3.2.5 Ecological Communities

Species present, along with condition, key diagnostic features and patch size were used to comment on the presence/absence of ecological communities indicated during the desktop review process.

3.3 SURVEY LIMITATIONS

The flora and vegetation survey was carried out in early spring, an optimal time for assessing flora on the Swan Coastal Plain. Despite this, several limitations associated with survey activities remain, the applicability of these to the survey are discussed in Table 4.

Table 4: Summary of Survey Limitations

Potential Survey Limitation	Constraint	Comment
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.
Competency and experience	No	The surveyor has appropriate training with more than 10 years' experience in conducting ecological surveys in Western Australia, primarily on the Swan Coastal Plain.
Completeness of flora species list	No	It is acknowledged that the survey may not have recorded all species present with some individuals located outside the quadrats or area traversed; despite that, it is estimated that 80 – 90% of species present were identified.
Intensity of survey effort	No	Vegetation in the proposed clearing area has been disturbed with little under and middle storey present. The site was traversed on foot and quadrats installed. Accordingly, the intensity of the survey effort was considered sufficient, particularly considering that most of the potentially occurring significant species were understorey species and there were few native understorey species left.
Resources	No	Adequate resources were available to carry out the survey and identify species presenting.
Season	No	The survey was carried out in October, 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.
Species flowering	No	While it is recognised that not all species flower each year, some species would have 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 3 km search radius (DBCA, 2021c) indicated the potential presence of 29 flora species, of which 19 are dicotyledons and 10 monocotyledons. This result is unexpected given the extent of native vegetation present around the Site. The outcomes of a second NatureMap search using a 10 km search radius provided by the DBCA in March 2022 indicated the potential for 695 flora species, namely:

- 15 Bryopsid (moss).
- 457 Dicotyledons.
- 1 Gymnosperm (pine).
- 211 Monocotyledons.
- 1 Pteridophyte (fern).

The survey carried out by ATA Environmental in 2006 recorded 139 flora species, of which 127 were native and 12 non-native (weed) species; a complete species was not provided (ATA, 2007).

4.1.2 Conservation Significant Flora Species

A review of the NatureMap Report (DBCA, 2021c), the Protected Matters Search Tool (PMST) report (DAWE, 2021), the DBCA Threatened and Priority Flora List (TPFL) (2021e) and the WA Herbarium list (DBCA, 2021g) identified the potential for 67 conservation significant species listed under the *Biodiversity Conservation Act 2016* (WA) (BC Act) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). No declared or priority flora was recorded by ATA Environmental (2007).

Of the 67 conservation significant species recorded within 5 km of the site, eight are more likely to occur than the others due to the soil type and habitat requirements they are known to grow in; these are summarised in Table 5. A summary of the 67 potential conservation significant species identified during the literature review process is provided in Appendix 3 and a description of the conservation codes in Appendix 4.

Table 5: Conservation Significant Species with Suitable Habitat within the Site

Species Name	Common Name	Conservation Code
<i>Austrostipa mundula</i>		P3
<i>Baeckea Sp. Limestone</i>		P1
<i>Conostylis pauciflora subsp. euryrhipis</i>		P4
<i>Jacksonia sericea</i>	Waldjumi	P4
<i>Lasioptalum membranaceum</i>		P3
<i>Leucopogon maritimus</i>		P1
<i>Melaleuca sp. Wanneroo</i>		T
<i>Pimelia calcicola</i>		P3

4.1.3 Ecological Communities

The PMST report (DAWE, 2021) identified the potential presence of two threatened ecological communities listed under the EPBC Act, namely:

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

Note that these communities are listed as Priority 3 under the BC Act.

A review of the DBCA (2021e) threatened and priority ecological community database search outcomes indicated that:

- The 500 m buffer associated with the presence to the west of the *Banksia attenuata* Woodlands over species rich dense shrubland (floristic community type 20a as originally described in Gibson, Keighery, Keighery, Burbidge, and Lyons (1994)) ecological community extends into the Site.
- One patch of the *Banksia* dominated Woodlands of the Swan Coastal Plain ecological community has been either recorded or inferred as being present within the Site, with numerous other patches recorded in proximity to the Site.
- Several patches of the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain occur several hundred metres to the west of the Site, with the closest buffer around the patch at least 90 m to the northwest.

Assessments carried out by ATA Environmental (2007) and PGV Environmental (2012) indicated there were no priority or threatened ecological communities listed under the then *Wildlife Conservation Act 1950* (WA), the forerunner of the BC Act, present within the site. Both the Banksia Woodland and Tuart Woodlands and Forests ecological communities were listed under the EPBC Act and/or the BC Act after these assessments and clearing of vegetation within the site were carried out. The remaining vegetation is in a degraded condition with little understorey present suggesting the likelihood of these communities being present is low.

4.2 FLORA AND VEGETATION SURVEY RESULTS

4.2.1 Flora Species

A total of 148 flora species (taxa) were recorded from 45 families during the field survey carried out by Natural Area, with the most common being Fabaceae (peas), Myrtaceae and Proteaceae.

Of the flora species recorded:

- 101 were native species and 47 non-natives (weeds).
- 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 are shown in Figure 4, with the location of quadrats shown in Figure 5. The survey flora species list is provided in Appendix 5.



Figure 4: Flora Species

(Photographs: Natural Area Consulting Management Services)

The results of the Natural Area 2021 flora survey and the 2006 ATA survey are consistent, with 31 species identified by ATA in quadrats 4 and 5 in common with the overall species list compiled by Natural Area.


4.2.2 Introduced Flora (Weeds)

The survey identified 47 weed species within the survey area, representing 31.76% of the Site's floristic diversity. Species of the Asteraceae, Fabaceae and Poaceae families were commonly represented. Of the non-native species identified, Bridal Creeper (*Asparagus asparagoides*) is a declared pest listed on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management Act 2007* (WA) (BAM Act) (DPIRD, 2022) and as a weed of national significance (WoNS) (Weeds Australia, 2020). This classification requires the landowner/land manager to control the population to limit damage associated with the presence of the species.

4.2.3 Vegetation Type

One vegetation type, *Eucalyptus marginata* open Woodland, was recorded within the site, and is described in Table 6.

Table 6: Vegetation Type

Vegetation Type	Description	Photograph
<i>Eucalyptus marginata</i> (Jarrah) Open Woodland	An open woodland of <i>Eucalyptus marginata</i> over <i>Xanthorrhoea preissii</i> and mixed shrubs and an understorey of <i>Desmodium flexuosum</i> and weedy herbs and grasses.	

4.2.4 Vegetation Condition

Vegetation condition on site ranged from Completely Degraded to Excellent, with most of the site being Completely Degraded (Table 7, Figure 5).

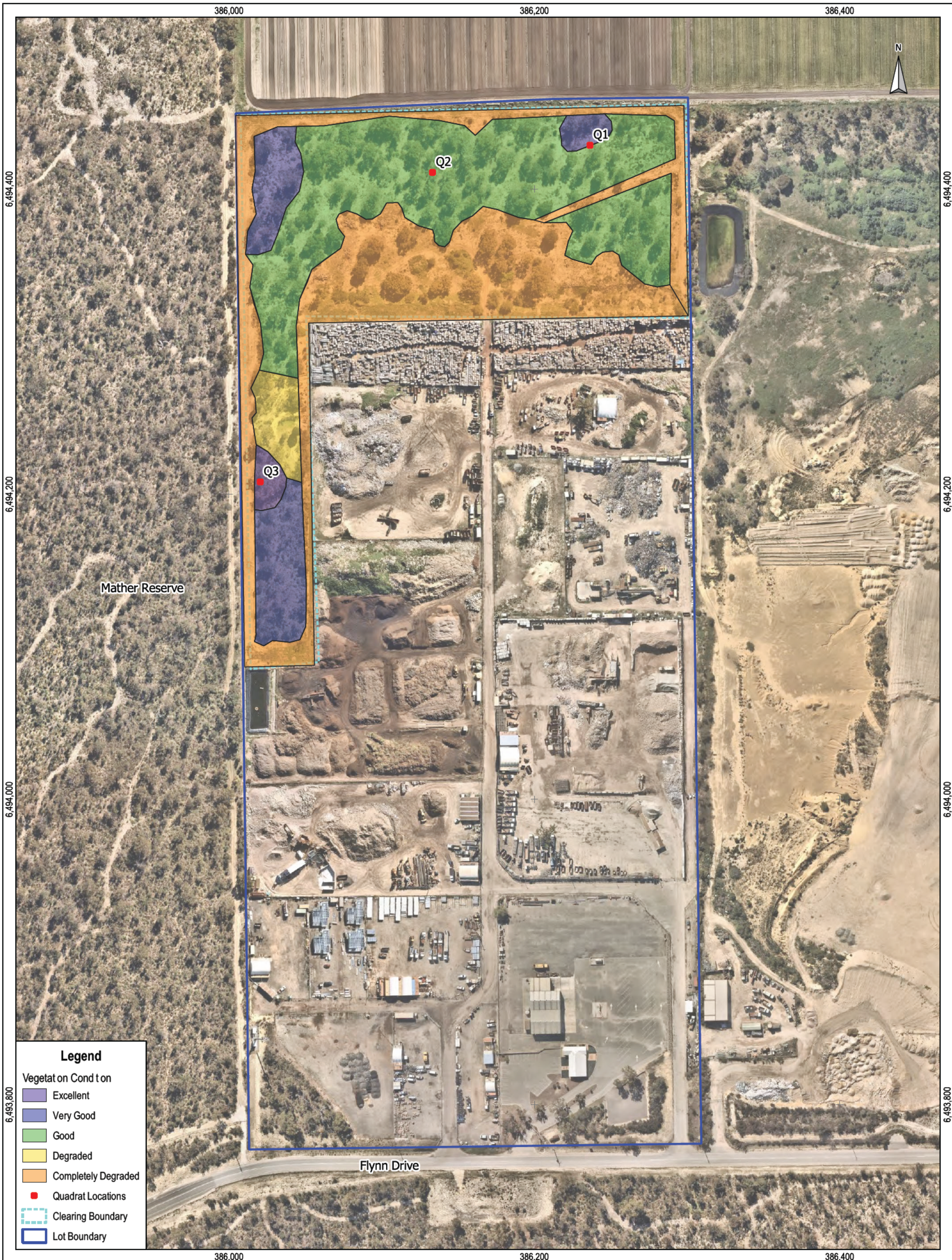
Table 7: Vegetation Condition

Vegetation Condition	Pristine	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
Area (ha)	0	0.07	0.58	2.03	0.17	2.21	5.06
Area (%)	0	1.3	11.4	40.2	3.4	43.7	100

4.2.5 Ecological Communities

No threatened or priority communities were observed within the site. As the number of Banksia trees on site were limited and were not the dominant overstorey species, the Banksia Woodlands of the Swan Coastal Plains ecological community was determined not to be present. This finding is consistent with those reported by PGV Environmental in 2012 and ATA Environmental in 2006. Given the consistency of the three assessments that have been carried out, it is uncertain when the patch of the Banksia Woodlands of the Swan Coastal Plain that coincides with the survey site was recorded/inferred/designated.

