BIOLOGICAL SURVEY

LOTS 5324 AND 8037 DURINGEN ROAD, COWALLA

MAIN ROADS WESTERN AUSTRALIA

FEBRUARY 2023

Focused Vision Consulting Pty Ltd
ABN 25 605 804 500

Please direct all enquiries to:
Focused Vision Consulting Pty Ltd
8/83 Mell Road, SPEARWOOD WA 6163
Ph: 08 6179 4111
E: admin@focusedvision.com.au

Document History

Rev.	Author	Reviewed	Approved	Date
A	Megan Gray Graduate Ecologist/Botanist Yasmyn Skinner Graduate Ecologist Natalia Huang Principal Zoologist	Kellie Bauer-Simpson Principal Ecologist		09/02/2022
B	Megan Gray Graduate Ecologist/Botanist Yasmyn Skinner Graduate Ecologist Natalia Huang Principal Zoologist	Kristen Bleby Senior Ecologist	Kellie Bauer-Simpson Principal Ecologist	18/02/2022
C	Megan Gray Graduate Ecologist/Botanist Yasmyn Skinner Graduate Ecologist Natalia Huang Principal Zoologist	Main Roads WA	Kellie Bauer-Simpson Principal Ecologist	04/06/2022
0	Megan Gray Graduate Ecologist/Botanist Yasmyn Skinner Graduate Ecologist Natalia Huang Principal Zoologist	Lisa Chappell Senior Environmental Scientist/ Botanist	Kellie Bauer-Simpson Principal Ecologist	25/08/2022
1	Megan Gray Ecologist/Botanist Yasmyn Skinner Graduate Ecologist Natalia Huang Principal Zoologist	Lisa Chappell Senior Environmental Scientist/ Botanist	Kellie Bauer-Simpson Principal Ecologist	03/02/2023

TABLE OF CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

Main Roads Western Australia (Main Roads) commissioned Focused Vision Consulting Pty Ltd (FVC) to undertake and report on a biological assessment, including a desktop assessment and field assessment for the potential offset site at Lots 5324 and 8037 Duringen Road, Cowalla (survey area). The purpose of the biological assessment was to define key flora, vegetation, fauna, and Black-Cockatoo values. The biological assessment required an assessment of the State and Commonwealth listed *Banksia Woodlands of the Swan Coastal Plain* Threatened Ecological Community (TEC), Black-Cockatoo habitat, and trees with suitable DBH (i.e. trees with a diameter at breast height ≥500 mm) (DSEWPaC 2012).

FVC undertook a comprehensive biological assessment of the survey area during spring 2021, which comprised of a desktop assessment for flora, vegetation, ecological communities, fauna and significant fauna habitat, plus field assessments including a two-phase flora and vegetation assessment, targeted survey for flora species and ecological communities of significance, a basic fauna assessment and a targeted Black-Cockatoo habitat survey. All assessments and reporting have been conducted in accordance with relevant technical guidance and conservation advice.

The key findings and conclusions arising from the flora, vegetation, fauna and habitat assessment within the survey area are as follows:

- The timing of the field surveys (October and November) was considered optimal for the identification of biological values, especially flowering flora and annual and ephemeral species. A two-phase floristic survey was conducted within Banksia woodland quadrats.
- No Threatened flora under the *Biodiversity Conservation Act 2016* (BC Act) or under the *Environment Protection and Biodiversity and Conservation Act 1999* (EPBC Act) were recorded.
- Four Priority flora listed by the Department of Biodiversity, Conservation and Attractions (DBCA), *Banksia dallanneyi* subsp. *pollosta* (P3), *Dillwynia dillwynioides* (P3), *Dodonaea hackettiana* (P4) and *Verticordia lindleyi* subsp. *lindleyi* (P4) were recorded across five of the six mapped vegetation units.
- Based on the findings of desktop assessment, combined with field observations regarding habitat suitability, further to the four recorded Priority flora, it is considered that eight species of Threatened flora and 38 species of Priority flora may occur in the survey area.
- No Declared Pests (DP) plants or Weeds of National Significance (WoNS) listed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) were recorded within the survey area.
- Remnant vegetation of the survey area supports six vegetation units broadly characterised as Banksia woodlands (BaBmEt, BaBmMp and MpBaBm), Melaleuca woodlands (MpCp and MrKgMt) and a vegetation unit (Xp), that has been subject to significant modification, including clearing.
- The majority of the survey area (993.93 ha, 71.82%) supports vegetation with a condition of 'Very Good' to 'Excellent', with more than half of the Banksia woodland vegetation units in 'Excellent' condition, occupying 60.30% (834.37 ha)of the survey area.
- The Commonwealth-listed Threatened Ecological Community (TEC) and State-listed Priority Ecological Community (PEC) '*Banksia woodlands of the Swan Coastal Plain IBRA Region*' (Banksia woodlands TEC) was confirmed to occur throughout the survey area. The three vegetation units (BaBmEt, BaBmMp and MpBaBm) described and mapped within the survey area were determined to be characteristic of the Banksia woodlands TEC which occupies 64.36% (890.71 ha) of the survey area, and is part of a regional patch that spans approximately 19,064.75 ha.
- Two State-listed Priority 3 ecological communities occur within the survey area, Floristic Community Type (FCT) 22 - '*Banksia ilicifolia* woodlands' and FCT 23b – 'Northern *Banksia attenuata – Banksia menziesii* woodlands'. Floristic analysis and consideration of species composition determined that vegetation unit

MpBaBm is likely representative of FCT 22, while vegetation units BaBmEt and BaBmMp are considered representative of FCT 23b.

- No fauna species of significance were recorded within the survey area; however, the Commonwealth-listed Carnaby's Black-Cockatoo is considered likely to regularly utilise the survey area for foraging and was observed adjacent to the survey area during the field assessment. No other fauna species of significance was observed in the survey area.
- Based on the findings of desktop assessment, combined with field observations confirming habitat provided in the survey area, it is considered that 31 significant fauna species may occur as residents, vagrants or irregular visitors.
- Six fauna habitats, referred to as Vegetation and Substrate Associations (VSAs), were recorded, described and mapped within the survey area. The Banksia woodland VSAs (VSA1 and VSA6) and Melaleuca woodland VSAs (VSA4 and VSA5) provide higher value of habitat for native fauna, with the most dominant habitat, 'VSA1 - Banksia woodland' (60.62% of the survey area) considered of greatest significance with regards to fauna. This VSA also provides the best quality foraging habitat for Threatened Black-Cockatoos.
- Carnaby's Black-Cockatoos are considered regular visitors, Forest Red-tailed Black-Cockatoo irregular visitors and Baudin's Black-Cockatoo vagrant to the survey area.
- Banksia woodlands make up 64.36% (890.71 ha) of the survey area provide high quality foraging habitat for Carnaby's Black-Cockatoo; however, all VSAs within the survey area are considered to be of low to negligible foraging value for Forest Red-tailed Black-Cockatoos.
- A total of 21 Suitable DBH Trees were identified within the survey area, one of which contains a hollow potentially suitable to support Black-Cockatoo breeding but has no evidence of use by Black-Cockatoos.
- No trees suitable for Black-Cockatoo roosting are present in the survey area.

1 INTRODUCTION

1.1 BACKGROUND

Main Roads Western Australia (Main Roads) required a biological assessment, including a desktop assessment and field assessment for the potential offset site at Lots 5324 and 8037 Duringen Road, Cowalla (survey area). The desktop study area (study area) encompasses the survey area plus a 15 km radial buffer (**Figure 1**). The purpose of the biological assessment was to define key flora, vegetation, fauna, and Black-Cockatoo values. The biological assessment required an assessment of the State and Commonwealth listed *Banksia Woodlands of the Swan Coastal Plain* Threatened Ecological Community (TEC), and Black-Cockatoo foraging and roosting habitat and Suitable DBH Trees (i.e. trees with a diameter at breast height of ≥500 m).

1.2 LOCATION

The survey area is located within the locality of Cowalla, approximately 96 km north of Perth and 24 km southeast of Lancelin within the shire of Gingin. Bordered by Cowalla Road to the west and Moore River National Park to the east, the proposed offset site is located at Lots 5324 and 8037 on Duringen Road. The survey area covers an area of approximately 1,383.78 ha (**Figure 1**).

1.3 SCOPE OF WORK

Main Roads required a biological survey to delineate key flora, vegetation, fauna, and Black-Cockatoo values for the survey area. A two-phase (two field survey visits) flora and vegetation survey and basic fauna survey was carried out in accordance with the *Technical Guide Flora and Vegetation Surveys for Environment Impact Assessment* (EPA 2016a) and *Technical Guidance Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2020).

The scope of work required to be fulfilled was as follows:

- Complete a desktop assessment to evaluate the study area prior to undertaking field work.
- Conduct field assessments as per the latest EPA Guidance to verify / ground truth the desktop assessment findings through a detailed and targeted flora survey, basic fauna survey and targeted Black-Cockatoo survey.
- Report on the findings of the desktop and field assessments, with a particular focus on the presence or absence of Black-Cockatoo habitat and Threatened and Priority Ecological Communities (TEC/PEC) with a particular focus on floristic community types (FCTs) that make up the *Banksia Woodlands of the Swan Coastal Plain* TEC.

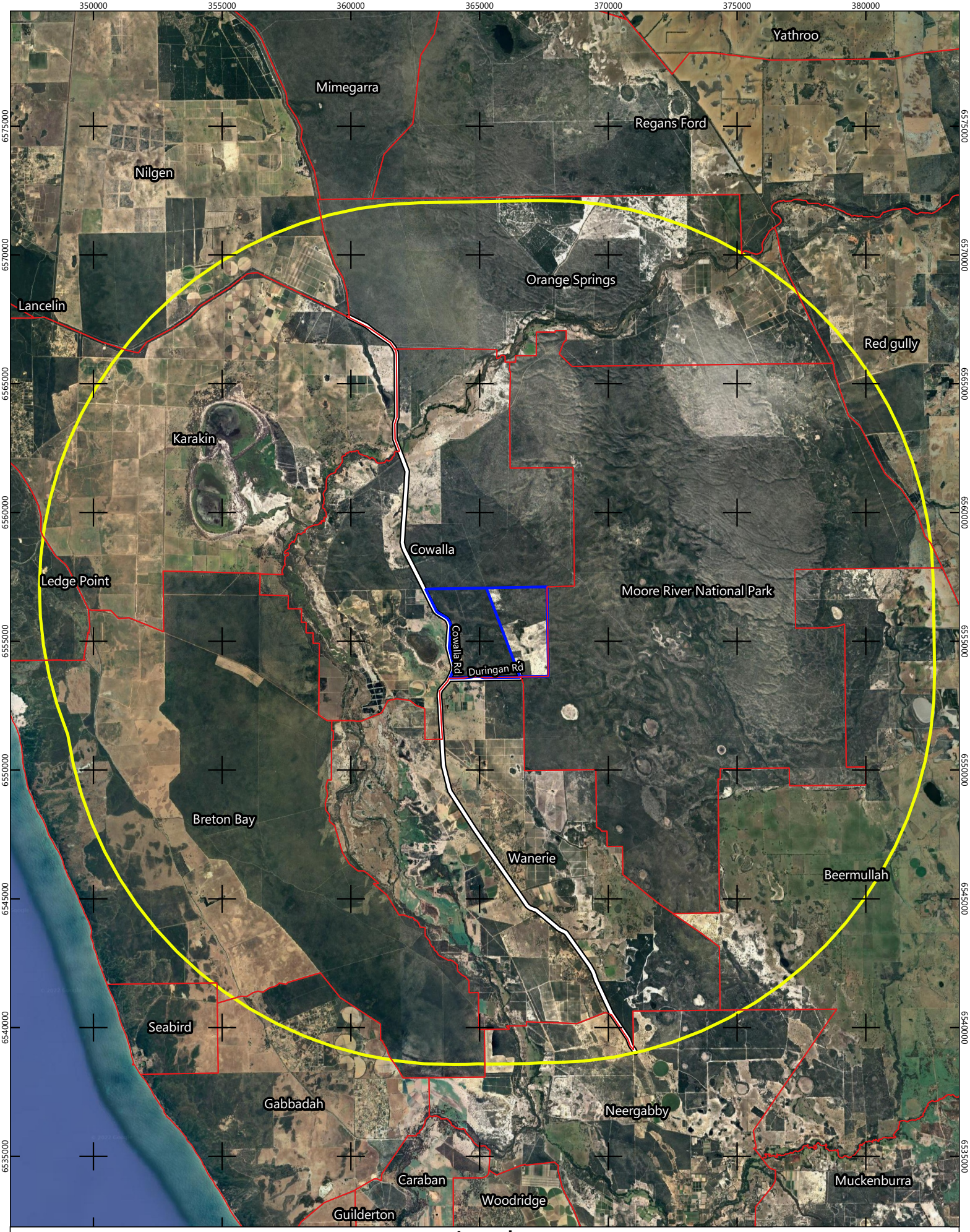


Figure 1 - Survey and Study Areas

2 LEGISLATIVE CONTEXT

The biological assessments were conducted in accordance with the following legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Western Australian *Environmental Protection Act 1986* (EP Act)
- Western Australian *Biodiversity Conservation Act 2016* (BC Act).

The assessments complied with requirements for environmental survey and reporting in Western Australia, as outlined in:

- EPA (2008) *Guidance Statement No. 33: Environmental Guidance for Planning and Development*
- EPA (2016a) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*
- EPA (2016b) *Environmental Factor Guideline – Flora and Vegetation*
- EPA (2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*
- Threatened Species Scientific Committee (TSSC) (2016) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *(s 266B) Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community*
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012) *EPBC Act referral guidelines for three threatened black cockatoo species:* Carnaby's cockatoo (endangered) *Calyptorhynchus latirostris,* Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii*; Forest red-tailed black cockatoo (vulnerable) *Calyptorhynchus banksii naso*.

Components of survey methodology guidance was also taken from:

- Commonwealth of Australia (2013) *Survey Guidelines for Australia's threatened orchids*
- Main Roads Western Australia (MRWA) (2021) *Threatened Ecological Community Banksia Woodlands of the Swan Coastal Plain Ecological Community Factsheet.*

2.1 THREATENED AND PRIORITY FLORA

The Department of Biodiversity, Conservation and Attractions (DBCA) assigns conservation status to endemic plant species that are geographically restricted to a few known populations or threatened by local processes. Allocating conservation status to plant species assists in protecting populations and conserving species from potential threats (DBCA 2018).

The BC Act provides a statutory basis for the listing of threatened species, specially protected species, threatened ecological communities (TECs), critical habitat and key threatening processes (DBCA 2021a). Whilst not awarded any statutory protection, DBCA also maintains the Priority flora list, for species of conservation concern. Therefore, both Threatened and Priority flora are important focuses of surveys conducted to inform the EIA process, and their definitions are presented in **Table 1**.

Table 1 - Definitions of Threatened and Priority Flora Species

Conservation Code	Category
T	**Threatened Species** Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act). Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
P1	**Priority 1 – 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 2 – 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 3 – 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 4 – Rare, Near Threatened and other species in need of monitoring** (a) 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. (b) 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. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Species at risk of extinction are recognised as Threatened at a Commonwealth level and are categorised according to the EPBC Act as summarised in **Table 2**.

Table 2 - Categories of EPBC Act Threatened Species

Conservation Code	Category
Ex	**Extinct** Taxa not definitely located in the wild during the past 50 years
ExW	**Extinct in the Wild** Taxa known to survive only in captivity
CR	**Critically Endangered** Taxa facing an extremely high risk of extinction in the wild in the immediate future
EN	**Endangered** Taxa facing a very high risk of extinction in the wild in the near future
VU	**Vulnerable** Taxa facing a high risk of extinction in the wild in the medium-term future
CD	**Conservation Dependent** Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened
Data Deficient (Insufficiently Known)	**Data Deficient** Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information
Least Concern	Taxa that are not Threatened

Any species listed in State and Commonwealth legislation as being of significance is said to be a significant species. This incorporates species that are endangered, vulnerable and rare, or covered by international conventions. Significance is not limited to species covered by State and Commonwealth legislation and also includes species of local significance and species showing significant range extensions or at the edge of their known range.

2.2 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat, which are subject to processes that threaten to destroy or significantly modify the assemblage across its range (DEC 2007).

The Minister may list an ecological community as a TEC in one of the following categories: Presumed Totally Destroyed (PD), Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). A publicly available database, listing TECs within Western Australia is maintained by DBCA.

TECs in WA are protected under the State BC Act and some are also protected under the Commonwealth EPBC Act. The TECs on the Commonwealth register are also listed on the Department of Agriculture, Water and the Environment (DAWE) website, and in the Protected Matters Database.

Additional to TECs, ecological communities that are considered potentially of significance (and potentially TECs) that do not currently meet survey criteria or that are not adequately defined, are rare but not threatened, have been recently removed from the TEC list or require regular monitoring, are PECs (DEC 2013) and are required to be taken into consideration during environmental impact assessments.

2.3 VEGETATION OF SIGNIFICANCE

Alongside and in addition to significance according to statutory listings, vegetation may be considered significant at a National, State, regional or local level.

2.3.1 Nationally Significant Vegetation

Vegetation communities may be considered to be of National significance where they support the following Commonwealth listed Matters of National Environmental Significance (MNES):

- populations of Threatened (EPBC listed) species
- TECs listed as nationally (EPBC) significant
- RAMSAR Wetlands of International Importance (DAWE 2021a).

2.3.2 State Significant Vegetation

Vegetation communities may be considered to be of State significance where they:

- support State-listed Threatened flora, fauna and TECs afforded protection under the BC Act (EPA 2008, WALGA 2004)
- occur within the State-managed conservation estate (areas protected under the *Conservation and Land Management Act 1984*) or areas that have been formally recommended by the DBCA for inclusion in the State conservation estate (EPA 2008).

