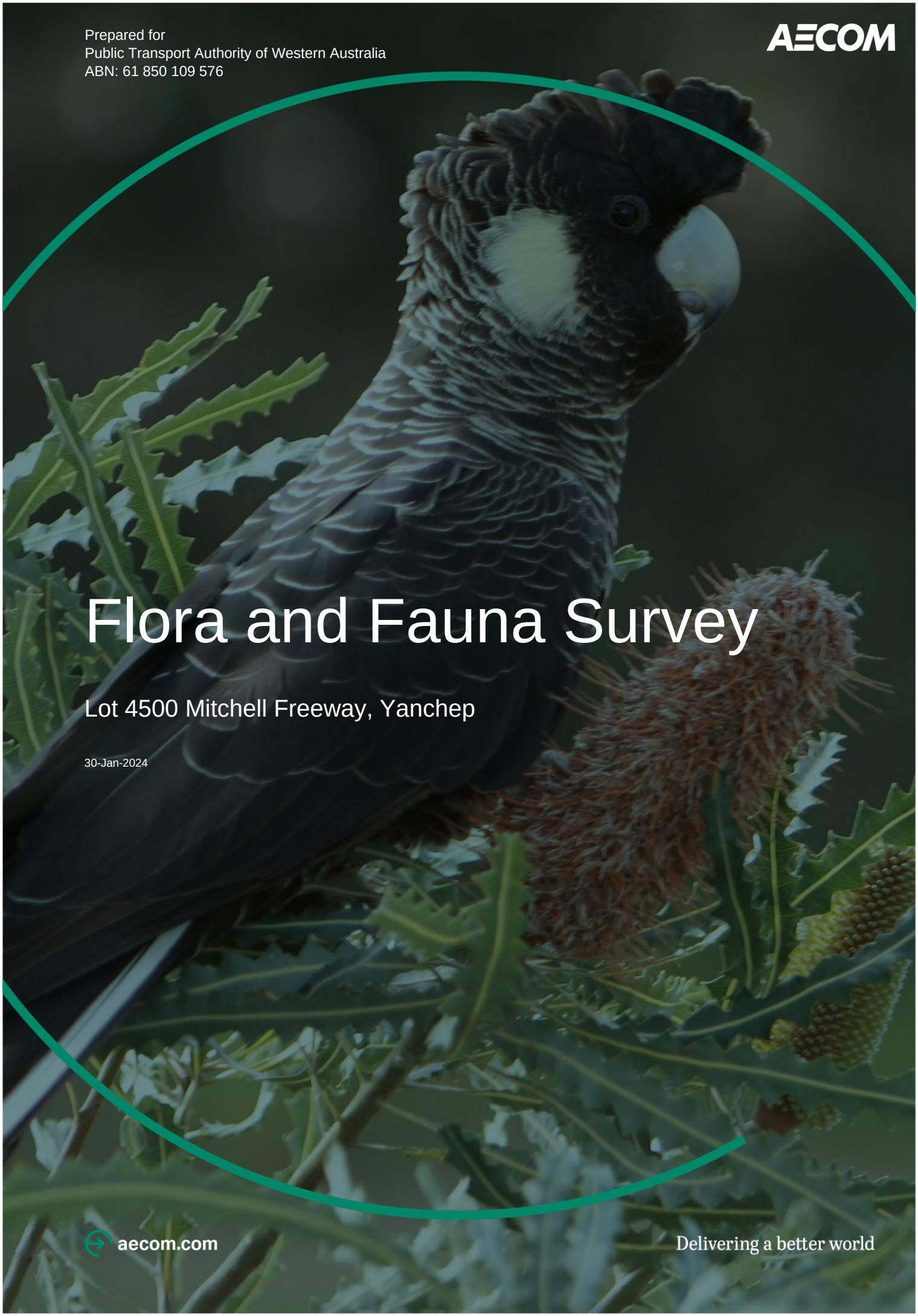
Prepared for
Public Transport Authority of Western Australia
ABN: 61 850 109 576

AECOM



Flora and Fauna Survey

Lot 4500 Mitchell Freeway, Yanchep

30-Jan-2024

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Delivering a better world

Flora and Fauna Survey

Lot 4500 Mitchell Freeway, Yanchep

Client: Public Transport Authority of Western Australia

ABN: 61 850 109 576

Prepared by

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Table of Contents

List of Figures

List of Tables

Executive Summary

AECOM Australia Pty Ltd (AECOM) was engaged by Public Transport Authority of Western Australia (PTA) to undertake a spring flora, vegetation, fauna and black cockatoo assessment for Lot 4500 Yanchep Beach Road (the survey area) located approximately 52 km to the north of Perth Central Business District (CBD) in Yanchep. The survey area is currently an undeveloped piece of land zoned as a regional road under the Metropolitan Regional Scheme for the future Mitchell Freeway. The results of the survey will be used to assess the viability of the site to store excavated soil. The soil stockpile will require clearing of native vegetation. The assessment included a detailed desktop assessment, preparation of a survey sample plan, a field survey and reporting component. The desktop assessment identified:

- Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia Woodlands TEC) listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was likely to occur.
- 36 significant flora species may potentially occur, of which four species were considered to have a 'high' likelihood to occur.
- 96 significant fauna species may potentially occur, of which five species were 'highly' likely to occur and two were considered to have a 'moderate' likelihood of occurrence.

The field survey results are summarised below:

- no Priority or Threatened flora species were identified. Flora diversity was low. A total of 18 weed species were recorded, representing 31% of the total flora count.
- two native vegetation communities were mapped including a Banksia Woodland, and an Acacia Shrubland. One disturbed/altered community was mapped as Paddock, with one Floristic Community Type (FCT 28 – Spearwood *Banksia attenuata – Eucalyptus* woodlands) confidently inferred from two quadrats and a relevé.
- the Threatened Ecological Community (TEC) Banksia Woodlands of the Swan Coastal Plain was recorded, extending 0.36 ha.
- twenty-seven fauna species were recorded, with bird species representing the dominant class, and including three conservation significant species:
  - Carnaby's Cockatoo (*Zanda latirostris*) listed as Endangered under the EPBC Act and *Biodiversity Conservation Act 2016* (BC Act),
  - Quenda (*Isoodon fusciventer*) listed as Priority 4 by Department of Biodiversity, Conservation and Attractions (DBCA), and
  - Black-faced Cuckooshrike (*Coracina novaehollandiae*) listed as Marine under the EPBC Act.
- fauna habitats represented potentially suitable habitat for an additional three conservation significant fauna species; Black-striped Snake (*Neelaps calonotos*) (listed as Priority 3 by DBCA), the Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*) (listed as Priority 3 by DBCA), and the Western Brush Wallaby (*Notamacropus irma*) (listed as Priority 4 by DBCA).
- the foraging habitat quality for the entire survey area for Carnaby's Cockatoo was 10 (High Quality native foraging) utilising the DAWE 2022 guidelines. A refined foraging score of 4 (Moderate Quality) was applicable to areas of Banksia Woodland (2.75 ha) for Carnaby's Cockatoo using the Bamford scoring tool.
- clearing of native vegetation within the survey area is unlikely to be at variance with the 10 Clearing Principles.

Access to a small section at the northern end of the survey area was restricted due to a burn-off being conducted by the property owner. This limitation was mitigated through assessing the area from the edge. No other limitations were identified that may influence the results of the survey.

1.0 Introduction

1.1 Background

Public Transport Authority of Western Australia (PTA) is currently undertaking works associated with the Yanchep Rail Extension project. As part of this project, approximately 300,000 cubic metres of excavated soil require an appropriate storage location. AECOM Australia Pty Ltd (AECOM) was engaged to undertake environmental investigations that will support a clearing impact assessment, with the view of using Lot 4500 Yanchep Beach Road to store the excavated soil.

1.2 Location

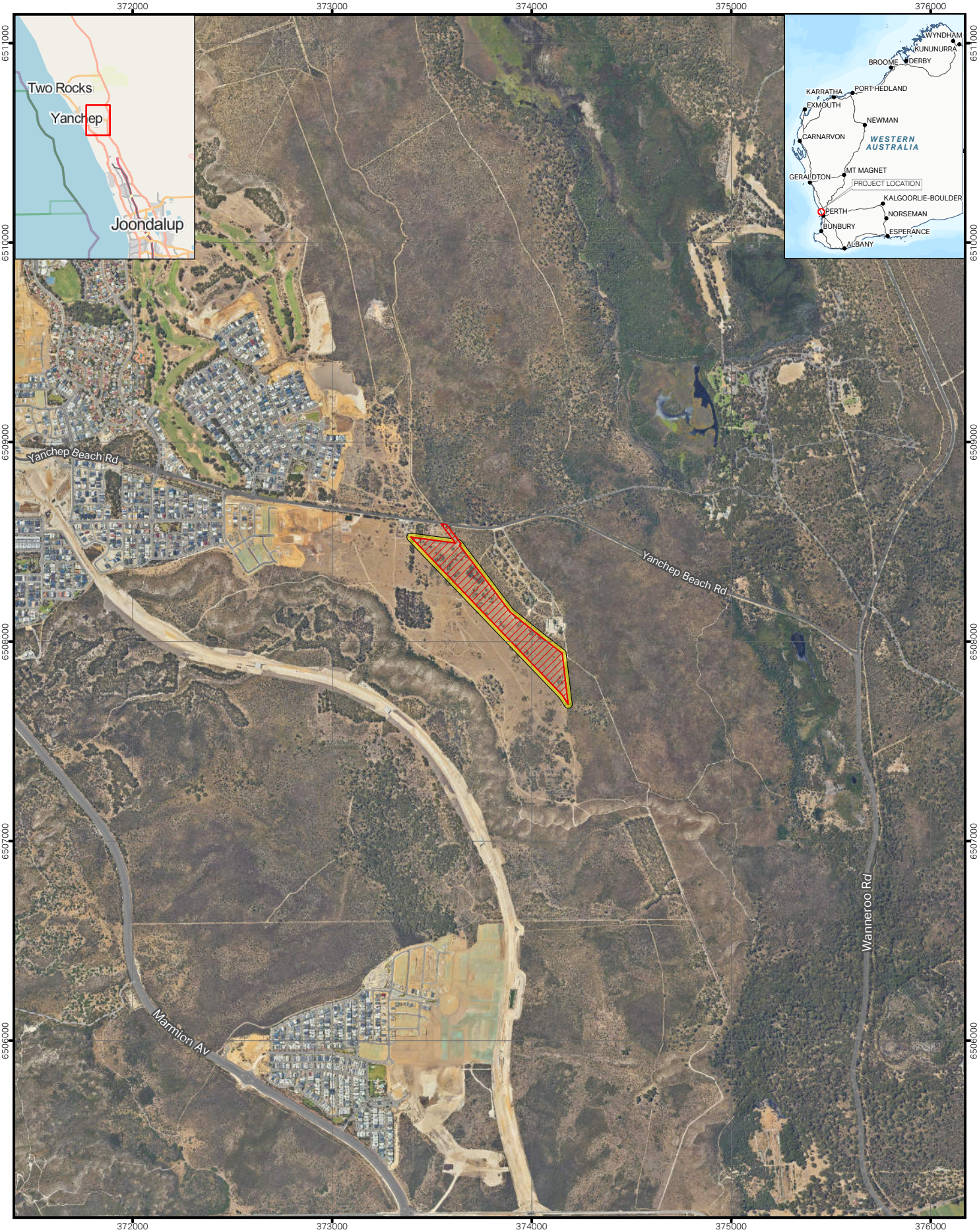
Lot 4500 Yanchep Beach Road (the survey area) is currently an undeveloped piece of land, zoned as a regional road under the Metropolitan Regional Scheme for the future Mitchell Freeway. It is located 3 km to the east of the Yanchep township and approximately 52 km from the Perth CBD.

1.3 Objective

The objective of the flora, reconnaissance vegetation, basic fauna and black cockatoo assessment was to define the environmental values within the survey area to inform a clearing permit impact assessment. The scope included:

- a desktop assessment and literature review for flora, communities and fauna
- a single-phased field survey to record floristic data, define vegetation communities, vegetation condition and fauna habitat, targeted searches for conservation significant flora, fauna and communities, and targeted black cockatoo habitat assessment.
- a technical report and data package, including an assessment of the significance of findings against the ten clearing principles (DWER).

The survey area includes a larger polygon where the reconnaissance flora and vegetation survey, and basic fauna and black cockatoo assessment is to occur, and a 20 m buffer that was subject to targeted searches. From here-in they will be referred to as reconnaissance survey area and targeted survey area respectively.



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GDA2020 MGA ZONE 50

LEGEND

Survey Area

Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo

Targeted Flora Survey

Survey Area

PUBLIC TRANSPORT AUTHORITY

FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 1

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2.0 Existing Environment

2.1 Climate

Yanchep is located approximately 52 km north of Perth CBD, and the climate is typical of the Swan Coastal Plain. The region is characterised by hot and dry summer periods, with mild wet winters. Precipitation predominantly occurs within the winter season, with sporadic storms through summer and spring.

Rainfall and temperature data were obtained from Gingin Aero WA (station number 9178), located 19 km to the north-east of Yanchep. The long-term rainfall and temperature data is compared against the October 2022 to September 2023 data in Figure 2 to determine the climatic conditions of the area over the preceding 12 months to the survey (BoM, 2023).

The survey was undertaken on 5th October 2023 following a year of below average rainfall, with 85.7 mm less than the long-term average recorded over the preceding 12 months. Rainfall was particularly low in the three months prior to the survey, 197.6 mm from July to September 2023, compared to the long-term average of 288.4 mm typically recorded during this period. Although rainfall was low in the months preceding the survey, the previous disturbance and displacement of native vegetation within the survey area means this is not considered a limitation, as native herbs have been limited in abundance historically at this site.

Maximum temperatures were slightly higher than average from January to March and again from July to September. Minimum temperatures have fallen below the mean from February to August 2023. In the month preceding the survey, warmer conditions were observed with both the maximum and minimum temperatures above the long-term averages.

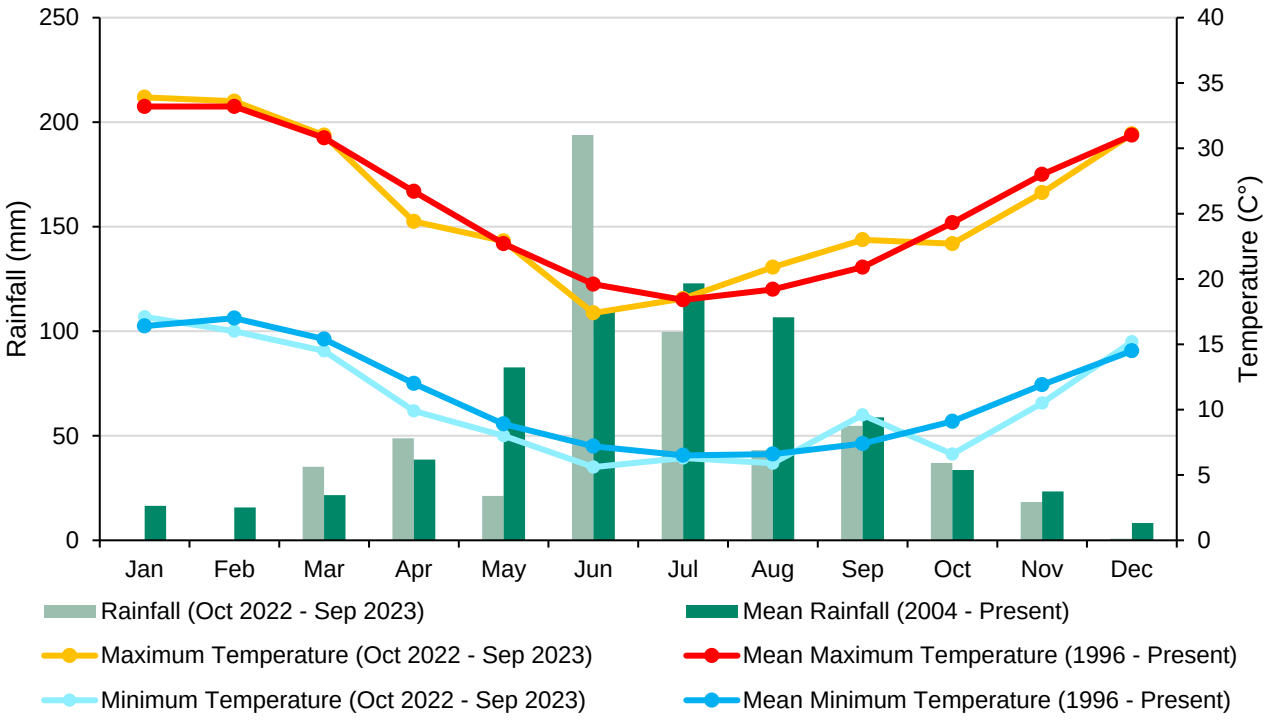


Figure 2 Rainfall and temperature data from Gingin Aero WA (station number 9178) (BoM, 2023)

2.2 Interim Biogeographical Region of Australia Regions

The largest regional vegetation classification scheme recognised by Environmental Protection Authority (EPA) is the Interim Biogeographical Region of Australia (IBRA). The IBRA regions provide the planning framework for the systematic development of a comprehensive, adequate and representative (CAR) national reserve system. There are 89 recognised IBRA regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (IBRA7, 2012). The survey area is situated across the Swan Coastal Plain IBRA region.

The Swan Coastal Plain bioregion, described in CALM (2002), includes Perth and the outer suburbs (excluding the Hills suburbs). The Swan Coastal Plain is comprised of a narrow belt less than 30 km wide of aeolian, alluvial and colluvial deposits of Holocene or Pleistocene age (Gibson et al, 1994). A complex series of seasonal freshwater wetlands, alluvial river flats, coastal limestone and several offshore islands are included in the bioregion. Younger sandy areas and limestone are dominated by heath and/or Tuart woodlands, while Banksia and Jarrah-Banksia woodlands are found on the older dune systems.

2.3 Geology and Landforms

The survey area is situated across the Spearwood System (Figure 3), described as sand dunes and plains with yellow deep sands, pale deep sands and yellow/brown shallow sands. The survey area intersects with the Karrakatta Sand Yellow Phase, which includes low hilly to gently undulating terrain with yellow sand over limestone at 1-2 m. (Figure 4):

2.4 Vegetation

Beard *et al*. (2013) mapping is used to determine the current extent of remnant vegetation remaining when compared to pre-European vegetation extent. There are two vegetation associations recorded across the survey area. Table 1 describes these vegetation associations and the percent remaining across different boundaries. Pre-European vegetation, utilising Beard *et al*. (2013) mapping is depicted on Figure 5.

Table 1 Beard et al. (2013) vegetation association's percentage remaining

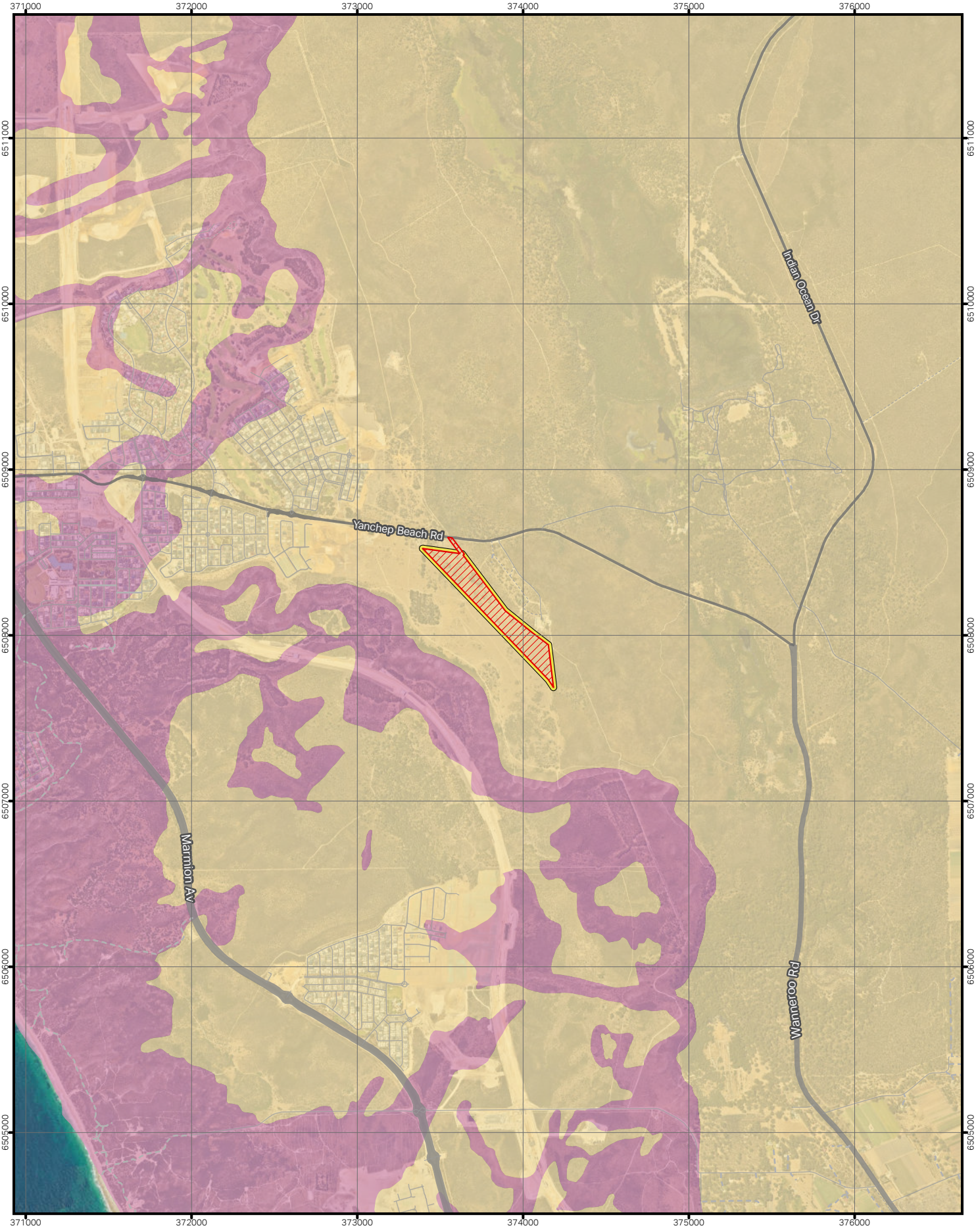
Vegetation Association	Description	Percent Remaining (%)		
		Western Australia	Swan Coastal Plain IBRA Region	City of Wanneroo
949	Low woodland; Banksia	56.42	57.28	46.30
1007	Mosaic: Shrublands; *Acacia lasiocarpa* & *Melaleuca acerosa* heath / Shrublands; *Acacia rostellifera* & *Acacia cyclops* thicket	68.05	68.68	59.94

Vegetation complex mapping undertaken by Heddle *et al.* (1980) indicates the basic relationship between vegetation, soils and rainfall. The survey area falls within the Cottesloe Complex North (vegetation system complex 51) described as a “low open forest and low woodland and closed heath.”

As of 2018, there was 57.89% remaining of this vegetation complex across the Swan Coastal Plain and 68.35% remaining within the City of Wanneroo (Government of Western Australia, 2019).

2.5 Conservation Reserves and Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are classes or areas of native vegetation where the exemptions for clearing vegetation under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations) do not apply. The entire survey area is situated within the buffer for an ESA associated with a TEC and Bush Forever site 288 - Yanchep National Park and Adjacent Bushland. Furthermore. the survey area intersects with Reserve R29246 legislated under the CALM Act 1984 – Section 5(1)(h) (Figure 6).