The key diagnostic feature of the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community is the presence of *Eucalyptus gomphocephala* (Tuart). As none were recorded within the Site, it indicates that ecological community is not present.



Scale 1:2200
 Original Size A3
 Source NearMap August 2021
 Grid GDA94 / MGA zone 50 (EPSG 28350)

0 50 100 m

NVCP Supporting Information
 190 Flynn Drive
 Neerabup

Figure 5
Vegetation Condition and Quadrat Locations

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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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 3 km search radius (DBCA, 2021c) (Appendix 1).
- A review of the PMST report using a 3 km search radius (DAWE, 2021) (Appendix 2).
- A DBCA threatened and priority listed fauna database search (DBCA, 2021g).
- DBCA shapefile datasets indicating locations of black cockatoo breeding and roosting sites (DBCA, 2021f, and g).

The following documents provided by Mr Stampalia were also reviewed:

- The survey report documenting the detailed flora and fauna survey carried out by ATA Environmental in 2006 (ATA, 2007).
- The Significant Tree Assessment report prepared by PGV Environmental in 2012.

5.2 ON-GROUND FAUNA ASSESSMENT

During the detailed flora and vegetation assessment, Natural Area Botanist/Zoologist Sharon Hynes and field assistant Ryan Woodhouse 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

Botanist/Zoologist Sharon Hynes and field assistant Ryan Woodhouse also carried out a black cockatoo habitat assessment, reviewing significant trees on site identified by PGV Environmental in 2012. 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; trees with hollows were inspected using a pole mounted camera.

- 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

6.1 LITERATURE REVIEW RESULTS

6.1.1 Fauna Species

A review of the NatureMap Report using a 3 km search radius (DBCA, 2021a) indicated the potential presence of 87 fauna species, of which there were 60 birds, 18 invertebrates, 3 mammals, and 6 reptiles. ATA (2007) recorded the presence of 25 vertebrate fauna species, along with 42 birds during the detailed fauna survey carried out during 2006. Bird species recorded by ATA included the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Rainbow Bee-eater (*Merops ornatus*).

6.1.2 Conservation Significant Species

The DBCA (2021e) threatened, and priority fauna data indicated the potential for 11 conservation significant species, of which there were four birds, two mammals, one reptile, and four invertebrates. The PMST report (DAWE, 2021) indicated the potential for three bird species listed under the EPBC Act. A summary of the potential conservation significant species is provided in Table 8; note that marine and aquatic species provided in the various data sources have been discounted on the basis that their presence within the site is very unlikely, and thus have not been included in species numbers or included in Table 8.

The Carnaby's Cockatoo (*Calyptorhynchus latirostris*) (DBCA, 2021e; ATA, 2007), the Rainbow Bee-eater (*Merops ornatus*) (ATA, 2007), and the Graceful Sunmoth (*Synemon gratiosa*) (DBCA, 2021g) have been recorded within the broader Site boundary in vegetation that has since been cleared. Note that the Rainbow Bee-eater is a migratory species that was previously listed under the EPBC Act and the then *Wildlife Conservation Act 1950* (WA), with its conservation status being altered, and is no longer listed as migratory under either Act. The conservation status of the Graceful Sunmoth was altered from being listed as Critically Endangered under State and Federal legislation to Priority 4 (P4) under the BC Act indicating it requires ongoing monitoring. The flora survey carried out by Natural Area in 2021 recorded one or two *Lomandra maritima* plants in the northwest portion of the site; this plant is used by the Sunmoth as the host for its young. The low numbers of host plants suggest that the presence of the moth within the Site is unlikely.

A review of the DBCA *Black Cockatoo Breeding Sites – Buffered* (DBCA-063) (DBCA, 2019a), and the DBCA *Black Cockatoo Roosting Sites – Buffered* (DBCA-064) (DBCA, 2019b) indicated that the closest known breeding site is more than 5 km from 190 Flynn Drive, with the closest roosting site more than 750 m away.

Table 8: Potential Conservation Significant Species

Species	Common Name	BC Act	EPBC Act	Likelihood
Birds				
<i>Calyptorhynchus banksia naso</i>	Forest Red-tailed Black Cockatoo	T	VU	Yes, known in Perth metropolitan area.
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	T	En	Unlikely, tends to occur in locations south of Perth.
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	T	EN	Yes, historically recorded on site.
<i>Falco peregrinus</i>	Peregrine Falcon	S		No, more likely to be a transient visitor.
<i>Leipoa ocellata</i>	Malleefowl	T	VU	No, tends to occur in wheatbelt regions.
Mammals				
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	T	VU	Unlikely, changes to vegetation suggest it is unlikely.
<i>Isoodon fusciventer</i>	Southern Brown Bandicoot, Quenda	P4		Potentially, has been recorded in nearby locations.
<i>Notamacropus irma</i>	Western Brush Wallaby	P4		Potentially, has been recorded nearby, more likely to be transient visitor.
Reptiles				
<i>Neelaps calonotos</i>	Black-striped Burrowing Snake	P3		Potentially, not recorded within 3 km of site.
Invertebrates				
<i>Austrosaga spinifer</i>	Spiny Katydid (Swan Coastal Plain)	P2		Potentially, not recorded within 3 km of site.
<i>Hylaeus globuliferus</i>	Woolybush Bee	P3		Yes, recorded in bushland to the south and west of the site.
<i>Leioproctus contrarius</i>	A Short-tongued Bee	P3		No, not recorded within 3 km of site.
<i>Synemon gratiosa</i>	Graceful Sunmoth	P4		Potentially, previously recorded on site in vegetation that has since been cleared.

6.1.3 PGV Environmental Significant Tree Assessment

A significant tree assessment was undertaken by PGV Environmental in 2012, recording trees with a diameter at breast height (DBH) of 500 mm or greater as per the then draft *Black Cockatoo Referral Guidelines* published by the then Commonwealth Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC) (2012). According to PGV Environmental (2012), the assessment:

- Identified 26 trees scattered throughout the site, with none in proximity to each other and no clumps of trees with other smaller diameter trees.
- Nine of the 26 trees contained hollows or spouts which were considered suitable for birds or bats to nest in, and all were considered too small to be used by black cockatoos for breeding, thus the value of the site as breeding habitat was considered to be nil.
- Five of the 26 trees had an intact base (Trees 1, 7, 11, 16, and 21), with the other 21 having bases hollowed out by fire, making them unstable and likely to fall over because of the poor condition of the base.
- On that basis, PGV Environmental indicated that there were no obvious areas that would be worthy of retention in the event of future clearing.
- Trees 1, 11, and 16 contained small hollows or spouts that could be used by birds smaller than black cockatoos.
- Tree 1 was in the best condition and the tallest tree on site, and worthy of retention if its lean to the north did not impact on the siting of infrastructure and/or public accessibility.
- Tree 7 had a lower height and did not contain any hollows or spouts but was a healthy specimen that was worth retaining.
- The canopy of Tree 21 was mostly dead after a fire in 2007, and it was unknown at that time if the regrowth was going to improve the health of the tree.
- The main foraging habitat for Carnaby's Cockatoos are proteaceous plants such as Banksia, Grevillea, and Hakea, and while there were species recorded on site that black cockatoos are known to feed on, their density was low, thus the value of the site for foraging was considered to be low.
- The site was not considered to have value as a roosting site, with no evidence of that use recorded.

It is noted that current aerial imagery indicates that several of the trees identified by PGV (2012) have since been cleared. As it is not clear from the PGV report where the 26 identified trees were located, no comment can be made as to which of those are present within the site and those that have been removed over the last decade.

6.2 FAUNA ASSESSMENT RESULTS

6.2.1 Opportunistic Fauna Survey Results

A total of ten bird species, including the Carnaby's Cockatoo, and two reptile species were recorded from opportunistic sightings during the basic fauna survey. Scat and track evidence of the presence of Western Grey Kangaroo (*Macropus fuliginosus*) was also identified. (Table 9)

Table 9: Fauna Observations within the site.

Species	Species Name	Common Name
Birds		
Meliphagidae	<i>Anthochaera carunculata</i>	Red Wattlebird
Psittaculidae	<i>Barnardius zonarius</i>	Australian Ringneck
Cacatuidae	<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo
Corvidae	<i>Corvus coronoides</i>	Australian Raven
Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
Cacatuidae	<i>Eolophus roseicapilla</i>	Galah
Artamidae	<i>Gymnorhina tibicen</i>	Australian Magpie
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail
Mammals		
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo
Reptiles		
Scincidae	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
Scincidae	<i>Tiliqua rugosa subsp. rugosa</i>	Bobtail

* Denotes introduced species

ATA Environmental (2007) recorded 25 vertebrate fauna species and 42 birds during the detailed survey carried out in 2006, including the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Rainbow Bee-eater (*Merops ornatus*); an overall species list was not provided.