2.3.3 Regionally Significant Vegetation

Vegetation communities may be considered to be of regional significance where they:

- support populations of Priority Flora or ecological communities (EPA 2016b, Government of Western Australia 2000)
- are formally protected or recognised as Environmentally Sensitive Areas (ESAs), or under planning schemes for conservation, such as Bush Forever (EPA 2008, WALGA 2004)
- support conservation category wetlands including associated vegetation (Government of Western Australia 2000)
- maintain important ecological processes (EPA 2016b)
- support high diversity of flora, fauna, communities, or community structure (Government of Western Australia 2000)
- contain undescribed flora species and species exhibiting range extensions (EPA 2016b)
- have a restricted regional distribution (EPA 2016b)
- are represented by less than 30% of their pre-European extent (Commonwealth of Australia 2001).

2.3.4 Locally Significant Vegetation

Vegetation communities may be considered to be locally significant where they:

- occur as small, isolated communities (Government of Western Australia 2000, WALGA 2004)
- have a restricted local extent (proportion) (EPA 2016b) and/or are locally restricted to only one or a few locations (WALGA 2004).

2.4 VEGETATION CLEARING, EXTENT AND STATUS

Clearing of native vegetation is regulated in WA under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Any clearing of native vegetation is an offence, unless carried out under a clearing permit or if the clearing is for an exempt purpose (Department of Water and Environmental Regulation (DWER 2018). A clearing permit may be required under Part V of the EP Act, whereby permit applications to clear native vegetation must be assessed against the '10 Clearing Principles' as outlined in the regulations (DER 2014).

Where clearing of native vegetation is proposed to occur, there are several key criteria applied to the assessment of clearing permit applications, in the interests of biodiversity conservation (DER 2014).

The objective of the EPA in relation to flora and vegetation is 'to protect flora and vegetation so that biological diversity and ecological integrity are maintained' (EPA 2016a). This objective is documented in the EPA Factor Guideline - Flora and Vegetation (EPA 2016a). The EPA considers it is important that ecological communities are maintained above the threshold level of 30% of the original pre-clearing extent of the community in unconstrained areas and 10% within 'constrained' areas (EPA 2008).

2.5 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Areas (ESAs) are areas that require special protection due to aspects such as landscape, fauna or historical value and are generally considered to be areas of high conservation value. ESAs are declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005 (Government of Western Australia 2005).

There are several types of ESAs relating to flora and vegetation, declared under Part V of the EP Act, which include:

- a defined wetland and the area within 50 m of that wetland
- the area covered by vegetation within 50 m of rare (Threatened) flora, to the extent where the vegetation is continuous with the vegetation in which the rare (Threatened) flora is located
- the area covered by a TEC
- Bush Forever sites (Government of Western Australia 2000).

2.6 INTRODUCED FLORA

To date, over 1,200 introduced (weed) species have been recognised to occur within Western Australia (EPA 2007). Weeds are non-indigenous plants that have been introduced either directly or indirectly through human activity. Establishing in foreign natural ecosystems, these species adversely modify natural processes, degrading the conservation values of the community and impacting on native fauna habitat. Weeds threaten the survival of numerous flora species as a result of their rapid growth and ability to out-compete native plants for available nutrients, water, space and sunlight.

2.6.1 Weeds of National Significance

Under the National Weed Strategy, there are currently 32 weed species listed as Weeds of National Significance (WoNS) (DAWE 2021b). Each weed was considered for inclusion based on the following criteria: invasive tendencies, impacts, potential for spread and socioeconomic and environmental values.

2.6.2 Declared Pest Plants

The Western Australian Organism List (WAOL) details organisms listed as Declared Pests (DPs), including pest plants, under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (DPIRD 2021).

Under the BAM Act, DPs may be listed under one of the following categories:

- C1 (exclusion), that applies to pests not established in Western Australia; control measures are to be taken to prevent their entry and establishment
- C2 (eradication), that applies to pests that are present in Western Australia but in low numbers or in limited areas where eradication is still a possibility
- C3 (management), that applies to established pests where it is not feasible or desirable to manage them in order to limit their damage.

2.6.3 Environmental Weeds

Introduced species have also been ranked by several attributes, including invasiveness, distribution and environmental impacts in the various regions in *An Environmental Weed Strategy* (CALM 1999). Those species meeting certain criteria are classified as environmental weeds. To advance the above categorisation, the Invasive Plant Prioritisation Process was developed in 2008 (DPaW 2013).

2.7 SIGNIFICANT FAUNA

Fauna species of significance (CS) are recognised under three classes: those listed under legislation (CS1) (as listed in **Table 2** above and **Table 3** below), those listed as Priority by DBCA (CS2) (**Table 4**), and those that can be considered of local or other significance, but which have no formal listing (CS3).

Fauna species can be assigned one of three significance categories:

- **Significance 1 (CS1)**: Species listed as Threatened under legislation, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and State *Biodiversity Conservation Act 2016* (BC Act).
- **Significance 2 (CS2)**: Species listed as Priority by the DBCA.
- **Significance 3 (CS3)**: Species listed as locally significant because of local threats and declines as defined by the Government of Western Australia (2000) as part of the Bush Forever plan.

Further to the Commonwealth-level classifications applied to Threatened fauna, as summarised in **Table 2**, fauna species of State-level conservation concern are scheduled under the BC Act in accordance with the schedules listed in **Table 3**.

Table 3 – Categories of Fauna Scheduled Under the WA BC Act

Schedule	Category Description
Schedule 1 (S1)	Critically Endangered fauna
Schedule 2 (S2)	Endangered fauna
Schedule 3 (S3)	Vulnerable Migratory species listed under international treaties
Schedule 4 (S4)	Presumed extinct fauna
Schedule 5 (S5)	Migratory birds under international agreement
Schedule 6 (S6)	Conservation dependent fauna
Schedule 7 (S7)	Other specially protected fauna

Fauna species not listed under the BC Act, but for which there is some concern, are listed by DBCA as Priority species, in accordance with the categories listed in **Table 4**.

Table 4 - DBCA Priority Fauna Categories

Conservation Code	Category Description
Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands
Priority 4 (P4)	Taxa in need of monitoring
Priority 5 (P5)	Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change

3 EXISTING ENVIRONMENT

3.1 CLIMATE

The study area has a Mediterranean climate which is characterised by hot dry summers and mild wet winters (Mitchell *et al.* 2002). Gingin Aero (site number 009178) is one of the Bureau of Meteorology's (BoM) meteorological recording stations located approximately 50 km from the study area, operating since 1968. The site has recorded an average annual rainfall of 646.6 mm and annual mean maximum temperatures ranging from 18.4°C in winter to 33.1°C in summer (BoM 2021) (**Figure 2**). In the months leading up to (May, June and July) and during the field assessments (October and November) the total monthly rainfall was greater than the average. In July, a total of 245.4 mm of rainfall was recorded, an additional 116.3 mm than the monthly average (129.1 mm). Another surge of rainfall (50.7 mm more than the average) occurred in October (Phase 1). Surplus rainfall in the winter and spring months provided optimal conditions, increasing the likelihood of annuals being present.

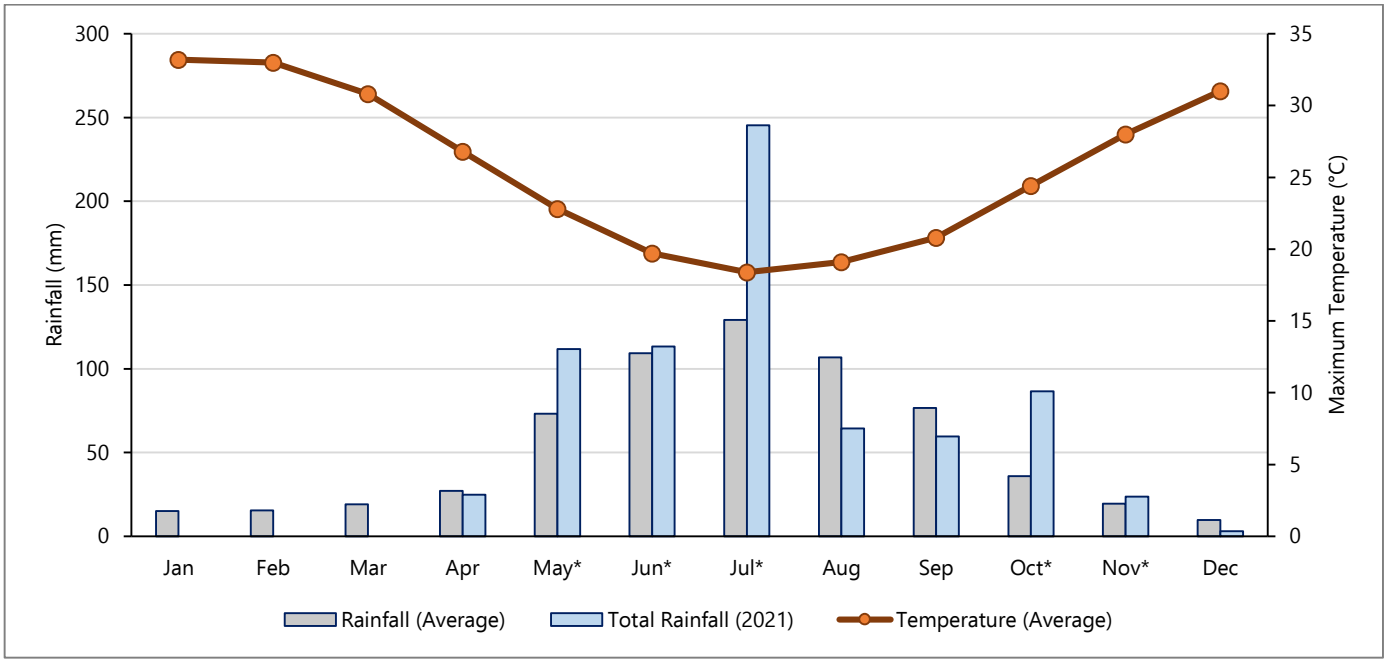


Figure 2 - Climate Data for Gingin Aero Weather Station 009178 (BoM 2021)

3.2 IBRA REGION

There are 89 recognised Interim Biogeographic Regionalisation for Australia (IBRA) regions across Australia that have been defined based on climate, geology, landforms, and characteristic vegetation and fauna (DAWE 2021c). The study area lies within the Swan Coastal Plain (SWA) IBRA region and, at a finer scale, within the Perth subregion (SWA02) (Mitchell *et al.* 2002).

The Swan Coastal Plain bioregion is a low lying coastal plain, mainly covered with Banksia and Tuart (*Eucalyptus gomphocephala*) woodlands on sandy soils. Swampy areas are dominated by paperbark, and outwash plains by *Casuarina obesa*. Melaleuca shrublands and *C. obesa* - Marri (*Corymbia calophylla*) woodlands are located extensively in the south, while Jarrah (*Eucalyptus marginata*) woodland dominates duricrusted Mesozoic sediments to the east (Mitchell *et al.* 2002).

The Perth subregion is comprised of colluvial and aeolian sands, alluvial river flats, coastal limestone and heath and/or tuart woodlands on limestone, Banksia and Jarrah - Banksia woodlands on Quaternary marine dunes of varying ages, Marri on colluvial and alluvial, and seasonal wetlands (Mitchell *et al.* 2002).

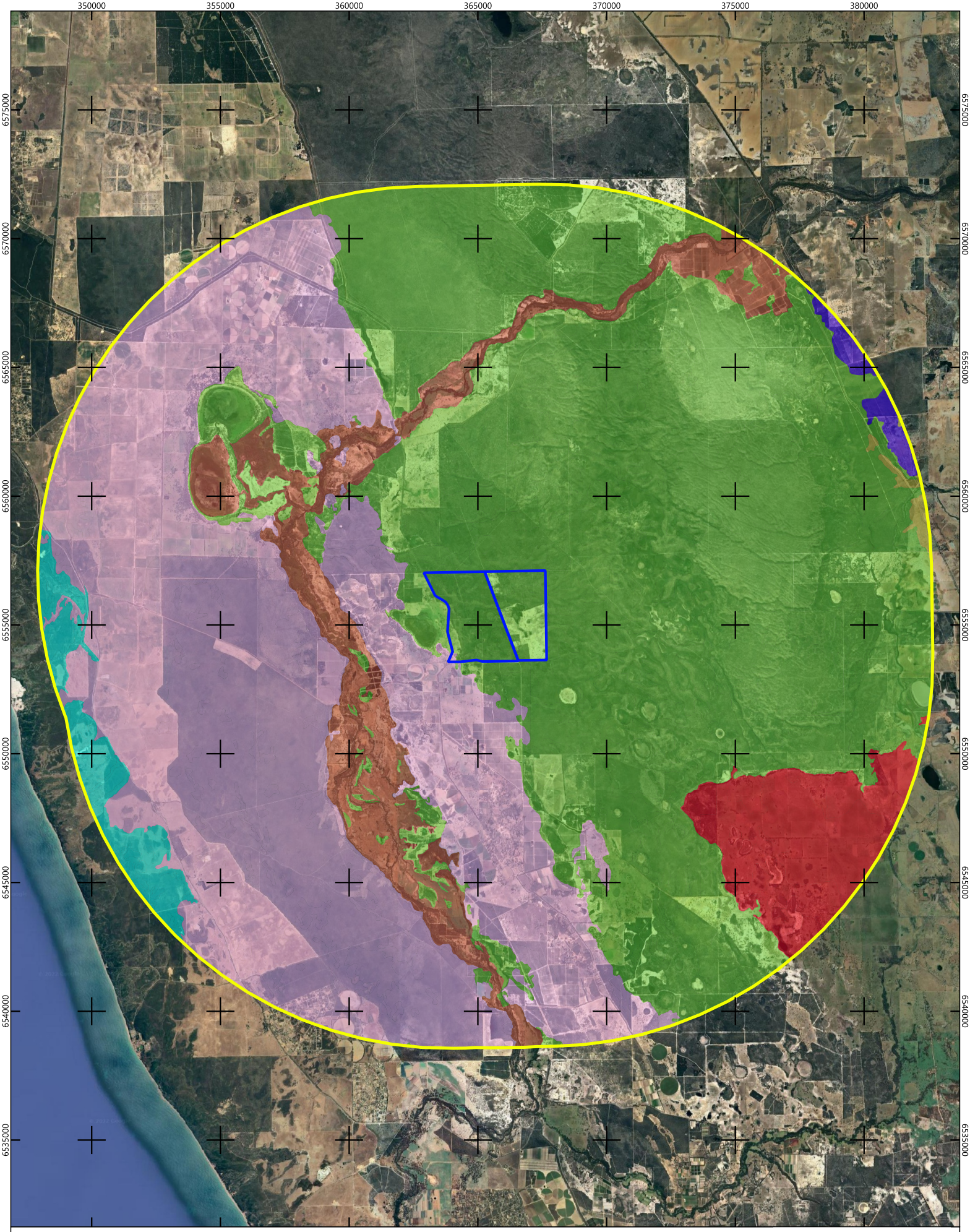
3.3 LANDFORMS, GEOLOGY AND SOILS

The Swan Coastal Plain supports five major geomorphological systems (landforms) that lie parallel to the coast. From west to east these are; Quindalup Dunes, Spearwood Dunes, Bassendean Dunes, Pinjarra Plain and Ridge Hill Shelf (Churchward and McArthur 1980; Gibson *et al.* 1994). The survey area is situated almost entirely on the Bassendean System with a small portion found within the Spearwood System, the spatial extent of each system is presented in **Figure 3a**. The Bassendean System extends across the Swan Coastal Plain from Busselton to Jurien, with pale deep sand, semi-wet and wet soils making up sand dunes and sandplains. These soils support mixed health and Banksia-paperbark woodlands. The Spearwood System similarly makes up sand dunes, sandplains with soils consisting of deep yellow sands, pale-deep sands and yellow/brown shallow sands.

The portion of the survey area consisting of the Bassendean System contains two varying geologies, Bassendean Sand and Lake Deposits (38492) (**Table 5**). Where the Bassendean System transitions into the Spearwood System, Bassendean sand is present, with the most south-eastern corner of the survey area being Tamala Limestone (**Figure 3b**).

Table 5 - Soil Systems and Associated Geology within the Survey Area

Soil System	Geology		Description
	Code	Unit	
212Bs Bassendean System	Qdcb	Bassendean Sand	Basal conglomerate overlain by dune quartz sand with heavy mineral s concentrations.
	Qt	Lake deposits 38492	Lacustrine or residual mud, clay, silt and sand, commonly gypsiferous and/or saline; playa, claypan, and swamp deposits; peat; peaty sand and clay; halitic and gypsiferous and evaporites.
211Sp Spearwood System	Qdcb	Bassendean Sand	Basal conglomerate overlain by dune quartz sand with heavy mineral s concentrations.
	Qdct	Tamala Limestone	Unconsolidated to strongly lithified calcarenite with calcrete/kankar soils; aeolian. Locally quartzoze, feldpathic, or heavy mineral -bearing.