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LEGEND

Survey Area

Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo

Targeted Flora Survey

Soil Landscape Mapping - Systems (DPIRD-064)

Map unit name

Quindalup South System

Spearwood System

Land Systems

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FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 3

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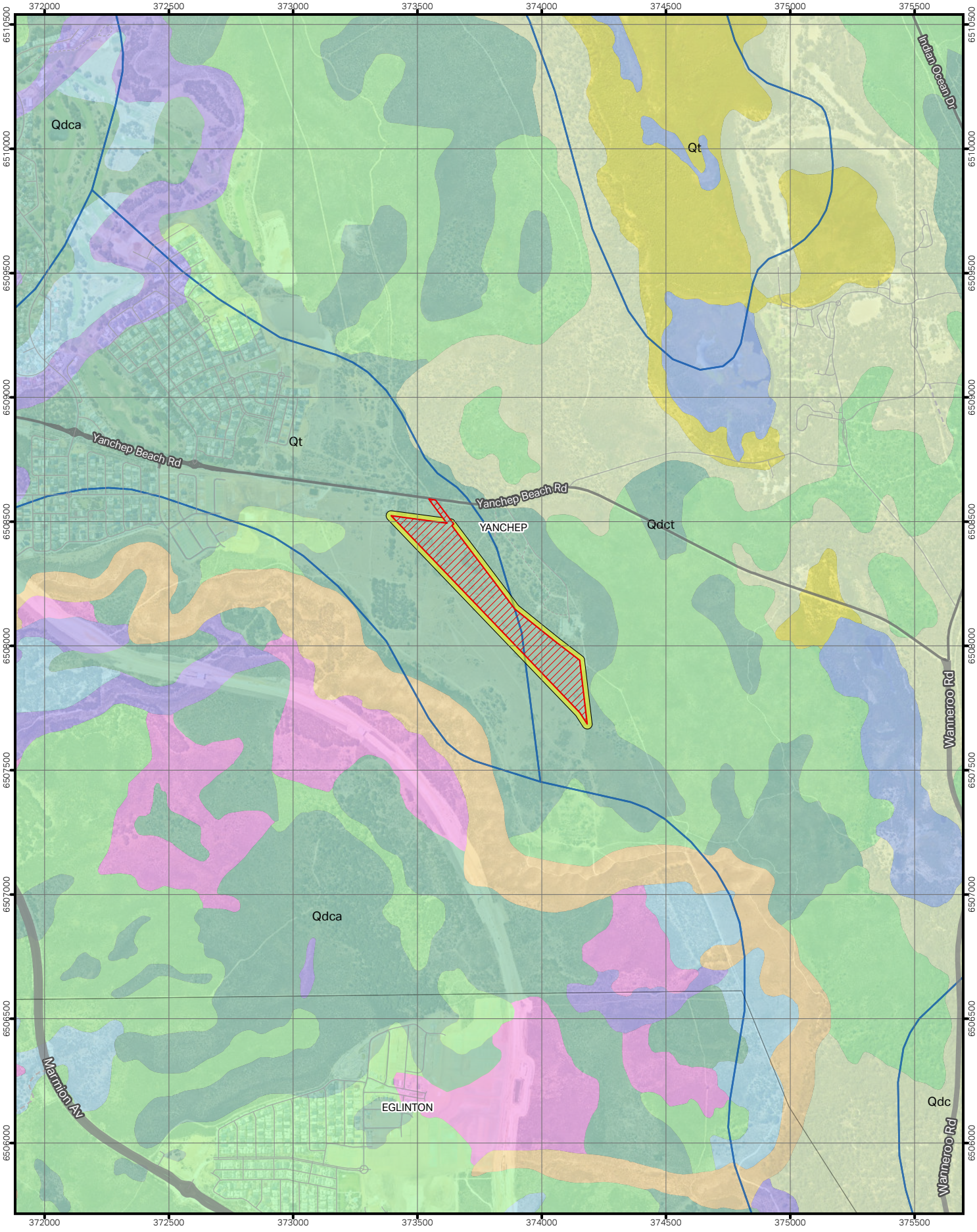

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LEGEND

Survey Area
- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey
- Geoscience Australia (2012) Surface Geology of Australia, 1:1 000 000 scale, 2012 edition

Soil Landscape Mapping - Best Available (DPIRD-027)
- Karrakatta Sand Yellow phase
- Karrakatta shallow soils phase
- Quindalup South deep sand flat phase
- Quindalup South oldest dune phase
- Quindalup South second dune phase
- Quindalup South shallow sand flat phase
- Spearwood Sand phase
- Spearwood wet, lake phase
- Spearwood, Beonaddy Sand phase

Geology and Soils

PUBLIC TRANSPORT AUTHORITY

FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 4

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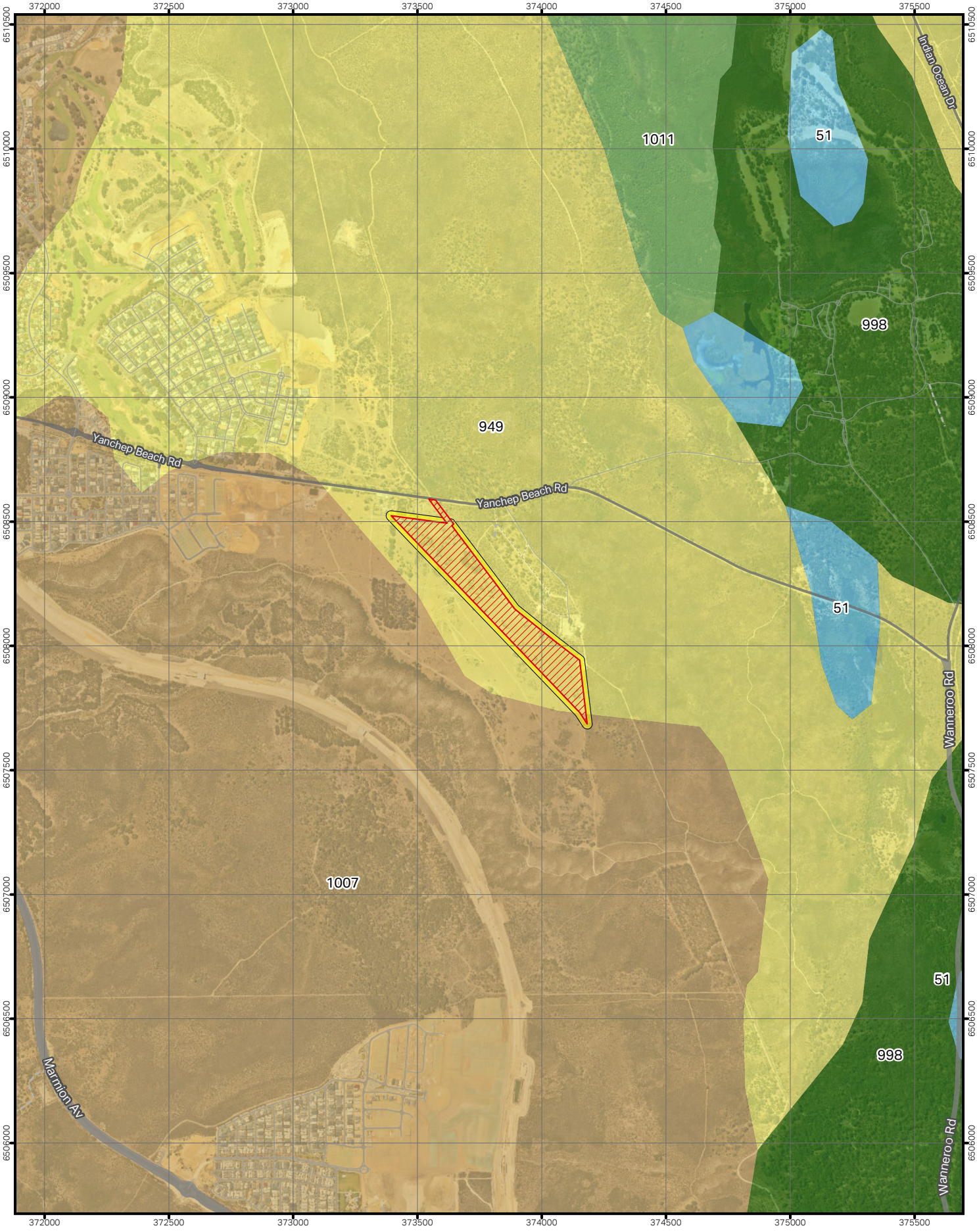

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LEGEND

Survey Area

- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey

Pre-European Vegetation (DPIRD-006)

- 51, Sedgeland
- 949, Low woodland or open low woodland
- 998, Woodland southwest
- 1007, Scrub-heath / Thicket
- 1011, Woodland southwest

Pre-European Vegetation

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FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 5

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LEGEND

Survey Area

Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo

Targeted Flora Survey

Clearing Regulations - Environmentally Sensitive Areas (DWER-046)

Bush Forever Areas - 2000 (DPLH-019)

DBCA - Legislated Lands and Waters (DBCA-011)

National Park

Section 5(1)(h) Reserve

Conservation Estates and Environmentally Sensitive Areas

PUBLIC TRANSPORT AUTHORITY

FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 6

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3.0 Conservation Codes

3.1 Flora and Fauna

Species at risk of extinction are recognised at a Commonwealth level under the EPBC Act and are categorised as outlined in Table 2.

Table 2 Categories of species listed under Schedule 179 of the EPBC Act

Code	Category
Ex	**Extinct Taxa** which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild Taxa** which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered Taxa** which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered Taxa** which is not critically endangered, and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable Taxa** which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent Taxa** which at a particular time if, at that time: the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered the following subparagraphs are satisfied: the species is a species of fish. the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised the plan of management is in force under a law of the Commonwealth or of a State or Territory cessation of the plan of management would adversely affect the conservation status of the species.
Mi	The EPBC Act also requires the compilation of a list of **Migratory Species** that are recognised under international treaties including the: • Japan Australia Migratory Bird Agreement 1981 (JAMBA) • China Australia Migratory Bird Agreement 1998 (CAMBA) • Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA) • Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals). All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as a MNES under the EPBC Act.
Ma	**Marine**. Species established under s248 of the EPBC Act.

Flora and fauna species that are considered Threatened and need to be specially protected because they are under identifiable threat of extinction are listed under the BC Act. These categories are defined in Table 3.

Table 3 Conservation codes for WA flora and fauna listed under the BC Act

Code	Category
CR	**Critically Endangered Species** Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines. Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.
EN	**Endangered Species** Threatened species considered to be facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines. Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.
VU	**Vulnerable Species** Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines. Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.
EX	**Extinct Species** Species which have been adequately searched for and there is no reasonable doubt that the last individual has died, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).
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; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.
CD	**Species of special conservation interest (conservation dependent fauna)** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).
OS	**Other specially protected species** Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Species that have not yet been adequately surveyed to warrant being listed under the BC Act, or are otherwise data deficient, are added to a Priority List as Priority 1, 2 or 3 by the State Minister for Environment. 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 listed as Priority 4. Categories and definitions of Priority Flora and Fauna species are provided Table 4.

Table 4 Conservation codes for WA flora and fauna as listed by DBCA and endorsed by the Minister for Environment

Code	Category
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, e.g., agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
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, e.g., national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
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. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
P4	**Priority Four – Rare, Near Threatened and other species in need of monitoring** Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

3.2 Vegetation Communities

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat and that may be subject to processes that threaten to destroy or significantly modify the assemblage across its range. TECs are listed by both State and Commonwealth legislation.

Communities can be classified as TECs under the EPBC Act. Categories of EPBC Act listed TECs are described in Table 5.

Table 5 Categories of TECs that are listed under the EPBC Act

Code	Category
CE	**Critically Endangered** If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
E	**Endangered** If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
V	**Vulnerable** If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Vegetation communities in Western Australia are listed as TECs under the BC Act in one of four categories including Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable. These categories are defined in Table 6. Possible TECs that do not meet survey criteria or are not adequately defined are listed as Priority Ecological Communities (PECs) under Priorities 1, 2 and 3. Ecological communities that are adequately known and are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. Conservation dependent communities are classified as Priority 5. PECs are endorsed by the Minister for Environment and are described in Table 7.

DBCA requires that all Priority and Threatened ecological communities are considered during environmental impact assessments and clearing permit applications.

Table 6 Conservation codes for state-listed Threatened Ecological Communities

Code	Category
PD	Presumed Totally Destroyed
CR	Critically Endangered
EN	Endangered
VU	Vulnerable

Table 7 Categories for Priority Ecological Communities (PECs)

Code	Category
P1	**Priority One**: poorly known ecological communities
P2	**Priority Two**: poorly known ecological communities
P3	**Priority Three**: poorly known ecological communities
P4	**Priority Four**: ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list.
P5	**Priority Five**: ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Significant flora and vegetation units need to take into account a number of other features other than statutory listings in accordance with the Flora and Vegetation Environmental Factor Guideline (EPA, 2016b). These include the following:

- restricted distribution.
- degree of historical impact from threatening processes.
- a role as a refuge.
- providing an important function required to maintain ecological integrity of a significant ecosystem.

4.0 Methodology

4.1 Desktop Assessment

A comprehensive desktop assessment was completed prior to completing the field surveys. The objective was to define the existing environment and determine the significant species and/or communities that may occur. This information informed the field survey sample plan.

The desktop assessment utilised the following sources:

- DBCA flora, fauna and communities' database searches with various buffers (10 km, 10 km and 20 km, respectively)
- Protected Matters Search Tool (PMST) with a 10 km buffer.

Significant flora species likelihood of occurrence was assessed systematically using a point-based system which considers proximity (within 5 km) and date of known records (last 20 years), presence within the Local Government Area (LGA) and habitat suitability (Table 8).

Significant fauna species likelihood of occurrence was assessed systematically using a point-based system that considers proximity (within 5 km) and date of known records (last 20 years) as well as habitat suitability (Table 9).

The likelihood of significant ecological communities occurring depends on the presence of suitable landforms, land systems, known occurrences and distance of known occurrences.

Table 8 Categories of likelihood of occurrence for flora species

Likelihood of Occurrence	Score	Definition
Known	6	Species is known to occur in the survey area.
High (Likely)	5	Not known to occur in the survey area however there are records nearby and suitable habitat for the species is known or likely to be present within the survey area.
Moderate (Possible)	4 (if suitable habitat is known to be, or likely to be present) 3 (if suitable habitat may be present within the survey area)	Species is not known to occur within the survey area however there are nearby records AND/OR recent records OR records within the LGA AND suitable habitat for the species is known or likely to be present within the survey area. OR Not known to occur within the survey area but there are records nearby AND recent records AND records within the LGA, and suitable habitat for the species may be present (marginal habitat).
Low (Unlikely)	2,3	Species is not known to occur within the survey area but there are records nearby OR recent records OR within the LGA AND suitable habitat for the species may be present (marginal habitat).
Negligible (Suitable Habitat not Present)	1,2,3	Despite records nearby OR being present within the LGA OR recent records, no suitable habitat is present within the survey area and therefore the likelihood of the species occurring is negligible.

Table 9 Categories of likelihood of occurrence for fauna species

Likelihood of Occurrence	Score	Definition
Known	5	Species is known to occur in the survey area.
High (Likely)	3,4	Not known to occur in the survey area but there are records within close proximity of the survey area AND/OR recent records and suitable habitat for the species is known to be, or likely to be, present within the survey area
Moderate (Possible)	2,3	Not known to occur within the survey area but there are records in close proximity of the survey area and recent records and suitable habitat for the species is likely to be present within the survey area. OR Not known to occur within the survey area but suitable habitat for the species is known to be, or likely to be present within the survey area.
Low (Unlikely)	1,2	Not known to occur within the survey area but there are records in close proximity OR recent records and suitable habitat for the species may be present (marginal habitat).
Negligible (Suitable Habitat not Present)	1,2,3	Despite records in close proximity or recent records, no suitable habitat is present within the survey area, therefore the likelihood of the species occurring there is negligible.

4.2 Flora and Vegetation

A flora and vegetation assessment was undertaken utilising methods outlined in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016). The survey encompassed a single-phase site visit recording data from detailed relevés and quadrats. The survey represents a combination of reconnaissance and detailed survey as outlined in the EPA Technical Guide. This level of survey was considered suitable for an area that largely comprised Degraded vegetation and cleared paddock. The assessment was completed by:

- Cassandra House (collection permit FB62000118-2), MSc (Conservation Biology), BSc (Conservation Biology), 7+ years' experience.
- Caitlyn Sepkus (collection permit FB62000384): BSc (Environmental Biology), 3+ years' experience.

The field survey was undertaken on 5th October 2023. Floristic data was collected from two non-permanent quadrats (Q1-Q2) and three relevés (R1-R3), supported by numerous observation points.

Quadrats were 10 x 10 m defined by a measuring tape. Data collected from quadrats and relevés included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment, and presence/absence of disturbance. Each site was given a unique site number, and the following parameters recorded:

- date
- location using hand-held GPS (accuracy of 5 m)
- sample site type (quadrat/relevé and size)
- photograph
- soil details (type, colour, moisture)

- landform
- vegetation condition using the Keighery (1998) scale and description of disturbance
- fire history
- comprehensive species list including:
- estimated height
- estimated percentage cover (for trees percentage within quadrat).

Any species unable to be identified in the field were collected for identification in AECOM's in-house herbarium and the specimens and taxonomic references and keys at the Western Australian Herbarium (WAH). Naming of species followed the convention of WAH (1998-).

4.2.1 Vegetation Mapping

Vegetation communities were described and mapped based on changes in dominant species composition and landform. Vegetation community descriptions were based on the Association Level V in accordance with the National Vegetation Information System (NVIS) Framework (DEE, 2017). Delineation of vegetation communities was supported by analysing floristic data collected within quadrats and relevés.

The Keighery *et al.* (2012) Swan Coastal Plain (SCP) dataset and the Gibson *et al*. (1994) dataset were used for the Floristic Community Type (FCT) analysis. The survey data was reconciled with this dataset.

The following steps were taken in accordance with the DBCA (2023) TEC identification guidelines:

- nomenclature was reconciled between the Project, Keighery *et al*. (2012) and Gibson *et al.* (1994) SCP data
- species were amalgamated or removed, including hybrids, singletons, indeterminate taxa, or species that are difficult to differentiate
- single-site insertion was used for datasets
- presence/absence matrices were produced.

Analysis was undertaken using Primer-E. The Bray Curtis dissimilarity measure was used to quantify the compositional similarity between the sample sites based on presence absence data. This method is easily interpretable and provides meaningful results. A sense check was completed incorporating appropriate geology, soils, landscape and the description provided in the Gibson et al. (1994) reference material and Bush Forever (Govt. of WA, 2000). Critical analysis of relevant features include soil, landform, hydrological status, and common species was undertaken for all inferred FCTs.

Vegetation condition was mapped using the Keighery (1994) vegetation condition scale, informed by sample data, survey observations, and weed infestations recorded, as recommended in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016).

4.2.2 Banksia Woodlands TEC Assessment

A review of aerial imagery, DBCA data and preliminary mapping was completed to determine patch size was undertaken to identify likely locations of Banksia Woodlands TEC. The patch was then assessed in the field using the Banksia TEC conservation advice (DEE, 2016) and the *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016). The patch was visited, and a preliminary review of Banksia species present was undertaken. Patches that included a dominant or co-dominant overstorey of *B. attenuata, B. menziesii, B. prionotes* or *B. ilicifolia* were considered for further assessment. Patches that were clearly not associated with Banksia Woodlands, e.g. had no Banksia overstorey species, were excluded for further consideration. Where patches that included a dominant or co-dominant overstorey of the aforementioned Banksia species, at least one quadrat was established. The sample site was centred on the area of the highest native floristic diversity and/or cover within the patch.

For each patch the key diagnostic characteristics, condition, size and relevant contextual information was considered in accordance with the Banksia TEC conservation advice (DEE, 2016). FCT analysis was completed for sample data considered likely to represent the TEC as per the DBCA *Methods for survey and identification of Western Australian threatened ecological communities* (DBCA, 2023) and the EPA *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016).

The condition of the patch was informed by species richness of quadrat data compared to available datasets, including the Keighery *et al.* (2012) SCP and Gibson *et al.* (1994) datasets and the relative expected natural range of diversity for the inferred FCT, where applicable. The extent of the patch within the survey area was mapped by marking the extent of Banksia species present. The condition of the patch and size thresholds are then used to determine whether the quality of the patch is suitable to meet Matters of National Environmental Significance (MNES) standards.

4.2.3 Targeted Flora Searches

Targeted flora searches were completed for species considered to have a high likelihood of occurrence. A field booklet of all species considered likely to occur was developed prior to commencing the field survey. The booklet included all available information and photographs relevant for the tentative identification of Threatened and Priority flora in the field.

The survey area was traversed on foot using meandering traverses. All species that were considered to potentially resemble a Threatened or Priority species were photographed, their location recorded on a hand-held GPS, and a sample taken. Samples were submitted to the WA Herbarium for formal identification.

4.3 Fauna Survey

A basic fauna survey was conducted in accordance with *Technical Guidance – Terrestrial Fauna Surveys* (EPA, 2020). The fauna survey was conducted in conjunction with the detailed flora and vegetation survey. Conducting the two surveys concurrently enabled consistent and clear mapping of the fauna habitats and vegetation communities.

Fauna habitats were assessed for specific habitat components, including consideration of structural diversity and refuge opportunities for fauna, to determine the potential for these habitats to support conservation significant species. Six detailed habitat assessments were completed throughout the survey area. The fauna habitat assessments included:

- location
- general habitat description
- habitat condition and disturbance types
- dominant / characteristic flora species and vegetation layers
- presence and abundance of key habitat features such as large mature trees, small and large hollows, fallen logs, course and fine litter, decorticating bark, bare ground, grass, stones and boulders, rock crevices, soil cracks, vines, dense shrubs, water bodies etc.
- presence of fauna and secondary signs (e.g., scats, digging, tracks, burrows, eggshell, bones, feathers etc.)
- connectivity of habitat.

The fauna survey primarily focused on mapping of fauna habitat and assessing for the potential presence of conservation significant fauna. Other data recorded included observations (direct and indirect) of fauna species present. This can include distinctive calls, scats, tracks and diggings. All observations were made between daylight hours of 0700 and 1700. Attention was given to searching for conservation significant species identified in the desktop assessment as having the potential to occur in the area. Nomenclature has been confirmed against the Checklist of Terrestrial Vertebrates of Western Australia (WAM, 2023).

4.4 Targeted Black Cockatoo Survey

The targeted black cockatoo survey targeted Carnaby's Cockatoo, as this threatened black cockatoo species was the most likely to occur. Breeding, foraging and roosting assessments were completed in the survey area. Methodologies for these assessments have been developed based on the current EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species (DAWE, 2022).

4.4.1 Breeding Habitat

This included quantifying the number of trees that have the potential to form hollows (based on their diameter at breast height [DBH]), and those with potentially suitable hollows). Any hollow forming native eucalypts with a DBH > 300 mm was assessed, their location, species, and hollow presence were recorded. Hollow assessments were restricted to ground observations only and included as much detail as possible.

4.4.2 Roosting Habitat

An assessment of roosting habitat was conducted during the field surveys. This includes consideration of preferred roosting habitat and features such as water sources, tall trees, specific tree species as defined in the Referral Guidelines.

4.4.3 Foraging Habitat

Foraging habitat was assessed by calculating a foraging value score, based on assessments in the field and desktop assessment information.

The foraging tool outlined in the Referral Guidelines (Table 10) was implemented. A size threshold of 1 ha applies to foraging habitat. there is no mechanism under the guidelines to do separate assessments for different habitat types. Therefore, to supplement this assessment, the foraging quality assessment developed by Bamford Consulting Ecologists (BCE) (BCE, 2020) was also utilised which considers site condition, site context and species stocking rate to provide foraging habitat scores for different habitat types.

Table 10 Black Cockatoo foraging quality tool from the Federal guidelines (DAWE, 2022)

Starting Score	Carnaby's Cockatoo
10	Start at a score of 10 if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as Banksia spp. (including Dryandra spp.), Hakea spp. and Grevillea spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.
	Context Adjustor
Foraging Potential	Subtract 2 from your score if there is no evidence of feeding debris on your site.
Connectivity	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site
Proximity to breeding	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.
Proximity to roosting	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from sig. plant disease	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.
Total score	
Appraisal	To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition.

Table 11 Site condition described by Bamford Consulting

Site Score	Description of Vegetation Values
	Carnaby's Cockatoo
0	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: • Water bodies (e.g. salt lakes, dams, rivers) • Bare ground • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes • Mown grass.
1	Negligible to low foraging value. Examples: • Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees • Paddocks that are lightly vegetated with melons or other known food-source weeds (e.g. Erodium spp.) that represent a short-term and/or seasonal food source • Blue Gum plantations (foraging by Carnaby's Black-Cockatoos has been reported but appears to be unusual).
2	Low foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have <10% projected foliage cover • Woodland with tree banksias 2-5% projected foliage cover • Open eucalypt woodland/mallee of small- • fruited species • Paddocks that are densely vegetated with melons or other known food-source weeds (e.g. Erodium spp.) that represent a short-term and/or seasonal food source.
3	Low to Moderate foraging value. Examples: Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover Woodland with tree banksias 5-20% projected foliage cover Eucalypt Woodland/Mallee of small-fruited species Eucalypt Woodland with Marri < 10% projected foliage cover.
4	Moderate foraging value. Examples: Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.
5	Moderate to High foraging value. Examples: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths • Pine plantations with trees more than 10 years old (but see pine note below in moderation section).
6	High foraging value. Example: Banksia Low Forest (of key species B. attenuata and B. menziesii) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).

Vegetation structural class terminology follows Keighery (1994).

Site context is a function of site size, availability of nearby habitat and the availability of nearby breeding areas. Site context includes consideration of connectivity, although Black-Cockatoos are very mobile and will fly across paddocks to access foraging sites (Table 12). Based on BCE observations, Black-Cockatoos are unlikely to regularly go over open ground for a distance of more than a few kilometres and prefer to follow tree-lines.