6.2.2 Black Cockatoo Habitat Assessment

Eleven habitat trees with a diameter at breast height > 500 mm were recorded within the site (Table 10). The preliminary observations indicated there were three larger hollows on trees 7 and 10 with an adequate entrance size that could potentially be used by black cockatoos for nesting. However, when these were inspected with a GoPro camera on a telescopic pole, they were found to be superficial and not suitable for cockatoo nesting; the first hollow in Tree 10 was being utilised by the European Honey Bee (Figure 6). The location of the 11 habitat trees is provided in Figure 7. Carnaby's Cockatoos were observed feeding on grasses within the north-eastern portion of the Site, with no current or aged evidence of feeding in the form of chewed Banksia cones or Jarrah nuts observed, indicating limited use of the site for feeding.

Table 10: Site Habitat Trees

Tree No.	Tree Species	DBH (mm)	GPS coordinates	Comments
1	<i>Eucalyptus marginata</i>	1700	115.799423; -31.680573	No hollows
2	<i>Eucalyptus marginata</i>	1850	115.799753; -31.680135	No hollows
3	<i>Eucalyptus marginata</i>	1500	115.800075; -31.680171	Galah nesting
4	<i>Eucalyptus marginata</i>	700	115.798937; -31.680619	No hollows
5	<i>Eucalyptus marginata</i>	1000	115.799015; -31.680421	No hollows

Tree No.	Tree Species	DBH (mm)	GPS coordinates	Comments
6	<i>Eucalyptus marginata</i>	850	115.798810; -31.680100	Small hollow
7	<i>Eucalyptus marginata</i>	1075	115.798910; -31.679681	Striated Pardalote nesting in small hollow, 1 potential hollow
8	<i>Eucalyptus marginata</i>	850	115.798660; -31.680142	Small hollow
9	<i>Eucalyptus marginata</i>	1800	115.797717; -31.679995	Small hollow
10	<i>Eucalyptus marginata</i>	1200	115.797622; -31.680749	3 potential hollows, No. 1 with bees
11	<i>Eucalyptus marginata</i>	1550	115.797643; -31.682513	No hollows



Figure 6: Tree Hollows

(Photographs: Natural Area Consulting Management Services)



Scale 1:2200
 Original Size A3
 Source NearMap August 2021
 Grid GDA94 / MGA zone 50 (EPSG 28350)

0 50 100 m

NVCP Support ng Informat on
 190 Flynn Drive
 Neerabup

Figure 7
Habitat Tree Locations

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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7. IMPLICATIONS OF RESULTS

7.1 FLORA

The detailed flora and vegetation survey carried out by Natural Area identified 148 flora species, including 101 native species. No threatened or priority flora species listed under the BC Act and/or the EPBC Act were recorded. Accordingly, the proposed clearing of 5 ha within the site is unlikely to impact on conservation significant flora species.

7.2 VEGETATION ASSOCIATION

A single vegetation type is present within the Site, namely *Eucalyptus marginata* open Woodland (Vegetation Community 6). Based on 2018 data from the DBCA (2019f), the current extent of this vegetation community is 13,362.25 ha, or 23.72% of the pre-European extent. The proposed clearing of 5 ha of this community represents a loss of 0.04% of the current extent. Given that the vegetation condition within the Site is variable (Figure 5), impacts to this Association are expected to be minimal.

7.3 VEGETATION CONDITION

According to the assessment carried out by Natural Area in 2021, 2.68 ha is in Good (2.03 ha) or better condition (0.65 ha), with 2.38 ha in a Degraded (0.17) or Completely Degraded (2.21 ha) condition. The disturbed nature of the vegetation across much of the Site suggest that impacts associated with clearing are likely to be minimal.

7.4 THREATENED ECOLOGICAL COMMUNITIES

No threatened or priority communities were observed within the site based on the absence of key diagnostic features of those with a likelihood of being present. As the number of Banksia trees on Site were very limited and were not the dominant overstorey species, the Banksia Woodlands of the Swan Coastal Plain ecological community was determined to be absent. Similarly, the absence of any *Eucalyptus gomphocephala* indicated that the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community was not present on site.

7.5 SIGNIFICANT FAUNA

The basic fauna survey carried out by Natural Area in 2021 observed the presence of Carnaby's Cockatoos feeding on grasses in the north-eastern portion of the Site. The detailed flora survey recorded the presence of species known to be preferred foraging species including *Eucalyptus marginata* (Jarrah), *Banksia attenuata* (Slender Banksia) and *Banksia menziesii* (Firewood Banksia), in limited numbers. The limited evidence of foraging on the Site suggests that despite the presence of suitable foraging species and no hollows of suitable size for breeding, 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 11 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, the limited 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, the limited 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 11: Assessment of Impact Risk to Black Cockatoos

Referral Guideline Descriptors	MBS Comment
High Risk of Significant Impacts: Referral Recommended	
Clearing of known nesting tree.	<ul style="list-style-type: none"> • No known nesting trees identified when assessing trees with a DBH > 500 mm. • Three hollows identified, with none being of sufficient size to be used by black cockatoos. • Site is located more than 5 km from known breeding areas.
Clearing or degradation of any part of a vegetation community known to contain breeding habitat.	<ul style="list-style-type: none"> • Vegetation community does not contain known breeding habitat. • Site is located more than 5 km from known breeding areas.
Clearing of more than 1 ha of quality foraging habitat.	<ul style="list-style-type: none"> • Approximately 0.65 ha of vegetation in the proposed clearing area is in Very Good or Excellent condition, 2.03 ha in Good condition. • While Jarrah and Banksia trees are present within the proposed clearing area, the Banksia are present in a low density. • The only evidence of usage by black cockatoos was observed feeding on grasses on Site during the basic fauna assessment. • PGV Environmental (2012) found no evidence of foraging in their 2012 assessment of the site and concluded that the value of the site as foraging habitat was low.
Clearing or degradation (including pruning the top canopy) of a known night roosting site.	<ul style="list-style-type: none"> • The black cockatoo habitat assessment determined that there is no evidence of the site being used as a night roosting site. • The Site is a minimum of 750 m from known roosting sites.
Creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging, or roosting).	<ul style="list-style-type: none"> • 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.

Referral Guideline Descriptors	MBS Comment
Uncertainty: Referral Recommended or Contact the Department	
<p>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.</p>	<ul style="list-style-type: none"> • While the proposal will result in the clearing of 5 ha of vegetation with known foraging species, there is no evidence of feeding at the site in the form of new or aged chewed Jarrah 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.
<p>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.</p>	<ul style="list-style-type: none"> • The proposed clearing area is not located in a known black cockatoo breeding, foraging, or night roosting habitat area. • The variable condition of the vegetation on Site combined with limited evidence of usage by black cockatoos suggests edge effects are likely to be limited due to the proposed clearing.
<p>Actions that do not directly affect the listed species but have the potential for indirect impacts such as increasing competitors for nest hollows.</p>	<ul style="list-style-type: none"> • The three hollows present on Site are too small to be used by black cockatoos for breeding. • One hollow was occupied by bees.
<p>Actions with the potential to introduce known plant diseases such as <i>Phytophthora</i> spp. to an area where the pathogen was not previously known.</p>	<ul style="list-style-type: none"> • While there is no information available relating to the dieback status of the Site, the degraded nature of much of the area would be uninterpretable.
Low Risk of Significant Impacts: Referral May Not be Required	
<p>Actions that do not affect black cockatoo habitat or individuals.</p>	<ul style="list-style-type: none"> • Proposed clearing will affect potential black cockatoo habitat. • Impacts to individuals are not expected due to limited evidence of usage.
<p>Actions whose impacts occur outside the modelled distribution of the three black cockatoos.</p>	<ul style="list-style-type: none"> • The proposed clearing area is located within the modelled distribution area of the Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>) and the Forest Red-tailed Black Cockatoo (<i>Calyptorhynchus banksii naso</i>).

7.6 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 12).

Table 12: 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 is not likely to be at variance with this principle due to the historic disturbance and currently degraded nature of vegetation present within much of the Site. The detailed flora survey confirmed the presence of 148 flora species, of which 101 were native and 47 introduced species; no conservation significant species were recorded.
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.	Clearing is not likely to be at variance with this principle as the degraded nature of the proposed clearing area combined with a limited number of preferred black cockatoo foraging species and no hollows of suitable size for breeding suggest that the habitat is not significant or necessary for WA fauna.
C.	Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.	Clearing is not likely to be at variance with this principle as the detailed flora survey carried out by Natural Area in 2021 did not record any conservation significant species.
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).	Clearing is not likely to be at variance with this principle as the detailed flora and vegetation assessment carried out by Natural Area in 2021 determined that key diagnostic features of the Banksia Woodlands of the Swan Coastal Plain and Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the Swan Coastal Plain were absent. :
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.	Clearing is not likely to be at variance with this principle as more than 13,362.25 ha of vegetation association 6 remain, with the proposed clearing representing 0.04% of the current extent.
F.	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	Clearing will not be at variance with this principle as there are no wetlands or waterways on site, with the closest wetland being approximately 1800 m to the northeast, and the indicative depth to groundwater being 48 m.
G.	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Clearing is not likely to be at variance with this principle based on the extent of vegetation remaining in nearby locations and the level of disturbance that has already occurred on site.
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.	Clearing is not likely to be at variance with this principle as the vegetation present within the site is in a largely degraded condition that is immediately adjacent to Mather Reserve to the west.
I.	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Clearing will not be at variance with this principle as there are no wetlands or waterways on site, and depth to groundwater is a minimum 28 m below the natural ground level.
J.	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	Clearing will not be at variance with this principle as there are not wetlands or waterways on site that could overflow their banks and contribute to flooding.