0 2 4 6 8 km

GDA 94 / MGA Zone 50

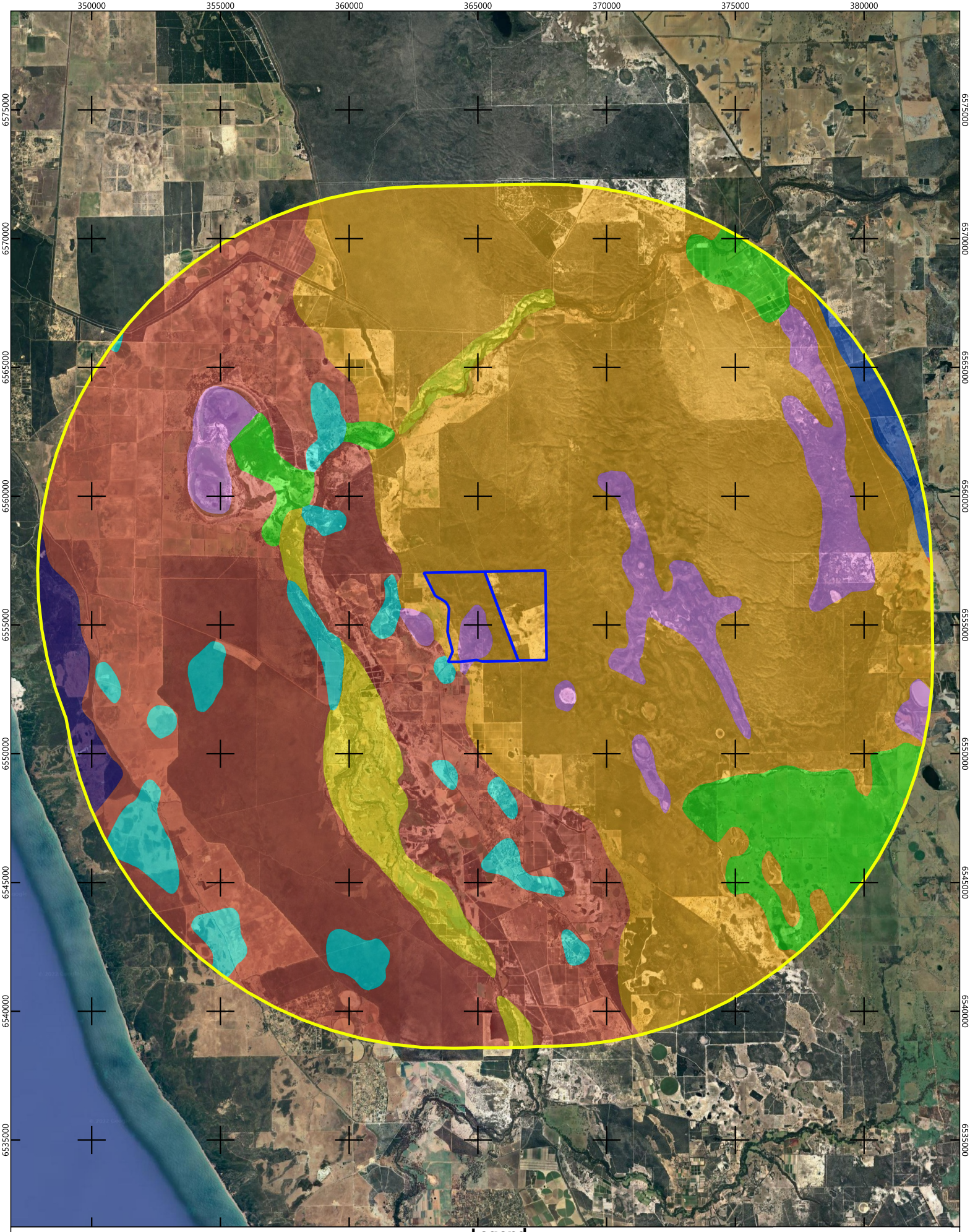
Legend

- Survey Area
- Study Area
- Bassendean System
- Capitella System
- Dandaragan System
- Moore River System
- Quindalup South System
- Spearwood System
- Yanga System

Figure 3a - Soils and Geology (Soils)

FOCUSED VISION consulting

MRWA21005 14 October 2021



0 2 4 6 8 km

GDA 94 / MGA Zone 50

Legend

- Survey Area
- Study Area
- Alluvium 38485
- Bassendean Sand
- Coastal Dunes 38488
- Ferruginous Duricrust 38498
- Guildford Formation
- Lake Deposits 38492
- Safety Bay Sand
- Sand Plain 38499
- Tamala Limestone

Figure 3b - Soils and Geology (Geology)

FOCUSED VISION consulting

3.4 VEGETATION

Vegetation of the Swan Coastal Plain has been broadly characterised by Beard (1990), and later re-assessed by Shepherd *et al.* (2002) into vegetation associations. Mapping depicted the native vegetation as it was presumed to be at the time of European settlement and is referred to as pre-European vegetation mapping. Two vegetation associations are present within the survey area as presented in **Figure 4**: Shrublands; teatree thicket (37) and Low woodland; banksia (949) (Beard 1990) (**Table 6**).

Table 6 - Pre-European Vegetation Associations of the Survey Area (Beard 1990, Government of Western Australia 2019)

Veg. Association No.	Vegetation Description	Pre–European Extent (ha)	Current Extent (ha)	Pre-European Extent Remaining (%)	Current Extent in DBCA Managed Lands (%)
Western Australia					
37	Shrublands; teatree thicket	39,296.52	24,727.17	62.92	13.16
949	Low woodland; banksia	218,193.94	123,104.02	56.42	31.52
Swan Coastal Plain IBRA Region					
37	Shrublands; teatree thicket	15,617.85	5,404.74	34.61	14.18
949	Low woodland; banksia	209,983.26	120,287.93	57.28	32.31
Perth IBRA Subregion					
37	Shrublands; teatree thicket	14,018.45	4,784.19	34.13	15.31
949	Low woodland; banksia	184,475.82	104,128.96	56.45	33.30
Shire of Gingin					
37	Shrublands; teatree thicket	9,484.90	4,012.25	42.30	20.80
949	Low woodland; banksia	138,102.77	81,731.46	59.18	36.49

Vegetation complexes outlined by Heddle *et al.* (1980) and updated by Webb *et al.* (2016) within the survey area and are categorised based on vegetation in association with landforms and underlying geology. Two vegetation complexes occur within the survey area, Bassendean Complex – North and the Karrakatta Complex – North (**Table 7**). The majority of the survey area supports the Bassendean Complex – North (99.999%), with a small portion in the south-west corner supporting the Karrakatta Complex – North (0.001%) (**Figure 5**). Both complexes are similar in that they support low open *Banksia* spp. and *Eucalyptus todtiana* (Pricklybark) forest/woodlands, while the Karrakatta Complex – North occasionally also supports an open forest of *E. gomphocephala* (Tuart) amongst the Banksia and Pricklybark (Heddle *et al.* 1980). The Bassendean Complex – North, in its moister areas exhibits low woodlands of *Melaleuca* spp. over sedgelands (Heddle *et al.* 1980).

Table 7 - Vegetation Complexes within the Survey Area (Heddle *et al.* 1980 and Webb *et al.* 2016)

Code	Vegetation Complex	Pre–European Extent (ha)	Current Extent (ha)	Pre-European Extent Remaining (%)
Western Australia				
43	**Bassendean Complex – North** *Banksia* spp. and *Eucalyptus todtiana* and/or *Melaleuca* spp. and sedgelands	79,057.35	56,659.67	71.67
47	**Karrakatta Complex – North** *Banksia* spp. and *Eucalyptus todtiana* +/- *Eucalyptus gomphocephala*	44,272.94	19,976.32	28.24
Shire of Gingin				
43	**Bassendean Complex – North** *Banksia* spp. and *Eucalyptus todtiana* and/or *Melaleuca* spp. and sedgelands	49,711.91	38,979.76	78.41
47	**Karrakatta Complex – North** *Banksia* spp. and *Eucalyptus todtiana* +/- *Eucalyptus gomphocephala*	39,119.68	18,974.26	48.50

The following key criteria (as discussed in **Section 2.4**) are applied to vegetation clearing from a biodiversity perspective, which justifies the retention targets (EPA 2000):

- The 'threshold level' below which species loss appears to accelerate exponentially within an ecosystem level, is regarded as being at a level of 30% (of the pre-European, i.e. pre-1750 extent of the vegetation type)
- A level of 10% of the original extent of a vegetation community is regarded as being a level representing Endangered
- Clearing which would increase the threat level to a vegetation community should be avoided.

The remaining extents of the Beard vegetation associations (**Table 6**) and Heddle vegetation complexes (**Table 7**) do not fall below 30% of pre-European extent remaining, besides the Karrakatta Complex – North, which within Western Australia, is represented by 28.24% of its pre-European extent.

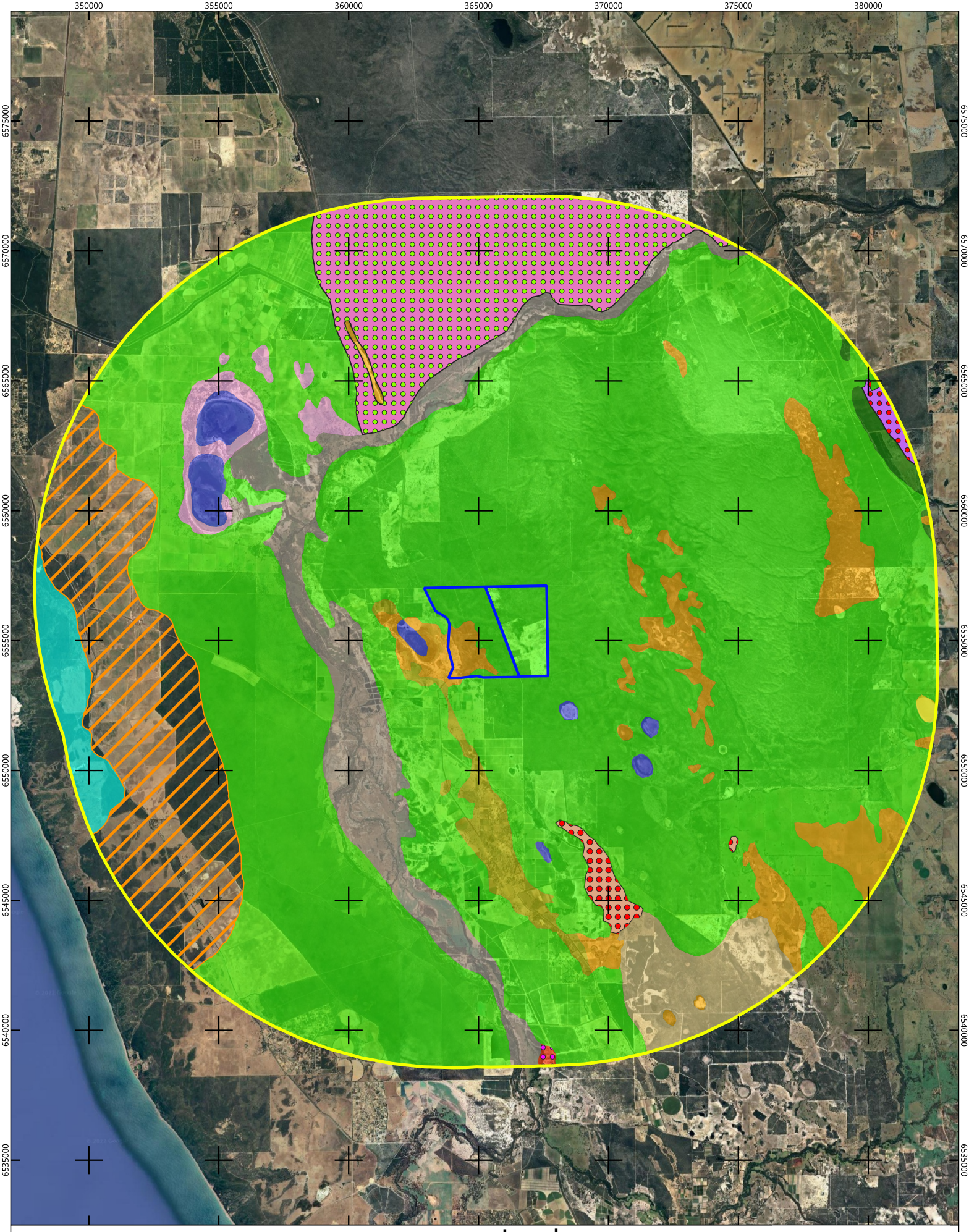


Figure 4 - Pre-European Vegetation

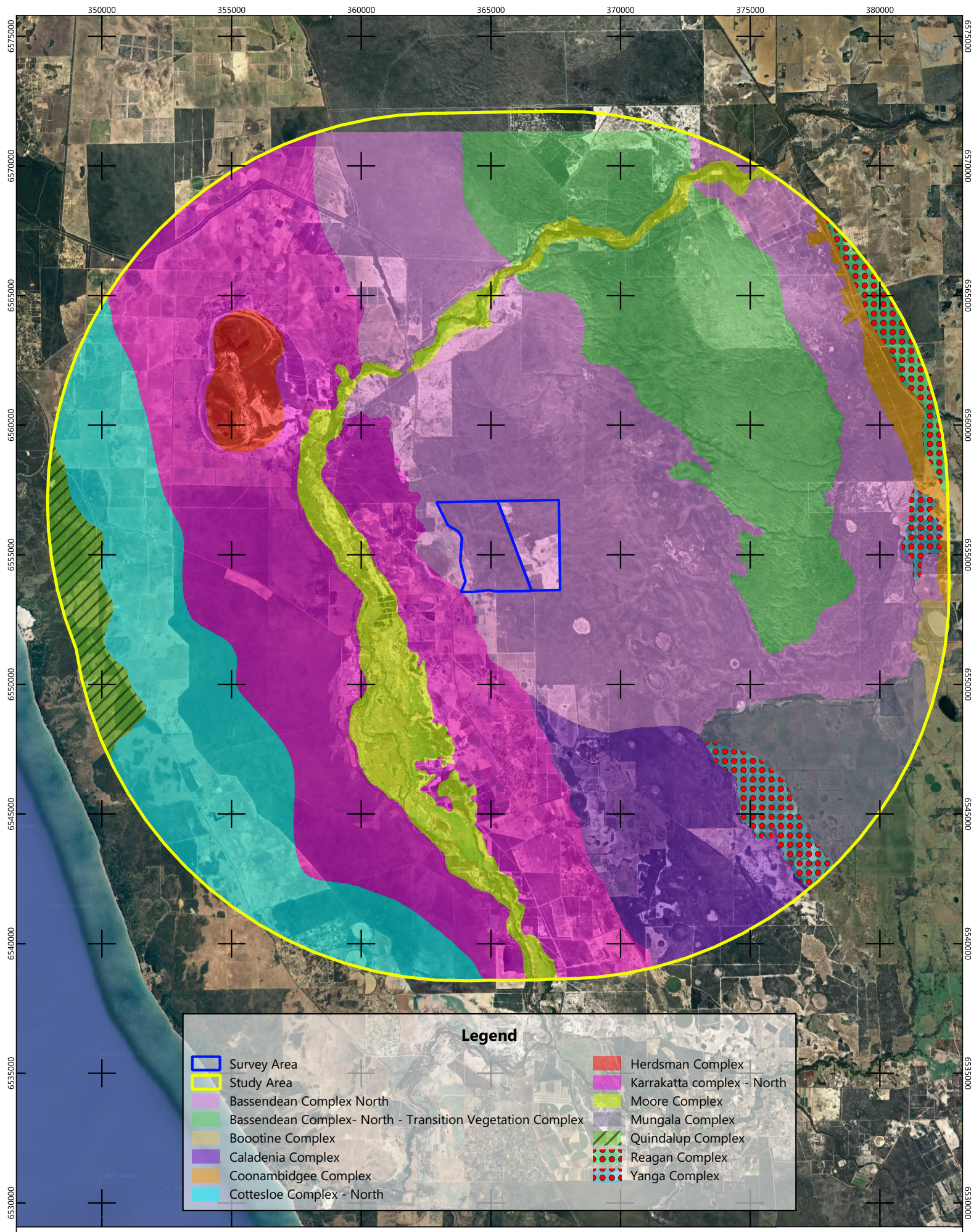


Figure 5 - Vegetation Complexes

FOCUSED VISION consulting

3.5 HYDROLOGY AND WETLANDS

The survey area occurs within the lower parts of the Moore River Catchment area, extending from Latham (approximately 192 km north-west of the survey area) to the Moore River Estuary in Guilderton approximately 24 km south-west of the survey area. Falling within the Lower Moore sub-catchment, the survey area is located approximately 4 km east of the Moore River and approximately 8 km south-east of Karakin Lakes. There are no Ramsar wetlands located within the study area, with the closest known Ramsar wetland, "Forrestdale and Thomson Lakes", located approximately 115 km south of the survey area in the Perth region (DAWE 2021a).

The Geomorphic Wetlands of the Swan Coastal Plain dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain. Wetland management categories are based on their ecological, hydrological and geomorphological significance, and the degree of disturbance that has occurred. The three Wetland Management Categories on the Swan Coastal Plain can be summarised as follows:

- Conservation Category (CC) – wetlands that support a high level of ecological attributes and functions (generally having intact vegetation and natural hydrological processes), or that have a reasonable level of functionality and are representative of wetland types that are rare or poorly protected.
- Resource Enhancement (RE) – wetlands that have been modified (degraded) but still support substantial ecological attributes (wetland dependant vegetation covering more than 10%) and functions (hydrological properties that support wetland dependent vegetation and associated fauna) and have some potential to be restored to CC quality. Typically, such wetlands still support some elements of the original native vegetation, and hydrological function.
- Multiple Use (MU) – wetlands that are assessed as possessing few remaining ecological attributes and functions. While such wetlands can still play an important role in regional or landscape ecosystem management, including water management, they are considered to have low intrinsic ecological value. Typically, they have very little or no native vegetation remaining (less than 10%).

According to the Geomorphic Wetlands Swan Coastal Plain dataset, 13 wetlands are located within the survey area of which nine are conservation category, three are resource enhancement and one is multiple use (**Table 8**). The largest conservation category wetland found within the survey area covers an area of 179.44 ha. Located at the southern end of Lot 5328, it is almost entirely contained within the survey area with the exception of 0.88 ha (**Figure 6**). The 13 wetlands that fall within the survey area form part of a network of wetlands (conservation and other categories) that continue south-east eventually draining into the ephemeral Ellen Brook, a tributary of the Swan River.