The maximum score for site context is 3, and because it is effectively a function of presence/absence of nearby breeding and the distribution of foraging habitat across the landscape, the following table, developed by Bamford Consulting in conjunction with DEE, provides a guide to the assignation of site context scores. Note that 'local area' is defined as within a 15 km radius of the centre point of the study site. This is greater than the maximum distance of 12km known to be flown by Carnaby's Black-Cockatoo when feeding chicks in the nest.

Table 12 Site context weighting

Site Context Score	Percentage of the existing native vegetation within the 'local' area that the study site represents	
	'Local' breeding known/likely	'Local' breeding unlikely
3	>5%	>10%
2	1-5%	5-10%
1	0.1-1%	1-5%
0	<0.1%	<1%

Species stocking rate is described as "the usage and/or density of a species at a particular site" in the offsets guide. Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant (score of 1) or not abundant (score of 0).

Scores are moderated based on vegetation composition scores. Where vegetation composition was scored as 2 or less, no context or species density score was given.

Scoring is transposed into one of the following categories:

- 0: None.
- 1: Negligible.
- 2: Low.
- 3: Low to Moderate.
- 4-6: Moderate.
- 7: Moderate to High.
- 8: High.

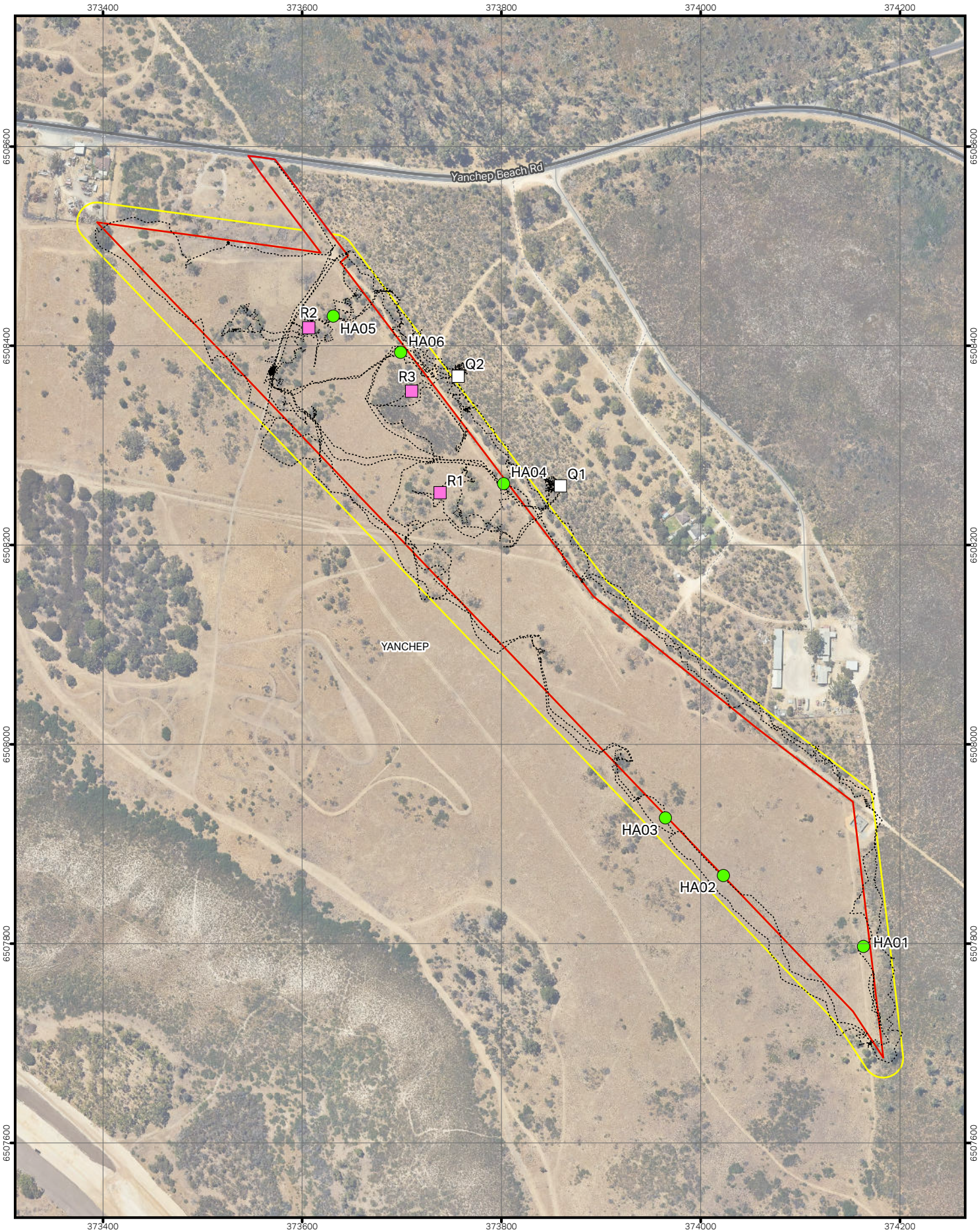
4.5 Limitations

Limitations of the survey are discussed in Table 13. No limitations were identified that would influence the outcome of the flora, vegetation, fauna and black cockatoo surveys.

Table 13 Limitations of the field survey

Limitation	Flora and Vegetation	Fauna
Availability of contextual information on the region	**Nil** Contextual information was derived from publicly available datasets for pre-European vegetation mapping, geology, landforms and climate. DBCA database searches were obtained to inform desktop studies. The Keighery *et al.* (2012) SCP dataset and Gibson *et al*. (1994). was used for FCT analysis.	**Nil** Conservation significant fauna information was gathered utilising sufficient resources. Resources used to inform surveys included publicly available databases (PMST, Atlas of Living Australia), DBCA Priority and Threatened fauna data and black cockatoo known breeding and roosting locations.
Competency/experience of consultant conducting survey	**Nil** The surveys were completed by Cassandra House and Caitlyn Sepkus who have more than 7-years' and 3-years' experience, respectively, conducting surveys of similar scope.	**Nil** The survey was conducted by Ecologist Cassandra House who has over 7 years' experience completing basic fauna and targeted Black Cockatoo surveys.
Proportion of flora/fauna identified, recorded and/or collected (based on sampling, timing and intensity)	**Nil** Floristic data was collected from two quadrats and three relevés, as well as multiple observation points and mapping notes (Figure 7). This effort is considered sufficient for the survey area.	**Nil** The survey area was traversed on foot in its entirety and six habitat assessments were completed.
Completion (is further work needed)	**Nil** No further work is required. Work was completed on all properties and areas of native vegetation where access was granted. Not all vegetation communities were represented by three or more quadrats as outlined in the EPA Technical Guidance. This was particularly relevant for communities less than 1 ha, or communities that were Degraded. In these cases unbounded relevés were utilised to capture floristic data.	**Nil** The objectives of the basic fauna assessment and targeted black cockatoo survey were met, and no further work is required.
Remoteness and/or access issues	**Minor** The northern end of the survey area was partially inaccessible due to a burn-off being conducted by the property owner at the time of the survey. However, targeted searches were completed from a safe distance. This portion of the survey area was disturbed and represented paddock; therefore it is considered unlikely that significant flora occurs at this location.	**Minor** The northern end of the survey area was partially inaccessible due to a burn-off being conducted by the property owner at the time of the survey. However, from a distance it was observed that this area did not contain native vegetation. The objectives of the basic fauna assessment were met.

Limitation	Flora and Vegetation	Fauna
Timing, weather, season, cycle	**Nil** The field survey was undertaken during the typical ideal survey season in accordance with EPA Guidelines (2016). Three samples were unable to be confirmed to species level due to an absence of suitable identifying material. This includes a *Desmocladus* sp., *?Scaevola canescens* and *Acacia ?saligna*. None of which are considered to potentially represent a significant flora species.	**Nil** The survey was undertaken within the known active periods for Carnaby's Cockatoos. Although the survey was conducted during a period of increased temperatures and dryness, the survey timing is within range for basic fauna surveys based on the EPA Guidelines (2020).
Disturbances (e.g. fire, flood, accidental human intervention) which affected results of the survey	**Minor** The northern extent of the targeted survey area was partially inaccessible due to a burn-off conducted by the property owner at the time of the survey. This did not impact the ability to identify the extent of Banksia Woodlands TEC present.	**Minor** The northern end of the survey area was partially inaccessible due to a burn-off being conducted by the property owner at the time of the survey. This may have disturbed some fauna species; however, it is not considered likely to have influenced the outcome of the survey.



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LEGEND

Survey Area
- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey

Sample Sites
- Quadrat
- Relevé
- Tracklog
- Fauna Habitat Sample Sites

Survey Effort

PUBLIC TRANSPORT AUTHORITY

FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 7

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5.0 Desktop Assessment

5.1 Threatened and Priority Ecological Communities

Fifteen significant ecological communities were identified within 20 km of the survey area. This includes nine communities listed under the EPBC Act and 15 listed under the BC Act. Three TECs have a buffer that overlaps with the survey area, and an additional TEC which occurs directly adjacent to the survey area (within 1 km). The communities are described in Table 14 and mapped in Figure 8.

Table 14 Threatened and Priority Ecological Communities identified in the desktop study

Community Name and Description[1]	Cons. Status[2]		Distance from Survey Area (km)	Likelihood
	EPBC	WA		
Acacia shrublands on taller dunes, southern Swan Coastal Plain ('floristic community type 29b') Community is dominated by Acacia shrublands or mixed heaths on the larger dunes. This community stretches from Seabird to south of Mandurah. No consistent dominant but species such as *Acacia rostellifera*, *Acacia lasiocarpa*, and *Melaleuca acerosa* were important.		P3	10.7	Unlikely, this community is known to occur on the Quindalup soil system.
Banksia Woodlands of the Swan Coastal Plain Ecological Community Canopy is most commonly dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. Other Banksia species that can dominate in the community are B. prionotes or *B. ilicifolia*. It typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands; it is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau and can occur in other less common scenarios.	E	P3	0	Likely, occurs within the 200 m buffer of this community.
Low lying *Banksia attenuata* woodlands or shrublands ('floristic community type 21c') (a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC) This type occurs sporadically between Gingin and Bunbury and is largely restricted to the Bassendean system. The type tends to occupy lower lying wetter sites and is variously dominated by *Melaleuca preissiana*, *Banksia attenuata, B. menziesii, Regelia ciliata, Eucalyptus marginata* or *Corymbia calophylla*. Structurally, this community type may be either a woodland or occasionally shrubland.			15.4	Unlikely, typically restricted to the Bassendean system.

Community Name and Description[1]	Cons. Status[2]		Distance from Survey Area (km)	Likelihood
	EPBC	WA		
***Banksia ilicifolia* woodlands, southern Swan Coastal Plain ('floristic community type 22') (a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC)** Low lying sites generally consisting of *Banksia ilicifolia – B. attenuata* woodlands, but *Melaleuca preissiana* woodlands and scrubs are also recorded. Occurs on Bassendean and Spearwood systems in the central Swan Coastal Plain north of Rockingham. Typically, has very open understorey, and sites are likely to be seasonally waterlogged.			6.5	May, suitable soil system present.
Swan Coastal Plain *Banksia attenuata - Banksia menziesii* woodlands ('floristic community type 23b') (a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC) These woodlands occur in the Bassendean system, from Melaleuca Park to Gingin. Occurs in reasonably extensive Banksia woodlands north of Perth.			6.9	Unlikely, typically restricted to the Bassendean system.
Northern Spearwood shrublands and woodlands ('floristic community type 24') (can be a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC) Heaths with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. Most sites occur on the Cottesloe unit of the Spearwood system. The heathlands in this group typically include *Banksia sessilis*, *Calothamnus quadrifidus*, and *Schoenus grandiflorus*.			8.4	May, suitable soil system present.
***Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. 1994)** The community has been recorded from sands near Koondoola and Banksia Grove, and at the base of the Darling Scarp largely between Wannamal and Maddington. This community is generally very species rich. It is usually dominated by *Banksia attenuata*, occasionally with *Eucalyptus marginata,* with *Bossiaea eriocarpa*, *Conostephium pendulum, Hibbertia huegelii*, *Hibbertia hypericoides*, *Petrophile linearis*, *Scaevola repens*, *Stirlingia latifolia*, *Mesomelaena pseudostygia* and *Alexgeorgea nitens* being common in the understorey.	E	CR	16.9	Unlikely, due to distance from survey area.
Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain Mostly confined to Quindalup Dunes and Spearwood Dunes but can also occur on the Bassendean dunes and Pinjarra Plain. It can occur on the banks of rivers and wetlands. Tuart is the key upper canopy species although it may co-occur with trees of other species. Trees commonly co-occurring with Tuart include *Agonis flexuosa* (peppermint), *Banksia grandis*, *Banksia attenuata*, *Eucalyptus marginata*; and less commonly, *Corymbia calophylla*, *Banksia menziesii* and *Banksia prionotes*. An understorey of native plants is typically present, which may include grasses, herbs and shrubs.	CE	P3	0	May, occurs within the 500 m buffer of this community.

Community Name and Description[1]	Cons. Status[2]		Distance from Survey Area (km)	Likelihood
	EPBC	WA		
Quindalup *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands ('floristic community type 30b') (Can form a component of the Tuart woodlands and forests of the Swan Coastal Plain EPBC listed TEC) This community is dominated by either Tuart or *Agonis flexuosa*. The presence of *Hibbertia cuneiformis*, *Geranium retrorsum* and *Dichondra repens* differentiate this group from other Quindalup community types. The type is found from the Leschenault Peninsular south to Busselton.		P3	1.7	May, due to distance to survey area.
Southern Swan Coastal Plain Eucalyptus gomphocephala - Agonis flexuosa woodlands (floristic community type 25) (can be a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC or the Tuart woodlands and forests of the Swan Coastal Plain EPBC listed TEC) Woodlands of *Eucalyptus gomphocephala - Agonis flexuosa* south of Woodman Point. Recorded from the Karrakatta, Cottesloe and Vasse units. Dominants other than Tuart were occasionally recorded, including *Corymbia calophylla* at Paganoni block and *Eucalyptus decipiens* at Kemerton. Occasionally dominants other than Tuarts were recorded (*Corymbia calophylla* and *Eucalyptus decipiens*) however Tuarts are emergent nearby. Banksias found in this community include *Banksia attenuata, B. grandis* and *B. littoralis*. Tuart formed the overstorey nearby however.		P3	10.3	May, due to distance to survey area and suitable soil system.
Aquatic Root Mat Community Number 1 of Caves of the Swan Coastal Plain The community occurs in the cave system of the Leeuwin-Naturaliste Ridge incorporating Easter and Jewel Caves. It comprises a complete food web. Rootlets and their associated microflora provide the primary food source, and root mat grazers, predators, parasites, detritivores and scavengers complete the interactions. The root mats are produced by *Eucalyptus diversicolor* (karri). Aquatic cavernicoles (cave animals) in the community include crustaceans (Amphipoda, Copepoda, Ostracoda) and worms (Oligochaeta). The ostracod *Acandona admiratio* is specific to Jewel and Easter Caves.	E	CR	0	Unlikely, occurs within the 5000 m buffer of this community. Publicly available data and aerial imagery does not suggest the presence of caves.
Coastal shrublands on shallow sands, southern Swan Coastal Plain ('floristic community type 29a') Mostly heaths on shallow sands over limestone close to the coast. No single dominant but important species include *Spyridium globulosum, Rhagodia baccata*, and *Olearia axillaris.*		P3	16.9	Unlikely, due to distance from survey area.

Community Name and Description[1]	Cons. Status[2]		Distance from Survey Area (km)	Likelihood
	EPBC	WA		
***Melaleuca huegelii - M. systena* shrublands of limestone ridges (floristic community type 26a as originally described in Gibson et al. 1994)** The community is found on skeletal soils on limestone ridge slopes and ridge tops between Yanchep north of Perth, and south of Perth near Lake Clifton. The community commonly comprises species-rich thickets, heaths and scrubs dominated by *Melaleuca huegelii, Melaleuca systena* and *Banksia sessilis*, commonly over *Grevillea preissii, Spyridium globulosum*, and *Acacia lasiocarpa*. A suite of herbs commonly occurs under the shrub layer.		CR	1.2	May, due to distance from survey area.
Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. 1994) The community occurs on clay flats with thin skeletal soils and has been recorded largely between Wattle Grove and Sabina River. It comprises rapidly drying clay flats. Typical and common shrubs include *Hakea sulcata*, *Verticordia densiflora, Hakea varia, Pericalymma ellipticum* and *Viminaria juncea*. *Aphelia cyperoides, Centrolepis aristata, Drosera gigantea* and *Drosera menziesii* also commonly occur.	CE	EN	14.2	Unlikely, due to distance from survey area.
Woodlands over Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in Gibson *et al*. 1994) The community is within wetland depressions (swales) occurring between parallel Holocene dunes, mostly located on the Rockingham Becher Plain but also extending further north to Lancelin and south to Dalyellup. Typical and common native species in the community are the shrubs *Acacia rostellifera, Acacia saligna* and *Xanthorrhoea preissii*, the sedges *Machaerina juncea, Ficinia nodosa* and *Lepidosperma gladiatum* and the grass *Poa porphyroclados.*	E	CR	0	May, due to distance from survey area.

1.Community descriptions derived from DBCA (2023a; 2023b)

2. EPBC: CE Critically Endangered, E Endangered, V Vulnerable; WA: CR Critically Endangered, EN Endangered, VU Vulnerable, P Priority

5.2 Conservation Significant Flora

The desktop study identified 36 significant flora species that may potentially occur in the survey area. Of these, four species are considered to have a 'high' likelihood of occurrence. These species and their habitat are described in Table 15.

Nine significant flora species were considered to have a 'moderate' likelihood. This was largely informed by either marginal habitat being present, or lack of records within 5 km, and the age of the records. The remaining 23 significant flora had a 'low' to 'negligible' likelihood based on lack of suitable habitat. The comprehensive flora desktop study is presented in Appendix A and mapped in Figure 8.

Table 15 Conservation significant flora species that have a 'high likelihood' of occurrence.

Species	Habitat[1]	Cons. Code[2] BC Act / DBCA
Eucalyptus foecunda subsp. *foecunda*	Limestone, white-grey sand.	P4
Leucopogon sp. Yanchep (M. Hislop 1986)	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	P3
Pimelea calcicola	Sand. Coastal limestone ridges.	P3
Stylidium maritimum	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	P3

1. Habitat derived from WAH (1998-) Florabase
2. Conservation codes P Priority

5.3 Conservation Significant Fauna

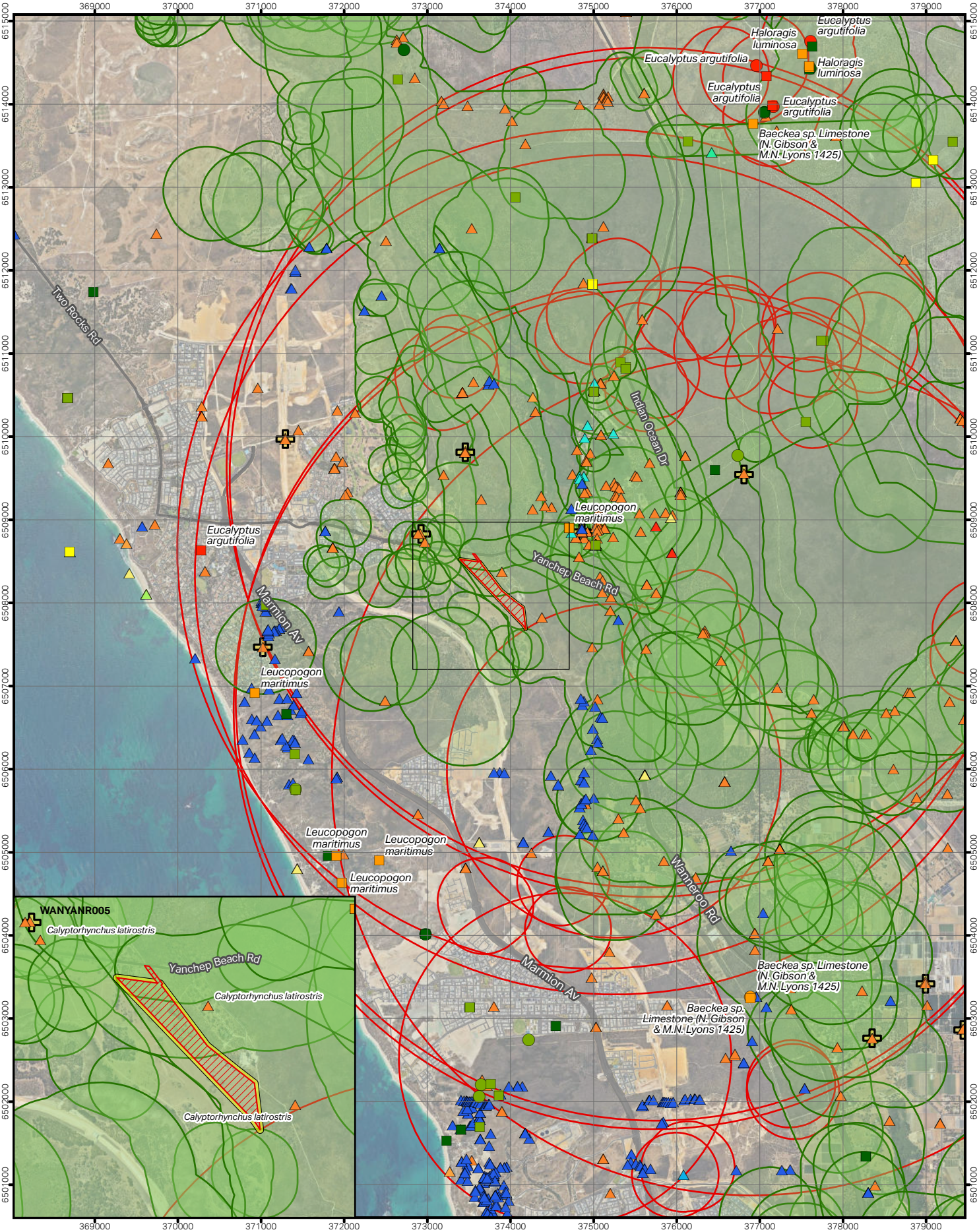
A total of 96 significant fauna species were identified in the desktop study as potentially occurring in the survey area (Figure 8). This included 77 bird, nine mammal, eight invertebrate and two reptile species (presented in Appendix B). Oceanic species or strictly marine species were excluded from the desktop assessment due to the absence of marine waters from the survey area.

Of the 96 significant fauna species, five species were evaluated to have a 'high' likelihood occur, two species had a 'moderate' likelihood of occurrence, and the remaining 89 species were considered to have a 'low' or 'negligible' likelihood of occurrence due to lack of suitable habitat or outdated records. The species considered to have a 'high' likelihood of occurrence are presented in Table 16.

Table 16 Conservation significant fauna species that have a 'high' likelihood of occurrence

Class	Scientific Name	Common Name	Conservation Status[1]		Ecology
			EPBC Act	BC Act / DBCA	
Mammal	*Isoodon fusciventer*	Quenda		P4	The Quenda or Southern Brown Bandicoot is found in forest, woodland, heath and shrub communities usually consisting of a combination of sandy soils and dense heathy vegetation (Van Dyck & Strahan, 2008).
Invertebrate	*Idiosoma sigillatum*	Swan Coastal Plain shield-backed trapdoor spider		P3	Remnant habitats in Banksia woodland and heathland on sandy soils (Rix et al., 2018).
Mammal	*Notamacropus irma*	Western Brush Wallaby		P4	Open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets (DCCEEW, 2023).
Reptile	*Neelaps calonotos*	Black-striped Snake		P3	Confined to the Swan Coastal Plain between Mandurah and Lancelin, sheltering in upper layers of loose soil beneath leaf litter in *Eucalyptus*/*Banksia* woodlands, typically at the base of trees and shrubs (Bush et al., 2010).
Bird	*Zanda latirostris*	Carnaby's Cockatoo	E	EN	Carnaby's Cockatoo have a widespread distribution across the Jarrah Forest between Mundaring, Nannup, Hopetoun, Perth and Peel (DAWE, 2022).

1. Conservation codes: P Priority, E/EN Endangered



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metres

GDA2020 MGA ZONE 50

LEGEND

Survey Area
- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey

TEC / PEC
- Critically Endangered
- Priority 3

WA Herbarium database (WAHERB) T&P1 labelled only
- Threatened
- P1
- P2
- P3
- P4

Threatened and Priority Flora database (TPFL) T&P1 labelled only
- Threatened
- P1
- P3
- P4
- Black Cockatoo Roosting Sites

Threatened Fauna database (DBCA)
- Critically Endangered
- Endangered
- Vulnerable
- Migratory Species
- Specially Protected
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Conservation Significant Flora, Fauna and Communities Desktop Results

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Figure 8

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6.0 Field Results

6.1 Flora

6.1.1 Conservation Significant Flora

No conservation significant flora were recorded during the field survey.