7.7 AVOIDANCE MEASURES

The Site is in the ownership of the Proponent, thus provides the option of using available land, hence this solution represents the best option in terms of the proposed location. As the remainder of the site has been developed in accordance with its zoning, the clearing of the remaining 5 ha is the only portion of the site that can be developed. A review of the site conditions indicates that the proposed clearing area represents the best clearing option for the following reasons:

- The Site had been significantly disturbed through clearing, fire, and other human activities in the past.
- There is no threatened or priority flora species or ecological communities listed under the BC Act and/or the EPBC Act present within the Site.
- The proposed 5 ha clearing area is the remainder of the Lot that is zoned industrial purposes.
- Some 2.68 ha of the Site is in good or better condition, with 2.38 ha in a degraded or completely degraded condition.
- There are no hollows present that are suitable for use by black cockatoo species, such as the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*).
- There are limited Proteaceous species present within the Site, which are a preferred food source for the Carnaby's Cockatoo, with some Jarrah present that is a preferred food source for the Forest Red-tailed Black Cockatoo.

7.7.1 Avoidance Measures

The location of the proposed 5 ha clearing area avoids impacts to:

- 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 but present within Mather Reserve to the west, the Bush Forever site to the south, and in other nearby locations.
- The Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community which is not present within the Site, and the closest patches occurring to the west.
- 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.
- There are no known black cockatoo nesting or roosting sites within the Site, and no trees present with hollows that were suitable for usage by those species.

7.7.2 Impact Minimisation Measures

Evidence of foraging by the Carnaby's Cockatoo was limited to observations of them feeding on grasses, with no current or aged feeding debris in the form of chewed Banksia cones and/or Jarrah nuts evident. Accordingly, impacts to black cockatoo species are likely to be minimal.

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APPENDICES

APPENDIX 1: NATUREMAP SPECIES REPORT

NatureMap Species Report

Created By Guest user on 10/10/2021

Current Names Only Yes
 Core Datasets Only Yes
 Method 'By Circle'
 Centre 115° 47' 56" E, 31° 40' 57" S
 Buffer 3km
 Group By Species Group

Species Group	Species	Records
Bird	60	457
Dicotyledon	19	22
Fungus	1	3
Invertebrate	18	30
Mammal	3	5
Monocotyledon	10	12
Reptile	6	22
TOTAL	117	551

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Bird				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
3.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
4.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
5.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
6.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
7.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
8.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
9.	25554 <i>Apus pacificus</i> (Fork-tailed Swift, Pacific Swift)		IA	
10.	41324 <i>Ardea modesta</i> (great egret, white egret)			
11.	<i>Barnardius zonarius</i>			
12.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
13.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
14.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
15.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
16.	48400 <i>Calyptorhynchus</i> sp. (white-tailed black cockatoo)		T	
17.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
18.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
19.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
20.	25592 <i>Corvus coronoides</i> (Australian Raven)			
21.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
22.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
23.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
24.	<i>Eolophus roseicapillus</i>			
25.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
26.	25623 <i>Falco longipennis</i> (Australian Hobby)			
27.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
28.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
29.	47962 <i>Glyciphila melanops</i> (Tawny-crowned Honeyeater)			
30.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
31.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
32.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
33.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
34.	25659 <i>Lichenostomus leucotis</i> (White-eared Honeyeater)			
35.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
36.	25651 <i>Malurus lamberti</i> (Variegated Fairy-wren)			
37.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
38.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
39.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
40.	25693 <i>Microeca fascians</i> (Jacky Winter)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
41.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
42.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
43.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
44.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
45.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
46.	48066 <i>Petroica boodang</i> (Scarlet Robin)			
47.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
48.	48071 <i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
49.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
50.	<i>Purpureicephalus spurius</i>			
51.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
52.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
53.	30948 <i>Smicromis brevirostris</i> (Weebill)			
54.	25589 <i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
55.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
56.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
57.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
58.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
59.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
60.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			

Dicotyledon

61.	30032 <i>Acacia saligna</i> subsp. <i>saligna</i>			
62.	1728 <i>Allocasuarina fraseriana</i> (Sheoak, Kondil)			
63.	20283 <i>Astartea scoparia</i> (Common Astartea)			
64.	5429 <i>Calothamnus sanguineus</i> (Silky-leaved Blood flower, Pindak)			
65.	5460 <i>Calytrix fraseri</i> (Pink Summer Calytrix)			
66.	15511 <i>Conospermum boreale</i>			
67.	1876 <i>Conospermum incurvum</i> (Plume Smokebush)			
68.	1885 <i>Conospermum triplinervium</i> (Tree Smokebush)			
69.	17104 <i>Corymbia calophylla</i> (Marr)			
70.	48710 <i>Drosera micrantha</i>			
71.	31233 <i>Drosera patens</i>		P1	
72.	30712 <i>Drosera x sidjamesii</i>		P1	
73.	6839 <i>Hemiantra pungens</i> (Snakebush)			
74.	5216 <i>Hybanthus calycinus</i> (Wild Violet)			
75.	32716 <i>Olearia lehmanniana</i>			
76.	42022 <i>Poranthera moorokatta</i>		P2	
77.	4713 <i>Stachystemon axillaris</i> (Leafy Stachystemon)			
78.	25831 <i>Stylidium araeophyllum</i> (Stilt Walker)			
79.	7717 <i>Stylidium divaricatum</i> (Daddy-long-legs)			

Fungus

80. *Phytophthora cinnamomi*

Invertebrate

81.	<i>Aname mainae</i>			
82.	<i>Araneus senicaudatus</i>			
83.	<i>Austracantha minax</i>			
84.	<i>Australomimetes ovidi</i>			
85.	<i>Eriophora biapicata</i>			
86.	33977 <i>Hylaeus globuliferus</i> (woolybush bee)		P3	
87.	<i>Isopeda leishmanni</i>			
88.	<i>Lampona cylindrata</i>			
89.	<i>Latrodectus hasseltii</i>			
90.	<i>Maratus pavonis</i>			
91.	<i>Nephila edulis</i>			
92.	<i>Oecobius navus</i>			
93.	<i>Ommatoiulus moreletii</i>			
94.	<i>Oratemnus curtus</i>			
95.	<i>Pholcus phalangioides</i>			
96.	33992 <i>Synemon gratiosa</i> (Graceful Sunmoth)		P4	
97.	<i>Venator immansueta</i>			
98.	<i>Venatrix pullastra</i>			

Mammal

99.	48588 <i>Isoodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
100.	48022 <i>Notamacropus irma</i> (Western Brush Wallaby)		P4	
101.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			

Monocotyledon

102.	1162 <i>Cartonema philydroides</i>			
103.	1134 <i>Centrolepis polygyna</i> (Wiry Centrolepis)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
104.	11826	<i>Conostylis aculeata subsp. aculeata</i>			
105.	11870	<i>Conostylis teretifolia subsp. teretifolia</i>			
106.	16245	<i>Cyathochaeta teretifolia</i>		P3	
107.	11049	<i>Diuris corymbosa</i>			
108.	1309	<i>Laxmannia squarrosa</i>			
109.	982	<i>Schoenus clandestinus</i>			
110.	1018	<i>Schoenus subfascicularis</i>			
111.	1361	<i>Tricoryne elatior (Yellow Autumn Lily)</i>			

Reptile

112.	30899	<i>Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)</i>			
113.	25133	<i>Lerista elegans</i>			
114.	25165	<i>Lerista praepedita</i>			
115.	25184	<i>Menetia greyii</i>			
116.	25192	<i>Morethia obscura</i>			
117.	25008	<i>Pygopus lepidopodus (Common Scaly Foot)</i>			

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 wholly 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



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: 10/10/21 23:55:46

[Summary](#)

[Details](#)

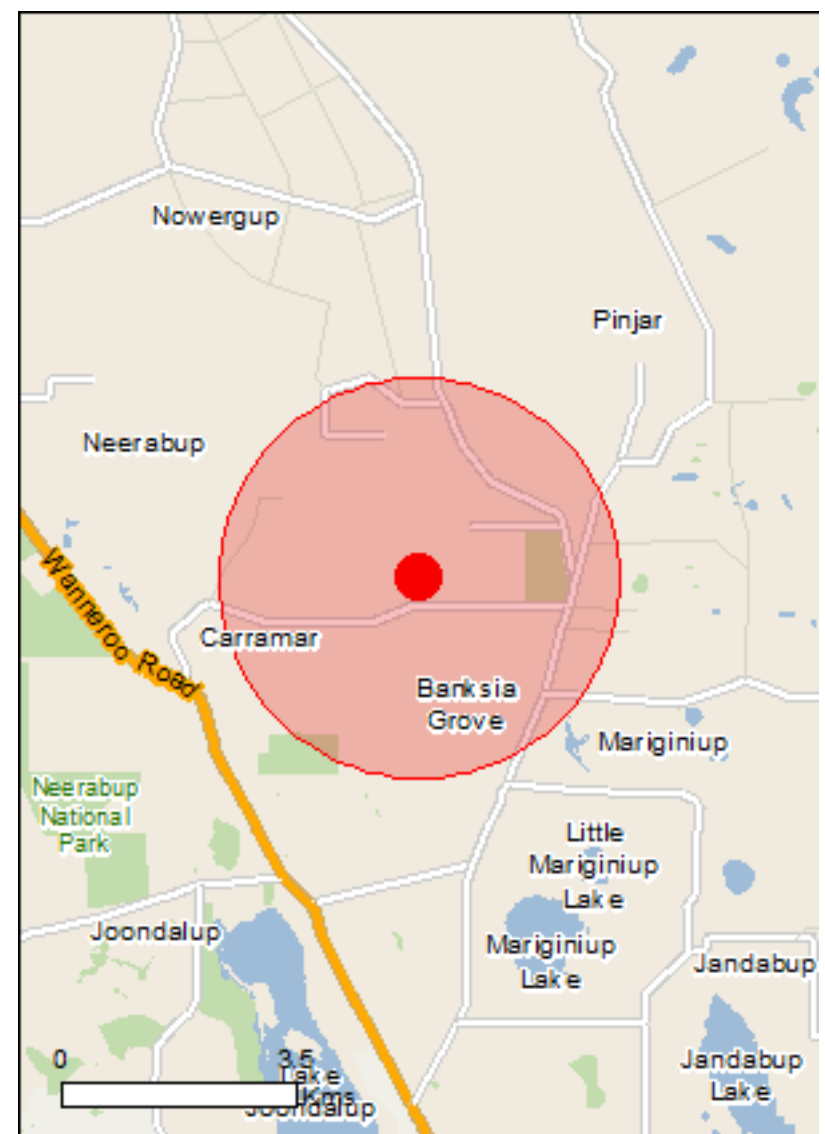
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