3.5.1 Groundwater Dependent Vegetation

Groundwater dependent ecosystems (GDEs) are ecosystems that are dependent on groundwater, classified as either Aquatic (ecosystems reliant on surface expressions of groundwater), Terrestrial (ecosystems reliant on groundwater presence) or Subterranean (caves and aquifer ecosystems) (BoM 2012). Using the Bureau of Meteorology Groundwater Dependent Ecosystems Atlas (BoM 2012), each geomorphic wetland outlined in **Table 8** is also classified as an Aquatic GDE at either 'High Potential GDE (national assessment)' or 'Moderate Potential GDE (national assessment)'. The functioning and composition of these ecosystems are often highly responsive to changes in groundwater availability (Murray *et al.* 2003). Therefore, the groundwater regime is a key factor influencing the composition of flora and fauna, ecological processes and ecosystem services (SKM 2001; Hatton and Evans 1998).

Key elements of the groundwater regime that influences the health of GDEs (and the groundwater dependent vegetation (GDV) occurring within them) in relation to vegetation, are groundwater levels, groundwater flux (rate of flow) and groundwater quality (SKM 2001).

Common groundwater dependent species of the Swan Coastal Plain are deep-rooted Paperbark trees (*Melaleuca* spp.), abundant across the study area. Impacts on groundwater regimes can negatively affect GDV and GDEs, which can in-turn impact overall ecosystem health on a local and regional scale.

Table 8 – Geomorphic Wetlands within the Survey Area

UFI	Wetland Name	Wetland Classification	Wetland Evaluation	Aquatic GDE Assessment (BoM 2012)	Total Area (ha)	Portion within Survey Area (%)
9237	Unknown	Basin - Dampland	Conservation	High Potential GDE (national assessment)	1.68	100.00
9238	Unknown	Basin - Sumpland	Conservation	High Potential GDE (national assessment)	6.41	100.00
9239	Unknown	Basin - Dampland	Conservation	High Potential GDE (national assessment)	1.48	100.00
9242	Unknown	Basin - Dampland	Conservation	Moderate Potential GDE (national assessment)	1.83	100.00
9446	Unknown	Basin - Dampland	Conservation	Moderate Potential GDE (national assessment)	2.70	93.26
9450	Unknown	Basin - Dampland	Conservation	Moderate Potential GDE (national assessment)	5.31	100.00
9463	Unknown	Basin - Dampland	Conservation	Moderate Potential GDE (national assessment)	0.69	82.39
13411	Unknown	Basin - Dampland	Conservation	High Potential GDE (national assessment)	16.95	100.00
13412	Unknown	Basin - Dampland	Conservation	High Potential GDE (national assessment)	179.44	99.51
9452	Unknown	Basin - Sumpland	Resource Enhancement	Moderate Potential GDE (national assessment)	0.96	100.00
9455	Unknown	Basin - Sumpland	Resource Enhancement	High Potential GDE (national assessment)	55.55	100.00
9457	Unknown	Basin - Sumpland	Resource Enhancement	High Potential GDE (national assessment)	2.87	100.00
9454	Unknown	Basin - Dampland	Multiple Use	Moderate Potential GDE (national assessment)	1.39	100.00

3.6 RESERVES, CONSERVATION AREAS AND ENVIRONMENTALLY SENSITIVE AREAS

Throughout the study area are numerous environmentally sensitive areas (ESA), making up areas such as conservation category wetlands, national parks or areas of conservation. A large portion of intact remnant vegetation within the study area is the Moore River National Park, which is located adjacent to the eastern boundary of the survey area. Connected to the south of Moore River National Park is the Moore River Nature Reserve (**Figure 7**). The Gnangara-Moore River state forest is situated to the west of the survey area with its vegetation extending north and south.

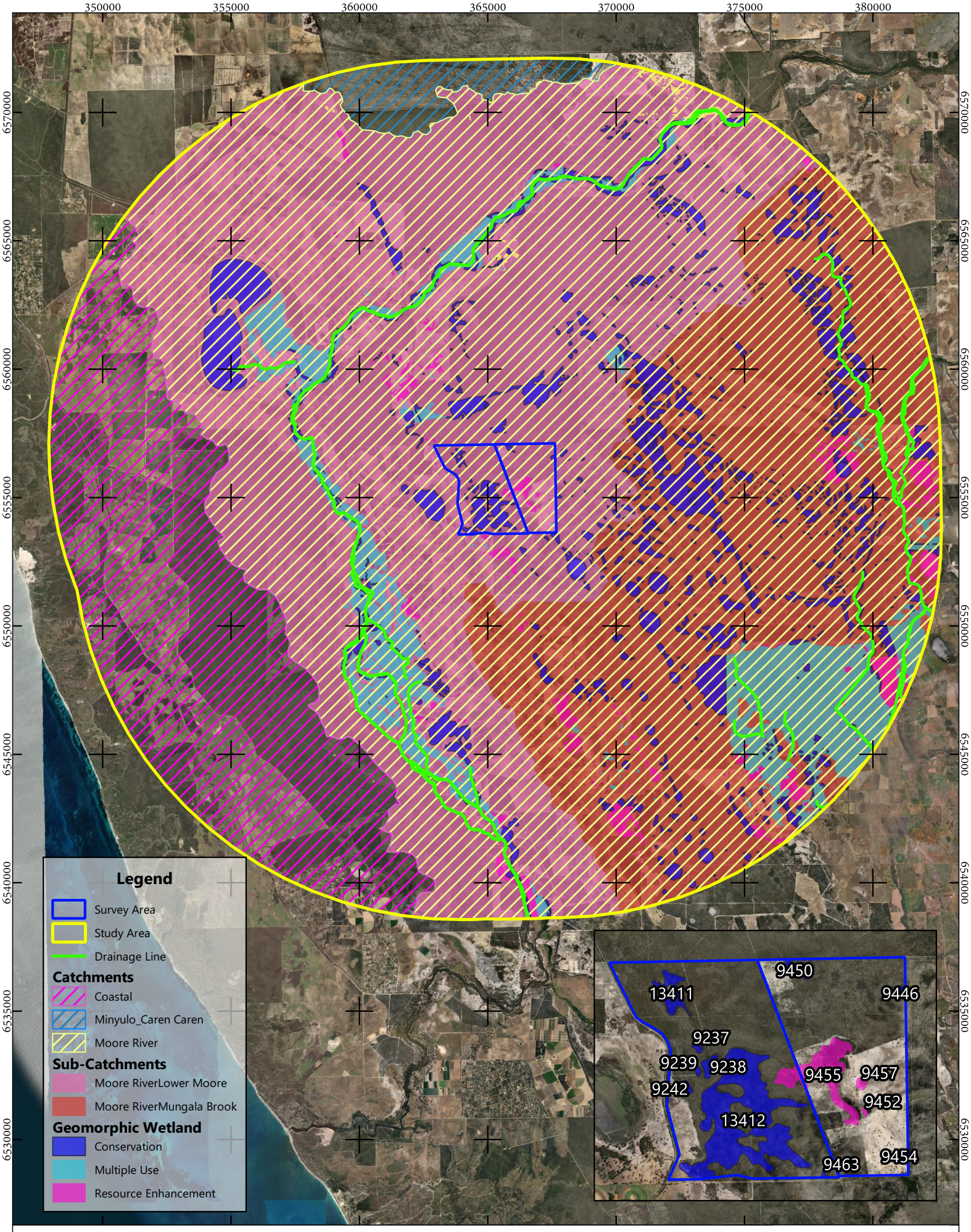
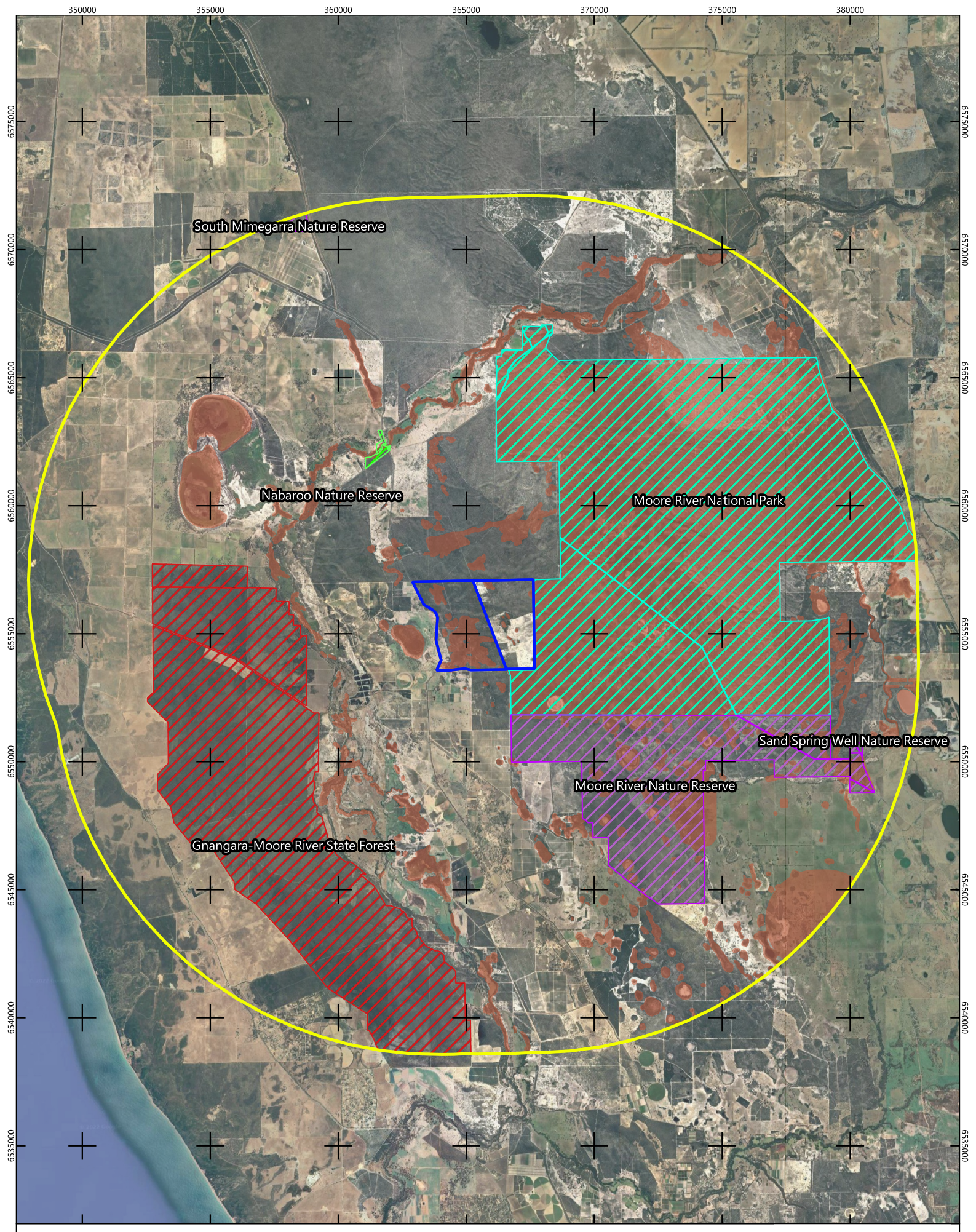


Figure 6 - Hydrology and Geomorphic Wetlands

FOCUSED VISION consulting



0 2 4 6 8 km

GDA 94 / MGA Zone 50

Figure 7 - Reserves, Conservation Areas and ESAs

Legend

- Survey Area
- Study Area
- Environmentally Sensitive Area
- Conservation And Recreation
- Conservation Of Flora And Fauna
- National Park
- State Forest

FOCUSED VISION consulting

MRWA21005 14 October 2021

4 METHODOLOGY

4.1 DESKTOP ASSESSMENT

4.1.1 Literature Review

Previous botanical surveys conducted in the region of the survey area were reviewed as part of the desktop assessment. These surveys are listed below, and the results have been summarised in **Section 5.1.1**:

- Indian Ocean Drive Passing Lanes: SLK52.49 to 54.82, 56.07 to 57.77, 61.08 to 62.7 and 64 to 65.83 Biology Survey (Astron 2016)
- Orange Springs Road Fauna Assessment Report (Ecoedge 2019a)
- Reconnaissance and Targeted Flora and Vegetation Orange Springs Road, Gingin (Ecoedge 2019b)
- Indian Ocean Drive Passing Lanes: SLK52.49 to 54.82, 56.07 to 57.77, 61.08 to 62.7 and 64 to 65.83 Biology Survey (Astron 2016)
- Mogumber Road West, Application for a Native Vegetation Clearing Permit – Area Permit (360 Environmental 2018)
- Mogumber Road West, Native Vegetation Clearing Permit: Offset Revegetation Management Plan (360 Environmental 2020).

4.1.2 Database Searches

The desktop assessment for significant fauna, flora and ecological communities consisted of database searches based on a central point within the survey area (GDA94, zone 50: 115° 35' 29'' E, 31° 07' 40'' S) with a 15 km buffer, referred to as the study area. Database searches included:

NatureMap (DBCA 2021b) (**Appendix A**)
the DAWE Protected Matters Search Tool (PMST) (DAWE 2021d) for MNES (**Appendix B**)
DBCA database search records (DBCA 2021c) for Threatened and Priority flora
DBCA database search records (DBCA 2021d) for Threatened and Priority ecological communities
DBCA database search records (DBCA 2021e) for significant fauna
Bamford Consulting Ecologists (BCE) internal database
Atlas of Living Australia (ALA) (ALA 2021).

The results from the database searches were compiled into a table concluding the likelihood of occurrence (flora and communities) or nature of occurrence (fauna) of each significant species based on factors such as habitat preference, the proximity of known recorded locations for each species and the currency (age) or previous records (**Table 9**). Habitat preferences for all target species were determined during the desktop assessment and study planning tasks, to enable targeted searching during the field assessments.

The desktop assessment formed the foundation of the field assessments and ensured that the assessments were targeted to the areas potentially supporting significant values.

Table 9 – Conservation-Significant Species and Communities Likelihood of Occurrence Criteria

Section	Occurrence Category	Description
Flora and Communities	Likely to occur	Species or ecological communities with a previously known (from within the last 10 years in well-surveyed regions or within the last 50 years in remote or sparsely surveyed regions) population to be present within and/or up to 15 km from the survey area. Suitable habitat is or is expected to be present.
	May Occur	Species or ecological communities provided with potentially suitable habitat or with the potential to occur, with no known occurrences within the survey area, but occurrences known within 20 km.
	Unlikely to Occur	Species or ecological communities not known to occur within 5 km of the survey area and suitable habitat is not expected to occur.
Fauna	Resident	Species with a population permanently present in the survey area.
	Regular migrant or visitor	Species that occur within the survey area regularly in at least moderate numbers, such as part of an annual cycle.
	Irregular Visitor	Species that occur within the survey area irregularly such as nomadic and irruptive species. The length of time between visitations could be decades but when the species is present, it uses the survey area in at least moderate numbers and for some time.
	Vagrant	Species that occur within the survey area unpredictably, in small numbers and/or for very brief periods. Therefore, the survey area is unlikely to be of importance for the species.
	Locally extinct	Species that would have been present but have not been recently recorded in the local area and therefore are almost certainly no longer present in the survey area.

4.2 FIELD ASSESSMENT

4.2.1 Flora and Vegetation

A two-phase, detailed flora and vegetation assessment was carried out by experienced FVC botanists as presented in **Section 8**. Two phases of survey were conducted to meet the recommendations of EPA (2016a) and the Conservation Advice (TSCC 2016) relevant to the *Banksia Woodlands of the Swan Coastal Plain* (Banksia Woodlands TEC) TEC. The Phase 1 field survey was conducted between 4 to 8 October and Phase 2 was conducted between 23 to 25 November 2021. The Phase 1 field assessment undertook the full methodology described below, whilst Phase 2 addressed rescoring of quadrats supporting Banksia woodlands.

Flora and vegetation data were collected in the field at sampling points where vegetation was noted to be of differing floristic composition, by either pegged quadrats where native vegetation was found to be in 'Good' or better condition, in accordance with the requirements for flora and vegetation assessments as documented in EPA (2016a).

To meet the EPA requirement, at least three quadrats per vegetation unit were established where vegetation was deemed to be of 'Good' or better condition where possible. Quadrats were established throughout the geographic range of each defined vegetation unit.

A total of 42 quadrats were assessed during phase one, with the locations of these presented in **Figure 8**. Each sampled quadrat from Phase 1 supporting key Banksia species attributed to the Banksia woodlands TEC was rescored as part of the second phase survey (a total of 28 quadrats).

Sampled quadrats were demarcated with a peg (galvanised fence-dropper) at the north-west corner where co-ordinates were recorded using GPS. During sampling, quadrats were marked by measuring tapes. Within each defined vegetation unit, quadrat dimensions were 10 m x 10 m in accordance with the Guidance (EPA 2016a) and were used to characterise all of the intact native vegetation communities (in 'Good' or better condition).

The following information was collected at each quadrat:

- observer
- date
- GPS location (MGA94)
- representative photograph
- soil type and colour
- topography
- vegetation condition/degradation/disturbances (e.g. grazing, weed invasion, fire)
- flora species observed, including average height and projected foliage cover of dominant species within each stratum
- vegetation community, described in accordance with Level 5 of the National Vegetation Information System (NVIS)
- vegetation condition, assessed against the currently accepted scale; an adaptation of the Keighery (1994) condition scale.

Observations and opportunistic data collection were also carried out continuously within and throughout the survey area and track logs of all personnel were captured at all times, to demonstrate survey effort and site coverage.