6.1.2 Flora Inventory

A total of 57 flora species were recorded including 42 native and 17 weed species. Native species were best represented by Fabaceae (7 species), closely followed by Proteaceae (6 species). Three species were recorded each in Asparagaceae and Cyperaceae, whilst Haemodoraceae and Restionaceae each had 2 species.

A total of 18 weed species were recorded, representing 31% of the total flora count. One species listed as a Declared Pest s22(2) under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) was recorded. **Echium plantagineum* was recorded at one location within the targeted survey area only, amongst paddock weeds, representing approximately 25 individuals (Figure 9).

A comprehensive species list, organised by family and the community they occur in, is presented in Appendix C. The flora quadrat data is presented in Appendix D.

Plate 1 **Echium plantagineum* recorded in targeted survey area

6.2 Vegetation

6.2.1 Vegetation Communities

Three vegetation communities were defined and mapped within the reconnaissance survey area, including two native communities and one disturbed community. Native vegetation was mapped for 3.29 ha, with disturbed areas mapped for 8.42 ha. The remaining 0.71 ha represents cleared areas.

The vegetation communities are summarised below and are presented in detail in Table 17 and mapped in Figure 9:

- BmApMp: a Banksia and Eucalypt woodland, including historically disturbed areas which are regenerating towards a natural state of Banksia Woodland
- ArHhCm: a dense Acacia shrubland with low native diversity
- Paddock: disturbed/cleared areas with sporadic native trees and shrubs

Table 17 Vegetation community descriptions and photographs

Description	Additional Detail	Photograph
Native Vegetation		
BmApMp *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* low open woodland over *Acacia pulchella, Jacksonia sternbergiana* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia, Burchardia congesta* and *Conostylis aculeata* sparse forbland. One patch of this community represents Banksia Woodland TEC.	Survey effort: Q1, Q2, R1, R2 Species richness: 39 native and 17 weed species Area: 2.75 ha, represents 23.5% of vegetation	 

Description	Additional Detail	Photograph
ArHhCm *Acacia rostellifera*, *Macrozamia fraseri* and *Jacksonia sternbergiana* tall closed shrubland over *Hibbertia hypericoides* and *Acacia ?saligna* low shrubland over *Corynotheca micrantha* and *Ptilotus polystachyus* sparse forbland.	Survey effort: R3 Species richness: Seven native and seven weed species Area: 0.54 ha, represents 4.6% of vegetation	
Disturbed Areas		
Paddock Introduced grassland with occasional native tree / shrub.	Area: 8.42 ha, represents 71.9% of vegetation	

Note, Cleared represents 0.71 ha and is not representative of native vegetation

6.2.2 Floristic Community Type Analysis

Analysis results confidently inferred one FCTs for three of the sites analysed. Two quadrats and one relevé represent FCT 28, with a description presented below. The comprehensive results for each quadrat, including similarity percentage, FCT, and justification for the inferred FCT, is presented in Appendix E.

FCT 28 Spearwood *Banksia attenuata* or *Banksia attenuata* - Eucalyptus woodlands

This FCT is not specifically listed as a Threatened or Priority Ecological Community within Western Australia, however it is regarded as a sub-community of the Banksia dominated woodlands community. Where this community occurs within the Swan Coastal Plain IBRA region it is considered to represent the Banksia Woodlands of the Swan Coastal Plain TEC under the Federal EPBC Act. Typical species include *Banksia attenuata, Hibbertia hypericoides, Xanthorrhoea preissii, Burchardia umbellata, Drosera erythrorhiza, Desmocladus flexuosus, Mesomelaena pseudostygia* and *Trachymene pilosa* (Gibson et al. 1994). This sub-community type has a medium-high species richness (56 sp./100m^2).

Initially, assessment of the Banksia woodland patch was centred on the area of highest native floristic diversity and/or cover, therefore two quadrats were established in vegetation adjacent to the reconnaissance survey area, in vegetation considered to represent the best condition of the patch. One relevé was also completed at the edge of the patch of Banksia woodland within the reconnaissance survey area. Both quadrats showed more than 40% similarity to FCT 28, with the relevé showing affinities to FCT 28, FCT 24 and FCT 6. However, it is unlikely to represent FCT 24 as this community are heaths or heaths with scattered *Eucalyptus gomphocephala* and occur on the Cottesloe unit of the Spearwood system. Affinity to FCT 6 Weed dominated wetlands on heavy soils, is likely due to the heavy presence of weeds within the sample site.

Comparing attributes from the three sample sites to FCT 28, it occurs on the correct landform (Spearwood system), numerous key species were present, and similarity was relatively high for the quadrats (51% and 47% for Quadrats 1 and 2, respectively) although lower in the relevé (32%). Furthermore, it aligns with FCTs that have been identified within Bush Forever Site 288 Yanchep National Park and Adjacent Bushland (Govt. of Western Australia, 2000). Species richness was not that comparable (average 31 species, inclusive of weeds, compared to 56 spp. in SCP dataset). The low similarity and reduced richness are likely a reflection of the relevé position along the edge and overall disturbance impacting the Banksia Woodland.

6.2.3 Conservation Significant Vegetation

One patch of Banksia Woodland was assessed against the key diagnostic characteristics outlined in the DEE (2016) Conservation Advice and considered to represent TEC. Patch 1 met the key characteristics, size and condition threshold to represent the Federally protected community (Table 18). The Banksia Woodland TEC is mapped for 0.36 ha within the reconnaissance survey area and represents the western edge of a larger patch that extends for >100 ha to the east. This TEC, extends across Lot 4500 and Lot 4700 Mitchell Freeway. Lot 4360 also intersects with the survey area, however, was not considered to represent TEC within the survey boundary due to a lack of Banksia overstorey present within the survey area.

All other areas of vegetation community BmApMp were dominated by *Eucalyptus todtiana* and separated from Patch 1 by a break in Banksia canopy of more than 30 m. None of these areas met the key diagnostic characteristics or condition thresholds based on preliminary observations. They were not dominated by *Banksia* spp, mapped as Degraded, and less than 2 hectares. These patches are therefore not considered part of the TEC.

Table 18 Patch 1 Banksia TEC Assessment

<table>
<tr><td>Patch identification and location</td><td>Patch 1 is located on the eastern boundary of the survey area, directly south of Yanchep Beach Road. It is represented by Q1, Q2 and R2.</td></tr>
<tr><td>Key characteristics</td><td>Yes, as below.</td></tr>
<tr><td>Location</td><td>Yes, on the Swan Coastal Plain.</td></tr>
<tr><td>Soils and landform</td><td>Yes, on the Spearwood System.</td></tr>
<tr><td>Structure</td><td>Yes, includes and overstorey of Banksia attenuata and Banksia menziesii as a low open woodland.</td></tr>
<tr><td>Composition</td><td>Yes, overstorey of B. attenuata and B. menziesii over shrubs, herbs and grasses.</td></tr>
<tr><td>Condition</td><td>Samples sites indicate low native plant species diversity and weed cover ranging from 3.9%-100%. Condition is considered Good as per the Conservation Advice.</td></tr>
<tr><td>Soil type and colour</td><td>Grey-white sand.</td></tr>
<tr><td>Landform</td><td>Undulating sandy terrain.</td></tr>
<tr><td>Tree Data incl. height, canopy percent cover and dominance</td><td>
<table>
<tr><th rowspan="2">Species</th><th colspan="2">Q1</th><th colspan="2">Q2</th><th colspan="2">R2</th></tr>
<tr><th>Height (cm)</th><th>Cover (%)</th><th>Height (cm)</th><th>Cover (%)</th><th>Height (cm)</th><th>Cover (%)</th></tr>
<tr><td>B. attenuata</td><td>400</td><td>10</td><td>200</td><td>7</td><td>400</td><td>6</td></tr>
<tr><td>B. menziesii</td><td>300</td><td>6</td><td>350</td><td>13</td><td>400</td><td>2</td></tr>
<tr><td>E. todtiana</td><td>-</td><td>-</td><td>-</td><td>-</td><td>600</td><td>15</td></tr>
</table>
</td></tr>
<tr><td>Native understorey present (%) and diversity</td><td>
<table>
<tr><th>Species</th><th>Q1</th><th>Q2</th><th>R2</th></tr>
<tr><td>Cover (%)</td><td>50.1</td><td>37.2</td><td>5.8</td></tr>
<tr><td>Diversity total</td><td>20</td><td>24</td><td>7</td></tr>
</table>
</td></tr>
<tr><td>Weed cover (%) and dominant weed species</td><td>
<table>
<tr><th>Species</th><th>Q1</th><th>Q2</th><th>R2</th></tr>
<tr><td>Cover (%)</td><td>3.9</td><td>5.7</td><td>100</td></tr>
<tr><td>Dominant species</td><td colspan="2">No clear dominant</td><td>*Ehrharta calycina</td></tr>
</table>
</td></tr>
<tr><td>Size of patch</td><td>Within survey area: 0.36 ha
Estimated total extent: >100 ha</td></tr>
<tr><td>Summary</td><td>This patch is part of the larger Yanchep National Park Banksia Woodland.
The patch meets the condition and size thresholds to be considered representative of the Commonwealth listed TEC.</td></tr>
<tr><td>Photograph</td><td>  </td></tr>
</table>

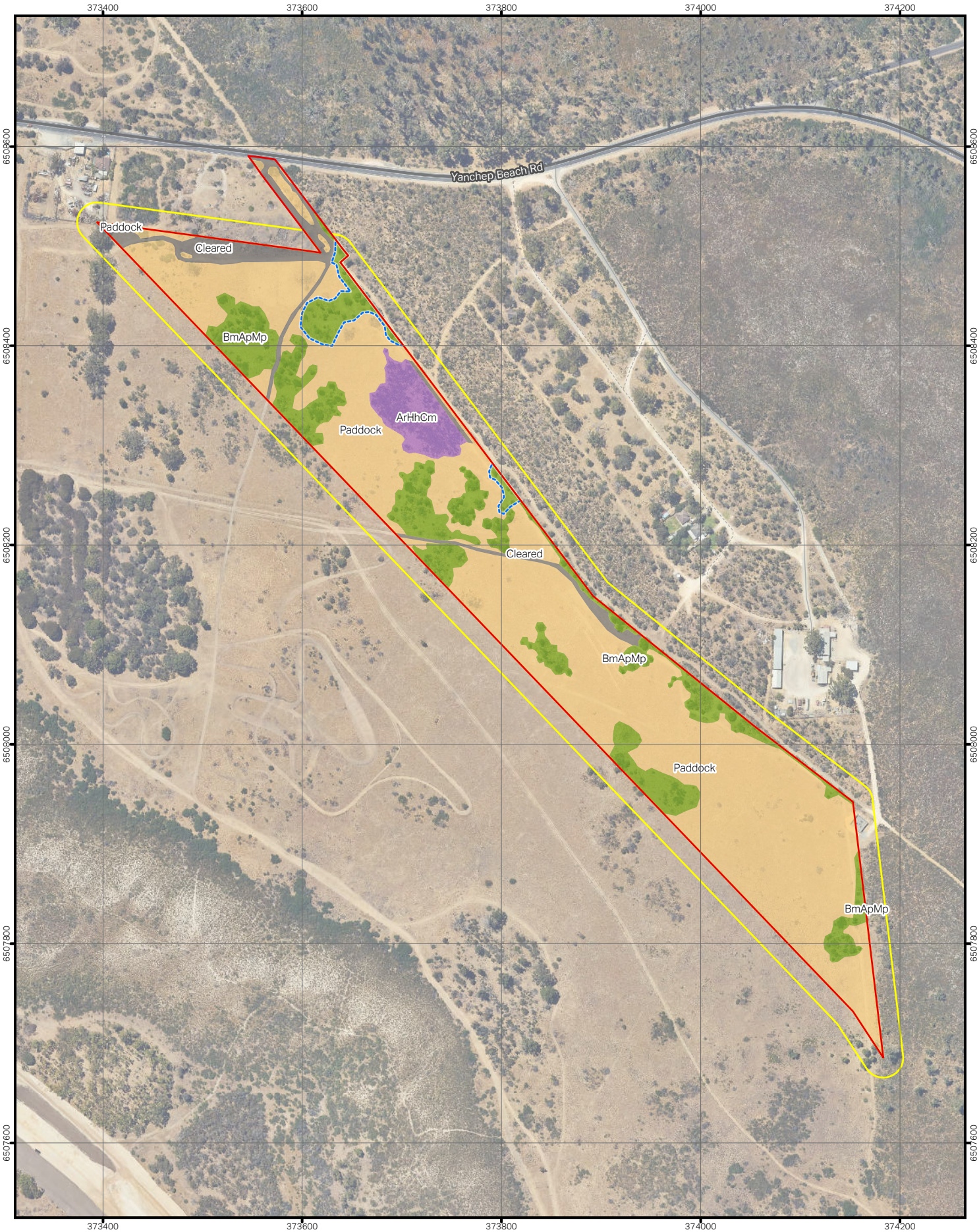
6.2.4 Vegetation Condition

Areas of native vegetation within the reconnaissance survey area were mostly considered in Degraded condition, with a small area of Banksia Woodland considered in 'Good' condition as per the conservation advice (DEE, 2016). Weed invasion occurred throughout all vegetation communities, which is expected on the Swan Coastal Plain particularly where the site has historically been disturbed. No areas of Very Good, Excellent or Pristine vegetation were encountered.

Paddocks and cleared areas with scattered native shrubs and trees were mapped as Completely Degraded. Cleared areas represent areas devoid of vegetation and are not included in percentage calculations below. Vegetation condition is mapped in Figure 9 and the extent of each category is presented in Table 19.

Table 19 Vegetation condition extent

Condition Rating	Extent (ha)	Percent of Total Area
Good	0.36	3
Degraded	2.93	25
Completely Degraded	8.42	72
Total	**11.71**	**100%**
Cleared	0.71	-



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metres

GDA2020 MGA ZONE 50

LEGEND

Survey Area
- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey

Vegetation Communities
- ArHhCm
- BmApMp
- Cleared
- Paddock

Threatened Ecological Community (TEC)
- WA and EPBC TEC Banksia Woodlands of the Swan Coastal Plain

Vegetation Communities and TEC

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Figure 9

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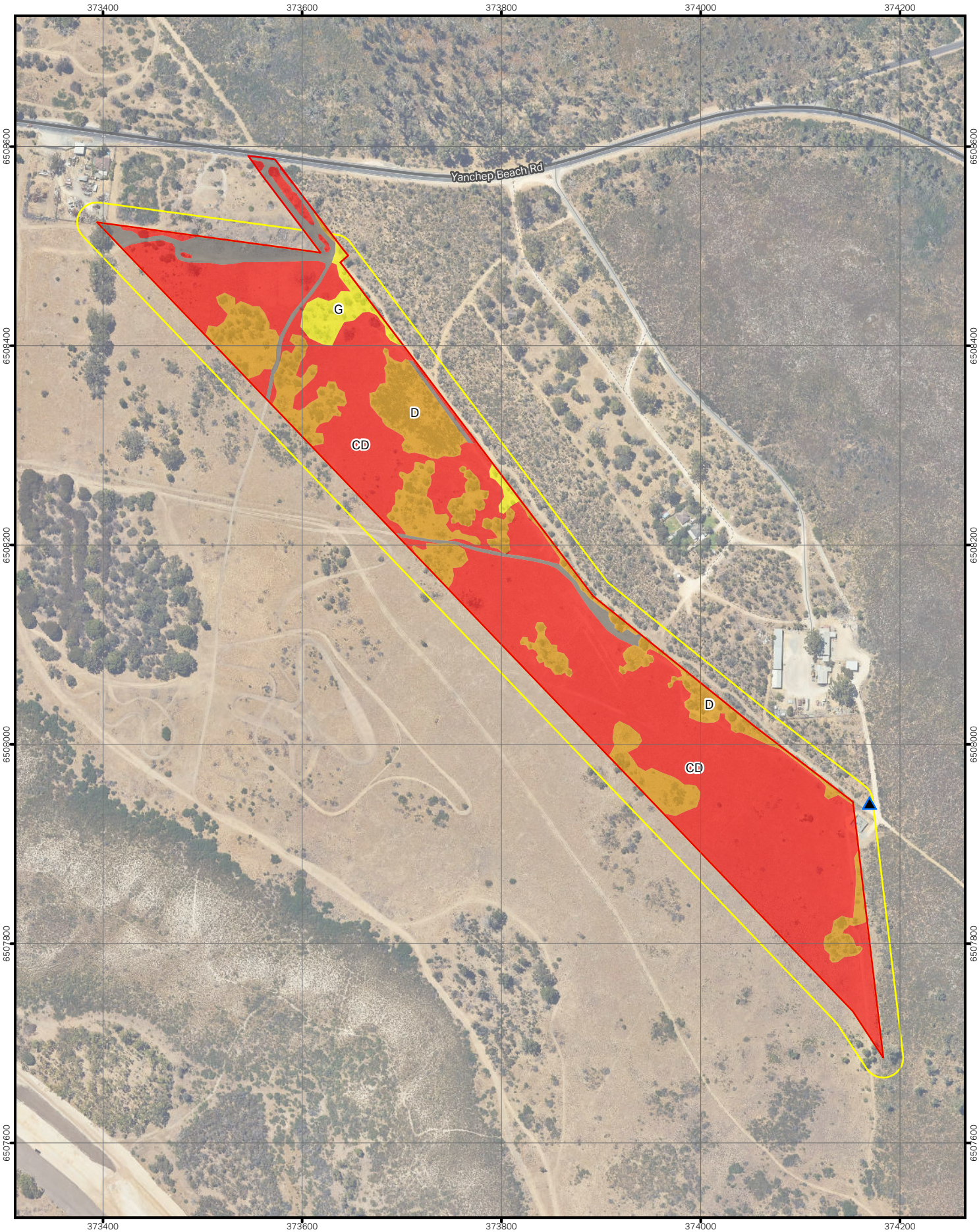

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LEGEND

Survey Area
- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey
- Declared Pest (*Echium plantagineum*)

Vegetation Condition
- Good
- Degraded
- Completely Degraded
- Cleared

Vegetation Condition

PUBLIC TRANSPORT AUTHORITY

FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 10

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6.3 Fauna

6.3.1 Fauna Habitat Assessment

Three fauna habitats representing native vegetation were mapped, including Banksia Woodland, Paddock Cleared and Tall Shrubland. Paddock Cleared (8.42 ha, 67.8%) and Banksia Woodland (2.75 ha, 22.2%) were the two most dominant habitat types. Fauna habitat types and suitability for significant fauna species is described below and mapped in Figure 11.

6.3.1.1 Banksia Woodland

The Banksia Woodland habitat is sporadic within the survey area, primarily occurring along the north-eastern edge and totalling 2.75 ha (22.2% of the survey area). It is characterised by an understorey of low shrublands and grasslands which vary in species composition and density across the survey area. Overstorey plant species within the community include *Banksia attenuata, Banksia menziesii*, *Eucalyptus todtiana* and *Nuytsia floribunda*. Shrubs range from low-lying to tall, with density varying across the landscape. Shrub species included *Acacia pulchella, Acacia saligna, Hibbertia hypericoides, Gompholobium tomentosum*, *Styphelia propinqua*, and *Hakea lissocarpha* among many others.

This habitat type contains occasional large logs (>30cm in diameter) and abundant small logs (<10cm). Vines are present occasionally, with small hollows and rocks occurring sporadically. Coarse leaf litter is abundant, fine leaf litter is sparse and small areas of bare ground occur throughout. The accumulated coarse leaf litter provides shelter for lizards to dig small burrows, suitable hunting habitat for many birds of prey, and shelter and foraging habitat for small mammals like Quenda *Isoodon fusciventer* (listed as Priority 4 by DBCA). The abundant leaf litter would also provide suitable habitat for the Black-striped Snake *Neelaps calonotos* (listed as Priority 3 by DBCA), which is known to prefer sheltering and foraging within leaf litter in Banksia Woodlands in sandy soil. The sandy soil and presence of leaf litter are also a key habitat component for the Swan Coastal Plain shield-backed trapdoor spider *Idiosoma sigillatum* (listed as Priority 3 by DBCA), which may utilise the habitat within the survey area.

The larger trees present within the Banksia Woodlands provide nesting, perching and roosting locations for various bird species. These trees are also suitable foraging species for Carnaby's Cockatoo (listed as Endangered under EPBC Act and BC Act), which was observed foraging in *Banksia* and *Eucalyptus* trees within the survey area. The Western Brush Wallaby *Notamacropus irma* (listed as Priority 4 by DBCA) may also use the Banksia Woodland habitat for foraging and shelter. This species is known to occur within open woodlands, although their preference is for seasonally wet areas with low shrubby thickets.

Plate 2 Banksia Woodland Habitat

6.3.1.2 Paddock Cleared

This is the dominant habitat in the survey area, occurring over 8.42 ha and comprising 67.8% of the survey area. The understorey is comprised mostly of weedy grasses and herbs, with sporadic native shrubs occur of various heights and density. Plant species which occur within the Paddock Cleared habitat include isolated trees of *Eucalyptus todtiana* and *Nuytsia floribunda,* with very occasional *Banksia* species. Shrubs include sporadic clusters of *Acacia saligna* and *Acacia rostelifera.*

The scattered shrubs and large isolated trees represent refuge for fauna species including birds and kangaroos as well as perching and foraging opportunities for Carnaby's Cockatoos. These isolated trees contain limited small hollows, with large logs occurring infrequently across the habitat. Small logs occur occasionally, with coarse leaf litter also common beneath shrubs or trees. Grasses are abundant, with areas of bare ground and the occasional small rock also occurring. The grasses provide foraging and shelter opportunities for Quenda, as well as the areas containing coarse leaf litter. The Western Brush Wallaby may use the open grasslands for foraging, with the isolated trees and shrubs providing shelter.

Plate 3 Paddock Cleared Habitat

6.3.1.3 Tall Shrubland

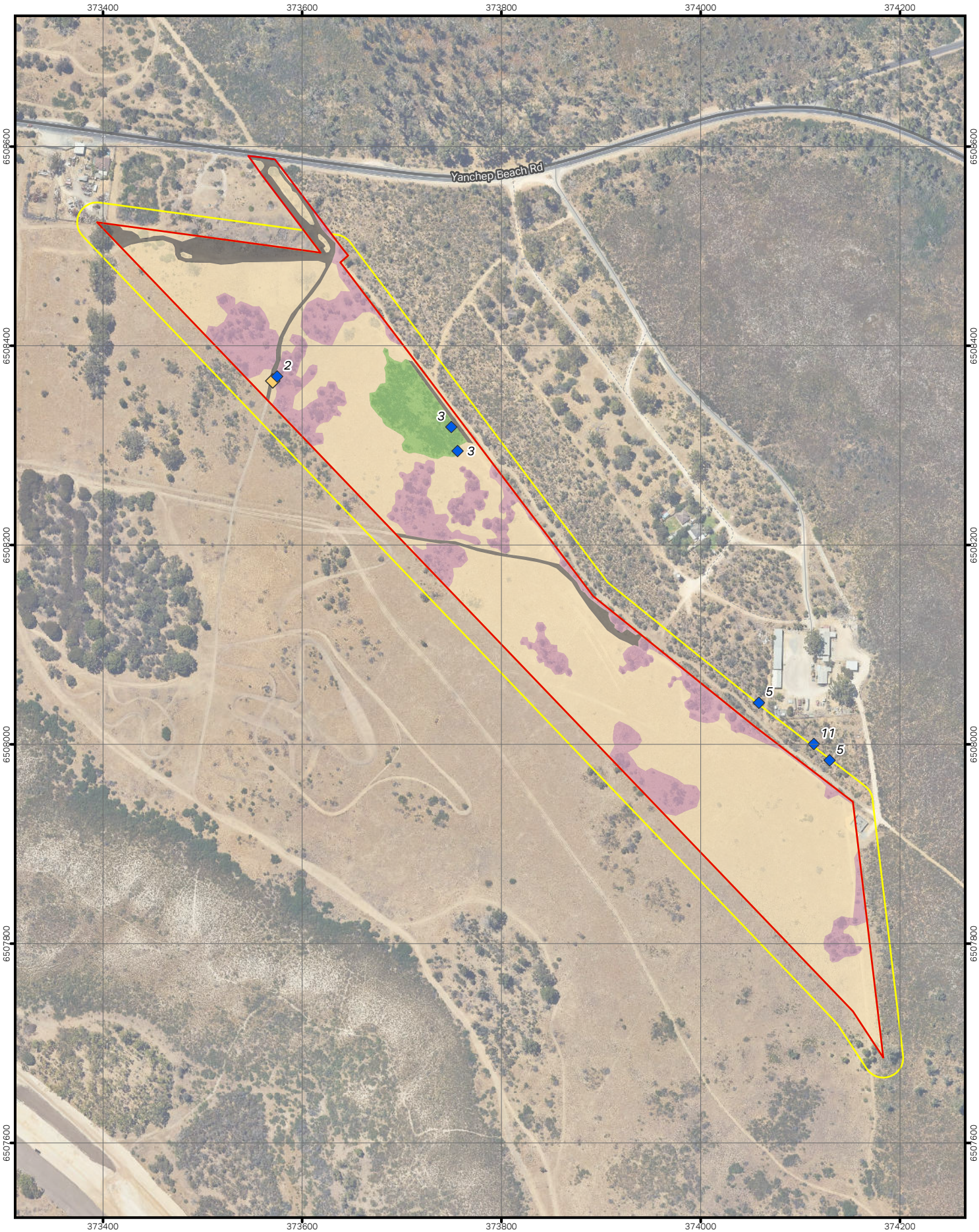
The Tall Shrubland habitat is restricted in size but provides a unique ecological niche for smaller animals such as birds and reptiles. It consists of a dense thicket of shrubby *Acacia*, with minimal variation in plant species composition or structure and extends for 0.54 ha (4.4% of the survey area). Within the thicket, isolated *Eucalyptus todtiana* and stags occur, providing perching and foraging sites for larger bird species such as Carnaby's Cockatoo.