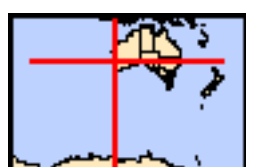
[Acknowledgements](#)



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[Buffer: 3.0Km](#)



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	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:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
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
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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 likely to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Drakaea elastica Glossy-leaved 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
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species

[[Resource Information](#)]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
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 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 within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within

Name	Threatened	Type of Presence 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

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 Resources 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
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

Name	Status	Type of Presence 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 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

Name	Status	Type of Presence
<p>Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]</p>		<p>habitat may occur within area</p> <p>Species or species habitat likely to occur within area</p>
<p>Lycium ferocissimum African Boxthorn, Boxthorn [19235]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Olea europaea Olive, Common Olive [9160]</p>		<p>Species or species habitat may occur within area</p>
<p>Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]</p>		<p>Species or species habitat may occur within area</p>
<p>Rubus fruticosus aggregate Blackberry, European Blackberry [68406]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]</p>		<p>Species or species habitat likely to occur within area</p>
Reptiles		
<p>Hemidactylus frenatus Asian House Gecko [1708]</p>		<p>Species or species habitat likely to occur within area</p>

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

-31.68243 115.79896

Acknowledgements

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

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

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

Please feel free to provide feedback via the [Contact Us](#) page.

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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



Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
<p><i>Acacia anomala</i> Photos: B.R. Maslin, D. Coates & S.D. Hopper</p>	Grass Wattle	Slender, rush-like shrub, 0.2-0.5 m high. Fl. yellow	Aug to Sep	Lateritic soils. Slopes.	T	N	Not recorded in City of Wanneroo
<p><i>Acacia benthami</i> Photo: B.R. Maslin</p>		Shrub, ca 1 m high. Fl. yellow	Aug to Sep	Sand. Typically on limestone breakaways.	P2	N	Soils not suitable
<p><i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> Photos: A.S. George</p>		Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Fl. white-cream-pink-green/green	Jul or Sep to Dec or Jan	Grey sand, lateritic gravel	P3	N	Soil and habitat type not suitable. Not recorded in City of Wanneroo



Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Andersonia gracilis</i> <small>Photos: K. Atkins & M. Hildrop</small></p>		Slender erect or open straggly shrub, 0.1-0.5 (-1) m high. Fl. white-pink-purple	Sep to Nov.	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	T/EN	N	Soil and habitat type not suitable.
 <p><i>Anigozanthos luteus</i> subsp. <i>chrysanthus</i> <small>Photos: S.J. Patrick & B. and G. Wells</small></p>	Golden Catspaw	Rhizomatous, perennial, herb, 0.2-0.4(-0.8) m high. Fl. yellow	Jul to Oct	Grey or yellow sand.	P4	N	Typically associated with Bassendean Dunes, recorded further west than Flynn Dr
 <p><i>Anigozanthos viridis</i> subsp. <i>terraspectans</i> <small>Photo: B. & B. Wells</small></p>	Dwarf Green Kangaroo Paw	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. green/yellow-green.	August to September.	Grey sand, clay loam. Winter-wet depressions	T, Vu	N	Soil and habitat type not suitable.
<i>Austrostipa mundula</i>				One record from 1963 in Tuart Woodland at Yanchep Road	P3	Potential	Yanchep Road about 500 m to east of the site

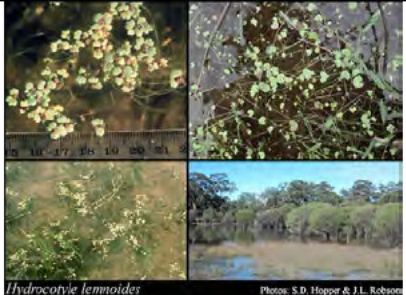
Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
<i>Baeckea</i> Sp. Limestone		Erect shrub ca 2 m high. Flower white; petals white, pink-tinged underneath, with a deep pink band across the base; sepals pink; centre green or yellow.		Sand, often with limestone, vegetation dominated by Banksia Woodland with some Jarrah, Tuart,	P1	Potential	Recorded in Neerabup Park in 1970
 <small>Caladenia huegelii Photos: J. & M. Greer & J.L. Robson</small>	Grand Spider Orchid	Tuberous, perennial herb, 0.25 – 0.6m high. Green, cream and red flowers.	September to October.	Grey or brown sand, clay loam.	T, En	N	Soil types not suitable.
<i>Calectasia elegans</i>	Elegant Tinsel Lily	Erect perennial subshrub to c. 45 cm high. Typical purple flower with red anthers; stilt roots present		Deep grey sand, associated with Banksia Woodland with moderately dense vegetation	P2	N	Soil types not suitable
<i>Chamaescilla gibsonii</i>		Clumped tuberous, herb. Fl. blue	Sep	Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	P3	N	Soil types, habitat not suitable
<i>Conostylis bracteata</i>		Rhizomatous, tufted or shortly proliferous perennial, grass-like or herb, 0.2-0.45 m high. Fl. yellow	Aug to Sep	Sand, limestone. Consolidated sand dunes.	P3	N	Soil types unsuitable, typically associated with coastal dune systems




Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Conostylis pauciflora</i> subsp. <i>euryrhypis</i> Photo: A.D. Crossford</p>		Rhizomatous, stoloniferous perennial, grass-like or herb, 0.06-0.18 m high. Fl. yellow	Aug to Oct	White, grey or yellow sand. Consolidated dunes.	P4	Potential	Tends to occur in coastal areas
<i>Conostylis pauciflora</i> subsp. <i>pauciflora</i>		Rhizomatous, stoloniferous perennial, grass-like or herb, 0.1-0.35 m high. Fl. yellow	Aug to Oct	Grey sand, limestone. Hillslopes, consolidated dunes.	P4	N	Soil and habitat type not suitable
<i>Cyathochaeta teretifolia</i>		Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown.		Grey sand, sandy clay. Swamps, creek edges.	P3	N	Soil and habitat type not suitable.
<i>Dampiera triloba</i>		Erect perennial, herb or shrub, to 0.5 m high. Fl. blue	Aug to Dec.	Only records within search area indicate it occurs in loamy sands in Gngangara area	P3	N	Soil, habitat type not suitable
<i>Darwinia foetida</i>		Domed shrub to 0.3 m by 0.3 m. Flowers green, bracts red-green.		Grey sand, associated with Open Marri Woodland, as well as species in wetter areas.	T	N	Soil, habitat not suitable; recorded only near Bullsbrook - Muchea


Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Diuris micrantha</i> <small>Photos: A.P. Brown, I. & M. Greeve & B. Jackson</small></p>	Dwarf Bee-orchid	Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown.	September to October.	Brown loamy clay. Winter-wet swamps, in shallow water.	Vu	N	Soil and habitat type not suitable.
 <p><i>Diuris purdiei</i> <small>Photos: I. & M. Greeve & S.D. Hopper</small></p>	Purdie's Donkey Orchid	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow	September to October.	Grey-black sand, moist. Winter-wet swamps.	En	N	Soil and habitat type not suitable.
 <p><i>Drakaea elastica</i> <small>Photos: A. Brown & S.D. Hopper</small></p>	Glossy-leaved Hammer Orchid	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow.	October to November.	White or grey sand. Low-lying situations adjoining winter-wet swamps	En	N	Soil and habitat type not suitable.




Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Drakaea micrantha</i> <small>Photos: S.D. Hopper, A. P. Brown & J. & M. Gross</small></p>	Dwarf Hammer Orchid	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow.	September to October.	White-grey sand.	Vu	N	Soil and habitat type not suitable.
 <p><i>Drosera occidentalis</i> <small>Photos: S.D. Hopper & J.L. Robson</small></p>	Western Sundew	Fibrous-rooted, rosetted perennial, herb, to 0.025 m high. Fl. pink/white	Oct to Dec or Jan.	One DBCA record from the search area indicates clayey sand soils	P4	N	Soil, habitat not suitable; recorded only near Bullsbrook
<i>Drosera patens</i>		Fibrous-rooted, rosetted perennial, herb, to 0.05 m high. Fl. white.	Dec or Feb	Sandy soils. Margins of winter-wet depressions, swamps and lakes.	P1	N	Soil and habitat type not suitable.
<i>Drosera x sidjamesii</i>		Fibrous-rooted perennial, herb, to 0.06 m high. Fl. green-pink.	Nov to Dec or Jan to Mar.	Peaty sand. Along lake margins, close to winter high-water line.	P1	N	Soil and habitat type not suitable.



Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Eleocharis keigheryi</i> Photo: G.J. Keighery</p>		Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green.	August to November.	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	T, Vu	N	Soil and habitat type not suitable.
<p><i>Eryngium pinnatifidum</i> subsp. <i>Palustre</i></p>		Erect annually renewed herb; flowers green/white/purple.		Record from Shire of Swan indicates dampland, grey sand.	P3	N	Soils, habitat not suitable
 <p><i>Eucalyptus argenteifolia</i> Photos: A.D. Crawford, S.D. Hopper & J.L. Robinson</p>	Wabling Hill Mallee	(Mallee), 1.5-4 m high, bark smooth. Fl. white	Mar to Apr.	Shallow soils over limestone. Slopes or gullies of limestone ridges, outcrops.	T, Vu	N	Soils, habitat not suitable
<p><i>Fabronia hampeana</i></p>		Moss		Grows on trunks of <i>Macrozamia riedlei</i> , limestone outcrops with yellow sand, in Banksia Woodland.	P2	Unknown	



Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
<i>Grevillea curviloba</i>		Prostrate to erect shrub, 0.1-2.5 m high. Fl. white-cream	Aug to Oct	Grey sand, sandy loam. Winter-wet heath.	T	N	Soils, habitat not suitable
<i>Grevillea sp. Ocean Reef</i>		Dense, spreading shrub to 2 m high x 3 m wide, clonal		Quindalup dunes, coastal sands, Recorded in City of Joondalup foreshore dunes only	P1	N	Soils, habitat not suitable
<i>Guichenotia tuberculata</i>		Erect, open shrub, (0.25-)0.6-0.9 m high. Fl. purple-pink	Aug to Oct.	Sand clay over laterite, sand.	P3	N	Soils, habitat not suitable
<i>Hibbertia helianthemoides</i>		Spreading to erect, low or prostrate shrub, to 0.3 m high. Fl. yellow	Jul or Sept to Oct	Clayey sand over sandstone or loam over quartzite. Hills and scree slopes.	P4	N	Soils, habitat not suitable
<i>Hibbertia leptotheca</i>				Typically recorded in coastal dunes	P3	N	Soils, habitat not suitable
	Aquatic Pennywort	Aquatic, floating annual, herb. Fl. purple	Aug to Oct	Swamps	P4	N	Habitat not suitable, no wetlands on site
<i>Hydrocotyle striata</i>		Herb, Spreading annual. Height: 5-10 cm.		Clay, Springs	P1	N	Soils, habitat not suitable


Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Hypolaena robusta</i> Photo: A.D. Canfora</p>		Dioecious rhizomatous, perennial, herb, ca 0.5 m high.	Sep to Oct.	White sand, sandplains.	P4	N	Soils not suitable, tends to occur further inland
<p><i>Isotropis cuneifolia</i> subsp. <i>glabra</i></p>		Prostrate to ascending, spreading perennial, herb or shrub, 0.05-0.15 m high. Fl. yellow/orange & red	Sep	Sand, clay loam. Winter-wet flats.	P3	N	Soils, habitat not suitable
 <p><i>Jacksonia gracillima</i> Photo: R. Davis</p>		Perennial tufted herb with narrow leaves 10-40 cm long, with rose pink flowers.	Oct - Nov	Grey sand, on mid-slope with exposed limestone. Fire > 5 years.	P3	N	WA Herb record is for area south of Perth, on soils different to those on site
 <p><i>Jacksonia sericea</i> Photo: I.R. Davison</p>	Waldjumi	Low spreading shrub, to 0.6 m high. Fl. orange	Dec or Jan to Feb	Calcareous & sandy soils.	P4	Y	Recorded in area, soils habitat suitable



Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
		Multi-stemmed shrub, 0.2-1 m high. Fl. pink-blue-purple	Sep to Dec.	Sand over limestone.	P3	Pot	Yellow sand over limestone at site
				Typically associated with coastal dunes	P2	N	Soils, habitat not suitable
					P4	Unknown	
		Low spreading shrub to 35 cm, white flowers, single stemmed at ground level. Ovary 3 celled glabrous.			P1	Pot	Tends to be recorded further west, and north but known from different soil types
		Erect shrub, 0.15-1 m high, to 0.6 m wide. Fl. white/pink	Apr to Jun or Sep	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	P3	N	Tends to be recorded further north towards Yanhep
		Multi-stemmed shrub, ca. 0.8 m high by 0.8 m wide. White flowers in terminal spikes.		Well drained grey sand	P2	N	Soils not suitable Recorded north of Muchea
		Almost prostrate, eventually scandent, woody shrub. Fl. red	Sep to Nov	White sand over limestone. Low coastal cliffs.	T	N	Soils not suitable
		Tall shrub to 2 m with yellow flowers		Yellow/brown/grey sand, sometimes with limestone present	T	Pot	Recorded nearby in Wattle Ave Neerabup
		Ascending to erect annual, herb, 0.02-0.1 m high. Fl. yellow	Sep to Oct	Granite or laterite soils.	P2	N	Soils, habitat not suitable

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <small>Phlebocarya pilosissima subsp. pilosissima Photo: G.J. Krieger</small>		Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Fl. cream-white	Aug to Oct	White or grey sand, lateritic gravel.	P3	N	Soils not suitable
 <small>Pimelea calcicola Photos: L.R. Dixon</small>		Erect to spreading shrub, 0.2-1 m high. Fl. pink	Sep to Nov.	Sand. Coastal limestone ridges.	P3	Potential	Yellow sand over limestone on site
 <small>Pithocarpa corymbulosa Photos: A. Canby</small>		Erect to scrambling perennial, herb, 0.5-1 m high. Fl. white	Jan to Apr	Gravelly or sandy loam. Amongst granite outcrops.	P3	N	Soils, habitat not suitable
<i>Platysace ramosissima</i>		Perennial, herb, to 0.3 m high. Fl. white-cream	Oct to Nov	Sandy soils.	P3	Unknown	Recorded further east of the site

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Poranthera moorokatta</i></p>		Monecious, erect annual 16 – 47 mm, leaves shortly petiolate, widely spaced, flowers in dense terminal umbel-like racemes	Sept – Nov	White silica sands, mixed grey and white sand with scattered leaf litter	P2	N	Known from two populations associated with Banksia Woodlands in Kings Park and Ellenbrook; recorded in Banksia Grove south of the site
<p><i>Sarcozona bicarinata</i></p>		Shrub, ca 0.1 m high. Fl. white	Aug	White sand	P3	N	Soil not suitable
<p><i>Schoenus griffinianus</i></p>		Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high	Sep to Oct	White sand.	P4	N	Soils not suitable, tends to be recorded further east
 <p><i>Sphaerolobium calcicola</i> Photos: R. Baichen</p>		Slender, multi-stemmed, scandent or erect shrub, to 1.5 m high. Fl. orange-red,	Jun or Sep to Nov	White-grey-brown sand, sandy clay over limestone, black peaty sandy clay. Tall dunes, winter-wet flats, interdunal swamps, low-lying areas.	P3	N	Soils, habitat not suitable

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
<i>Stachystemon exilis</i>	Slender Stachystemon	Slender small shrub, small white-yellow flowers and bright green narrowly lanceolate leaves with slightly recurved margins.		Grey, usually seasonally damp sand	P1	N	Soils not suitable
<i>Stenanthemum sublineare</i>		Erect shrub, to 0.1 m high. Fl. green	Oct to Dec.	Littered white sand. Coastal plain.	P2	N	Soils not suitable, tends to be recorded further east
 <i>Stylidium longitubum</i> Photos: M. Halop and P.G. Armstrong	Jumping Jacks	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink	Oct to Dec.	Sandy clay, clay. Seasonal wetlands.	P4	N	Soils, habitat not suitable
 <i>Stylidium maritimum</i> Photos: K.C. Richards		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. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Fl. white/purple	Sep to Nov	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	P3	N	Tends to be recorded in coastal foreshore areas

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
<i>Stylidium paludicola</i>		Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Fl. pink	Oct to Dec.	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	P3	N	Soils, habitat not suitable
<i>Stylidium trudgenii</i>		Caespitose perennial, herb, 0.05-0.5 m high		Grey sand, dark grey to black sandy peat. Margins of winter-wet swamps, depressions.	P3	N	Soils, habitat not suitable
<i>Styphelia filifolia</i>		Erect shrub 60 cm high x 40 cm wide. Flowers white, strictly pendulous. Leaves patent. Plants single stemmed at ground level.		Brown, well-drained sand	P3	N	Soils not suitable
	Queen of Sheba	Tuberous, perennial, herb, 0.1-0.35 m high. Fl. orange & red & purple & pink	Jun to Sep	Sandy clay, sand, laterite.	P2	N	Soils, habitat not suitable
<i>Tripterococcus sp. Brachylobus</i>				Recorded near Lake Pinjar near seasonal wetland on black, peaty clay loam	P4	N	Soil, habitat not suitable

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 <p><i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> <small>Photos: G. Cockerton</small></p>		Erect shrub, 0.2-0.75 m high. Fl. pink,	May or Nov to Dec or Jan.	Sand, sandy clay. Winter-wet depressions.	P4	N	Soils, habitat not suitable
 <p><i>Verticordia serrata</i> var. <i>linearis</i> <small>Photos: E.A. George</small></p>		Shrub, to 1 m high, differs from other varieties in the linear acuminate leaves 6-20 mm long; cilia to 1.2 mm long	Sep to Oct	White sand, gravel. Open woodland.	P3	N	Soils, habitat not suitable, tends to be recorded east of site

Sources:

- Descriptions and details: FloraBase, Department of Biodiversity, Conservation and Attractions, 2021; Barrett, 2012, DBCA Database searches, 2021 (WAHerb and WATPFL)
- Photos: FloraBase, Department of Biodiversity, Conservation and Attractions, 2021; *Poranthera moorokatta* – Russell Barrett, 2012

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.