The Phase 1 field assessment also included targeted searches for Threatened and Priority flora potentially supported by the survey area, which were targeted during traverses. Selective targeted searching was also carried out during the Phase 2 survey, traversing between quadrats that were rescored and in limited additional areas as appropriate, depending on flowering times and preferred habitats of target species. Habitat preferences for all target species were determined during the desktop assessment and study planning tasks, to enable targeted searching in the field. Any observed flora suspected to be Threatened or Priority was marked using GPS-enabled devices to enable inclusion in the report maps and spatial data layers. Where taxa suspected or known to be Priority flora were located whilst in the field, dedicated targeted searches were continued to quantify populations and map extent.

All traverses of all field personnel were logged using GPS-enabled devices, to demonstrate survey effort and these combined track logs are presented in **Figure 9**.

Multiple sampling events within the optimal flowering period (spring) during October and November enabled the capturing of species that may not have been present during the initial phase, particularly annuals and other late spring flowering species considered likely to be present during Phase 2.

The flora and vegetation data recorded during both field assessment phases from the combination of quadrats and continuous opportunistic observations contributed to the flora inventory for the survey area. The vegetation units of the survey area have been defined by data collected within quadrats and opportunistically between, and how they relate to other environmental features such as soil type and landform. A map of the vegetation units was then developed using GIS and is presented in this report.

Vegetation condition was assessed using the current bushland condition scale which is an adaptation of Keighery (1994) scale, as described in EPA (2016a). The spatial extent of the varying vegetation condition was mapped using GIS and is presented in this report.

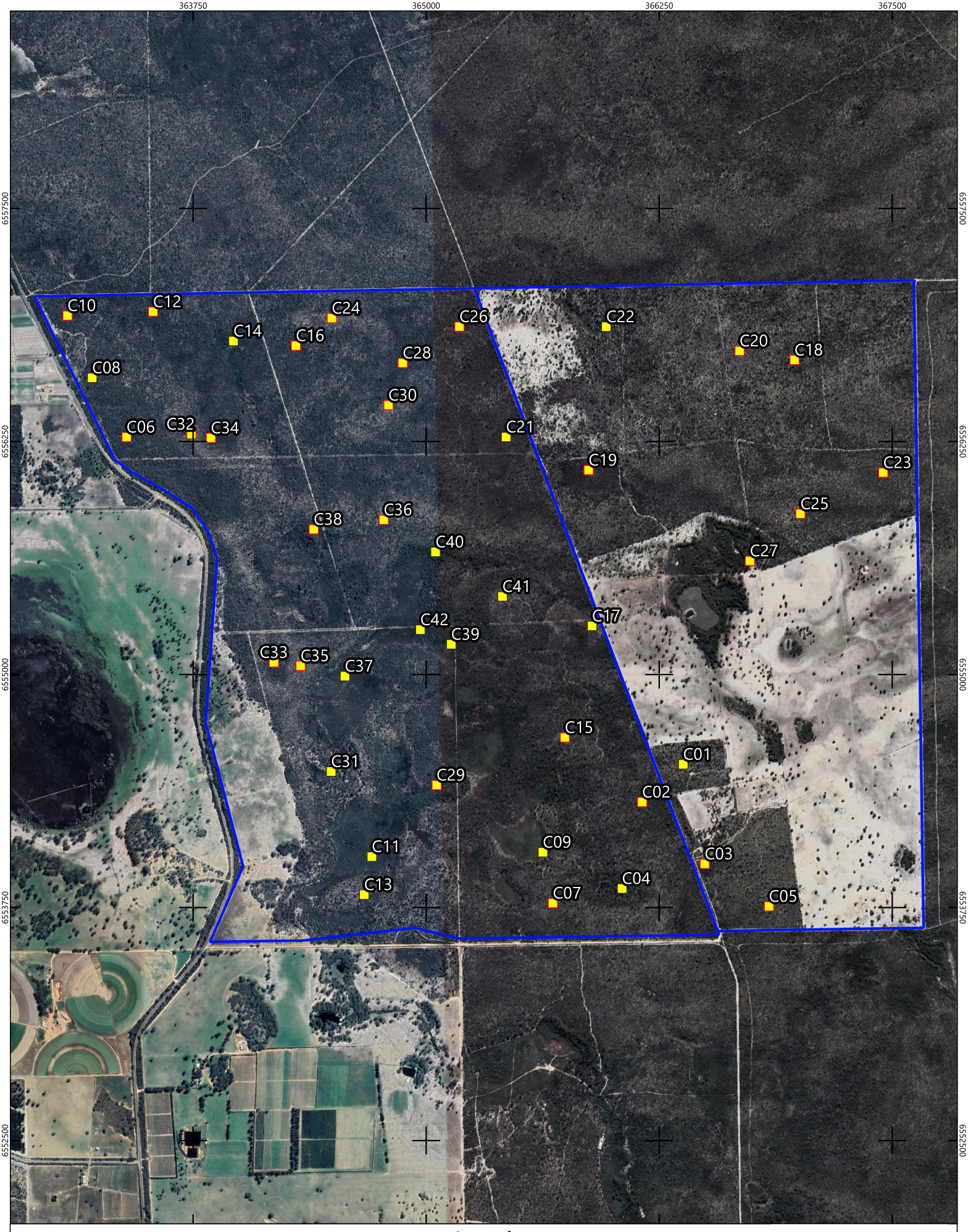


Figure 8 - Quadrat Locations

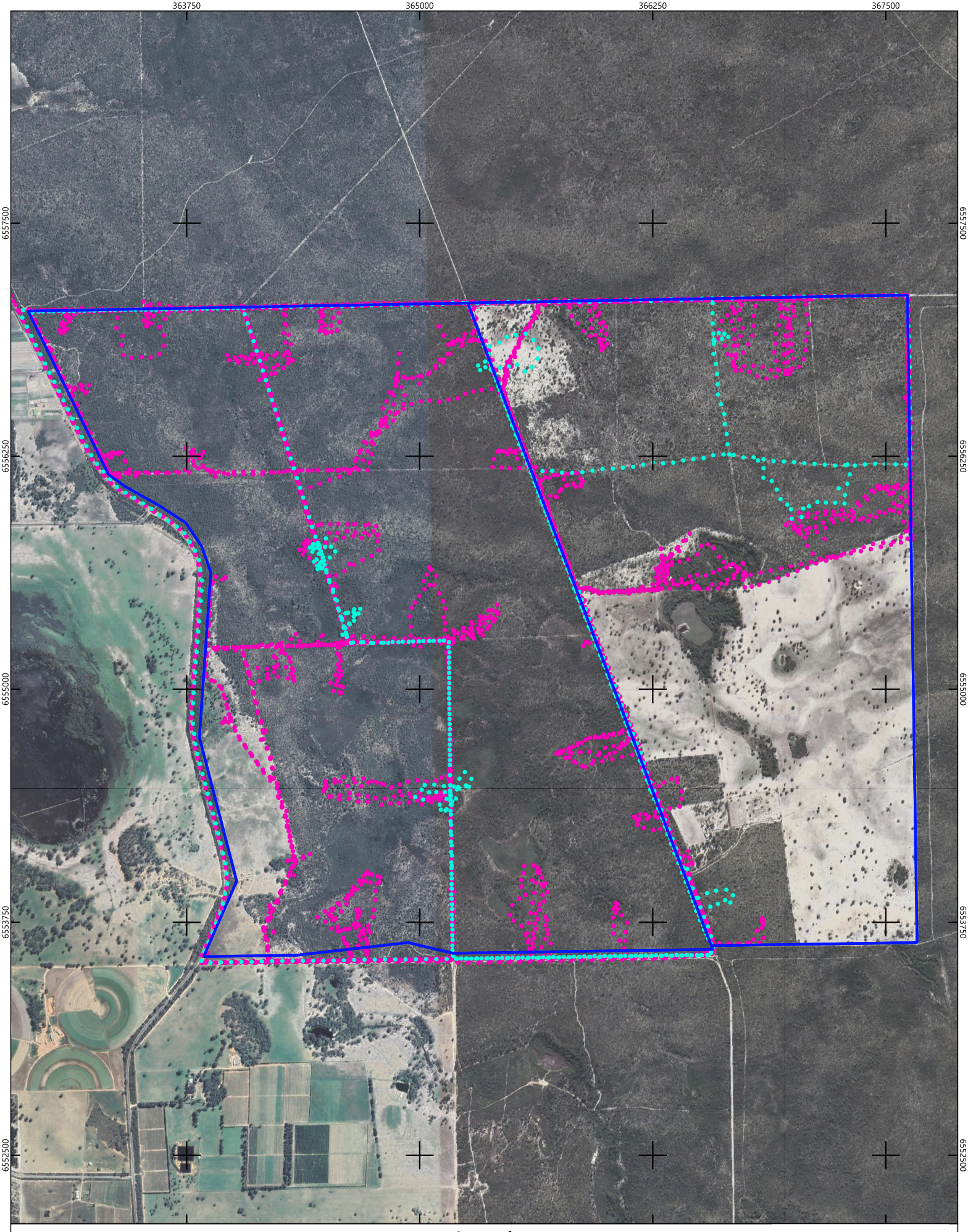


Figure 9 - Survey Effort

4.2.2 Fauna Assessment

A basic fauna assessment was conducted by staff from Bamford Consulting Ecologists (BCE), Dr Jamie Wadey (Zoologist/Ecologist) and Jake Bamford (Technician) on 25 October 2021. The field fauna assessment was conducted via foot and vehicle traverses to observe and record representative sample areas of the various habitats present. The assessment focused on habitat mapping, opportunistic fauna observations and a targeted survey for relevant fauna species of significance and their habitats, in particular, Black-Cockatoo habitats (foraging, breeding and roosting). Fauna species and direct evidence (signs) of fauna activity, such as scats, tracks, diggings, skeletons or calls were continuously searched for and recorded whilst on site.

The fauna and fauna habitat assessments were recorded and reported in accordance with:

- Environmental Protection Authority (EPA) (2020) *Technical Guidance – Terrestrial Fauna Surveys for Environmental Impact Assessment*
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012) *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered)* Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable)* Calyptorhynchus baudinii*, Forest red-tailed black cockatoo (vulnerable)* Calyptorhynchus banksii naso
- Department of the Environment and Energy (DEE) (2017a) *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo*. Department of the Environment and Energy
- Species nomenclature and conservation status were consistent with the current (November 2021) WAM version of *Checklist of the vertebrates of Western Australia* (WAM 2021).

The fauna habitat assessment was determined through identifying vegetation and substrate associations (VSAs) within the survey area, which utilised the vegetation mapping as a basis. VSAs combine vegetation types, the soils or other substrate with which they area associated, and the landform. In the context of fauna assessment, VSAs are the environments that provide habitats for fauna. Several VSA sites were sampled, where the following information was recorded:

- GPS Location (GDA94, zone 50)
- Dominant species and projected percent foliage cover in three strata; ground layer, mid layer and upper layer
- Weed percentage cover if present
- Leaf litter percent cover
- Bare ground percent cover
- Soil substrate
- Vegetation condition based on Keighery (1994) condition scale
- Representative photograph
- Fauna refuges (i.e. prominent fallen logs, rock piles, dense understorey etc.)
- Tree deaths (approximate number/hectare).

Targeted searches for the Black-striped Snake were conducted at every VSA sample site. This involved personnel raking leaf litter of a 2 m x 2 m area to search for the species.

4.2.3 Locally Rare Species

Particular attention was given to birds known to be declining on the Swan Coastal Plain. Many species of Passerine birds (perching birds) have declined on the Swan Coastal Plain since European settlement, particularly insectivorous and nectivorous species. Some of these species, such as robins, whistlers, thornbills, fairy-wrens, rufous treecreeper, grey shrike-thrush and some honeyeaters are now largely absent from their previous range (Government of Western Australian 2000).

4.2.4 Black-Cockatoo Habitat Assessment

The survey area was traversed on foot and surveyed in detail, to observe and record all suitable foraging, roosting and breeding habitat for the Carnaby's Black-Cockatoo and the Forest Red-tailed Black-Cockatoo (collectively referred to as Black-Cockatoos hereafter) as summarised in **Table 10**. As the survey site is located outside the distribution for Baudin's Black-Cockatoo, a habitat assessment was not conducted for this species.

Table 10 – Black Cockatoo Habitats Surveyed

Habitat	Examples
Foraging habitat	Food source plants for Black-Cockatoos include jarrah, marri, Proteaceous species such as *Banksia, Hakea* and *Grevillea*; and other native species such as *Allocasuarina, Anigozanthos.* Introduced species are also included, such as Pines (*Pinus* spp.) and Cape Lilac (*Melia azedarach*), *Erodium* spp. and various species grown for fruit, nuts and seeds which grow in native shrubland, heathland, woodland or forest and agricultural areas.
Night roosting habitat	These habitats include suitable trees (*Eucalyptus* or *Corymbia*) within or near riparian environments or natural or artificial water sources.
Breeding/nesting habitat	Any patch of woodland or forest that contains *Eucalyptus* or *Corymbia* trees with either a diameter at breast height of greater than 500 mm or with suitable nest hollows. More specifically, all individual trees observed to support suitable hollows within the survey area.

Active searches for evidence of Black-Cockatoo activity (e.g. chewed eucalypt or marri nuts) and therefore habitat, were undertaken throughout the survey area. Where observed, the following information was recorded:

- GPS Location (GDA94, zone 50)
- Black-Cockatoo species if possible
- Species of tree nut
- Estimate of age since activity.

4.2.4.1 Black-Cockatoo Foraging Habitat

Foraging habitat for Black-Cockatoos is given a score out of ten to indicate quality. The scoring system used was developed by BCE, in consultation with DAWE. Details of the scoring system are summarised here, comprising of:

- a score out of six for vegetation composition, condition and structure in accordance with **Table 11**
- a score out of three for site context, in accordance with **Table 12**
- a score out of one for stocking rate (Black-Cockatoo species density)
- moderation of the scores for context and stocking rate as appropriate.

The resulting total score reflects the quality of Black-Cockatoo foraging habitat and allows application of the Commonwealth biodiversity offsets calculator (DSEWPaC 2012).

The vegetation composition score is based on the presence, density/abundance, condition and proportions of food source plants for the relevant species of Black-Cockatoo. A selection of key examples applicable to each of the scores for the two Black-Cockatoo species assessed is presented in **Table 11**.

Table 11 - Scoring System for the Assessment of Foraging Value of Vegetation for Black-Cockatoos

Score	Description of Vegetation	
	Carnaby's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
0	No foraging value. No potential sources of food. Examples would be salt lakes, grass, infrastructure and bare ground.	
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).	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these <1%. Could include urban areas with scattered foraging trees.
2	Low foraging value. Examples: Shrubland in which species of foraging value, such as shrubby banksias, with <10% projected foliage cover. Open eucalypt woodland/mallee of small-fruited species. Paddocks densely vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g. marri, jarrah or sheoak) 1-5% projected foliage cover. • Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.
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.	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially marri and jarrah) 5-20% projected foliage cover. • Parkland-cleared, Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management). • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).
4	Moderate foraging value. Examples: • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover. • Kwongaan/ 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.	Moderate foraging value. Examples: • Marri-jarrah Woodland/Forest with 20-40% projected foliage cover. • Marri-jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. • Sheoak Forest with 40-60% 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.	Moderate to High foraging value. Examples: • Marri-jarrah Forest with 40-60% projected foliage cover. • Marri-jarrah Forest with >60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. • Sheoak Forest with >60% projected foliage cover.

Score	Description of Vegetation	
	Carnaby's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
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).	High foraging value. Example: • Marri-jarrah Forest 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 characteristic scores of ≤2 are not further analysed for context and species presence (stocking rate), as such habitat is considered to be of negligible foraging value.

The site context score is species-specific as it depends upon factors such as the vegetation type and extent, and the presence of breeding birds. Scores for site context are guided by **Table 12**, noting that 'local area' is defined as within a 15 km radius of the centre point of the survey area. To assign a score for site context, a maximum score of three is applied where foraging habitat is known or found to support breeding birds, or it can also be applied in fragmented landscapes where there is little foraging habitat remaining and thus what is left has a high contextual value.

Table 12 – Key to Black-Cockatoo Site Context Score for Foraging Habitat Quality

Site Context Score	Existing Native Vegetation within the 'Local Area' that the Survey Area Represents (%)	
	'Local' Breeding Known/Likely	'Local' Breeding Unlikely
3	> 5	> 10
2	1 - 5	5 - 10
1	0.1 - 1	0.1 - 5
0	< 0.1	< 0.1

The score for stocking rate/species density (0 or 1), is based upon the relevant Black-Cockatoo species being either abundant or low and is species-specific. A score of 1 is applied where the species is seen or known to occur/reported regularly and/or there is abundant foraging evidence. 'Regularly' is considered to be when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is applied when the species is recorded or reported very infrequently and there is little or no foraging evidence.

4.2.4.2 Black-Cockatoo Potential Breeding Habitat

The existing referral guidelines list certain tree species as typical and preferred breeding habitat for each of the three species of Black-Cockatoo (DSEWPaC 2012); however, some evidence suggests that Black-Cockatoos breed and nest in any trees that are sufficiently large and provide suitable hollows (Mike Bamford, pers. comm.). Therefore, all large eucalypts within the survey area were inspected and recorded for breeding habitat suitability and the presence of hollows. Nesting or potential nesting trees were assigned a rank as per **Table 13**.

Table 13 – Black-Cockatoo Suitable DBH Tree Hollow Categories

Rank	Description of Tree and Hollows/ Activity
0	Tree of DBH ≥ 500 mm but not tall and no hollows or potential for hollows.
1	Active nest observed; bird seen entering or emerging from hollow.
2	Hollow of suitable size and angle (i.e. near-vertical) visible with chew marks around entrance.
3	Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present (as suggested by structure of tree, such as large, vertical trunk broken off at a height of >10 m).
4	Tree with large hollows or broken branches that might contain large hollows, but hollows or potential hollows are unsuitable (not vertical or near-vertical as preferred by Black-Cockatoos).
5	Tree of DBH ≥ 500 mm (300 mm for salmon gum and wandoo) but lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.
X	Tree with potentially suitable hollow but has been colonised by feral honeybees (*Apis mellifera*), and therefore rendered unusable, the nest-tree rank is preceded by 'x' (e.g. x2, x3, x4).