Scattered small logs are present, whilst coarse leaf litter and grasses are abundant throughout. The grass and coarse leaf litter provide excellent foraging and shelter for both Quenda *Isoodon fusciventer* and Black-striped Snake *Neelaps calonotos*. The Western Brush Wallaby *Notamacropus irma* may also use this habitat type for foraging, with the thicket also providing suitable shelter adjacent to the more open Paddock Cleared habitat type.

Plate 4 Tall Shrubland Habitat

6.3.1.4 Cleared

This habitat type consists of completely cleared areas and tracks totalling 0.71 ha, 5.7% of the survey area. The areas are devoid of vegetation, with occasional build-ups of leaf litter. Predatory species such as foxes, hawks or falcons may take advantage of these spaces for hunting smaller species. These areas may be passed through by any mobile fauna species but is not primary habitat for any species of conservation significance.



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DATE MODIFIED	19 DEC 2023	**APPROVED BY**	C. HOUSE

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GDA2020 MGA ZONE 50

LEGEND

Survey Area
- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey

Fauna Habitat
- Banksia Woodland
- Paddock Cleared
- Tall Shrubland
- Cleared

Conservation Significant Fauna (label indicates Number Observed)
- *Isoodon fusciventer*, Foraging Evidence
- *Zanda latirostris*, Seen and Heard

Fauna Habitat and Conservation Significant Fauna

PUBLIC TRANSPORT AUTHORITY

FLORA AND FAUNA SURVEY – LOT 4500 MITCHELL FREEWAY, YANCHEP

Figure 11

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6.3.2 Fauna Inventory

A total of 27 vertebrate fauna species were recorded during the field survey. This comprised of 22 bird, two mammal and three reptile species. A complete inventory of fauna species recorded within the survey area is provided in Table 20.

Table 20 Fauna observations within the survey area

Class	Scientific Name	Common Name	Observation Method
Mammal	*Macropus fuliginosus melanops*	Western Grey Kangaroo	Seen
Mammal	*Isoodon fusciventer*	Quenda	Foraging evidence
Bird	*Zanda latirostis*	Carnaby's Cockatoo	Seen and heard
Bird	*Barnardius zonarius*	Australian Ringneck	Seen and heard
Bird	*Eolophus roseicapilla*	Galah	Seen and heard
Bird	*Gymnorhina tibicen*	Australian Magpie	Seen and heard
Bird	*Dromaius novaehollandiae*	Emu	Seen and heard
Bird	*Coracina novaehollandiae*	Black-faced Cuckooshrike	Seen and heard
Bird	*Gerygone fusca*	Western Gerygone	Seen and heard
Bird	*Gavicalis virescens*	Singing Honeyeater	Seen and heard
Bird	*Smicrornis brevirostris*	Weebil	Seen and heard
Bird	*Aquila audax*	Wedge-tailed Eagle	Seen and heard
Bird	*Falco cenchroides*	Nankeen Kestrel	Seen
Bird	*Lichmera indistincta*	Brown Honeyeater	Seen and heard
Bird	*Cincloramphus cruralis*	Brown Songlark	Seen
Bird	*Anthochaera lunulata*	Western Wattlebird	Seen and heard
Bird	*Rhipidura albiscapa*	Grey Fantail	Seen and heard
Bird	*Rhipidura leucophrys*	Willie Wagtail	Seen and heard
Bird	*Anthochaera carunculata*	Red Wattlebird	Seen and heard
Bird	*Corvus coronoides*	Australian Raven	Seen and heard
Bird	*Malurus splendens*	Splendid Fairywren	Seen and heard
Bird	*Zosterops lateralis*	Silvereye	Seen and heard
Bird	*Pachycephala rufiventris*	Rufous Whistler	Seen and heard
Bird	*Cacatua sanguinea*	Little Corella	Seen and heard
Reptile	*Tiliqua rugosa rugosa*	Bobtail/Shingleback Lizard	Seen
Reptile	*Menetia greyii*	Common Dwarf Skink	Seen
Reptile	*Cryptoblepharus buchananii*	Buchanan's Snake-Eyed Skink	Seen

6.3.3 Conservation Significant Fauna

Three conservation significant fauna species were recorded during the survey, including two bird species and one mammal species:

- Black-faced Cuckooshrike (*Coracina novaehollandiae)* listed as Marine under the EPBC Act
- Carnaby's Cockatoo (*Zanda latirostris)* listed as Endangered under the EPBC Act and BC Act
- Quenda (*Isoodon fusciventer)* listed as Priority 4 by DBCA.

Carnaby's Cockatoo and the Black-faced Cuckooshrike were seen and heard during the survey. Marine listing is a status given to species not listed as threatened or migratory but are otherwise protected under the EPBC Act. These "Other Matters" are protected under the EPBC Act in relation to activities on or in a Commonwealth area, or action outside Commonwealth land which may significantly affect the environment or species within Commonwealth land. Outside of Commonwealth land, the species have no protected status under the EPBC Act. As such, the Black-faced Cuckooshrike is only protected under the EPBC Act on Commonwealth land.

Quenda were recorded via distinct foraging evidence (Plate 5). Evidence of conservation significant species is mapped in Figure 11.

An additional three species are considered to have the potential to occur within the survey area due to the presence of suitable habitat and recent records within the surrounding area. The total area (ha) of suitable habitat for these species which occurs within the survey area is included in Table 21 below.

Plate 5 Typical conical-shaped Quenda digging - foraging evidence

Table 21 Total area (ha) of suitable habitat for significant fauna species within the survey area

Species	Area of Suitable Habitat (ha)			Total (ha)
	Banksia Woodland	Paddock Cleared	Tall Shrubland	
Carnaby's Cockatoo (*Zanda latirostris*)	2.75	8.42	0.54	11.71
Quenda (*Isoodon fusciventer*)	2.75	8.42	0.54	11.71
Black-striped Snake (*Neelaps calonotos*)	2.75		0.54	3.29
Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*)	2.75			2.75
Western Brush Wallaby (*Notamacropus irma*)	2.75	8.42	0.54	11.71

6.4 Black Cockatoos

6.4.1 Foraging

The survey area has been assessed as a score of 10 'High-quality foraging habitat' for Carnaby's Cockatoo in accordance with the Commonwealth Black Cockatoo Referral Guidelines foraging tool (DAWE, 2022) (Table 22). No subtractions were made. The survey area contains mature Banksia Woodlands, with suitable foraging species including multiple proteaceous species and *Eucalyptus todtiana* trees.

This foraging score tool does not account for variance in vegetation communities or condition, providing only a single score for the entire area. The assessment result would be different if vegetation communities were taken into account. This is represented by using the Bamford (2020) foraging tool, discussed in Section 6.4.2 below.

Table 22 Black Cockatoo Foraging Habitat Assessment (DAWE, 2022)

Starting score		**Carnaby's Cockatoo (*Zanda latirostris*)**	
		Start at a score of 10 if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**	
Attribute	Sub-tractions	Context adjustor (attributes reducing functionality of foraging habitat).	
Foraging potential	**-2**	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	☐
Connectivity	**-2**	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	☐
Proximity to breeding	**-2**	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.	☐
Proximity to roosting	**-1**	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	☐
Impact from significant plant disease	**-1**	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present	☐
Total score		**10**	

6.4.2 Refined Foraging Habitat Value

The refined foraging habitat value considered known breeding and roosting sites, and the characteristics associated with each fauna habitat type. The following factors influenced the results:

- There is a confirmed Carnaby's Black Cockatoo roosting site less than 200 m east of the survey area (DBCA, 2023c).
- The survey area is within the buffer zone of a confirmed breeding area (DBCA, 2023c).
- There are substantial areas of suitable foraging habitat adjacent to the survey area. Native vegetation within the survey area represents less than 0.1% of the available foraging habitat within a 15 km radius.

- The Banksia Woodland fauna habitat scored 4 according to the Bamford (2020) scoring tool and is therefore mapped as Moderate Quality. This is attributed to the number of Proteaceous foraging species and scattered Eucalyptus trees. This area extends for 2.75 ha.

Negligible Quality habitat consists of the Paddock Cleared (8.42 ha, score of 1) and Tall Shrubland (0.54 ha, score of 1) habitat types, which include isolated foraging species. As the foraging species in these habitat types are less abundant and condition is scored low, this means that no score is given for site context or stocking rate, resulting in a lower score overall.

Carnaby's Cockatoos were observed resting and foraging within the survey area, as well as flying over (Plate 6). Carnaby's were observed foraging in *Eucalyptus todtiana* within the survey area and in *Callistemon* trees within a neighbouring property. Foraging habitat is mapped in Figure 12.

Plate 6 Carnaby's Cockatoos seen resting on a *Eucalyptus todtiana* in the survey area

6.4.3 Breeding

A total of 44 potential nesting trees with a suitable DBH (>300 mm) were recorded (Figure 12, Appendix F). This consisted of 39 Coastal Blackbutt (*Eucalyptus todtiana*), four Stags (unknown dead trees), and one Tuart (*Eucalyptus gomphocephala*). Potential nesting trees are defined by DAWE (2022) as "*trees that have a suitable DBH to develop a nest hollow, but do not currently have hollows. Trees suitable to develop a nest hollow in the future are 300-500 mm DBH*".

One potentially suitable nesting tree, a Coastal Blackbutt, has a hollow with a potentially suitable entrance size for Black Cockatoos (Table 23; Plate 7). A suitable nesting tree is defined by DAWE (2022) as "*trees with suitable nesting hollows present, although no evidence of use*". No active Black Cockatoo breeding activity or nesting was observed during the field survey. This assessment is limited to observations made from the ground only.

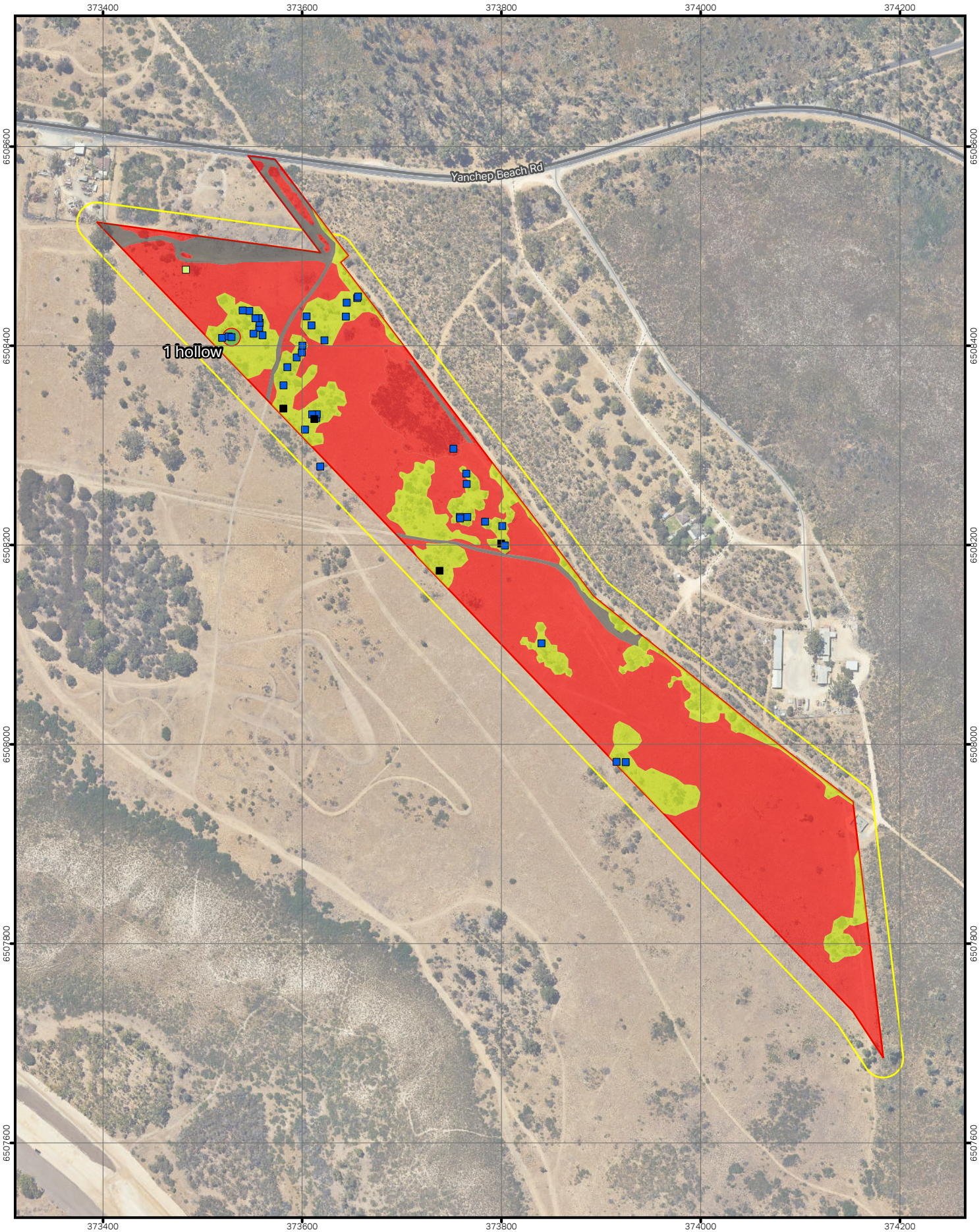
Table 23 Potentially suitable nesting tree hollow details

Species	Hollow Entrance (Depth x Width)	Height Above Ground (m)	Hollow Angle	Facing	Hollow Type	Evidence of Use
Coastal Blackbutt (*Eucalyptus todtiana*)	25 x 25 cm	5	45 degrees	South-east	Spout	None

Plate 7 Hollow recorded on potentially suitable nesting tree Coastal Blackbutt (*Eucalyptus todtiana*)

6.4.4 Roosting

No roosting sites were observed within the survey area, with roosting more likely to occur in larger trees present in the surrounding area. Twenty-one confirmed Carnaby's Cockatoo roosting sites are known to occur within 30 km of the survey area from Birdlife Data provided by DBCA. Six of these occur within 15 km and two within 1 km of the survey area (DBCA, 2023c).



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LEGEND

Survey Area
- Reconnaissance Vegetation, Basic Fauna and Targeted Black Cockatoo
- Targeted Flora Survey

Carnaby's Cockatoo Foraging Habitat Quality (Bamford Consulting Ecologists (BCE), 2020. Black Cockatoo Scoring System.)
- None
- Negligible
- Moderate

Black Cockatoo Breeding Habitat
- Tuart (*Eucalyptus gomphocephala*)
- Coastal Blackbutt (*Eucalyptus todtiana*)
- Stag (old dead tree, unknown species)
- Tree with Suitable Hollow

Carnaby's Cockatoo Foraging and Breeding Habitat

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Figure 12

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7.0 Discussion

7.1 Flora

Flora diversity was considered low, with 42 native flora species recorded. This is expected for disturbed or highly modified areas on the Swan Coastal Plain. Diversity was highest within Q1 and Q2, which were completed in adjacent Banksia woodlands to comply with the conservation advice for the identification of Banksia woodland TEC (DEE, 2016).

No Priority or Threatened flora species were recorded. The desktop assessment identified four species that were considered to have a high likelihood of occurrence, primarily due to the presence of remnant native vegetation within the targeted survey area. Each species is discussed in detail below.

Eucalyptus foecunda subsp. *foecunda* is listed as Priority 4 by DBCA and grows on white-grey sand with limestone (WAH, 2023). The species was considered to have a high likelihood of occurrence due to the distance of a known recent record (4 km from survey area) and suitable habitat in the targeted survey area. Extensive searches were completed throughout the reconnaissance and targeted survey area, and the species was not observed. *E.* foecunda subsp. *foecunda* is a tree and would be detectable at the time of survey. Therefore, this species is not considered to occur with the reconnaissance or targeted survey areas.

Leucopogon sp. Yanchep (M. Hislop 1986) is an erect perennial shrub listed as Priority 3 by DBCA. *L.* sp. Yanchep (M. Hislop 1986) grows on light grey-yellow sand, brown loam, limestone, laterite and granite (WAH, 1998-). The species was considered likely to occur due to the proximity of a recent record (1 km from survey area) and suitable habitat in the targeted survey area. Three Ericaceae specimens were collected, all of which were identified as *Styphelia propinqua* (CS231005-02, ACC/10484/E). *Leucopogon* sp. Yanchep (M. Hislop 1986) would have been detectable during the survey and therefore is not considered to occur within the survey area.

Pimelea calcicola is an erect to spreading shrub listed as Priority 3 by DBCA, it occurs on sand and coastal limestone ridges. The species was considered to have a high likelihood of occurrence due to a recent record nearby (<3 km from survey area) and suitable habitat present within the targeted survey area. No Pimelea species were observed within the reconnaissance or targeted survey area. The species flowers in Spring and is expected to be detectable at the time of survey. Hence, it is not considered to occur within the survey area.

Stylidium maritimum is a perennial herb growing to 0.7 m high and is listed as Priority 3 by DBCA. *S. maritimum* grows in a variety of habitats including on sand over limestone, including dune slopes and flats, coastal heath and shrubland and Banksia woodland. The species was considered to have a high likelihood of occurrence due to recent records in close proximity (3.05 km from survey area) and suitable habitat present in the targeted survey area. The species was not observed during targeted searches. It is a perennial herb that flowers from September to November and would have been detectable at the time of survey, therefore the species is not considered to occur in the survey area.

The reconnaissance survey area is primarily composed of paddock and historically disturbed vegetation. The targeted survey includes areas of remnant native vegetation. All areas of native vegetation were traversed with no priority species detected. It is therefore considered that no Priority or Threatened flora species occur or have the potential to occur within the reconnaissance or targeted survey areas.

7.2 Vegetation

Across the reconnaissance survey area, two native vegetation communities were mapped for 3.29 ha, with one disturbed community mapped across 8.42 ha. The native vegetation communities represent isolated patches of vegetation are surrounded by disturbed paddock. Diversity is relatively low when compared with quadrats from the Swan Coastal Plains dataset for FCT analysis (Gibson *et al*., 1994; Keighery *et al*., 2012). This is typical of vegetation that has been exposed to historical disturbance. Accordingly, most of the survey area (8.42 ha, 72%) was considered Completely Degraded.

The Banksia Woodlands TEC listed as Endangered under the EPBC Act was confirmed to occur for 0.36 ha, across Lot 4500 and Lot 4700.The small patch (Patch 1) represents an extension of the Yanchep National Park Banksia Woodland known to occur east of the survey area and was considered to be in 'Good' condition as per the conservation advice (DEE, 2016) due to assessment being centred upon the area of best condition.

All other areas of vegetation community BmApMp were dominated by *Eucalyptus todtiana* and separated from Patch 1 by a break in Banksia canopy of more than 30 m. Therefore, these areas are excluded from Patch 1, and were assessed individually. These areas of vegetation community BmApMp were considered to be Degraded in condition and therefore do not meet the condition thresholds of the conservation advice. These patches of vegetation are therefore not considered part of the TEC.

This TEC was expected to occur, informed by the desktop assessment results and local knowledge of the area. The TEC delineation was supported by FCT analysis which determined that the TEC represented FCT 28 Spearwood *Banksia attenuata – Eucalyptus* woodlands. This FCT is associated with the Spearwood land system and is typical of Banksia Woodlands north of Perth.

No other vegetation that could resemble other significant communities was recorded. No Tuart woodlands, heaths, Melaleuca shrublands, or wetland depressions were observed, thereby excluding Tuart Woodlands of the Swan Coastal Plain TEC, Northern Spearwood shrublands and woodlands (FCT 24), *Melaleuca huegelii - M. systena* shrublands of limestone ridges (FCT 26), and Woodlands over Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (FCT 19).

7.3 Basic Fauna Survey and Fauna Habitat

A total of 27 vertebrate fauna species were recorded during the field survey. This comprised of 22 bird, two mammal and three reptile species. Three conservation significant species were recorded during the survey, including Carnaby's Cockatoo *Zanda latirostris* (listed as Endangered under the EPBC Act and BC Act), Quenda *Isoodon fusciventer* (listed as P4 by DBCA) and Black-faced Cuckooshrike *Coracina novaehollandiae* (listed as Marine under the EPBC Act).

The fauna habitats present within the survey area were also considered suitable habitat for other significant fauna species. These species include the Swan Coastal Plain Shield-backed Trapdoor Spider (*Idiosoma sigillatum*), the Western Brush Wallaby (*Notamacropus irma*), and the Black-striped Snake (*Neelaps calonotos*). Due to the elusive nature of some of these species, they may occur within the survey area despite not being recorded during the course of the survey. The suitability of each habitat type for these significant species is discussed below.

Slight changes in the landscape and structure increase the complexity of each habitat type. Habitat types with a greater complexity can offer appropriate environmental conditions and support for a broader range of species. Although the complexity of the fauna habitat is lower within the survey area compared to the directly adjacent bushland, it provides a habitat linkage between these areas, particularly in relation to trees. Habitat linkages are typically areas or corridors of vegetation that link (larger) areas of fauna habitat. Linkages are important as they enable fauna to move freely between remnant bushland patches, therefore increasing gene-flow between populations. A study conducted by Gilbert et al. (1998) found that corridors and/or linkages do maintain species richness in fragmented urban landscapes. Trees throughout the landscape provide important foraging, breeding and resting habitat for numerous species of all classes. Most species are not able to travel large distances without vegetation to rest and forage in. Fauna species treat these sites as refuges, particularly when moving between different foraging sites throughout the day or night.

The Banksia Woodlands habitat is mapped for 2.75 ha is considered suitable habitat for Quenda (*Isoodon* fusciventer), Carnaby's Cockatoos (*Zanda latirostris*), the Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*), Western Brush Wallaby (*Notamacropus irma*), and Black-striped Snake (*Neelaps calonotos*). The sandy soil and leaf litter is suitable for the Swan Coastal Plain Shield-backed Trapdoor Spider, as well as the Black-striped Snake. Due to the vegetation composition, the Banksia Woodlands habitat would likely be marginal habitat for the Western Brush Wallaby, as it typically prefers areas of seasonally wet flats for foraging. These three significant fauna species may utilise areas where native understorey density was higher, generally associated with vegetation condition of 'Good' or better.

The Tall Shrubland habitat is mapped for 0.54 ha and provides suitable habitat for Quenda (*Isoodon fusciventer*), Carnaby's Cockatoos (*Zanda latirostris*), and Black-striped Snake (*Neelaps calonotos*). This habitat type contains sporadic trees suitable for foraging and perching for many bird species. Carnaby's Cockatoos were observed in this habitat during the survey. Coarse, loose-leaf litter under tall shrubs and trees provides suitable shelter for the Black-striped Snake. The dense shrubs provide refuge and foraging habitat for the Quenda, utilising the leaf litter to forage for small insects, lizards and fungi.

The lack of a shrubby midstorey or understorey in the Paddock Cleared habitat (8.42 ha) makes it marginal habitat for the afore-mentioned significant fauna species. Quenda would forage within the grassy areas; however, shelter is limited. Carnaby's Cockatoos would take advantage of isolated mature native trees and stags for resting during the day. The large mature trees, mostly *Eucalyptus todtiana* and *Banksia* species, provides connectivity between habitats as well as potential foraging for Carnaby's Cockatoos. Western Brush Wallabies may also forage within this habitat, as the species prefers open grasslands for feeding, although this is typically within winter-wet or low-lying areas. Surrounding fauna habitat was of higher quality for conservation significant species.