Conservation Code	Name	Description
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.
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, 2021c)

Appendix 4 - Table 2: Commonwealth Conservation Codes

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	<i>Acacia alata</i>	Winged Wattle
Fabaceae	<i>Acacia cochlearis</i>	Rigid Wattle
Fabaceae	<i>Acacia cyclops</i>	Coastal Wattle
Fabaceae	<i>Acacia iteaphylla</i> *	
Fabaceae	<i>Acacia pulchella</i>	Prickly Moses
Fabaceae	<i>Acacia pulchella var. pulchella</i>	
Fabaceae	<i>Acacia saligna</i>	Orange Wattle
Proteaceae	<i>Adenanthos cygnorum</i>	Common Woollybush
Restionaceae	<i>Alexgeorgea nitens</i>	
Casuarinaceae	<i>Allocasuarina fraseriana</i>	Sheoak
Casuarinaceae	<i>Allocasuarina humilis</i>	Dwarf Sheoak
Haemodoraceae	<i>Anigozanthos humilis</i>	Cats Paws
Haemodoraceae	<i>Anigozanthos manglesii</i>	Mangle Kangaroo Paw
Asteraceae	<i>Arctotheca calendula</i> *	Cape Weed
Asparagaceae	<i>Asparagus asparagoides</i> *	Bridal Creeper
Poaceae	<i>Austrostipa compressa</i>	
Poaceae	<i>Avena barbata</i> *	Bearded Oat
Proteaceae	<i>Banksia attenuata</i>	Slender Banksia
Proteaceae	<i>Banksia dallanneyi</i>	Couch Honeypot
Proteaceae	<i>Banksia menziesii</i>	Firewood Banksia
Pittosporaceae	<i>Billardiera fraseri</i>	Elegant Pronaya
Fabaceae	<i>Bossiaea eriocarpa</i>	Common Brown Pea
Ericaceae	<i>Brachyloma preissii</i>	Globe Heath
Brassicaceae	<i>Brassica tournefortii</i> *	Mediterranean Turnip
Poaceae	<i>Briza maxima</i> *	Blowfly Grass
Poaceae	<i>Bromus diandrus</i> *	Great Brome
Dasygongonaceae	<i>Calectasia narragara</i>	
Cupressaceae	<i>Callitris sp.</i> *	
Aizoaceae	<i>Carpobrotus edulis</i> *	Hottentot Fig
Myrtaceae	<i>Chamelaucium uncinatum</i> *	Geraldton Wax
Proteaceae	<i>Conospermum stoechadis</i>	Common Smokebush
Ericaceae	<i>Conostephium pendulum</i>	Pearl Flower
Haemodoraceae	<i>Conostylis aculeata</i>	Prickly Conostylis
Haemodoraceae	<i>Conostylis juncea</i>	
Haemodoraceae	<i>Conostylis setigera</i>	Bristly Cottonhead
Goodeniaceae	<i>Dampiera linearis</i>	Common Dampiera
Apiaceae	<i>Daucus glochidiatus</i>	Australian Carrot
Fabaceae	<i>Daviesia decurrens</i>	Prickly Bitter-pea

Family	Species Name	Common Name
Fabaceae	<i>Daviesia nudiflora</i>	
Fabaceae	<i>Daviesia triflora</i>	
Restionaceae	<i>Desmocladius flexuosus</i>	
Orchidaceae	<i>Disa bracteata</i>	
Scrophulariaceae	<i>Dischisma capitatum</i> *	Woolly-headed Dischisma
Droseraceae	<i>Drosera erythrorhiza</i>	Red Ink Sundew
Myrtaceae	<i>Eremaea pauciflora</i>	
Lamiaceae	<i>Eremophila glabra</i>	Tar Bush
Poaceae	<i>Ehrharta calycina</i> *	Perennial Veldt Grass
Poaceae	<i>Ehrharta longiflora</i> *	Annual Veldt Grass
Asteraceae	<i>Erigeron bonariensis</i> *	
Geraniaceae	<i>Erodium botrys</i> *	Long Storksbill
Myrtaceae	<i>Eucalyptus marginata</i>	Jarrah
Euphorbiaceae	<i>Euphorbia peplus</i> *	Petty Spurge
Euphorbiaceae	<i>Euphorbia terracina</i> *	Geraldton Carnation Weed
Papaveraceae	<i>Fumaria capreolata</i> *	Whiteflower Fumitory
Fabaceae	<i>Gastrolobium capitatum</i>	
Iridaceae	<i>Gladiolus caryophyllaceus</i> *	Wild Gladiolus
Fabaceae	<i>Gompholobium tomentosum</i>	Hairy Yellow Pea
Proteaceae	<i>Grevillea leucopteris</i> *	White Plume Grevillea
Proteaceae	<i>Grevillea preissii</i>	
Haemodoraceae	<i>Haemodorum paniculatum</i>	Mardja
Haemodoraceae	<i>Haemodorum spicatum</i>	Mardja
Proteaceae	<i>Hakea prostrata</i>	Harsh Hakea
Proteaceae	<i>Hakea ruscifolia</i>	Candle Hakea
Proteaceae	<i>Hakea trifurcata</i>	Two-leaf Hakea
Fabaceae	<i>Hardenbergia comptoniana</i>	Native Wisteria
Lamiaceae	<i>Hemiandra pungens</i>	Snakebush
Dilleniaceae	<i>Hibbertia huegelii</i>	
Dilleniaceae	<i>Hibbertia hypericoides</i>	Yellow Buttercup
Poaceae	<i>Hordeum leporinum</i> *	Barley Grass
Fabaceae	<i>Hovea trisperma</i>	Common Hovea
Asteraceae	<i>Hyalosperma cotula</i>	
Violaceae	<i>Hybanthus calycinus</i>	Wild Violet
Myrtaceae	<i>Hypocalymma robustum</i>	Swan River Myrtle
Asteraceae	<i>Hypochoeris radicata</i> *	Flat Weed
Restionaceae	<i>Hypolaena exsulca</i>	
Cyperaceae	<i>Isolepis marginata</i>	Coarse Club Rush

Family	Species Name	Common Name
Fabaceae	<i>Isotropis cuneifolia</i>	Granny Bonnets
Fabaceae	<i>Jacksonia floribunda</i>	Holly Pea
Fabaceae	<i>Jacksonia stembergiana</i>	Stinkwood
Fabaceae	<i>Kennedia prostrata</i>	Scarlet Runner
Myrtaceae	<i>Kunzea glabrescens</i>	Spearwood
Asteraceae	<i>Lagenophora huegelii</i>	
Asteraceae	<i>Leontodon rhagadioloides*</i>	Cretan Weed
Cyperaceae	<i>Lepidosperma calcicola</i>	
Cyperaceae	<i>Lepidosperma scabrum</i>	
Myrtaceae	<i>Leptospermum laevigatum*</i>	Coast Teatree
Brassicaceae	<i>Lobularia maritima*</i>	Sweet Alyssum
Asparagaceae	<i>Lomandra caespitosa</i>	Tufted Mat Rush
Asparagaceae	<i>Lomandra hermaphrodita</i>	
Asparagaceae	<i>Lomandra maritima</i>	
Fabaceae	<i>Lupinus angustifolius*</i>	Narrowleaf Lupin
Fabaceae	<i>Lupinus cosentinii*</i>	Blue Lupin
Anarthriaceae	<i>Lyginia imberbis</i>	
Primulaceae	<i>Lysimachia arvensis*</i>	Pimpernel
Fabaceae	<i>Medicago polymorpha*</i>	Burr Medic
Myrtaceae	<i>Melaleuca systema</i>	
Fabaceae	<i>Melilotus indicus*</i>	
Cyperaceae	<i>Mesomelaena pseudostygia</i>	
Cyperaceae	<i>Morelotia octandra</i>	
Onagraceae	<i>Oenothera drummondii*</i>	Beach Evening Primrose
Asteraceae	<i>Olearia axillaris</i>	Coastal Daisybush
Rubiaceae	<i>Opercularia vaginata</i>	Dog Weed
Orobanchaceae	<i>Orobanche minor*</i>	Lessor Broomrape
Asteraceae	<i>Osteospermum ecklonis*</i>	
Iridaceae	<i>Patersonia occidentalis</i>	Purple Flag
Geraniaceae	<i>Pelargonium capitatum*</i>	Rose Pelargonium
Proteaceae	<i>Petrophile linearis</i>	Pixie Mops
Proteaceae	<i>Petrophile macrostachya</i>	
Caryophyllaceae	<i>Petrorhagia dubia*</i>	
Rutaceae	<i>Philothea spicata</i>	Pepper and Salt
Haemodoraceae	<i>Phlebocarya ciliata</i>	
Thymelaeaceae	<i>Pimelea ferruginea</i>	
Asteraceae	<i>Podotrochea gnaphalioides</i>	Golden Long-heads
Phyllanthaceae	<i>Poranthera microphylla</i>	Small Poranthera