Where nesting or potential nesting trees were identified the following information was recorded:

- GPS Location (GDA94, zone 50)
- Species
- DBH
- Status (alive or dead)
- Rank.

4.2.4.3 Black-Cockatoo Roosting Habitat

Roosting habitat was assessed and mapped based on tree species and their proximity to water sources, combined with knowledge or literature review regarding known roost sites. Roosting habitat was considered to be tall trees within approximately 2 km of water sources. A review of DBCA databases regarding known and suspected Black-Cockatoo habitat was also undertaken to assist in identifying if the survey area is known to support, or may support, roosting habitat (DBCA 2021f).

4.3 DATA PROCESSING/ANALYSIS AND REPORTING

Following completion of the desktop and field assessments, all information and collected field data were collated, ready for analysis and reporting.

Flora identifications were undertaken by several of FVC's botanical taxonomists, listed in **Section 8**. Flora taxonomy and nomenclature followed current protocols of the WA Herbarium (1998-).

As per the recommendations of the EPA (2008), the nomenclature and taxonomic order presented in this report for fauna are based on the Western Australian Museum's (WAM) current (November 2021) version of *Checklist of the vertebrates of Western Australia* (WAM 2021).

Floristic data analysis was carried out for all flora quadrat data utilising PATN™ multivariate cluster analysis of species presence/absence to determine similarities between each quadrat. An association matrix of the Bray-Curtis coefficient was generated from the presence and absence site by species matrix using the software. The resultant dendrogram identified clusters of the quadrats which were then grouped into vegetation units and described at NVIS Level V.

The qualitative vegetation unit descriptions and species composition were able to be considered as potentially representative of the significant ecological communities resulting from the desktop assessment. Diagnosis of potential TEC vegetation within the survey area was also carried out in direct reference to the relevant Conservation Advice and other available information.

Floristic Community Types (FCTs) classify vegetation based on a combination of species composition, structure and the landform on which they occur. The FCTs of the Swan Coastal Plain have been defined as part of a range of studies, with the main references for these being Gibson *et al.* (1994) and Keighery *et al.* (2012). Floristic analysis of recorded quadrat data was assessed against the complete Gibson *et al.* (1994) and Keighery *et al.* (2012) datasets for FCTs, in an attempt to infer and assign FCTs.

In order to prepare the data for analysis, nomenclature for all species within the Gibson *et al.* (1994) and Keighery *et al.* (2012) datasets were updated to correlate with current nomenclature of recorded flora species within the survey area. All quadrat data was analysed with singletons and annuals included, for comparison with Gibson *et al.* (1994) and Keighery *et al.* (2012) data (as per advice from Val English, DBCA).

The analysis utilised PATN™ software (Belbin 2013), via multivariate cluster analysis of species presence/absence, in order to group sites of floristically similar composition within the survey area. Following this, floristic analysis of newly recorded quadrats in comparison to reference datasets Gibson *et al.*(1994) and Keighery *et al.* (2012) was also carried out. An initial inferred FCT was assigned to each quadrat based on 'nearest neighbour' in the dendrogram. Analyses using the "single site insertion" technique was not carried out, although similarities between each individual survey quadrat and reference quadrats were analysed via a dissimilarity matrix.

Analysis of the data using the Bray-Curtis Dissimilarity Index was then carried out to further refine FCT assignment. Dissimilarity indices range from 0 to 1, where 0 would indicate that the quadrats are identical (have zero dissimilarity) (Belbin 2013) and 1 indicating no shared species (Hao *et al.* 2019). The closer the value to 0, the greater the similarity. A dissimilarity index value of greater than 0.6 is considered to be high (Maguire *et al.* 2016) and tends to indicate little similarity.

Where appropriate, conclusions regarding relevant FCTs that would be assigned to each sampled quadrat were further critically analysed by determining similarities to Gibson *et al.* (1994) sites based on some or all of the following characteristics; key dominant flora species, vegetation structure, habitat, geographical location, soils/landforms, vegetation complexes and site hydrological status. The collective results of the FCT analysis concluded with settling on an inferred FCT for each quadrat, with justifications provided.

Other analysis in reference to relevant conservation advice and available information for significant ecological communities was also carried out in order to determine whether TECs or PECs are supported by the survey area.

Draft vegetation mapping was used as the basis for fauna habitat mapping, which was then able to consider the presence of habitat for conservation-significant fauna species.

All relevant data and results from the desktop and field assessments were collated or digitised in GIS, to enable the preparation of the suite of figures presented in this report.

All spatial data has been prepared as ESRI shapefiles that meet the protocols of the Index of Biodiversity Surveys for Assessment (IBSA) initiative.

This report has been prepared by suitably qualified and experienced professionals, including those who led the field studies, in accordance with relevant guidelines.

4.4 SURVEY LIMITATIONS

The current assessment was assessed against limitations imposed by many variables as outlined in the Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a) and *Technical Guidance – Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA 2020) (**Table** 14**14**).

Table 14 – Potential Survey Limitations and Constraints

Aspect	Constraint?	Commentary
Availability of regional data, previously available information	No	A wealth of data, literature and other information is available for sites within the Perth metropolitan area and its outskirts, such as the study area DBCA database search results are evidence of the high volume of records that exist for the study area and surrounds.
Scope (detail)	No	A two phase, detailed flora and vegetation assessment was carried out in accordance with EPA (2016a). A total of 42 quadrats were sampled across the survey area, with 28 quadrats with appropriate *Banksia* spp. resampled in phase 2. This level of survey detail was more than adequate for the assessment of floristic values. Appropriately, the fauna assessment scope focused on identifying fauna habitat and targeted survey for Black-Cockatoo habitats, since it is a key species of relevant to the region.
Competency/ Experience of personnel	No	All of the personnel undertaking the field assessment, flora identifications, data analysis, vegetation mapping and reporting are experienced botanists, with specialist skills in their respective fields. All botanists have a minimum of three (and up to 40) years' experience. Senior Botanist, Jeni Alford, who undertook phase one of the field flora and vegetation survey has more than 40 years' experience in undertaking botanical surveys. The basic fauna survey and targeted Black-Cockatoo habitat assessment was led out by a Zoologist, Dr Jamie Wadey, who meets the Commonwealth requirements for such surveys.
Survey effort/detail/ intensity	No	Similarly, as per the 'scope (detail)' aspect above, the detailed flora and vegetation assessment was more than adequate for the assessment of floristic values in the survey area which is potentially in a threatened ecological community. With a large area of good quality remnant vegetation sampling a minimum of three quadrats per vegetation units was applied. The fauna assessment a basic fauna and targeted survey for Black-Cockatoo habitats was at an appropriate level of detail.
Seasonal timing and climatic conditions	Somewhat	The field assessment were conducted during the months of October and November (spring), which is the optimal season for biological surveys on the Swan coastal Plain. A two-phase floristic survey allows the recording of flora that would otherwise absent during only a single phase assessment. Certain timing is necessary to confirm Black-Cockatoo use of habitats, e.g. at dusk during March to April to observed flocks coming in to roost and during December to January to observe chicks in nests and confirm breeding trees. However, initial surveys as per the scope are not seasonally constrained, with Black-Cockatoo activity noted outside the survey area. No such follow-up surveys (seasonally constrained) have been determined to be required. Weather during the fauna survey was sub-optimal, due to rainfall at the time. However, all relevant fauna values are considered to have been recorded.
Access	No	The majority of the survey area is easily accessible, with several quality artery tracks running through the survey area. Where private property exists, some areas were not accessible; however, imagery clearly presents these areas as degraded paddocks.
Mapping reliability	No	The mapping has been prepared at a scale based on ground-truthed areas, with limited extrapolation given the good accessibility for most of the survey area. Therefore, mapping reliability based on scale is considered high.

Aspect	Constraint?	Commentary
Disturbances	No	Only a small proportion of the survey area is completely degraded with the majority existing on Lot 8037 where paddocks, livestock and infrastructure are present. This degradation does not impede the quality of remnant vegetation in rest of the survey area, with only adjacent vegetation showing signs of historical disturbance and weed presence.
Survey completeness	No	The survey was completed to a high level of detail. Most areas were accessible and data and other information for the region is abundant.
Proportion of fauna identified, recorded and/or collected	Somewhat	A high proportion of the 20 fauna species identified were birds, with two mammals (invasive) and no reptiles observed. The proportion of fauna recorded and determined as likely to occur (199 species), based on the expected assemblage is considered adequate. As the fauna survey was basic and animals are transient, it is unexpected to record a high diversity of species. However, additional survey effort during different seasons would likely to increase recorded diversity within the survey area.

5 RESULTS

5.1 DESKTOP ASSESSMENT

5.1.1 Literature Review

Literature review was undertaken as part of the desktop assessment to identify previous biological surveys undertaken within or in the vicinity of the study area. The biological surveys were reviewed to provide a broader locality context and to identify key findings including significant flora, presence of TECs and PECs and significant fauna. The biological surveys reviewed for local and regional context of the study area are summarised in **Table 15**.

Table 15 – Previous Surveys Within and Surrounding the Study Area

Report Title	Survey Methodology	Key Survey Results
Indian Ocean Drive Passing Lanes: SLK52.49 to 54.82, 56.07 to 57.77, 61.08 to 62.7 and 64 to 65.83 Biology Survey (Astron 2016)	Level 2 Flora and Level 1 Fauna Survey, Targeted Black Cockatoo assessment	- Six vegetation types, some affinity with Banksia Woodlands of the Swan Coastal Plain TEC but do not meet patch and condition requirements. - No Threatened flora species - Two Priority flora species; *Dodonaea hackettiana* (P4) and *Lepidobolus densus* (P4) - 57.4 ha Black-Cockatoo foraging habitat - Five suitable DBH trees with no hollows present - One fauna species of significance present, Carnaby's Black-Cockatoo (EN)
Orange Springs Road Fauna Assessment Report (Ecoedge 2019a)	Level 1 Fauna Survey and Targeted Black Cockatoo assessment	- One fauna species of significance present, Carnaby's Black-Cockatoo (EN) (foraging evidence present) - Fifteen suitable DBH trees present, 13 no hollows, two with small hollows (unsuitable for breeding) - No evidence of roosting activity - Banksia woodlands present, suitable foraging habitat
Reconnaissance and Targeted Flora and Vegetation Orange Springs Road, Gingin (Ecoedge 2019b)	Reconnaissance and Targeted Flora	- Four vegetation types present identified from 100+ mapping notes. - Presence of TEC; FCT 23b (Northern *Banksia attenuata* – *Banksia menziesii* woodlands) - No Threatened flora species - Three Priority flora species; *Calytrix ecalycata* subsp. *brevis* (P3), *Isopogon panduratus* subsp. *palustris* (P3) *Dodonaea hackettiana* (P4).
Indian Ocean Drive Passing Lanes: SLK52.49 to 54.82, 56.07 to 57.77, 61.08 to 62.7 and 64 to 65.83 Biology Survey (Astron 2016)	Level 2 Flora and Level 1 Fauna survey, Targeted Black Cockatoo assessment	- Six vegetation types, some affinity with Banksia Woodlands of the Swan Coastal Plain TEC but do not meet patch and condition requirements. potential 'Banksia Woodlands of the Swan Coastal Plain' present - No Threatened flora species - Two priority flora species; *Dodonaea hackettiana* (P4) and *Lepidobolus densus* (P4) - 57.4 ha Black-Cockatoo foraging habitat - Five suitable DBH trees with no hollows present, - One fauna species of significance present, Carnaby's Black-Cockatoo (EN)
Mogumber Road West, Application for a Native Vegetation Clearing Permit – Area Permit (360 Environmental 2018)	Level 2 Flora Survey	- Three priority flora species present; *Banksia dallanneyi* subsp. *pallosta* (P3), *Banksia pteridifolia* subsp. *vernalis* (P3) and *Isopogon autumnalis* (syn. *Isopogon drummondii*) (P3). - 0.85 ha of Banksia Woodlands TEC (either FCT 23b or 23c) present

Report Title	Survey Methodology	Key Survey Results
Lot 10 Mogumber Road West, Mogumber, Native Vegetation Clearing Permit: Offset Revegetation Management Plan (360 Environmental 2020)	Flora and Vegetation Survey and Level 1 Fauna Survey	- One vegetation type present, in good to degraded condition - One threatened flora species present; *Banksia mimica* (T) - One priority flora species present; *Banksia dallanneyi* subsp. *pallosta* (P3)

5.1.2 Threatened and Priority Flora

A review of the NatureMap Species Report (DBCA 2021b) (**Appendix A**), the PMST Report (DAWE 2021d) (**Appendix B**) and DBCA database search (DBCA 2021c) identifying a total of 67 Threatened and/or Priority flora species previously recorded in the survey area (**Appendix C**). By considering species' previous known locations (**Figure 10**) and likely habitat present within the survey area, a pre-survey assessment determined that 15 species were unlikely to occur (**Appendix C**), 47 may occur and six were considered likely to occur (**Table 15**). The six species considered likely to occur are:

- *Goodenia xanthotricha* (P2)
- *Hakea oligoneura* (P2)
- *Leucopogon squarrosus* subsp. *trigynus* (P2)
- *Isopogon autumnalis* (P3)
- *Leucopogon* sp. Yanchep (M. Hislop 19896) (P3)
- *Dodonaea hackettiana* (P4).

Table 16 – Threatened and Priority Flora Potentially Occurring within the Survey Area

Species	Cons. Status		Description	Preferred Habitat	Pre-Survey Likelihood of Occurrence	Source
	EPBC	WA				
Chorizema varium	EN	T	Low, erect to spreading shrub growing to 0.3 m high with long, hairy branches. Produces flowers with yellow, orange and red parts in erect, dense clusters from September to October (possibly June).	Sandy soil. Coastal heath with limestone, hills and outcrops.	**May occur** – Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2, 3
Drakaea elastica	EN	T	Tuberous, perennial herb growing to 0.1-0.3 m high with a single bright green, glossy, prostrate heart-shaped leaf. Produces distinctive flower with red and green-yellow parts from October to November.	Bare patches of white or grey sandy soils. Low-lying situations adjoining winter-wet swamps.	**May occur** – Suitable habitat. Previous specimen located approximately 7 km from survey area.	1, 2, 3
Lepidosperma rostratum	EN	T	Rhizomatous, tufted perennial grass-like sedge growing to 0.5 m high. Produces brown flowers in narrow, spike-like inflorescence and fruits in June to August.	Peaty sand, sand, clayey soils. Winter wet swamps.	**May occur** – Suitable habitat. Previous specimen located approximately 8 km from survey area.	1, 2, 3
Paracaleana dixonii	EN	T	Tuberous perennial herb growing to 0.2 m high with single, linear leaf. Produces 1-2 distinct flower with green, brown and yellow parts from October to January.	Grey sand, sometimes with gravel. Flats and slopes.	**May occur** – Suitable habitat. Previous specimen located approximately 14 km from survey area.	1, 2, 3
Anigozanthos viridis subsp. *terraspectans*	VU	T	Small, rhizomatous perennial herb growing to 0.2 m high. Produces paw like yellow-green flowers from August to December on 0.1-0.15 m stems. Distinguished from *A. v.* ssp. *virdis* by having shorter flowering stems and smaller, narrower flowers.	Grey-yellow sand, clay loam soils. Winter wet depressions and drainage lines.	**May occu**r – Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2, 3
Eucalyptus argutifolia	VU	T	Mallee with smooth grey to pale coppery bark growing to 2-4 m high. Produces white flowers from March to April.	Grey sand soil. Limestone outcrops, ridges and breakaways.	**May occur** - Suitable habitat. Previous specimen located approximately 12 km from survey area.	1, 2, 3
Banksia mimica		T	Prostrate, lignotuberous shrub growing to 0.15-0.4 m high with leaves growing up to 0.4 m long. Produces yellow-brown flowers from December to February.	White or grey sand, sandy loam soils over laterite. Slopes and flats.	**May occur** – Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Macarthuria keigheryi		T	Small, erect shrub growing to 0.4 m high with bright yellow to green stems. Leaves mainly at the base of stems and on young growth. Produces flowers with white and green parts from September to December and February to March.	Open patches of white or grey sandy soil. Winter wet depressions, jarrah and banksia woodlands.	**May occur** – Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Marianthus paralius		T	Prostrate, scrambling to climbing, woody shrub with twining stems. Produces red flowers from September to November.	White sandy soil over limestone. Limestone ridges, coastal cliffs and limestone outcropping.	**May occur** – Suitable habitat. Previous specimen located approximately 19 km from survey area.	1