The remaining 0.71 ha of the survey area was cleared and not suitable for significant fauna. Species are likely to traverse the cleared habitat to access patches of native vegetation. The cleared habitat was primarily devoid of all vegetation and included firebreak tracks and larger cleared areas.

7.4 Targeted Black Cockatoo

The survey area is within the known range for the threatened Carnaby's Cockatoo species. This species was observed foraging and resting within the survey area. There were 44 potential nesting trees with a suitable DBH (>300 mm) were identified with the survey area. Only one potentially suitable nesting tree was identified, which has a hollow with a suitable entrance size for black cockatoos.

The survey area scored a foraging habitat score of 10 in accordance with the DAWE 2022 guidelines. The Bamford (2020) scoring method defined the area as supporting Moderate and Negligible foraging quality. The Moderate foraging quality is associated with the Banksia Woodland, which includes suitable foraging species such as *Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana*. All other areas were considered Negligible due to a low abundance of foraging species. The known occurrence of a roosting site within 1 km of the survey area, permanent water source presence nearby, confirmed sighting during the survey, and extent of suitable foraging habitat in the vicinity all contributed to the foraging score.

The local area supports both urban, agriculture and conservation land use. It is situated on the edge of a significant north-south corridor of native vegetation which includes Yanchep National Park, Gnangara Moore River State Forest, Park, and Wilbinga. The native vegetation in the vicinity is in better condition and supports more favoured foraging species than the vegetation within the survey area.

8.0 Assessment Against the 10 Clearing Principles

Clearing of native vegetation is regulated by DWER and requires a clearing permit under Part V of the EP Act, except when a proposal is assessed under Schedule 6 of the Act or is prescribed by regulation in the Environmental Protection (Clearing Native Vegetation) Regulations 2004. The proposed native vegetation clearing was assessed against the 10 Clearing Principles under Schedule 5 of the EP Act in accordance with DWER's Guide to the Assessment of Applications to Clear of Native Vegetation (DWER, 2014) and is provided in Table 24. It is assumed that the project involves the clearing of the entire 12.42 ha survey area is required.

Table 24 Assessment against the 10 Clearing Principles

Background	Source/Tool for Assessment	Conclusion
Principle (a) - Native vegetation should not be cleared if it comprises a high level of biological diversity		
The clearing area does not occur within a Biodiversity Hotspot as identified by the Threatened Species Scientific Committee for the Australian Government. DBCA flora, fauna, and communities' database searches identified 96 significant fauna species as potentially occurring, 36 significant flora species that may potentially occur, and 15 significant ecological communities occurring within 1 km, 10 km, and 20 km of the survey area respectively. No conservation significant threatened or priority flora were recorded during the field survey, as stated in Section 6.1.1. Four priority species were identified in the desktop assessment but were not found within the survey area. Areas of native vegetation within the reconnaissance survey area were mostly considered in Degraded condition. Paddocks and cleared areas with scattered native shrubs and trees were mapped as Completely Degraded. Completely degraded vegetation made up 8.42 ha (72%) of the survey area. Degraded vegetation contributed 2.93 ha (25%) and only 0.36 ha (3%) was mapped as 'Good' condition. Cleared areas were not included in condition calculations. Yanchep National Park is located immediately east of the site and contains approximately 2,800 ha of vegetation including native vegetation including Banksia Woodlands in likely better condition than the survey area. One patch of Commonwealth listed Banksia Woodland TEC, is mapped for 0.36 ha within the survey area and represents the western edge of a larger patch that extends through Yanchep NP for greater than 100 ha to the east. The TEC was recorded in 'Good' condition and is believed to be representative of FCT 28, with two quadrats and one relevé found to represent this FCT. FCT28 represents a Commonwealth protected TEC and is not listed as priority or threatened for protection under WA legislation. Flora diversity was lower than is typical for FCT 28, with an average of 31 species compared to a typical richness of 56, as stated in Section 6.2.2. In conclusion, this vegetation was not considered to represent a high level of diversity.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov) • PMST report • EP Environmental Factor Guideline – Flora and Vegetation (EPA, 2016) • Regional Botanical Province and Sub region Descriptions (Beard, 1990) • WA Herbarium Florabase (2023) • DCCEEW SPRAT Species Profile and Threats database	The Proposal is unlikely be at variance with this clearing principle

Background	Source/Tool for Assessment	Conclusion
Based on this assessment, it is considered that native vegetation within the clearing area does not represent a high level of biological biodiversity. Therefore, the proposal is unlikely to be at variance with this clearing principle.		
Principle (b) - Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia		
The proposed clearing contains two native vegetation types: 1. ArHhCm - *Acacia rostellifera*, *Macrozamia fraseri* and *Jacksonia sternbergiana* tall closed shrubland over *Hibbertia hypericoides* and *Acacia ?saligna* low shrubland over *Corynotheca micrantha* and *Ptilotus polystachyus* sparse forbland. 2. BmApMp - *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* low open woodland over *Acacia pulchella, Jacksonia sternbergiana* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia, Burchardia congesta* and *Conostylis aculeata* sparse forbland. A Desktop search (using DBCA and PMST data) of Threatened and Priority Fauna databases determined that 96 conservation significant fauna species have been previously recorded within 10 km of the proposed clearing area. Evidence indicating the presence of three conservation significant fauna species was identified during the survey. **<u>Carnaby's Cockatoo (Endangered)</u>** During the survey, a total of 44 potential nesting trees and one potentially suitable nesting tree with suitable DBH (>300 mm) were identified within the survey area. No roosting sites were observed. Under the Bamford (2020) scoring tool, only 2.75 ha of Banksia Woodland was mapped as suitable for Black Cockatoo foraging. Carnaby's Cockatoo was observed foraging and resting within the survey area. Aerials suggest the presence of native vegetation north and east of the survey area that likely also contains suitable foraging species such as *Eucalyptus todtiana, Eucalyptus gomphocephala*, or proteaceous species. Additionally, five of the 15 Threatened or Priority Ecological Communities identified within 20km of the survey area contain Banksia trees suitable for Carnaby's Cockatoo foraging. There are three confirmed roosting sites within 3 km east of the survey area located in Yanchep National Park which also contains Banksia and Eucalyptus species suitable for foraging. The nearest breeding site is approximately 22 km south. Given the proposed clearing is only 2.75 ha of foraging habitat and Yanchep National Park immediately adjacent contains 2800 ha of vegetation with suitable foraging trees, clearing of this habitat is unlikely to be detrimental to the ongoing success of Carnaby's Cockatoo.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov) • PMST report • WA Museum (2023) • DCCEEW SPRAT Species Profile and Threats database	The Proposal is unlikely to be at variance with this clearing principle

Background	Source/Tool for Assessment	Conclusion
Quenda (Priority 3) Quenda (*Isoodon fusciventer*) were recorded via distinct foraging evidence (diggings) identified within the survey area. Suitable habitat was recorded for all three vegetation communities, with the two native communities (ArHhCm & BmApMp) providing the most suitable habitat, containing open and closed shrublands used for shelter. Aerial's suggest similar habitat is presented in the surrounding area, therefore clearing is unlikely to represent a significant loss of habitat for the species. Other fauna species found to have a 'high' likelihood of occurrence include the Black-striped Snake (*Neelaps calonotos*), Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*), and Western Brush Wallaby (*Notamacropus irma*). No direct or indirect evidence was found during the field survey that would suggest the presence of these species within the survey area. As a result of the proposed clearing, it is likely that habitat containing breeding, sheltering, and feeding sites for at least five conservation significant species within the survey area would be lost or reduced. However, the native vegetation within the survey area is not considered to represent habitat which is the whole of, or is necessary for the maintenance of, significant habitat. Based on the above information it is considered unlikely that the proposed clearing is at variance to this principle.		
Principle (c) - Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora		
No Threatened or Priority flora species were recorded during the survey. The desktop assessment identified no threatened flora species with a high likelihood of occurrence in the survey area. Given no conservation significant species were identified during the field survey, and the presence of neighbouring cleared paddocks and limited adjoining vegetation south and west of the survey area, the proposed clearing would not provide a significant buffer for potential threatened species. The native vegetation proposed to be cleared therefore does not include, nor is it necessary for the continued existence, of any threatened flora. The clearing is consequently not at variance to this principle.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov) • PMST report • WA Museum (2023) • DCCEEW SPRAT Species Profile and Threats database	The Proposal is not at variance with this clearing principle

<table>
<tr><th>Background</th><th>Source/Tool for Assessment</th><th>Conclusion</th></tr>
<tr><td colspan="3">Principle (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</td></tr>
<tr><td>One patch of Commonwealth listed Banksia Woodland TEC, is mapped for 0.36 ha within the survey area and represents the western edge of a larger patch that extends through Yanchep NP for greater than 100 ha to the east. The TEC was recorded in ‘Good’ condition and is believed to be representative of FCT 28, with two quadrats and one relevé found to represent this FCT. FCT28 represents a Commonwealth protected TEC and is not listed as priority or threatened for protection under WA legislation. Additionally, it is estimated there is 81,800 ha of Commonwealth listed Banksia Woodlands TEC within reserves mostly within the Perth subregion and Swan Coastal Plain bioregion. Removal of 0.36 ha of this TEC is not anticipated to impact upon the survival of the Banksia Woodlands TEC.
The desktop assessment identified two other TECs that have a buffer that overlaps with the survey area, and an additional TEC which occurs directly adjacent to the survey area (within 1 km). These TECs were not recorded during the field survey.
Given FCT28 is not protected as threatened or priority at a state level, and given the substantial amount of Banksia Woodland within nearby reserves, the small patch of proposed clearing is unlikely to be at variance with this principle.</td><td>• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey
• Aerial photography
• DBCA GIS database
• Publicly available GIS layers (data.gov)
• PMST report
• WA Museum (2023)
• DCCEEW SPRAT Species Profile and Threats database</td><td>The Proposal is unlikely to be at variance with this clearing principle</td></tr>
<tr><td colspan="3">Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.</td></tr>
<tr><td><u>Vegetation Associations</u>
The high-level vegetation associations in this area have been mapped by Beard (2013) as the Vegetation Association 949 (Low woodland; Banksia) and 1007 (Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia rostellifera & Acacia cyclops thicket). The status of the remaining pre-European vegetation is shown in Table 25 below.
Table 25 Beard et al. (2013) vegetation association’s percentage remaining
<table>
<tr><th rowspan="2">Vegetation Association</th><th rowspan="2">Description</th><th colspan="3">Percent Remaining (%)</th></tr>
<tr><th>Western Australia</th><th>Swan Coastal Plain IBRA Region</th><th>City of Wanneroo</th></tr>
<tr><td>949</td><td>Low woodland; Banksia</td><td>56.42</td><td>57.28</td><td>46.30</td></tr>
<tr><td>1007</td><td>Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia rostellifera & Acacia cyclops thicket</td><td>68.05</td><td>68.68</td><td>59.94</td></tr>
</table>
</td><td>• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey
• Aerial photography
• DBCA GIS database
• Publicly available GIS layers (data.gov)
• CAR Reserve Analysis Report 2b</td><td>The Proposal is unlikely to be at variance with this clearing principle</td></tr>
</table>

Background	Source/Tool for Assessment	Conclusion
The survey area is located approximately 52 km north of Perth CBD and is therefore not as constrained as more urban areas of the Swan Coastal Plain. The percentage of vegetation remaining at a State (WA), IBRA Region, and local level (City of Wanneroo) for Vegetation Associations 949 and 1007 are above the 30% retention objective to protect Australia's biological diversity. The limited clearing of each vegetation association that is proposed is unlikely to reduce these figures below the 30% retention objective. **Vegetation Complex** Vegetation complex mapping undertaken by Heddle *et al.* (1980) indicates the basic relationship between vegetation, soils and rainfall. The survey area falls within the Cottesloe Complex North (Vegetation System Complex 51) described as a "low open forest and low woodland and closed heath." As of 2018, there was 57.89% remaining of this vegetation complex across the Swan Coastal Plain and 68.35% remaining within the City of Wanneroo (Government of Western Australia, 2019). This is above the 30% retention objective and the limited clearing of native vegetation proposed is unlikely to reduce the remaining extent to below the identified trigger levels. The proposal is therefore unlikely to be at variance with this Principle.		
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland		
The survey area does not intersect any wetlands of international importance (Ramsar) or nationally important Wetlands. The closest Ramsar Wetland is approximately 65 km south of the survey area (DBCA-010). There are two nationally important wetlands and Geomorphic Wetlands of the Swan Coastal Plain located approximately 1 km east of the survey area. The two wetlands, named Yonderup Lake and Loch McNess, are both listed as 'Conservation' for Management Category. According to the *Guideline for the Determination of Wetland Buffer Requirements* (DPI, 2005), the survey area being 1 km from the nearest wetlands is not within the separation buffer (50-100 m dependent on disturbance). No wetland depressions were observed during the field survey, nor any vegetation types that are representative of riparian vegetation growing in a wetland environment. These findings suggest the native vegetation proposed to be cleared is not growing in, or in association with, a watercourse environment. The proposed clearing of native vegetation is also unlikely to impact the nearby wetlands.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov) • Guideline for the Determination of Wetland Buffer Requirements	The Proposal is unlikely to be at variance with this clearing principle

Background	Source/Tool for Assessment	Conclusion
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.		
The survey area is situated across the Spearwood System, described as sand dunes and plains with yellow deep sands, pale deep sands and yellow/brown shallow sands. The survey area also intersects with the Karrakatta Sand Yellow Phase, which includes low hilly to gently undulating terrain with yellow sand over limestone at 1-2 m. The average annual rainfall in the local area according to the Australian Bureau of Meteorology is 638.5 mm, as recorded at Gingin Aero WA (station number 9178). The site is approximately 30 mAHD, with a generally gentle slope. As the area has moderate annual rainfall and a slight slope, it is unlikely to heavily contribute to an increased potential for wind/water erosion and on-site/off-site runoff. Acid Sulfate Soils (ASS) risk has not been assessed for the survey area, however the DWER publicly available dataset confirms the areas east of the survey area near the two conservation wetlands have a high-moderate risk of ASS occurring. Localised soil acidity may occur as a result of exposure of pyritic material to air and rainfall as a result of clearing. Vegetation at the site is mapped as Vegetation Association 949 and 1007, characterised as Low woodland; Banksia, and Mosaic: Shrublands; *Acacia lasiocarpa* & *Melaleuca acerosa* heath / Shrublands; *Acacia rostellifera* & *Acacia cyclops* thicket respectively. The proposed clearing of up to 3.29 ha of native vegetation is unlikely to cause appreciable land degradation. This is supported by the vegetation being in mostly degraded or completely degraded condition and most of the land surrounding the survey area to the west, and south comprising heavily cleared areas and paddocks. The presence of the two wetlands to the east are unlikely to increase the likelihood of potential land degradation given they are located 1 km away and are outside the area of affect.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov) • Department of Primary Industries and Regional Development – Wind Erosion – website	The Proposal is unlikely to be at variance with this clearing principle
Principle (h) - Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.		
The proposed clearing area intersects a strip of approximately 0.24 ha of an un-named conservation reserve (no. 29246), 15 ha in size, occurring along the east side of the survey area (LGATE-227). The proposed clearing also intersects approximately 0.01 ha of Yanchep National Park conservation reserve (no. 9868), 2800 ha in size, in the north-east and south-east corners of the survey area. The intersect areas of the conservation reserves are very small, particularly in relation to Yanchep Nation Park, and are therefore unlikely to have a significant impact on the environmental values. Parts of the interest area have been graded as 'Good' condition; based on aerial imagery, this condition looks to be representative of vegetation within the reserve to the east. Given the size of the conservation reserves being impacted, it is unlikely the proposed clearing will be at variance with this principle.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov)	The Proposal is unlikely to be at variance with this clearing principle

Background	Source/Tool for Assessment	Conclusion
Principle (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		
There were no surface water features or vegetation associated with watercourses noted on or in the vicinity of survey area during the field survey. However, there are two conservation wetlands located approximately 1 km east of the survey area. Given the distance of the proposed clearing from the wetlands, disturbances caused from clearing are unlikely to significantly impact surface water quality of the wetlands. ASS risk has not been mapped for the entire survey area, however there is a high-moderate risk of ASS occurring at the wetlands located 1 km east. This is also unlikely to be affected by project activities due to the distance from the survey area. The survey area also intersects a Protection Area 3 Public Drinking Water Source Area – Perth Coastal and Gwelup Underground Water Pollution Control Area. Given the extensive clearing (likely for agricultural use) that already surrounds the survey area, the additional clearing of 3.29 ha of native vegetation is unlikely to result in significant changes to the water table. The proposed clearing is therefore unlikely to be at variance with this principle.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov)	The Proposal unlikely to be at variance with this clearing principle
Principle (j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause or exacerbate the incidence or intensity of flooding.		
The closest wetlands are located 1 km east of the site, at a distance where clearing is unlikely to affect the area. The DWER document “a guide to the assessment of applications to clear native vegetation” states the following for Principle (j): “Consideration of this principle may require extensive modelling of the whole catchment and should only be considered for large clearing projects. For smaller applications, clearing should not cause waterlogging (localised flooding).” Furthermore, the cleared nature of the surrounding land and mostly degraded vegetation condition renders the clearing of this vegetation unlikely to increase or exacerbate the incidence of flooding. Therefore, it is unlikely the proposed clearing will be at variance with this principle.	• Reconnaissance Flora, Vegetation and Targeted Black Cockatoo Survey • Aerial photography • DBCA GIS database • Publicly available GIS layers (data.gov)	The Proposal is unlikely to be at variance with this clearing principle

9.0 Conclusion

AECOM was engaged by PTA to complete a spring flora, vegetation, fauna and black cockatoo assessment. The assessment included a detailed desktop study, a field survey completed on 5 October, and a reporting component. A summary of significant results is presented below.

- No Priority or Threatened flora were recorded.
- The Banksia Woodlands TEC listed under the EPBC Act was mapped for 0.36 ha within the detailed survey area. This TEC was considered to be in 'Good' condition and extends to the east for approximately >100 ha.
- The foraging habitat quality for the survey area for Carnaby's Cockatoo was 10 (High Quality native foraging) utilising the DAWE 2022 guidelines. The refined Bamford score was 4 (Moderate Quality) associated with the Banksia Woodland (2.75 ha) whilst the remainder of the area was considered 0 (Negligible).
- Three significant fauna species were recorded including Carnaby's Cockatoo (*Zanda latirostris*) (listed as Endangered under the EPBC Act and BC Act), Quenda (*Isoodon fusciventer*) (listed as Priority 4 by DBCA), and Black-faced Cuckooshrike (*Coracina novaehollandiae)* (listed as Marine under the EPBC Act).
- Fauna habitats represented suitable habitat for five conservation significant fauna species:
  - Black-striped Snake (*Neelaps calonotos*) (listed as Priority 3 by DBCA),
  - Carnaby's Cockatoo (*Zanda latirostris*) (listed as Endangered under EPBC Act and BC Act),
  - Quenda (*Isoodon fusciventer*) (listed as Priority 4 by DBCA),
  - Swan Coastal Plain Shield-backed Trapdoor Spider (*Idiosoma sigillatum*) (listed as Priority 3 by DBCA), and
  - Western Brush Wallaby (*Notamacropus Irma*) (listed as Priority 4 by DBCA).
- Clearing of native vegetation within the survey area is unlikely to be at variance with the 10 Clearing Principles.

The survey area comprises of paddock that has been historically cleared and likely used for agriculture. Diversity and complexity are limited and therefore has reduced in environmental value. Significant values were restricted to areas that represent native vegetation including Banksia and Eucalypt Woodlands, or areas that supported mature trees suitable for Black Cockatoo breeding and foraging.

A minor limitation influenced the survey, as access to a small section at the northern end of the targeted survey area was restricted due to a burn-off being conducted by the property owner. This limitation was mitigated through assessing the area from a safe distance.

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Appendix A

Significant Flora Desktop Assessment

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Taxon	Habitat[1]	Cons. Code EPBC	Cons. Code WA	Distance WAHERB (KM)	Distance TPFL (KM)	Date WAHERB	Date TPFL	PMST	Likelihood Assessment					Total Score	Likelihood	Comments
									Recorded in the Survey Area	Known occurrence nearby (5km)	Recent Record (Last 20 years)	Known occurrence within the LGA	Potential presence of suitable habitat within the Survey Area (0,1,2)			
Acacia benthamii	Typically on limestone breakaways.		P2	1.10		2009			0	1	1	1	1	4	Moderate	
Baeckea sp. Limestone (N. Gibson & M.N. Lyons 1425)	Limestone ridge, yellow-grey sand (WAH, 2023).		P1	5.22	5.21	2017	2020		0	0	1	1	0	2	Negligible	
Beyeria cinerea subsp. *cinerea*	Yellow, grey or white sand with sandstone or limestone. Coastal cliffs.		P3	9.20		1989			0	0	0	1	0	1	Negligible	
Conostylis bracteata	Sand, limestone. Consolidated sand dunes.		P3	3.54		1965			0	1	0	1	0	2	Negligible	
Conostylis pauciflora subsp. *euryrhipis*	White, grey or yellow sand. Consolidated dunes.		P4	2.81	6.11	2016	2013		0	1	1	1	1	4	Moderate	
Conostylis pauciflora subsp. *pauciflora*	Grey sand, limestone. Hillslopes, consolidated dunes.		P4	3.88	3.88	2007	2007		0	1	1	1	1	4	Moderate	
Eucalyptus argutifolia	Shallow soils over limestone. Slopes or gullies of limestone ridges, outcrops.	V	VU	3.15	6.47	2017	2017	Known	0	1	1	1	0	3	Negligible	
Eucalyptus foecunda subsp. *foecunda*	Limestone, white-grey sand (WAH, 2023).		P4	4.05		2004			0	1	1	1	2	5	High	
Haloragis luminosa	Limestone ridge, shrubland (WAH, 2023).		P1	7.10		2018			0	0	1	1	0	2	Negligible	
Hibbertia leptotheca	Dunes, limestone. In Heath (WAH, 2023).		P3	1.10	5.52	2016	2005		0	1	1	1	0	3	Negligible	
Lasiopetalum membranaceum	Sand over limestone.		P3	4.05	3.17	1987	1987		0	1	0	1	2	4	Moderate	
Lecania sylvestris	Recorded previously in roadside vegetation (WAH, 2023).		P2	3.54		1988			0	1	0	1	2	4	Moderate	
Lecania turicensis var. *turicensis*	Coastal rocks, limestone (WAH, 2023).		P2	4.73		1988			0	1	0	1	0	2	Negligible	
Lepidium pseudotasmanicum	Loam, sand.		P4	1.10		1991			0	1	0	1	2	4	Moderate	
Leucopogon maritimus	Recorded previously on white-yellow sand dunes, in low heath (WAH, 2023).		P1	1.10		2008			0	1	1	1	0	3	Negligible	
Leucopogon sp. Yanchep (M. Hislop 1986)	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.		P3	1.10		2005			0	1	1	1	2	5	High	
Pimelea calcicola	Sand. Coastal limestone ridges.		P3	2.87		2018			0	1	1	1	2	5	High	Increased habitat suitability as previous records include Banksia woodland
Placynthium nigrum	Recorded previously in roadside vegetation (WAH, 2023).		P3	3.54		1988			0	1	0	1	2	4	Moderate	
Rinodina bischoffii	Recorded previously in roadside vegetation (WAH, 2023).		P2	3.54		1988			0	1	0	1	2	4	Moderate	
Sphaerolobium calcicola	White-grey-brown sand, sandy clay over limestone, black peaty sandy clay. Tall dunes, winter-wet flats, interdunal swamps, low-lying areas.		P3	1.16		1997			0	1	0	1	0	2	Negligible	
Stylidium maritimum	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.		P3	3.05	3.34	2017	2005		0	1	1	1	2	5	High	
Stylidium striatum	Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland.		P4	2.85		1990			0	1	0	1	0	2	Negligible	
Styphelia filifolia	Sandy soils of the coastal plain (with one known occurrence from the northern Darling Scarp), usually in Banksia or Jarrah woodland and in low-lying situations (Hislop & Puente--Lelièvre, 2017).		P3	5.77		2002			0	0	0	1	2	3	Moderate	
Andersonia gracilis	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	E	EN					Likely	0	0	0	0	0	0	Negligible	
Banksia mimica	White or grey sand over laterite, sandy loam.	V	VU					May	0	0	0	0	0	0	Negligible	
Diuris purdiei	Grey-black sand, moist. Winter-wet swamps.		P4					May	0	0	0	0	0	0	Negligible	
Drakaea elastica	White or grey sand. Low-lying situations adjoining winter-wet swamps.	E	CR					Likely	0	0	0	0	0	0	Negligible	
Melaleuca sp. Wanneroo (G.J. Keighery 16705)	Melaleuca sp. Wanneroo (G.J. Keighery 16705) is known to co-occur often as a dominant, in dense patches with other Melaleuca species, predominantly M. systena, when growing on very shallow soils over limestone 'caprock' on ridges (TSSC, 2019).	E	EN					May	0	0	0	0	0	0	Negligible	
Macarthuria keigheryi	White or grey sand.	E	EN					May	0	0	0	0	2	2	Low	
Caladenia huegelii	Grey or brown sand, clay loam.	CE	CR					May	0	0	0	0	0	0	Negligible	
Grevillea curviloba	Grey sand, sandy loam. Winter-wet heath.	E	EN					May	0	0	0	0	0	0	Negligible	
Caleana dixonii	Deep sand in open areas beneath dense tall shrubland with scattered emergent banksias, or in shallow sand over laterite in heathland (DCCEEW, 2023).	E	VU					May	0	0	0	0	2	2	Low	
Anigozanthos viridis subsp. terraspectans	Grey sand, clay loam. Winter-wet depressions.	V	VU					Likely	0	0	0	0	0	0	Negligible	
Drakaea micrantha	White-grey sand.	V	VU					May	0	0	0	0	2	2	Low	
Diuris micrantha	Brown loamy clay. Winter-wet swamps, in shallow water.	V	VU					Likely	0	0	0	0	0	0	Negligible	
Eleocharis keigheryi	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	V	VU					May	0	0	0	0	0	0	Negligible	