Family	Species Name	Common Name
Orchidaceae	<i>Pterostylis</i> sp.	
Amaranthaceae	<i>Ptilotus manglesii</i>	Pom Poms
Amaranthaceae	<i>Ptilotus polystachyus</i>	Prince of Wales Feather
Asteraceae	<i>Quinetia urvillei</i>	
Myrtaceae	<i>Regelia inops</i>	
Fabaceae	<i>Retama raetam</i> *	
Euphorbiaceae	<i>Ricinus communis</i> *	Castor Oil Plant
Poaceae	<i>Rytidosperma occidentale</i>	
Goodeniaceae	<i>Scaevola nitida</i>	Shinning Fanflower
Goodeniaceae	<i>Scaevola repens</i>	
Asteraceae	<i>Senecio vulgaris</i> *	Common Groundsel
Caryophyllaceae	<i>Silene gallica</i> *	French Catchfly
Asteraceae	<i>Sonchus oleraceus</i> *	Common Sowthistle
Proteaceae	<i>Stirlingia latifolia</i>	Blueboy
Stylidiaceae	<i>Stylidium androsaceum</i>	
Stylidiaceae	<i>Stylidium ciliatum</i>	Golden Triggerplant
Stylidiaceae	<i>Stylidium cygnorum</i>	
Stylidiaceae	<i>Stylidium schoenoides</i>	Cow Kicks
Ericaceae	<i>Styphelia xerophylla</i>	
Orchidaceae	<i>Thelymitra macrophylla</i>	
Asparagaceae	<i>Thysanotus sparteus</i>	
Araliaceae	<i>Trachymene pilosa</i>	Native Parsnip
Hemerocallidaceae	<i>Tricoryne elatior</i>	Yellow Autumn Lily
Fabaceae	<i>Trifolium arvense</i> *	Hare's Foot Clover
Fabaceae	<i>Trifolium campestre</i> *	Hop Clover
Tropaeolaceae	<i>Tropaeolum majus</i> *	Garden Nasturtium
Asteraceae	<i>Urospermum picroides</i> *	False Hawkbit
Asteraceae	<i>Ursinia anthemoides</i> *	Ursinia
Asteraceae	<i>Verbesina encelioides</i> *	
Myrtaceae	<i>Verticordia nitens</i>	Morrison Featherflower
Campanulaceae	<i>Wahlenbergia capensis</i> *	Cape Bluebell
Campanulaceae	<i>Wahlenbergia preissii</i>	
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>	Grass Tree
Apiaceae	<i>Xanthosia huegelii</i>	

*Denotes introduced species



APPENDIX 6: QUADRAT DATA

Quadrat No.: Q1
Survey Date: 21/10/2020
Personnel: SH, RW
Latitude: 386244.4
Longitude: 6494408.8
Location: Flynn Dr
Topography: Upper slope
Aspect: South-west
Slope: 1-3%
Soil: Brown sand
Gravel: 0%
Rock: 0%
Leaf Litter: 30%
Bare Ground: 1%
Drainage: Well
Condition: Very Good



Notes: *Eucalyptus marginata* (Jarrah) Open Woodland

Native Species	Height (m)	Cover (%)	Weed Species	Height (m)	Cover (%)
<i>Bossiaea eriocarpa</i>	0.1	1	* <i>Briza maxima</i>	0.2	3
<i>Conostephium pendulum</i>	0.1	0.1	* <i>Bromus diandrus</i>	0.3	0.1
<i>Conostylis aculeata</i>	0.2	0.1	* <i>Carpobrotus edulis</i>	0.1	1
<i>Conostylis juncea</i>	0.1	0.1	* <i>Ehrharta calycina</i>	1	3
<i>Desmocladus flexuosus</i>	0.2	50	* <i>Ehrharta longiflora</i>	0.3	1
<i>Drosera erythrorhiza</i>	0.1	0.1	* <i>Lysimachia arvensis</i>	0.1	0.1
<i>Eremaea pauciflora</i>	0.5	0.5	* <i>Medicago polymorpha</i>	0.1	0.1
<i>Eucalyptus marginata</i>	12	50	* <i>Pelargonium capitatum</i>	0.1	0.1
<i>Gastrolobium capitatum</i>	0.1	0.1	* <i>Silene gallica</i>	0.1	0.1
<i>Gompholobium tomentosum</i>	0.3	0.5	* <i>Trifolium arvense</i>	1	1
<i>Haemodorum spicatum</i>	1.5	0.1	* <i>Trifolium campestre</i>	0.1	1
<i>Hibbertia hypericoides</i>	0.5	1	* <i>Wahlenbergia capensis</i>	0.4	0.1
<i>Hypocalymma robustum</i>	0.5	3			
<i>Hypolaena exsulca</i>	0.5	0.1			
<i>Kennedia prostrata</i>	0.1	3			
<i>Lomandra caespitosa</i>	0.1	0.1			
<i>Lomandra hermaphrodita</i>	0.1	0.1			
<i>Patersonia occidentalis</i>	0.5	0.5			
<i>Petrophile linearis</i>	0.1	0.1			
<i>Philothea spicata</i>	0.3	0.5			
<i>Pimelea ferruginea</i>	0.5	0.5			
<i>Xanthorrhoea preissii</i>	1.5	4			

Note: *denotes introduced species

Quadrat No.: Q2
Survey Date: 21/10/2020
Personnel: SH, RW
Latitude: 386136.0
Longitude: 6494409.7
Location: Flynn Dr
Topography: Mid slope
Aspect: South-west
Slope: 1-3%
Soil: Grey brown sand
 Gravel: 0%
 Rock: 0%
 Leaf Litter: 70%
 Bare Ground: 5%
 Drainage: Well
 Condition: Good



Notes: *Eucalyptus marginata* (Jarrah) Open Woodland

Native Species	Height (m)	Cover (%)	Native Species	Height (m)	Cover (%)
<i>Alexgeorgea nitens</i>	0.1	0.1	<i>Mesomelaena pseudostygia</i>	0.5	0.5
<i>Banksia attenuata</i>	10	5	<i>Morelotia octandra</i>	0.5	1
<i>Bossiaea eriocarpa</i>	0.2	2	<i>Opercularia vaginata</i>	0.1	0.5
<i>Brachyloma preissii</i>	0.5	1	<i>Petrophile linearis</i>	0.2	0.1
<i>Conostephium pendulum</i>	0.1	0.1	<i>Poranthera microphylla</i>	0.1	0.1
<i>Conostylis aculeata</i>	0.2	0.5	<i>Ptilotus manglesii</i>	0.1	0.5
<i>Daviesia nudiflora</i>	0.5	0.5	<i>Rytidosperma occidentale</i>	0.3	0.1
<i>Desmocladius flexuosus</i>	0.2	5	<i>Scaevola repens</i>	0.1	0.1
<i>Disa bracteata</i>	0.1	0.1	<i>Stirlingia latifolia</i>	0.5	2.5
<i>Eucalyptus marginata</i>	12	40	<i>Stylidium androsaceum</i>	0.1	0.1
<i>Gastrolobium capitatum</i>	0.1	0.1	<i>Xanthorrhoea preissii</i>	1.5	4
<i>Gompholobium tomentosum</i>	0.1	0.1			
<i>Haemodorum paniculatum</i>	0.1	0.1	Weed Species	Height (m)	Cover (%)
<i>Hibbertia hypericoides</i>	0.3	0.5	* <i>Briza maxima</i>	0.3	5
<i>Kennedia prostrata</i>	0.1	0.5	* <i>Ehrharta calycina</i>	0.5	5
<i>Lepidosperma calcicola</i>	0.3	0.5	* <i>Gladiolus caryophyllaceus</i>	0.3	0.1
<i>Lomandra caespitosa</i>	0.2	0.1	* <i>Ursinia anthemoides</i>	0.2	0.1
<i>Lomandra hermaphrodita</i>	0.1	0.1	* <i>Wahlenbergia capensis</i>	0.1	0.1

Note: *denotes introduced species

Quadrat No.: Q3
Survey Date: 21/10/2020
Personnel: SH, RW
Latitude: 386023.8
Longitude: 6494204.0
Location: Flynn Dr
Topography: Flat plain
Aspect: Flat
Slope: 0
Soil: Brown sand
Gravel: 0%
Rock: 0%
Leaf Litter: 50%
Bare Ground: 0%
Drainage: Well
Condition: Excellent



Notes: *Eucalyptus marginata* (Jarrah) Open Woodland

Native Species	Height (m)	Cover (%)	Native Species	Height (m)	Cover (%)
<i>Acacia pulchella</i>	0.1	0.1	<i>Patersonia occidentalis</i>	0.1	2
<i>Alexgeorgea nitens</i>	0.1	0.1	<i>Philotheca spicata</i>	0.4	0.5
<i>Banksia dallanneyi</i>	0.1	0.1	<i>Scaevola repens</i>	0.1	0.1
<i>Bossiaea eriocarpa</i>	0.3	2	<i>Stirlingia latifolia</i>	0.5	1
<i>Brachyloma preissii</i>	0.5	1	<i>Styloidium androsaceum</i>	0.1	0.1
<i>Conospermum stoechadis</i>	0.5	0.5	<i>Morelotia octandra</i>	0.3	2
<i>Conostylis aculeata</i>	0.3	1	<i>Thelymitra macrophylla</i>	0.1	0.1
<i>Conostylis juncea</i>	0.1	0.1	<i>Thysanotus sparteus</i>	0.1	0.1
<i>Dampiera linearis</i>	0.3	0.5	<i>Trachymene pilosa</i>	0.1	0.1
<i>Daviesia triflora</i>	0.5	0.5	<i>Xanthorrhoea preissii</i>	1.5	10
<i>Desmocladius flexuosus</i>	0.1	10	<i>Xanthosia huegelii</i>	1	0.1
<i>Eucalyptus marginata</i>	12	40			
<i>Gastrolobium capitatum</i>	0.2	0.5			
<i>Gompholobium tomentosum</i>	0.1	0.5	Weed Species	Height (m)	Cover (%)
<i>Pterostylis sp.</i>	0.1	0.1	* <i>Briza maxima</i>	0.3	0.1
<i>Hovea trisperma</i>	0.1	0.1	* <i>Gladiolus caryophyllaceus</i>	0.5	0.1
<i>Hyalosperma cotula</i>	0.1	0.1	* <i>Sonchus oleraceus</i>	0.1	0.1
<i>Hybanthus calycinus</i>	0.2	0.1	* <i>Urospermum picroides</i>	0.1	0.1
<i>Kennedia prostrata</i>	0.1	0.5			
<i>Lagenophora huegelii</i>	0.1	0.1			
<i>Lomandra hermaphrodita</i>	0.1	0.1			
<i>Lyginia imberbis</i>	0.5	0.5			
<i>Mesomelaena pseudostygia</i>	0.5	0.5			

Note: *denotes introduced species