Species	Cons. Status		Description	Preferred Habitat	Pre-Survey Likelihood of Occurrence	Source
	EPBC	WA				
Baeckea sp. *Limestone* (N. Gibson & M.N. Lyons 1425)		P1	Compact shrub growing to 1.2 m high. Produces pink or pale pink to white flowers from September to December.	Grey, yellow sandy soil with limestone. Hills and outcrops.	**May occur** – Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Grevillea evanescens		P1	Erect, robust shrub growing to 3-4 m high. Produces red flowers from July to November.	Brown clayey loam, sandy loam soils. Winter wet depressions and drainage lines, swamps.	**May occur** – Suitable habitat. Previous specimen located approximately 5 km from survey area.	1, 2
Dampiera tephrea		P2	Erect perennial herb or shrub growing to 0.6 m high. Produces blue/purple flowers from August to October.	Sand, gravelly loam soils often over limestone. Flats, sloping breakaways, riverbanks.	**May occur** – Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2
Eryngium pinnatifidum subsp. Umbraphilum (G.J. Keighery 13967)		P2	Tuberous, perennial herb growing to 0.5 m high. Produces blue or white flowers from October to November.	Sandy clay soil. Wetlands, winter wet flats.	**May occur** – Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2
Goodenia xanthotricha		P2	Erect shrub growing to 0.9 m high. Produces blue flowers from November to March.	Sandy clay, sand. Hilltops, slopes and flats, sometimes with laterite rocks.	**Likely to occur** – Suitable habitat. Previous specimen located approximately 11 km from survey area.	1, 2
Hakea oligoneura		P2	Densly branched shrub growing to 1.5-2 m high. Produces white flowers from August to September.	Grey-brown sandy soil with limestone. Ridges, limestone outcrops, slopes.	**Likely to occur** – Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Haloragis aculeolata		P2	Slender erect perennial herb growing to 0.4 m high. Produces green flowers from September to December.	Sand, loam or clay soils, sometimes over limestone. Winter-wet areas, flats and slopes.	**May occur** – Suitable habitat. Previous specimen located approximately 18 km from survey area.	1
Hypocalymma sp. Cataby (G.J. Keighery 5151)		P2	Erect, spreading shrub, 0.5-1 m high, to 1 m wide. Produces white flowers in August.	Grey sand.	**May occur** – Suitable habitat. Previous specimen located approximately 9 km from survey area.	1, 2
Lepyrodia curvescens		P2	Dioecious, shortly creeping, tufted rhizomatous herb growing to 0.24-0.4 m high. Produces dark red-purple flowers from September to November.	Grey sandy loam, sand, clayey sand soils with laterite. Seasonally inundated swampland, low rises and slopes.	**May occur** – Suitable habitat. Previous specimen located approximately 18 km from survey area.	1
Leucopogon squarrosus subsp. *trigynus*		P2	Erect shrub growing to 0.7 m high. Produces white flowers from June to October.	Sandy soil. Low-lying flats and slopes.	**Likely to occur** – Suitable habitat. Previous specimen located approximately 9 km from survey area.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Pre-Survey Likelihood of Occurrence	Source
	EPBC	WA				
Schoenus loliaceus		P2	Small, annual sedge growing to 0.06 m high.	Sandy soils. Winter-wet depressions.	**May occur** – Suitable habitat. Previous specimen located approximately 18 km from survey area.	1
Arnocrinum drummondii		P3	Rhizomatous, perennial, herb, 0.15-0.5 m high. Produces purple flowers, Sep to Dec.	White or yellow sand.	**May occur** – Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Babingtonia urbana		P3	Erect to sprawling shrub growing to 0.5 m high. Produces pink flowers from October to March.	Brown clay loam, sandy soils. Flats and winter wet depressions.	**May occur** – Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Banksia dallanneyi subsp. *pollosta*		P3	Prostrate, sprawling, lignotuberous shrub growing to 0.3 m high. Produces flowers with brown, yellow and orange parts from August to September.	Grey, yellow sandy soil. Hilltops, slopes and flats.	**May occur** – Suitable habitat. Previous specimen located approximately 8 km from survey area.	1, 2
Calytrix ecalycata subsp. *brevis*		P3	Upright shrub growing to 1 m high. Produces flowers between August and September.	Dry yellow sand. Sandplains, low rises	**May Occur** – Suitable habitat. WAH (1998-) specimen located approximately 22 km north of survey area. Ecoedge (2019b) recorded one individual on roadside approximately 10 km NE of the survey boundary.	4
Conostylis bracteata		P3	Tufted, rhizomatous perennial grass like herb growing to 0.2-0.4 m high. Produces yellow flowers from August to November.	Sandy soil. Dunes, sometimes with limestone outcropping.	**May occur** – Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Desmocladus biformis		P3	Rhizomatous, densely tufted perennial, herb (sedge-like) growing 0.1 to 0.2 m high. Produces flowers from September to October.	Sand, sandy clay, lateritic soils. Dry sites.	**May occur** – Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Dillwynia dillwynioides		P3	Decumbent or erect shrub growing between 0.3-1.2 m high. Produces flowers with red, orange and yellow parts from August to December.	Sand, loam, clay soils. Seasonally wet depressions, wetlands.	**May occur** – Suitable habitat. Previous specimen located approximately 10 km from survey area.	1, 2
Haemodorum loratum		P3	Bulbaceous, erect perennial herb growing between 0.45-1.2(-2) m high. Produces black-dark green flowers from October to November.	Sand. Slopes and flats.	**May occur** – Suitable habitat. Previous specimen located approximately 12 km from survey area.	1, 2
Hensmania stoniella		P3	Tufted, stilt-rooted perennial, herb, 0.1-0.2 m high. Produces yellow-cream-white flowers, Sep to Nov.	White, grey or lateritic sand, often winter-wet.	**May occur** – Suitable habitat. Previous specimen located approximately 14 km from survey area.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Pre-Survey Likelihood of Occurrence	Source
	EPBC	WA				
Hibbertia leptotheca		P3	Small shrub growing to 0.3-0.5 m high. Produces yellow flowers from August to October.	Sand with limestone. Limestone ridges, outcrops, slopes and dunes.	**May occur** – Suitable habitat. Previous specimen located approximately 20 km from survey area.	1
Isopogon autumnalis		P3	Erect multi stemmed shrub growing to 0.5 - 1 m high. Produces yellow flowers from February to June.	White, grey, yellow sandy soil with laterite gravel. Flats and slopes, rocky.	**Likely to occur** - Suitable habitat. Previous specimen located approximately 12 km from survey area.	1
Isotropis cuneifolia subsp. *glabra*		P3	Rhizomatous perennial herb or shrub growing to 0.2 m high. Produces flowers with yellow, red and orange parts, with distinct venation on the back of the flower, from Aug to Oct.	Sand, brown/black clay loam soils. Winter-wet flats, swamps and low rises.	**May occur** – Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Leucopogon sp. Yanchep (M. Hislop 1986)		P3	Erect shrub, 0.15-1 m high, to 0.6 m wide. Produces white/pink flowers, Apr to Jun or Sep.	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	**Likely to occur** – Suitable habitat. Previous specimen located approximately 4 km from survey area.	1, 2
Persoonia rudis		P3	Erect, often spreading shrub growing to 1 m high. Produces yellow flowers from September to December.	Sandy soil. Hills, slopes and flats, often associated with laterite.	**May occur** – Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Petrophile biternata		P3	Stout, rigid, non-lignotuberous shrub, 0.8-1.5 m high. Produces yellow/cream-yellow flowers, Aug to Oct.	Yellow/grey sand & gravel, laterite, quartzite soils. Lateritic ridges, plains.	**May occur** – Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Phlebocarya pilosissima subsp. *pilosissima*		P3	Compactly tufted, rhizomatous perennial grass-like shrub growing to 0.15-0.4 m high. Produces cream-white flowers from August to October.	White or grey sandy soil, sometimes with lateritic gravel. Slopes.	**May occur** – Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Pimelea calcicola		P3	Erect to spreading shrub growing to 0.2 to 1 m high. Produces white flowers with some pink from September to November.	Brown sandy loam, white-grey sandy soil associated with limestone. Coastal limestone ridges.	**May occur** – Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Platysace ramosissima		P3	Perennial, clumping, multi-stemmed herb growing to 0.3 m high. Produces cream-white flowers from December to January.	Sand, sandy clay soils. Seasonally wet flats, slopes.	**May occur** – Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Sarcozona bicarinata		P3	Herbaceous succulent shrubs to 0.1 m high. Produces white flowers in August.	White or grey sand over limestone.	**May occur** – Suitable habitat. Previous specimen located approximately 20 km from survey area.	1

Species	Cons. Status		Description	Preferred Habitat	Pre-Survey Likelihood of Occurrence	Source
	EPBC	WA				
Stylidium maritimum		P3	Caespitose perennial, herb, 0.3-0.7 m high, Leaves tufted, linear to narrowly oblanceolate, 10-40 cm long, 1-5.5 mm wide, apex acute to mucronate, margin involute, glabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Produces white/purple flowers, Sep to Nov.	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	**May occur** – Suitable habitat. Previous specimen located approximately 20 km from survey area.	1
Stylidium nonscandens		P3	Erect perennial, herb, 0.18-0.46 m high, Leaves in whorls, linear, 0.2-4.2 cm long, 0.4-1.2 mm wide, apex subacute to acute, margin entire, glabrous. Scape glabrous. Inflorescence racemose. Produces pink flowers, Sep to Nov.	Sand over laterite. Hillslopes and crests. Banksia woodland, heath, mallee shrubland.	**May occur** – Suitable habitat. Previous specimen located approximately 11 km from survey area.	1, 2
Thryptomene sp. Lancelin (M.E. Trudgen 14000)		P3	Shrub growing to 0.5 m high. Produces pink flowers in September.	Calcareous sand.	**May occur** – Suitable habitat. Previous specimen located approximately 17 km from survey area.	1
Anigozanthos humilis subsp. *chrysanthus*		P4	Rhizomatous perennial herb growing to 0.4 (0.8) m high. Produces yellow paw like flowers from July to October.	Grey, yellow sandy soil. Flats and undulating plains.	**May occur** – Suitable habitat. Previous specimen located approximately 10 km from survey area.	1, 2
Caladenia speciosa		P4	Tuberous perennial herb growing to 0.2 m high with single, hairy, erect leaf 15-25 cm long. Produces up to 3 white flowers with red tinges from September to October.	Sand and loamy soils. Slopes and flats, swampy areas.	**May occur** – Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Conostylis pauciflora subsp. *euryrhipis*		P4	Dense, rhizomatous perennial grass like herb growing to 0.2 m high with sinuous leaves. Produces yellow flowers from August to October.	Sandy soil. Limestone ridges, dunes, slopes and flats.	**May occur**- Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Dodonaea hackettiana		P4	Erect shrub or tree growing to 1-5 m high. Produces yellow flowers with green and red parts mainly between July to October.	Sandy soils, associated with limestone outcropping. Limestone ridges, slopes and dunes.	**Likely to occur** – Suitable habitat. Previous specimen located within survey area.	1, 2
Eucalyptus macrocarpa subsp. *elachantha*		P4	(Spreading or sprawling mallee), 0.8-4 m high, bark smooth, grey over salmon pink. Produces red-pink flowers, Aug to Sep or Nov to Dec.	White or grey sand over laterite. Hillslopes, ridges, sandplains.	**May occur** – Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Lepidobolus densus		P4	Rhizomatous, caespitose perennial sedge growing to 0.4 m high.	Sand, occasionally with lateritic gravel. Flats, slopes and sandplains.	**May occur** – Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Rumex drummondii		P4	Erect perennial herb growing to 0.9 m high. Produces cream flowers turning reddish from August to November.	Sandy clay, peaty soils. Winter-wet areas, creeklines and disturbed areas.	**May occur** – Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Pre-Survey Likelihood of Occurrence	Source
	EPBC	WA				
Schoenus griffinianus		P4	Small, tufted perennial grass-like herb growing to 0.1 m high. Produces brown flowers from September to October.	White/grey sandy soil. Undulating plains, depressions.	**May occur** – Suitable habitat. Previous specimen located approximately 14 km from survey area.	1, 2
Tripterococcus sp. Brachylobus (A.S. George 14234)		P4	Slender, erect, multi-stemmed perennial herb to 0.6 m high. Produces orange-yellow flowers from October to February.	Grey-white sand, peaty sand over clay soils. Winter wet flats, shallow depressions, dry flats and slopes.	**May occur** – Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Verticordia lindleyi Schauer subsp. *lindleyi*		P4	Erect shrub growing to 0.2 to 0.75 m high. Produces pink flowers with white fringes from November to January (also known from May).	Sand, sandy clay soils. Winter-wet depressions.	**May occur** – Suitable habitat. Previous specimen located approximately 6 km from survey area.	1, 2
Verticordia paludosa		P4	Erect shrub growing to 0.9 m high. Produces pink-white flowers from January to May.	Sand, peaty sand and gravelly clayey sandy soils. Flats, slopes and winter-wet low-lying areas.	**May occur** – Suitable habitat. Previous specimen located approximately 6 km from survey area.	1, 2

Sources of information: 1 (DBCA, DBCA 2021c), 2 (NatureMap, DBCA 2021b), 3 (PMST, DAWE 2021d), 4 (Ecoedge 2019b)

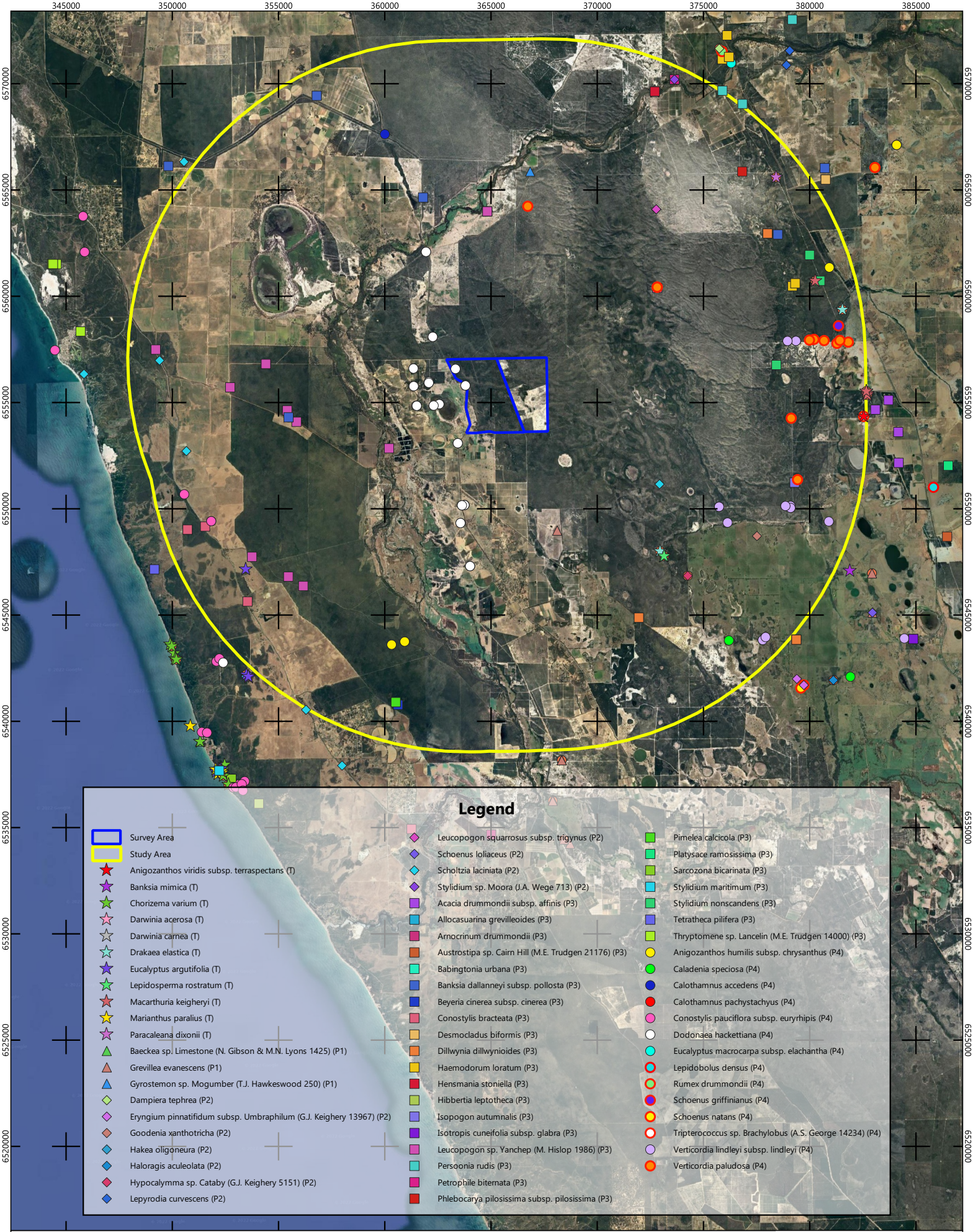


Figure 10 - Significant Flora

5.1.3 Threatened and Priority Ecological Communities

A review of DBCA's TEC and PEC database (DBCA 2021c), the PMST report (DAWE 2021d) and the Gibson *et al.* (1994) and Keighery *et al.* (2012) dataset identified eight significant ecological communities found or predicted to occur within 15 km of survey area (**Figure 11**). The likelihood of occurrence of each TEC and PEC is determined through assessment of various factors such as the FCTs present nearby, landforms, soils, geology and known extent of the relevant TECs and PECs. Three TECs are considered likely to occur, four may occur and one is considered unlikely to occur (**Table 17**). The known extent of the State-listed TECs and PECs returned from the database search is presented in **Figure 11**.

Table 17 – Threatened and Priority Ecological Communities Potentially Occurring within the Survey Area

Abbreviated Identifier	Community Name	Cons. Status		Likelihood of Occurrence
		EPBC	WA	
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain	EN	P3	**Likely to Occur** 817 predicted occurrences and 27 known occurrences (Keighery *et al.* (2012) quadrats representing FCTs 23a, 22 and S09) are mapped throughout the study area, with only predicted occurrences occurring within the survey area.
SCP22	*Banksia ilicifolia* woodlands	EN	P3	**Likely to Occur** Two known occurrences from Keighery *et al.* (2012) quadrats occur within the study area, with quadrat MR11 located on the eastern boundary of the survey area.
SCP23b	Northern *Banksia attenuata* – *Banksia menziesii* woodlands	EN	P3	**Likely to Occur** Fourteen known occurrences correlate with Keighery *et al.* (2012) quadrats, with quadrat MR10 located ~750 m north-east of the survey area.
Clay Pans	Clay Pans of the Swan Coastal Plain	CR		**May Occur** Two known communities occur ~7 and ~12 km south-east of the survey area (Keighery *et al.* 2012). Associated soils are present within the survey area, could potentially support this TEC.
SCP09	Dense shrublands on clay flats (floristic community type 9 as originally described in Gibson *et al.* (1994))	CR	VU	**May Occur** One predicted occurrence of this community is located ~7 km south-east of the survey area. Soil type, 'Humic dark grey swamp soils' present within the survey area could potentially support this TEC.
SCP07	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson *et al.* (1994))	CR	VU	**May Occur** Two known occurrences of this community are located ~12 km SE of the survey area on Bassendean, Phase 6+7 soils (Keighery *et al.* 2012). This soil type is present within the survey area, which could potentially support this TEC (**Table 5**).
Muchea Limestone	Shrublands and Woodlands on Muchea Limestone of Swan Coastal Plain	EN		**Unlikely to Occur** One known community occurs ~13 km SE of the study area. No limestone soils are present within the survey area (**Table 5**).
Tuart Woodlands	Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain	CR	P3	**May Occur** 145 predicted occurrences within the study area, with the closest occurring <100 m from the south-west corner of the survey area. Majority of the survey area is 'Bassendean Complex – North' unlikely to support *E. gomphocephala* woodlands (see **Section 3.4**).