1. Habitat derived from WAH (1998-) unless otherwise stated.

Appendix B

Significant Fauna Desktop Assessment

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Type	Taxon	Common Name	Habitat	Cons. Code WA	Cons. Code EPBC	Date (DBCA)	Records (DBCA)	Distance (KM) [DBCA]	PMST	Recorded in Survey Area	Known from Vicinity (<20km)	Recent Record (Last 20 years)	Potential presence of suitable habitat within the Survey Area (0,1,2)	Total Score	Likelihood
Bird	*Actitis hypoleucos*	Common Sandpiper	Wide range of coastal wetlands, around muddy margins or rocky shores, some inland wetlands and rarely on mudflats (DCCEEW, 2023)	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Anous stolidus*	Common Noddy	Blue-water seas, usually far from the mainland from northern seas south to Lancelin Island (Birdlife, 2020)(Johnstone & Storr, 1998).	IA	Mi				Likely	0	0	0	0	0	Negligible
Bird	*Anous tenuirostris melanops*	Australian Lesser Noddy	The Australian lesser noddy is only known to breed in Houtman Abrolhos, where colonies on Pelsaert (four colonies, total area 3.0 ha), Wooded (0.7 ha) and Morley (0.8 ha) Islands occupy a total of 5 ha. Birds appear to remain near the breeding islands all year (Higgins and Davies, 1996).	EN	V & Ma				May	0	0	0	0	0	Negligible
Bird	*Aphelocephala leucopsis*	Southern Whiteface	Dry open forests and woodland and inland scrubs of mallee, mulga and saltbush are the preferred habitat of Southern Whiteface, especially areas with fallen timber or dead trees and stumps (Higgins & Davies, 1996).		V				May	0	0	0	1	1	Low
Bird	*Apus pacificus*	Fork-tailed Swift	Over inland plains, sometimes boave foothills or in coastal areas (DCCEEW, 2023).	IA	Mi	2000	3	2.06	Likely	0	1	0	1	2	Low
Bird	*Ardenna carneipes*	Flesh-footed Shearwater	Subtropics over conntinental shelves and occasionally inshore waters (DCCEEW, 2023).	VU & IA	Ma & Mi				Likely	0	0	0	0	0	Negligible
Bird	*Ardenna grisea*	Sooty Shearwater	The species migrates and forages in the North Pacific and Atlantic Oceans during the non-breeding season. Sooty Shearwaters may forage inshore occasionally, especially during rough weather.		Ma & Mi				May	0	0	0	0	0	Negligible
Bird	*Ardenna pacifica*	Wedge-tailed Shearwater	Tropical and subtropical waters (DCCEEW, 2023).		Mi				Known	0	0	0	0	0	Negligible
Bird	*Arenaria interpres*	Ruddy Turnstone	Coastal regions with exposed rock coast lines or coral reefs (DCCEEW, 2023).	IA	Mi	1991	1	2.25	Known	0	1	0	0	1	Negligible
Bird	*Atrichornis clamosus*	Noisy Shrub-bird	Ecological communities that support a dense understorey or lower stratum of sedges and shrubs, a dense accumulation of leaf litter and an abundant population of litter-dwelling invertebrates. It mainly occurs in low closed forests dominated by Eucalyptus or Agonis and Banksia littoralis and steep and wetter gullies, and drainage lines of hills and granite mountains , and on the margins of freshwater lakes. It is also common in low closed forests up to 5 m in height that are dominated by Hakea elliptica, Eucalyptus or Agonis and B. littoralis and occur around granite outcrops (H. elliptica), in shallower and drier gullies (Eucalyptus) and on the margins of freshwater lakes (Agonis and B. littoralis).	EN	E				May	0	0	0	1	1	Low
Bird	*Botaurus poiciloptilus*	Australasian Bittern	Freshwater wetlands and, rarely, estuaries or tidal wetlands, favouring tall dense vegetation (TSSC, 2019).	EN	E	1977	3	7.74	Known	0	1	0	0	1	Negligible
Bird	*Calidris acuminata*	Sharp-tailed Sandpiper	Occurs along muddy edges of shallow fresh or brackish wetlands with inundated or emergent sedges, grass, saltmarsh or other low vegetation (DCCEEW, 2023).	IA	Mi	1992	2	2.25	Known	0	1	0	0	1	Negligible
Bird	*Calidris alba*	Sanderling	Restricted to the coast, mostly on open sandy beaches exposed to open sea-swell, exposed sandbars and spits, and shingle banks (DCCEEW, 2023).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Calidris canutus*	Red Knot	Intertidal mudflats, sandflats and sandy beaches of sheltered coasts (DCCEEW, 2023).	EN & IA	E & Mi	1992	1	2.25	Known	0	1	0	0	1	Negligible
Bird	*Calidris ferruginea*	Curlew Sandpiper	Intertidal mudflats in sheltered coastal areas and inland around ephemeral and permanent lakes, dams, waterholes and bore drains with bare edges of mud and sand (DCCEEW, 2023).	CR & IA	CE & Mi	1992	3	2.25	Known	0	1	0	0	1	Negligible
Bird	*Calidris melanotos*	Pectoral Sandpiper	Occupies shallow, fresh waters often containing low grass or other small herbs, swamp margins, flooded pastures and saltmarshes (Pizzey & Knight, 2012;DCCEEW, 2023).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Calidris ruficollis*	Red-necked Stint	Coastal sheltered areas and exposed or ocean beaches, sometimes on stony or rocky shores, reefs or shoals (DCCEEW, 2023).	IA	Mi	1992	4	2.25	Known	0	1	0	0	1	Negligible
Bird	*Calidris subminuta*	Long-toed Stint	Freshwater wetlands (DCCEEW, 2023).	IA	Mi	1992	2	2.25	Known	0	1	0	0	1	Negligible
Bird	*Calidris tenuirostris*	Great Knot	Sheltered coastal habitats with large intertidal mudflats or sandflats (DCCEEW, 2023).	CR & IA	CE & Mi	1992	1	2.25	Known	0	1	0	0	1	Negligible
Bird	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo	Inhabits dense Eucalyptus marginata (Jarrah), E. diversicolor (Karri) and Corymbia calophylla (Marri) forests (TSSC, 2009).	VU	V				Known	0	0	0	1	1	Low
Bird	*Charadrius bicinctus*	Double-banded Plover	They utilise grassy areas including short pasture, ploughed or newly cropped paddocks, swards, airstrips, sports grounds, exposed reefs and rock platforms with shallow rock pools and coastal sand dunes (DCCEEW, 2023).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Charadrius dubius*	Little Ringed Plover	Breeds on stony substrates around lakes, gravel pits, and along rivers; migrants occur in wide variety of fresh and brackish wetland habitats (eBird, 2023).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Charadrius leschenaultii*	Greater Sand Plover, Large Sand Plover	Beaches, tidal mudflats, reefs, dunes and is seldom observed far inland (Pizzey & Knight, 2012).	VU & IA	V				Known	0	0	0	0	0	Negligible
Bird	*Charadrius mongolus*	Lesser Sand Plover	Open intertidal flats of sheltered bays, lagoons or estuaries (Pizzey & Knight, 2012).	EN & IA	E				Known	0	0	0	0	0	Negligible
Bird	*Diomedea amsterdamensis*	Amsterdam Albatross	The Amsterdam Albatross is a marine, pelagic seabird. It nests in open patchy vegetation (among tussocks, ferns or shrubs) near exposed ridges or hillocks. It sleeps and rests on ocean waters when not breeding (Marchant & Higgins 1990).	CR	E, Ma & Mi				May	0	0	0	0	0	Negligible
Bird	*Diomedea dabbenena*	Tristan Albatross	Open water in the Atlantic Ocean near the Cape of Good Hope, South Africa (Marchant & Higgins 1990).	CR	E & Mi & Ma				May	0	0	0	0	0	Negligible
Bird	*Diomedea epomophora*	Southern Royal Albatross	Occurs on the ocean predominately around New Zealand, south eastern Australia and southern South America. Breeds on New Zealand islands.	V	VU, Ma & Mi				May	0	0	0	0	0	Negligible
Bird	*Diomedea exulans*	Wandering Albatross	Southern extent of the Australian waters of the Southern Ocean (Marchant & Higgins, 1990)	VU	V & Mi & Ma				Likely	0	0	0	0	0	Negligible
Bird	*Diomedea sanfordi*	Northern Royal Albatross	The Northern Royal Albatross is marine, pelagic and aerial. Its habitat includes subantarctic, subtropical, and occasionally Antarctic waters (Marchant & Higgins 1990).	V	E, Ma & Mi				May	0	0	0	0	0	Negligible
Bird	*Falco hypoleucos*	Grey Falcon	Timered lowland plains, including acacia shrublands)particularly with tree-lined watercourses), tussock grassland and open woodland (TSSC, 2020).	VU	V				May	0	0	0	1	1	Low
Bird	*Falco peregrinus*	Peregrine Falcon	Rainforests, arid zones and coastal to alpine areas (BirdLife, 2023).	OS		1980	6	7.74		0	1	0	1	2	Low

Type	Taxon	Common Name	Habitat	Cons. Code WA	Cons. Code EPBC	Date (DBCA)	Records (DBCA)	Distance (KM) [DBCA]	PMST	Recorded in Survey Area	Known from Vicinity (<20km)	Recent Record (Last 20 years)	Potential presence of suitable habitat within the Survey Area (0,1,2)	Total Score	Likelihood
Bird	*Gallinago megala*	Swinhoe's Snipe	Dense clumps of grass and rushes around the edges of fresh, brackish wetlands, including billabongs, rivers pools, small streams and sewage ponds. They are also found in drying clay pans and inundated plains (Higgins and Davis, 1996).	IA					Likely	0	0	0	0	0	Negligible
Bird	*Gallinago stenura*	Pin-tailed snipe	Shallow freshwaters and is distributed on the north-west coastal plains but is a casual visitor further south to Perth (Johnstone & Storr, 1998).	IA	Mi				Likely	0	0	0	0	0	Negligible
Bird	*Glareola maldivarum*	Oriental Pratincole	Open plains, floodplains or short grassland (including farmland), often occurring near terrestrial wetlands, and occurring along the coast. The species does not breed in Australia (DCCEEW, 2023).	IA	Mi				Known	0	0	0	1	1	Low
Bird	*Halobaena caerulea*	Blue Petrel	Off the coast of the Perth area, breeding on offshore stacks near Macquarie Island (Pizzey & Knight, 1999).		V & Ma				May	0	0	0	0	0	Negligible
Bird	*Hydroprogne caspia*	Caspian Tern	The Caspian Tern is found in sheltered coastal embayments and those with sandy or muddy margins (DCCEEW, 2023).	IA	Mi	1992	2	2.25	Known	0	1	0	0	1	Negligible
Bird	*Leipoa ocellata*	Malleefowl	Semi-arid to arid zone in shrublands and low woodlands dominated by mallee and associated habitats such as such as Broombush (Melaleuca uncinata) and Scrub Pine (Callitris verrucosa) (Benshemesh, 2007).	VU	V				Known	0	0	0	0	0	Negligible
Bird	*Limicola falcinellus*	Broad-billed Sandpiper	Sheltered areas of the coast, particularly estuarine mudflats but also saltmarshes, shallow freshwater lagoons, saltworks and sewage farms (DCCEEW, 2023).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Limosa lapponica*	Bar-tailed Godwit	Widespread around the coast of Western Australia from Eyre to Derby (DotE, 2015).	IA (& VU or CR at subsp. level)	Mi (& V or CE at subsp. level)	1992	2	2.25	Known	0	1	0	0	1	Negligible
Bird	*Limosa lapponica menzbieri*	Northern Siberian Bar-tailed Godwit	Coastal habitat, including large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats (Higgins & Davies, 1996).	CR	CE				Known	0	0	0	0	0	Negligible
Bird	*Limosa limosa*	Black-tailed Godwit	Coastal habitat including sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats (DCCEEW, 2023)	IA	Mi & Ma				Known	0	0	0	0	0	Negligible
Bird	*Macronectes giganteus*	Southern Giant-Petrel	The Southern Giant-Petrel occurs over subantarctic waters in summer near its breeding islands in the Atlantic and Indian Oceans, in subantarctic to southern subtropical waters on the Argentinean continental shelf and off New Zealand and the cold eastern boundary current off South America. In winter, it is common off South America, South Africa, Australia and New Zealand. It occurs in both pelagic and inshore waters. It is attracted to land at sewage outfalls and scavenges ashore (Marchant & Higgins 1990).		E, Ma & Mi				May	0	0	0	0	0	Negligible
Bird	*Macronectes halli*	Northern Giant-Petrel	Oceans, bays, seas, islands and mainland coastal areas, including offshore and inshore waters from around Fremantle (WA) (Pizzey & Knight, 2012).		V & Ma & Mi				Likely	0	0	0	0	0	Negligible
Bird	*Motacilla cinerea*	Grey Wagtail	Found across a wide variety of wetlands, watercourses and on the banks of lakes and marshes (DCCEEW, 2023).	IA	Mi				May	0	0	0	1	1	Low
Bird	*Numenius madagascariensis*	Eastern Curlew	Intertidal mudflats. The southern most important international site in Western Australia is Eighty Mile Beach (Bamford et al., 2008).	CR & IA	CE & Mi				Known	0	0	0	0	0	Negligible
Bird	*Numenius minutus*	Little Curlew	Dry grassplains, floodplains, margins of drying swamps, tidal mudflats, crops and sewage ponds (Pizzey & Knight, 2012).	IA	Ma & Mi				Likely	0	0	0	1	1	Low
Bird	*Numenius phaeopus*	Whimbrel	Along the Australian coast, inhabiting estuaries, mangroves, tidal flats, flooded paddocks, and bare grasslands (Pizzey & Knight, 2012)	IA	Mi				Known	0	0	0	1	1	Low
Bird	*Onychoprion anaethetus*	Bridled Tern	Vegetated coral cays, rocky continental islands and rock stack. They and forage in offshore, continental shelf waters and is rarely recorded along mainland coasts (Pizzey & Knight, 2012).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Oxyura australis*	Blue-billed duck	Deep water in large permanent wetlands and swamps with aquatic vegetation (Marchant & Higgins, 1990).	P4		2008	20	1.10		0	1	1	0	2	Low
Bird	*Pachyptila turtur subantarctica*	Fairy Prion (Southern)	Subtropical waters, circumpolar. Burrows in cervices or hollows beneath Colobanthus muscoides with peaty soil (TSSC, 2015).	VU					Known	0	0	0	0	0	Negligible
Bird	*Pandion haliaetus*	Osprey	Littoral and coastal habitats, terrestrial wetlands of tropical and temperate Australia, and offshore islands.Atypical habitats incude heath, woodland or forest (DCCEEW, 2023).		Ma				Known	0	0	0	1	1	Low
Bird	*Phaethon rubricauda*	Red-tailed Tropicbird	Tropical and subtropical areas around northern Western Australia (DCCEEW, 2023).	IA & P4	Mi				Known	0	0	0	0	0	Negligible
Bird	*Phalaropus lobatus*	Red-necked Phalarope	Inland and coastal lakes/swamps, includng saline waters, saltfields and artifical wetlands (DCCEEW, 2023).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Philomachus pugnax*	Ruff	Fresh, brackish and saline wetlands, tidal mudflats and saltfields (Pizzey & Knight, 2012).	IA	Ma & Mi				Known	0	0	0	0	0	Negligible
Bird	*Phoebetria fusca*	Sooty Albatross	On vegetated cliffs and steep slopes that are sheltered from prevailing winds, often amongst tussock grass and has sometimes been observed foraging in inshore waters in southern Australia.	EN & IA	V & Mi				May	0	0	0	0	0	Negligible
Bird	*Plegadis falcinellus*	Glossy Ibis	Well vegetated wetlands, wet pastures, floodwaters, brackish wetlands and mudflats (Pizzey & Knight, 2012).	IA	Mi	1980	3	7.74		0	1	0	1	2	Low
Bird	*Pluvialis fulva*	Pacific Golden Plover	Coastal habitats, found occassionally around inland wetlands (DCCEEW, 2023).		Mi				Known	0	0	0	0	0	Negligible
Bird	*Pluvialis squatarola*	Grey Plover	Coastal, marine shores, inlets, estuaries and lagoons with large tidal mudflats or sandflats, sandy beachesand rocky coasts. It is occasionally found inland (Birdlife Australia, 2023).		Mi & Ma	1992	2	2.25	Known	0	1	0	1	2	Low
Bird	*Pterodroma mollis*	Soft-plumaged Petrel	Along the entire western and southern coast, but does not occur on the northern coast of the Pilbara and Kimberly regions (Marchant & Higgins, 1990), typically frequenting oceans, bays, seas, islands, and mainland coastal areas (Pizzey & Knight, 2012).		V & Ma				Known	0	0	0	0	0	Negligible
Bird	*Rostratula australis*	Australian Painted Snipe	Shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DCCEEW, 2023).	EN	E				Known	0	0	0	0	0	Negligible
Bird	*Sterna dougallii*	Roseate Tern	Coastal and marine areas of subtropoical and tropical seas, inhabiting rocky, sandy beached, coral reefs, sand cays and offshore islands. Rarely on inshore waters (DCCEEW, 2023).		Mi				Known	0	0	0	0	0	Negligible
Bird	*Sternula albifrons*	Little Tern	Sheltered coastal environments including lagoons, estuaries, ridges or inlets, especially those with exposed sandbanks or open gently sloping sandy beaches (DCCEEW, 2023).		Ma & Mi				May	0	0	0	0	0	Negligible

Type	Taxon	Common Name	Habitat	Cons. Code WA	Cons. Code EPBC	Date (DBCA)	Records (DBCA)	Distance (KM) [DBCA]	PMST	Recorded in Survey Area	Known from Vicinity (<20km)	Recent Record (Last 20 years)	Potential presence of suitable habitat within the Survey Area (0,1,2)	Total Score	Likelihood
Bird	*Sternula nereis nereis*	Fairy Tern	It is most common in Western Australia, found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons, favouring both fresh and saline wetlands and near-coastal terrestial wetlands, including lakes and salt-ponds. (Birdlife Australia, 2023)	VU	V	1992	2	2.25	Known	0	1	0	0	1	Negligible
Bird	*Thalassarche carteri*	Indian Yellow-nosed Albatross	Subtropical and warmer subantarctic waters, foraging mostly in the southern Indian Ocean, particually off the coast of southern Western Australia, as far north as Shark Bay (Marchant & Higgins, 1990) (Weimerskirch et al., 1986).	VU	V & Mi & Ma				Likely	0	0	0	0	0	Negligible
Bird	*Thalassarche cauta*	Shy Albatross	Endemic to Australia, found in the ocean off the southern coast (Abbott et al., 2006). Juvenieles can be found in oceanic waters as far north as Shark Bay (Alderman et al., 2010).	VU	E & Ma & Mi				Likely	0	0	0	0	0	Negligible
Bird	*Thalassarche impavida*	Campbell Albatross	The Campbell Albatross is a marine sea bird inhabiting sub-Antarctic and subtropical waters from pelagic to shelf-break water habitats. In breeding and non-breeding seasons, the Campbell Albatross are specialised shelf feeders, concentrating around breeding islands or over adjacent submarine banks. In winter, they are commonly found in the coastal waters of continents, over up-wellings or boundaries of currents (Marchant & Higgins 1990).	VU	V, Ma & Mi				May	0	0	0	0	0	Negligible
Bird	*Thalassarche melanophris*	Black-Browed Albatross	Over antarctic, subantarctic, subtropical marine and coastal waters (0-24 degrees C). Nests annually on a mound of soil and vegetation, on the cliffs or steep slopes of vegetated antarctic and subantarctic islands. (NSW Governemnt Office of Environment & Heritage, 2022)	EN	V & Mi & Ma				Likely	0	0	0	0	0	Negligible
Bird	*Thalassarche steadi*	White-capped Albatross	The White-capped Albatross is a marine species and occurs in subantarctic and subtropical waters. The White-capped Albatross has been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, birds have been observed over continental shelves around continents (DCCEEW, 2023).	V	VU, Ma & Mi				May	0	0	0	0	0	Negligible
Bird	*Thalasseus bergii*	Crested Tern	A strictly coastal species. Occasional records in the arid interior of Australia (BirdLife Australia, 2022).	IA	Mi	2008	3	3.96	Known	0	1	1	0	2	Low
Bird	*Tringa brevipes*	Grey-tailed tattler	Sheltered coasts with reefs and rock platforms or intertidal mudflats, embayments, estuaries and coastal lagoons (particularly those fringed with mangroves) (Higgins and Davies, 1996).	IA & P4	Mi				Known	0	0	0	0	0	Negligible
Bird	*Tringa glareola*	Wood Sandpiper	Common in Northern Australia, a casual visitor to southern parts, occuping wetland margins, saltmarshes and sewage ponds (Pizzey & Knight, 2012).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Tringa nebularia*	Common Greenshank	Inland wetlands and sheltered coastal habitats In shallows around the edges of water often among pneumatophores of mangroves or other sparse, emergent or fringing vegetation, such as sedges or saltmarsh (DCCEEW, 2023).	IA	Ma & Mi	1992	4	2.25	Known	0	1	0	0	1	Negligible
Bird	*Tringa stagnatilis*	Marsh Sandpiper	Wetlands of varying salinity including fresh, sewage ponds and estuaries (Pizzey & Knight, 2012).	IA					Known	0	0	0	0	0	Negligible
Bird	*Tringa totanus*	Common Redshank	Tidal sandbars and mudflats, mangroves and freshwater swamps (Pizzey & Knight, 2012)	IA					Known	0	0	0	0	0	Negligible
Bird	*Xenus cinereus*	Terek Sandpiper	Primarily coastal distribution, more commoly norther and eastern Australia. Some have been recorded inland and between Bunbury and the mouth of the Moore River (DotE, 2015).	IA	Mi				Known	0	0	0	0	0	Negligible
Bird	*Zanda baudinii*	Baudin's Cockatoo	Temperate forest and woodland dominated by Eucalyptus marginata (jarrah), Corymbia calophylla (marri) and E. diversicolor (karri) (TSSC, 2018).	EN	E				Known	0	0	0	1	1	Low
Bird	*Zanda latirostris*	Carnaby's Cockatoo	Uncleared or remnant native eucalypt woodlands containing salmon gum and wandoo, and in shrubland or kwongan heathland dominated by hakea, dryandra, banksia and grevillea species. It also occurs in remnant patches of native vegetation on land otherwise cleared for agriculture. Forages seasonally in pine plantations (DCCEEW, 2023)	EN	E	2022	510	0.12	Known	0	1	1	2	4	High
Invertebrate	*Neopasiphae simplicior*	A native bee	Occurs in a single location within the bushland of the Forrestdale Lake Nature Reserve, collected from the flowers of Goodenia filiformis, Lobelia tenuior, Angianthus preissianusand Velleia sp.(DCCEEW, 2023).	E	CE				Known	0	0	0	1	1	Low
Invertebrate	*Austroconops mcmillani*	A biting midge	Larvae live in small aquatic habitats.	P2		2011	8	1.05		0	1	1	1	3	Moderate
Invertebrate	*Hesperocolletes douglasi*	Rottnest Bee	Extant population known in Pinjar. Only been two individuals ever found (TSSC, 2019).	CR	CE				May	0	0	0	1	1	Low
Invertebrate	*Hurleya* sp. (WAM C23193)	Crystal Cave crangonyctoid, cave shrimp	Only known from Yanchep Aquatic Root Mat Community	CR		1997	2	1.89		0	1	0	0	1	Negligible
Invertebrate	*Idiosoma sigillatum*	Swan Coastal Plain shield-backed trapdoor spider	Remnant habitats in Banksia woodland and heathland on sandy soils (Rix et al., 2018).	P3		2018	2	1.13		0	1	1	2	4	High
Invertebrate	*Leioproctus douglasiellus*	a short-tongued bee	Known from Kenwick wetlands, Cannington and Forestdale Lake and near Lithgow in the Blue Mountains of NSW (ALA, 2019). Has an association with Goodenia filiformis and Anthotium junciforme (South Metro Connect, 2011).	EN					Known	0	0	0	1	1	Low
Invertebrate	*Synemon gratiosa*	Graceful Sun Moth	1. Coastal heathland on Quindalup dunes where it is restricted to secondary sand dunes due to the abundance of the host plant Lomandra maritima, the prefered habitat (denser population). 2. Banksia woodland on Spearwood and Bassendean dunes, where the second known host plant L. hermaphrodita is widespread. Throughout the Swan Coastal Plain, extending into the Geraldton Sandplains (DEC, 2011).	P4		1992	301	1.05		0	1	0	1	2	Low
Invertebrate	*Westralunio carteri*	Carter's Freshwater Mussel	Freshwaters of south-west Western Australia, greatest in abundance in slower flowing waters with stable, soft sediments and low salinity (>3 g /L is lethal) (Klunzinger et al., 2012).	VU	V	1977	1	2.02	Known	0	1	0	0	1	Negligible
Mammal	*Bettongia penicillata ogilbyi*	Woylie	Dry sclerophyllous forest with a dense understory (ALA, 2023).	EN	CE	0	1	1.86	Known	0	1	0	1	2	Low
Mammal	*Dasyurus geoffroii*	Western Quoll, Chuditch	Currently restricted to south-west Western Australia, in areas dominated by sclerophyll forest or drier woodland, heath and mallee shrubland (Van Dyck & Strahan, 2008).	VU					Known	0	0	0	1	1	Low
Mammal	*Hydromys chrysogaster*	Water Rat	Occur near permanent bodies of fresh or brackish water (Van Dyck & Strahan, 2008).	P4		2013	7	1.16		0	1	1	0	2	Low
Mammal	*Isoodon fusciventer*	Quenda, Southern Brown Bandicoot	Forest, woodland, heath and shrub communities, with sandy soils and dense heathy vegetation (Van Dyck & Strahan, 2008).	P4		2022	18	1.53		0	1	1	2	4	High

Type	Taxon	Common Name	Habitat	Cons. Code WA	Cons. Code EPBC	Date (DBCA)	Records (DBCA)	Distance (KM) [DBCA]	PMST	Recorded in Survey Area	Known from Vicinity (<20km)	Recent Record (Last 20 years)	Potential presence of suitable habitat within the Survey Area (0,1,2)	Total Score	Likelihood
Mammal	*Macroderma gigas*	Ghost Bat	Northern Australia, inhabiting arid Pilbara to tropical savanna woodlands and rainforests rainforest, monsoon and vine thicket, open woodlands and arid areas and reside in caves, rock crevices and disused mine adits (DoE 2016).	VU	V				May	0	0	0	0	0	Negligible
Mammal	*Myrmecobius fasciatus*	Numbat	Mulga woodland, spinifex sandplains and Eucalypt forests and woodlands. In WA, their habitat is generally woodland dominated by Eucalyptus species, with abundant hollow logs and branches (DBCA, 2021)	EN	E				Known	0	0	0	1	1	Low
Mammal	*Notamacropus irma*	Western Brush Wallaby	Open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets (DCCEEW, 2023).	P4		2014	3	5.82		0	1	1	2	4	High
Mammal	*Pseudocheirus occidentalis*	Western Ringtail Possum	Peppermint (*Agonis flexuosa*) forest and woodland and Tuart (*Eucalyptus gomphocephala*) with a peppermint mid-story. Inland, the species is found in Jarrah (*Eucalyptus marginata*), Wandoo (*Eucalyptus wandoo*) and Marri (*Corymbia calophylla*) forest (Van Dyck & Strahan, 2008).	CR	CE				Known	0	0	0	1	1	Low
Mammal	*Setonix brachyurus*	Quokka	Jarrah forest south-east of Perth, extending south through southern Jarrah, Marri and Karri forests onward to the south coast. It is now thought to be absent from the Swan Coastal Plain. Rottnest Island (DCCEEW, 2023).	VU	V				Known	0	0	0	1	1	Low
Reptile	*Delma concinna major*	Javelin Lizard	Heaths on dunes and sand-plains along mid- to lower west coast. Subspecies dwells in dense matrix of low vegetation and associated leaf litter in Shark Bay.	P1		2015	1	5.61		0	1	1	1	3	Moderate
Reptile	*Neelaps calonotos*	Black-striped Snake	Confined to the Swan Coastal Plain between Mandurah and Lancelin, sheltering in upper layers of loose soil beneath leaf litter in Eucalyptus/Banksia woodlands, typically at the base of trees and shrubs (Bush et al., 2010).	P3		1995	3	1.13		0	1	0	2	3	High

Appendix C

Flora Site Data

Appendix C Flora Site Data

Appendix C – Flora Site Data

Site No: Q1	**Date**: 05/10/2023	**Longitude**: 115.67099	**Latitude**: -31.55376

Type: Quadrat
Soil Types: White-grey sand
Topography: Flat
Surface:
Outcrops: None
Litter: Bare ground 10%, litter 15%
Vegetation Condition: Good
Condition Notes: Condition representative of Banksia Woodland TEC patch assessment, as per the Conservation Advice (DEE, 2016).
Soil Condition: Dry
Fire: 10+ years

Vegetation Type: BmApMp - *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* low open woodland over *Acacia pulchella, Jacksonia sternbergiana* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia, Burchardia congesta* and *Conostylis aculeata* sparse forbland.

Weed	Taxon	Height (cm)	Foliage (%)
	?Scaevola canescens	5	0.1
	Acacia pulchella	110	2
	Alexgeorgea nitens	5	0.1
	Allocasuarina humilis	110	15
*	*Avena barbata*	40	0.1
	Banksia attenuata	400	10

Weed	Taxon	Height (cm)	Foliage (%)
	Banksia menziesii	300	6
*	*Briza maxima*	30	0.1
*	*Bromus diandrus*	30	0.1
	Burchardia congesta	30	0.1
*	*Carpobrotus edulis*	5	0.1
	Conostylis aculeata	20	0.1
	Corynotheca micrantha	20	0.1
	Desmocladus sp.	10	0.5
	Drosera pallida	10	0.1
*	*Ehrharta calycina*	80	1
	Gastrolobium capitatum	50	0.1
*	*Gladiolus caryophyllaceus*	40	0.1
	Gompholobium tomentosum	30	0.5
	Hibbertia hypericoides	50	16
*	*Hypochaeris glabra*	20	0.5
	Jacksonia sternbergiana	60	2
*	*Lysimachia arvensis*	5	0.1
	Mesomelaena pseudostygia	30	2
	Nuytsia floribunda	250	3
*	*Pelargonium capitatum*	20	0.5
	Petrophile macrostachya	60	0.1
	Podotheca gnaphalioides	15	0.1
*	*Silene gallica* var. *gallica*	15	0.1
	Stylidium repens	15	0.1
	Thysanotus manglesianus	15	0.1
*	*Trifolium arvense*	20	0.1
*	*Trifolium campestre*	10	0.1
*	*Ursinia anthemoides*	25	1
	Xanthorrhoea preissii	200	8

Site No: Q2	**Date**: 05/10/2023	**Longitude**: 115.66993	**Latitude**: -31.55276

Type: Quadrat
Soil Types: Yellow-brown sand
Topography: Flat
Surface:
Outcrops: Limestone in broader community
Litter: Bare ground 10%, litter 15%
Vegetation Condition: Good
Condition Notes: Condition representative of Banksia Woodland TEC patch assessment, as per the Conservation Advice (DEE, 2016).
Soil Condition: Dry
Fire: 10+ years

Vegetation Type: BmApMp - *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* low open woodland over *Acacia pulchella, Jacksonia sternbergiana* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia, Burchardia congesta* and *Conostylis aculeata* sparse forbland.

Weed	Taxon	Height (cm)	Foliage (%)
	Acacia pulchella	80	2
	Acacia rostellifera	50	1
	Acanthocarpus preissii	50	0.5
	Alexgeorgea nitens	5	0.1
	Apectospermum spinescens	30	0.5
	Banksia attenuata	200	7
	Banksia menziesii	350	13
	Burchardia congesta	30	0.1

Weed	Taxon	Height (cm)	Foliage (%)
*	*Carpobrotus edulis*	5	0.5
	Conostylis aculeata	30	0.1
	Conostylis setigera	5	0.1
	Desmocladus sp.	10	0.1
*	*Ehrharta calycina*	70	2
*	*Gladiolus caryophyllaceus*	30	0.1
	Gompholobium tomentosum	10	0.1
	Hakea lissocarpha	60	1
	Hibbertia hypericoides	60	3
*	*Hypochaeris glabra*	10	2
	Lepidosperma calcicola	30	0.1
	Lomandra suaveolens	25	0.1
*	*Lysimachia arvensis*	2	0.1
	Macrozamia fraseri	70	5
	Mesomelaena pseudostygia	40	3
*	*Pelargonium capitatum*	30	0.1
	Petrophile axillaris	60	2
	Petrophile brevifolia	20	3
	Petrophile macrostachya	50	5
*	*Petrorhagia dubia*	10	0.1
	Podotheca gnaphalioides	10	0.1
	Schoenus clandestinus	5	0.1
*	*Silene gallica* var. *gallica*	10	0.1
	Stylidium repens	5	0.1
	Styphelia propinqua	60	0.1
*	*Trifolium arvense*	10	0.1
*	*Trifolium campestre*	10	0.1
*	*Ursinia anthemoides*	15	0.5
	Xanthorrhoea preissii	80	10

Site No: R1	**Date**: 05/10/2023	**Longitude**: 115.66972	**Latitude**: -31.55381

Type: Relevé
Soil Types: White-grey sand
Topography: Gentle slope
Surface:
Outcrops: None
Litter: Bare ground 10%, litter 5%
Vegetation Condition: Degraded
Condition Notes:
Soil Condition: Dry
Fire: 10+ years

Vegetation Type: BmApMp - *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* low open woodland over *Acacia pulchella, Jacksonia sternbergiana* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia, Burchardia congesta* and *Conostylis aculeata* sparse forbland.

Weed	Taxon	Height (cm)	Foliage (%)
	Acacia ?saligna	100	1
	Acacia pulchella	80	4
*	*Arctotheca calendula*	20	5
*	*Avena barbata*	40	5
	Banksia menziesii	200	12
*	*Briza maxima*	15	1
*	*Bromus diandrus*	25	2
*	*Carpobrotus edulis*	5	7
*	*Ehrharta calycina*	60	40

Weed	Taxon	Height (cm)	Foliage (%)
	Eucalyptus todtiana	600	20
*	*Euphorbia terracina*	20	3
*	*Hypochaeris glabra*	15	15
	Macrozamia fraseri	60	0.5
*	*Pelargonium capitatum*	15	3
	Rhagodia baccata	30	0.1
*	*Trifolium arvense*	5	1
*	*Trifolium campestre*	5	1
*	*Ursinia anthemoides*	30	8

Site No: R2	**Date**: 05/10/2023	**Longitude**: 115.66836	**Latitude**: -31.55230

Type: Relevé
Soil Types: White-grey sand
Topography: Flat
Surface:
Outcrops: None
Litter: Bare ground 1%, litter 3%
Vegetation Condition: Good
Condition Notes: Condition representative of Banksia Woodland TEC patch assessment, as per the Conservation Advice (DEE, 2016).
Soil Condition: Dry
Fire: <5 years
Vegetation Type: BmApMp

Weed	Taxon	Height (cm)	Foliage (%)
	Acacia ?saligna	350	1
	Anthocercis littorea	210	0.5
*	*Avena barbata*	50	4
	Banksia attenuata	400	6
	Banksia menziesii	400	2
*	*Briza maxima*	20	1
*	*Bromus diandrus*	30	0.5
*	*Carpobrotus edulis*	5	2
	Conostylis aculeata	20	0.1
*	*Ehrharta calycina*	60	70

Weed	Taxon	Height (cm)	Foliage (%)
	Eucalyptus todtiana	600	15
*	*Euphorbia terracina*	30	0.5
*	*Hypochaeris glabra*	15	15
	Jacksonia sternbergiana	110	2
	Kennedia prostrata	5	0.1
*	*Lupinus cosentinii*	15	0.1
	Macrozamia fraseri	60	0.1
	Nuytsia floribunda	800	2
*	*Pelargonium capitatum*	20	5
*	*Trifolium arvense*	10	0.1
*	*Ursinia anthemoides*	20	2

Site No: R3	**Date**: 05/10/2023	**Longitude**: 115.66943	**Latitude**: -31.55289

Type: Relevé
Soil Types: Yellow-brown sand
Topography: Flat
Surface:
Outcrops: None
Litter: Bare ground 10%, litter 10%
Vegetation Condition: Degraded
Condition Notes:
Soil Condition: Dry
Fire: 10+ years

Vegetation Type: ArHhCm - *Acacia rostellifera*, *Macrozamia fraseri* and *Jacksonia sternbergiana* tall closed shrubland over *Hibbertia hypericoides* and *Acacia ?saligna* low shrubland over *Corynotheca micrantha* and *Ptilotus polystachyus* sparse forbland.

Weed	Taxon	Height (cm)	Foliage (%)
	Acacia ?saligna	70	2
	Acacia rostellifera	350	80
*	*Bromus diandrus*	15	1
*	*Carpobrotus edulis*	5	1
	Corynotheca micrantha	20	1
*	*Ehrharta calycina*	80	70
*	*Euphorbia terracina*	25	3
	Hibbertia hypericoides	60	0.5
*	*Hypochaeris glabra*	20	15
	Jacksonia sternbergiana	250	3

Weed	Taxon	Height (cm)	Foliage (%)
	Macrozamia fraseri	180	1
*	*Pelargonium capitatum*	30	5
	Ptilotus polystachyus	40	0.1
*	*Trifolium arvense*	10	0.5

Appendix D

Flora Species by Family by Community Matrix

Appendix D Flora Species by Family by Community Matrix

Appendix D - Flora Species by Family by Community Matrix

Family	Weed[1]	Taxon	ArHhCm	BmApMp				Oppo
			R3	Q1	Q2	R1	R2	
Aizoaceae								
	*	*Carpobrotus edulis*	X	X	X	X	X	
Amaranthaceae								
		Ptilotus polystachyus	X					
Asparagaceae								
		Acanthocarpus preissii			X			
		Lomandra suaveolens			X			
		Thysanotus manglesianus		X				
Asteraceae								
	*	*Arctotheca calendula*				X		
	*	*Hypochaeris glabra*	X	X	X	X	X	
		Podotheca gnaphalioides		X	X			
	*	*Ursinia anthemoides*		X	X	X	X	
Boraginaceae								
	*DP	*Echium plantagineum*						X
Caryophyllaceae								
	*	*Petrorhagia dubia*			X			
	*	*Silene gallica* var. *gallica*		X	X			
Casuarinaceae								
		Allocasuarina humilis		X				
Chenopodiaceae								
		Rhagodia baccata				X		
Colchicaceae								
		Burchardia congesta		X	X			
Cyperaceae								
		Lepidosperma calcicola			X			
		Mesomelaena pseudostygia		X	X			
		Schoenus clandestinus			X			
Dilleniaceae								
		Hibbertia hypericoides	X	X	X			
Droseraceae								
		Drosera pallida		X				
Ericaceae								
		Styphelia propinqua			X			X
Euphorbiaceae								
	*	*Euphorbia terracina*	X			X	X	
Fabaceae								
		Acacia ?saligna	X			X	X	X
		Acacia pulchella		X	X	X		
		Acacia rostellifera	X		X			
		Gastrolobium capitatum		X				
		Gompholobium tomentosum		X	X			
		Jacksonia sternbergiana	X	X			X	
		Kennedia prostrata					X	
	*	*Lupinus cosentinii*					X	
	*	*Trifolium arvense*	X	X	X	X	X	
	*	*Trifolium campestre*		X	X	X		
Geraniaceae								
	*	*Pelargonium capitatum*	X	X	X	X	X	
Goodeniaceae								
		?Scaevola canescens		X				
Haemodoraceae								
		Conostylis aculeata		X	X		X	
		Conostylis setigera			X			
Hemerocallidaceae								
		Corynotheca micrantha	X	X				
Iridaceae								
	*	*Gladiolus caryophyllaceus*		X	X			
Loranthaceae								
		Nuytsia floribunda		X			X	
Myrtaceae								
		Agonis flexuosa						X
		Apectospermum spinescens			X			
		Eucalyptus todtiana				X	X	
Poaceae								
	*	*Avena barbata*		X		X	X	
	*	*Briza maxima*		X		X	X	
	*	*Bromus diandrus*	X	X		X	X	
	*	*Ehrharta calycina*	X	X	X	X	X	
Primulaceae								
	*	*Lysimachia arvensis*		X	X			
Proteaceae								

Family	Weed[1]	Taxon	ArHhCm	BmApMp				Oppo
			R3	Q1	Q2	R1	R2	
		Banksia attenuata		X	X		X	
		Banksia menziesii		X	X	X	X	
		Hakea lissocarpha			X			
		Petrophile axillaris			X			
		Petrophile brevifolia			X			
		Petrophile macrostachya		X	X			
Restionaceae								
		Alexgeorgea nitens		X	X			
		Desmocladus sp.		X	X			
Solanaceae								
		Anthocercis littorea					X	X
Stylidiaceae								
		Stylidium repens		X	X			
Xantorrhoeaceae								
		Xanthorrhoea preissii		X	X			
Zamiaceae								
		Macrozamia fraseri	X		X	X	X	

1. DP Declared Pest under the BAM Act

Appendix E

Floristic Community Type Analysis Results

Appendix E Floristic Community Type Analysis Results

Appendix E - Floristic Community Type Analysis Results

Sample Site	Bray Curtis Resemblance Comprehensive (Keighery et al., 2012) (% similar, SCP quadrat, FCT)	Bray Curtis Resemblance No Singles (Keighery et al., 2012) (% similar, SCP quadrat, FCT)	Bray Curtis Resemblance Comprehensive (Gibson et al., 1994) (% similar, SCP quadrat, FCT)	Bray Curtis Resemblance No Singles (Gibson et al., 1994) (% similar, SCP quadrat, FCT)	Inferred FCT	Comment
Q1	47%, WOODV-2, 28 44%, TRIG-3, 28 44%, YAN-4, 28 43%, SHENT-1, 28	48%, WOODV-2, 28 45%, TRIG-3, 28 45%, YAN-4, 28 44%, SHENT-1, 28	49%, WOODV-2, 28 46%, YAN-4, 28 44%, SHENT-1, 28 44%, TRIG-3, 28	51%, WOODV-2, 28 48%, YAN-4, 28 46%, SHENT-1, 28 46%, TRIG-3, 28	FCT 28	
Q2	44%, WOODV-2, 28 42%, SHENT-1, 28 41%, YAN-4, 28 38%, wilb07, 28	46%, WOODV-2, 28 44%, SHENT-1, 28 43%, YAN-4, 28 40%, wilb07, 28	44%, WOODV-2, 28 41%, SHENT-1, 28 41%, YAN-4, 28 36%, TRIG-3, 28	47%, WOODV-2, 28 44%, SHENT-1, 28 44%, YAN-4, 28 38%, TRIG-3, 28	FCT 28	
R2	30%, WOODV-2, 28 28%, bold12, 24 27%, bold14, 24 27%, card11, 6	31%, WOODV-2 29%, bold12, 24 29%, bold14, 24 29%, card1, 6	30%, WOODV-2, 28 27%, THOM-2, 24 27%, card11, 6 26%, card4, 6	32%, WOODV-2, 28 30%, card11, 6 29%, THOM-2, 24 29%, card4, 6	FCT 28	Unlikely to refect FCT 24 as it encompasses *Eucalyptus gomphocephala* - *Agonis flexuosa* woodlands. Correlation to FCT 6 (Weed dominated wetlands on heavy soils) likely due to heavy presence of weeds within the sample site. FCT 28 is suitable.

Appendix F

Black Cockatoo Breeding Habitat

Appendix F Black Cockatoo Breeding Habitat

D R A F T

Appendix F - Black Cockatoo Breeding Habitat

Species	Tree Height	DBH (cm)	Tree Health	No. of Hollows	Size of Hollow (cm)	Hollow Height Above Ground (m)	Evidence of Use	Northing	Easting
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	33	Alive	0	NA	NA	NA	6507982.41	373915.47
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	35	Alive	0	NA	NA	NA	6507982.18	373924.69
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	32	Alive	0	NA	NA	NA	6508101.36	373840.16
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	30	Alive	0	NA	NA	NA	6508271.70	373764.69
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	57	Alive	0	NA	NA	NA	6508261.27	373765.09
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	40	Alive	0	NA	NA	NA	6508228.26	373758.30
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	40	Alive	0	NA	NA	NA	6508226.77	373758.40
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	35	Alive	0	NA	NA	NA	6508228.13	373765.76
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	42	Alive	0	NA	NA	NA	6508223.50	373783.57
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	54	Alive	0	NA	NA	NA	6508219.08	373800.82
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	33	Alive	0	NA	NA	NA	6508199.57	373803.46
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	34	Alive	0	NA	NA	NA	6508278.76	373618.11
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	31	Alive	0	NA	NA	NA	6508327.49	373614.22
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	42	Alive	0	NA	NA	NA	6508331.31	373614.65

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Species	Tree Height	DBH (cm)	Tree Health	No. of Hollows	Size of Hollow (cm)	Hollow Height Above Ground (m)	Evidence of Use	Northing	Easting
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	46	Alive	0	NA	NA	NA	6508331.12	373609.96
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	31	Alive	0	NA	NA	NA	6508315.90	373602.76
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	48	Alive	0	NA	NA	NA	6508360.31	373581.24
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	39	Alive	0	NA	NA	NA	6508378.49	373585.11
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	37	Alive	0	NA	NA	NA	6508388.31	373594.48
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	82	Alive	0	NA	NA	NA	6508393.21	373599.62
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	31	Alive	0	NA	NA	NA	6508400.16	373600.26
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	30	Alive	0	NA	NA	NA	6508410.54	373560.17
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	53	Alive	0	NA	NA	NA	6508417.96	373556.85
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	34	Alive	0	NA	NA	NA	6508423.07	373557.32
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	30	Alive	0	NA	NA	NA	6508427.68	373556.37
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	31	Alive	0	NA	NA	NA	6508427.61	373553.04
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	53	Alive	0	NA	NA	NA	6508435.06	373546.93
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	41	Alive	0	NA	NA	NA	6508435.44	373540.22
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	38	Alive	0	NA	NA	NA	6508407.94	373519.59
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	68	Alive	0	NA	NA	NA	6508409.40	373526.24

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Species	Tree Height	DBH (cm)	Tree Health	No. of Hollows	Size of Hollow (cm)	Hollow Height Above Ground (m)	Evidence of Use	Northing	Easting
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	96	Alive	1	25 x 25	5	Occupancy: No signs	6508408.71	373529.07
Coastal Blackbutt (*Eucalyptus todtiana*)	10-15m	68	Alive	0	NA	NA	NA	6508412.13	373551.12
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	34	Alive	0	NA	NA	NA	6508429.45	373604.43
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	33	Alive	0	NA	NA	NA	6508296.67	373751.76
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	31	Alive	0	NA	NA	NA	6508447.88	373655.19
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	34	Alive	0	NA	NA	NA	6508449.38	373656.07
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	35	Alive	0	NA	NA	NA	6508443.26	373644.64
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	30	Alive	0	NA	NA	NA	6508429.28	373643.78
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	45	Alive	0	NA	NA	NA	6508405.50	373622.34
Coastal Blackbutt (*Eucalyptus todtiana*)	5-10m	35	Alive	0	NA	NA	NA	6508420.49	373609.30
Stag	10-15m	62	Dead	0	NA	NA	NA	6508174.20	373737.91
Stag	5-10m	50	Dead	0	NA	NA	NA	6508201.54	373799.68
Stag	5-10m	50	Dead	0	NA	NA	NA	6508326.47	373612.16
Stag	5-10m	67	Dead	0	NA	NA	NA	6508336.96	373581.07
Tuart (*Eucalyptus gomphocephala*)	10-15m	85	Alive	0	NA	NA	NA	6508476.34	373483.27

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