5.1.3.1 Banksia WL SCP – Banksia Woodlands of the Swan Coastal Plain

The *Banksia Woodlands of the Swan Coastal Plain ecological community* (Banksia woodlands TEC) was approved for inclusion as an Endangered TEC under the EPBC Act on 16 September 2016 (TSSC 2016) and is a P3 PEC at the State level. This ecological community is known to be present throughout the study, although the extent to which this community is present within the survey area is unconfirmed (**Figure 11a**).

The Banksia woodlands TEC is largely restricted to the Swan Coastal Plain IBRA bioregion, within the Perth (SWA02) and Dandaragan (SWA01) sub-regions. It extends into the adjacent Jarrah Forrest IBRA region (JA01 and JA02 sub-regions) and areas of the Whicher and Darling escarpments where pockets of Banksia woodland may occur. Associated with deep Bassendean sands, Spearwood sands and occasionally Quindalup sands this community occurs as a woodland supporting a prominent tree layer of Banksia with scattered Eucalypts and other tree species among or emerging above the canopy, with a rich understory comprised of sclerophyllous shrubs, graminoids and forbs (TSSC 2016).

Twenty-one Floristic Community Types (FCTs) described by Gibson *et al.* (1994), in Bush Forever (Government of Western Australia 2000), Keighery *et al.* (2012) and Urban Bushland Council (2011) best correspond to the Banksia woodlands TEC (TSSC 2016), these are summarised in **Table 17**. The FCTs associated with the Banksia woodlands TEC documented to occur within the study area are; FCT 22, FCT 23b and FCT 23c and S09 (Keighery *et al.* 2012).

5.1.3.2 SCP22 – Banksia ilicifolia woodlands (FCT 22)

The SCP 22 community forms part of the Commonwealth-listed Endangered Banksia woodlands TEC and is characterised by a woodland of *Banksia ilicifolia* and *Banksia attenuata* woodlands with the presence of *Melaleuca preissiana* woodlands and scrubs. Occurring north of Rockingham in the central Swan Coastal Plain on Bassendean and Spearwood systems, this community are likely to be seasonally waterlogged with a typical open understory (DBCA 2017). This community type is present within the study area, with two known occurrences located approximately 13 m east and 9 km south of the survey area (**Figure 11a**).

Of the Keighery *et al.* (2012) quadrats, two associated with FCT 22 are found within the study area, located approximately 20 m east and 9.7 km south of the survey area (**Figure 11b**). This community is likely to occur within the survey area.

5.1.3.3 SCP23b – Swan Coastal Plain Banksia attenuata – Banksia menziesii woodlands (FCT 23b)

The SCP 23b community forms part of the Commonwealth-listed Endangered Banksia woodlands TEC and is characterised by a woodland of *Banksia attenuata* with *Banksia menziesii* and occurs on the Bassendean soils system (DBCA 2017). This community type is present within the study area, with 15 known occurrences located on the eastern side of the survey area where the Bassendean System is present (**Figure 3** and **Figure 11a**).

Within the study area 14 quadrats were established by Keighery *et al.* (2012) that correspond to the FCT 23b. This community is likely to occur within the survey area (**Figure 11b**).

5.1.3.4 Clay Pans of the Swan Coastal Plain

The *Clay Pans of the Swan Coastal Plain* ecological community (Clay Pans TEC) was listed under the EPBC Act as Critically Endangered in 2012. This ecological community has two known occurrences within the study area located approximately 7 and 12 km south of the survey area (**Figure 11a**).

Clay pans are considered unlikely to be connected to groundwater, relying on rainfall or local surface drainage it occurs where clay substrate is low in the landscape forming an impermeable layer close to the surface. Containing a number of endemic perennial and annual flora, these clay pans are considered the most diverse of the Swan Coastal Plain wetlands (DBCA 2019b).

This ecological community is comprises four State-listed TECs (FCTs 7, 8, 9 and 10a) and one PEC, as summarised in **Table 17** (DBCA 2019b). Two occurrences of FCT 7 occur approximately 8.7 km and 12.4 km south-east of the survey area (**Figure 11b**).

5.1.3.5 SCP07 – Herb Rich Saline Shrublands in Clay Pans (FCT 7)

This vegetation community type forms part of the Commonwealth Critically Endangered Clay Pans TEC and is listed as Vulnerable under the BC Act. One known occurrence of this community is present approximately 12.4 km south-east of the survey area (**Figure 11a**).

Occurring on heavy clay soils generally inundated from winter to mid-summer, many sites of this community still retain approximately 30 cm deep of free water in early spring. Aquatic species are common in this vegetation community early in the growing season. *Cotula coronopifolia* (water buttons) can form yellow floating mats in some pools while others are dominated by *Ornduffia submersa*. As the wetland dries, a succession of species such as *Centrolepis* spp. And annual *Stylidium* spp. (trigger plants) successively germinate, grow and flower, resulting in an extended flowering period of over three months (DBCA 2019b).

Structurally, this vegetation community type is quite variable, ranging from woodlands to herblands, the most common overstorey taxa being *Melaleuca viminea*, *Melaleuca uncinata* (broom bush), *Melaleuca cuticularis* (saltwater paperbark) or *Casuarina obesa* (swamp sheoak). The species saltwater paperbark and swamp sheoak may indicate some saline influence for at least some part of the year (DBCA 2019b).

Typical species in the understorey include the common herbs, *Brachyscome bellidioides*, *Centrolepis polygyna* (wiry centrolepis), *Pogonolepis stricta* and water buttons (*Cotula* spp.). In addition, species such as *Angianthus* aff. *drummondii*, *Eryngium pinnatifidum* subsp. *palustre* and *Blennospora drummondii* occur in low frequency and are absent from the constituent vegetation community types SCP08 and SCP10 (DBCA 2019b).

Two quadrats established by Keighery *et al.* (2012) that correspond to the FCT 7 occur approximately 8.7 km and 12.4 km south-east of the survey area. This community may occur within the survey area (**Figure 11b**).

5.1.3.6 SCP09 – Dense Shrublands on Clay Flats (FCT 9)

The 'Dense Shrublands on Clay Flats' community forms part of the Commonwealth-listed Critically Endangered Clay Pans TEC and is listed as Vulnerable under the BC Act. One known occurrence of this community is present approximately 7 km east of the survey area (**Figure 11a**).

This community type consists of shrublands or low open woodlands on clay flats that are inundated for long periods because it usually occurs very low in the landscape. Sedges are more apparent in this ecological community and include *Chorizandra enodis* (black bristlerush), *Cyathochaeta avenacea*, *Lepidosperma longitudinale* (pithy sword-sedge) and *Meeboldina coangustata*. Shrubs include *Hakea varia* (variable-leaved hakea) and *Melaleuca viminea* and occasionally *Xanthorrhoea preissii, Xanthorrhoea drummondii* (grass trees) and *Kingia australis*. This vegetation community type has a lower species richness and weed frequency than in the other clay pan community types, presumably because of the longer inundation times (DBCA 2019b).

No quadrats established by Gibson *et al.* (1994) or Keighery *et al.* (2012) determined to represent FCT S09 occur within the study area. This community may occur within the survey area (**Figure 11b**).

5.1.3.7 Muchea Limestone – Shrublands and Woodlands on Muchea Limestone of Swan Coastal Plain

The 'Shrublands and Woodlands of Muchea Limestone of the Swan Coastal Plain' community was listed under EPBC Act as Endangered in 2000. This community type is found inland, and is considered unique, as its floral assemblage consists of species generally associated with the Tamala limestone soils on the coast (DEE 2017b).

One known occurrence of this community is found within the study area, located approximately 12.5 km south-east of the survey area (**Figure 11a**). The known occurrence of this community in the wider study area is on the Yanagara system, on soils consisting of a combination of sand, clay and limestone. However, soils within the survey area (located on the Bassendean system, with little or no limestone) consist predominantly of sand with swamp peats and gleyed clay at depth. Key flora species characteristic to this community include, *Casuarina obesa, Eucalyptus decipiens, Eucalyptus foecunda* and *Melaleuca huegelii* (DEE 2017b), none of which were recorded within the survey area.

It is considered unlikely that this TEC occurs within the survey area, given the lack of soils and dominant flora characteristic of this community type.

5.1.3.8 Tuart Woodlands – Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain

The *Tuart* (Eucalyptus gomphocephala) *Woodlands and Forests of the Swan Coastal Plain* Ecological Community (Tuart woodlands and forests TEC) was approved for inclusion as an Endangered TEC under the EPBC Act on 4 July 2019. This community occurs in the Swan Coastal Plain IBRA region within the Perth subregion, from Jurien, 200 km north of Perth, to Sabina River near Busselton, 225 km south of Perth (TSSC 2019). Numerous occurrences of this community are predicted to be present within the study area, restricted to the Spearwood soil system; however, no known occurrences of this community are present within the survey area (**Figure 11a**).

This ecological community occurs as woodland, forest or other structural forms associated with soils of the Swan Coastal Plain with a prominent tree layer of *Eucalyptus gomphocephala* (Tuart) as the defining feature (DEE 2019). The distribution of the ecological community is limited by the distribution of Tuart, although Tuart trees do also occur as a component of other vegetation communities, including the nationally listed Banksia woodlands TEC (DEE 2019).

Twelve FCTs described by Gibson *et al.* (1994) contain Tuart trees as a component of the TEC; however, no corresponding quadrats were located within the study area (**Figure 11b**). The twelve correlating FCTs are summarised in **Table 17**. This community type may occur within the survey area.

Table 18 – Summary of FCTs Associated with TECs

TEC	FCT	FCT Name	EPBC TEC	WA TEC/PEC
Banksia woodlands TEC	**Supergroup 3 – Uplands centered on Bassendean Dunes and Dandaragan Plateau**			
	20a	*Banksia attenuata* woodlands over species rich dense shrublands		EN
	20b	Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands		EN
	20c	Eastern shrublands and woodlands	EN	CR
	21a	Central *Banksia attenuata – Eucalyptus marginata* woodlands		
	21b	Southern *Banksia attenuata* woodlands		P3
	21c	Low lying *Banksia attenuata* woodlands or shrublands		P3
	22	*Banksia ilicifolia* woodlands		P3
	23a	Central *Banksia attenuata – Banksia menziesii* woodlands		
	23b	Northern *Banksia attenuata – Banksia menziesii* woodlands		P3
	23c	Northern *Banksia attenuata – Banksia menziesii* woodlands		
	S09	North-eastern *Banksia attenuata – Banksia menziesii* woodlands		
	Supergroup 4 – Uplands centered on Spearwood and Quindalup Dunes			
	24	Northern Spearwood shrublands and woodlands		P3
	25	Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands		P3
	28	Spearwood *Banksia attenuata* or *Banksia attenuata – Eucalyptus* woodlands		
	Whicher Scarp FCTs (Keighery *et al.* 2008)			
	A1	Central Whicher Scarp Mountain Marri Woodland WHSFCT_A1		P1
	A2	North Whicher Scarp Jarrah and Woody Pear woodland WHSFCT_A2		
	A3	North Whicher Scarp *Banksia* and Woody Pear woodland WHSFCT_A3		
	A4	Whicher Scarp *Banksia grandis*, Jarrah and Marri woodland WHSFCT_A4		
	B1	Swan Coastal Plain/North Whicher Scarp *Banksia attenuata* woodland WHSFCT_B1		
	B2	West Whicher Scarp *Banksia attenuata* woodland WHSFCT_B2	P1	
	C2	Whicher Scarp Jarrah woodland on deep coloured sands WHSFCT_C2	P1	
Clay Pans TEC	7	Herb Rich Saline Shrublands in Clay Pans	CR	VU
	8	Herb Rich Shrublands in Clay Pans	CR	VU
	9	Dense Shrublands on Clay Flats	CR	VU
	10a	Shrublands on Dry Clay Flats	CR	EN
	-	Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs	CR	P1
Tuart woodlands TEC	**Supergroup 2 – Seasonal Wetlands**			
	16	Highly saline seasonal wetlands		
	17	*Melaleuca rhaphiophylla – Gahnia trifida* seasonal wetlands		
	19b	Woodlands over sedgelands in Holocene dune swales		
	Supergroup 3– Uplands centered on Bassendean Dunes			
	21a	Central *Banksia attenuata – Eucalyptus marginata* woodlands		
	Supergroup 4 – Uplands centered on Spearwood and Quindalup Dunes			
	24	Northern Spearwood shrublands and woodlands		P3
	25	Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands		P3
	26b	Woodlands and mallees on Limestone		
	28	Spearwood *Banksia attenuata* or *Banksia attenuata – Eucalyptus* woodlands		
	29a	Coastal shrublands on shallow sands		P3
	30b	Quindalup *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands		P3
	30c2	Woodlands and shrublands on Holocene dunes (re-allocated from 30c and 30a as per Gibson *et al.* 1994)		
	S11	Northern *Acacia rostellifera – Melaleuca systena* shrublands		

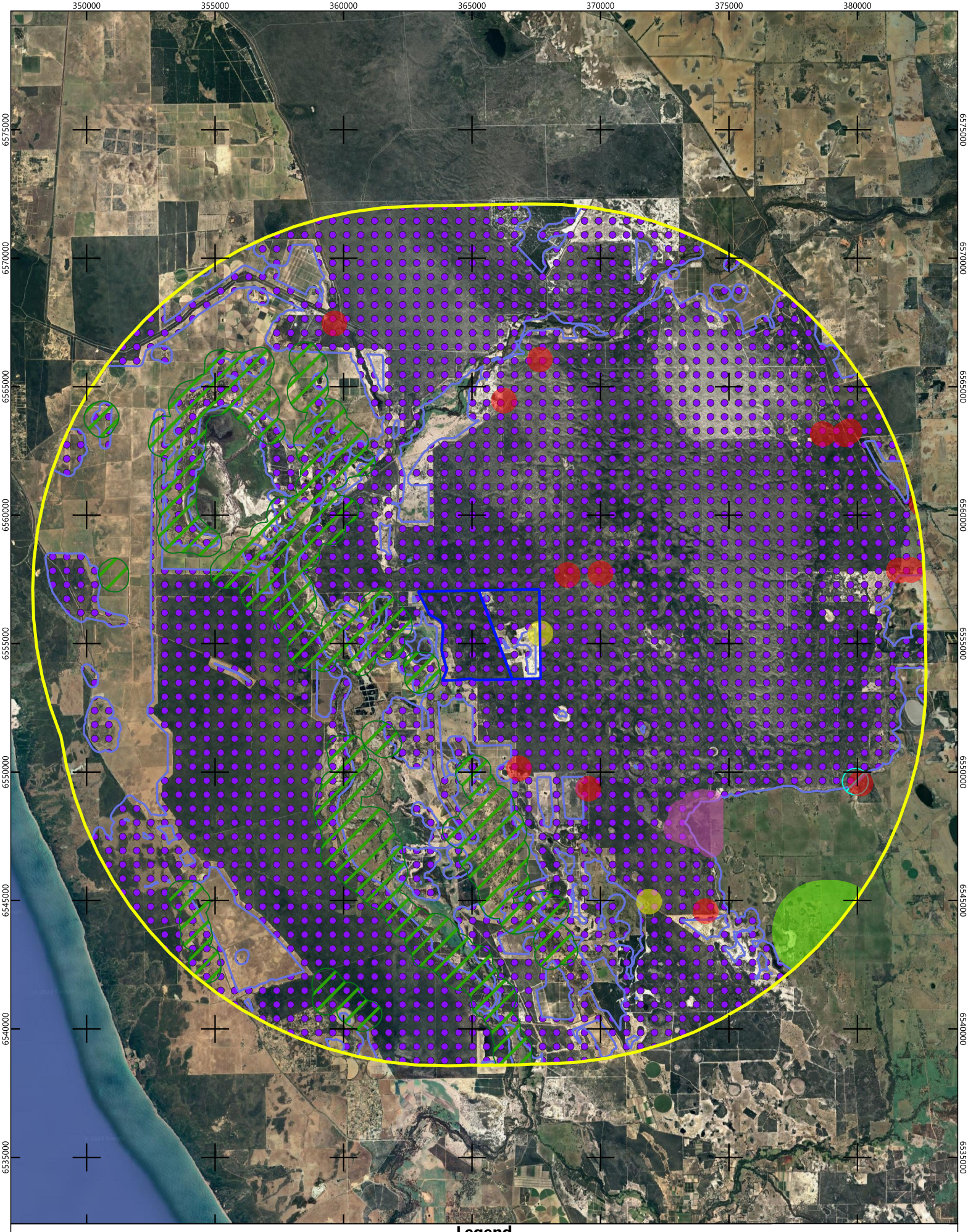


Figure 11a - Threatened and Priority Ecological Communities (DBCA TECs and PECs)

FOCUSED VISION consulting

MRWA21005 14 October 2021

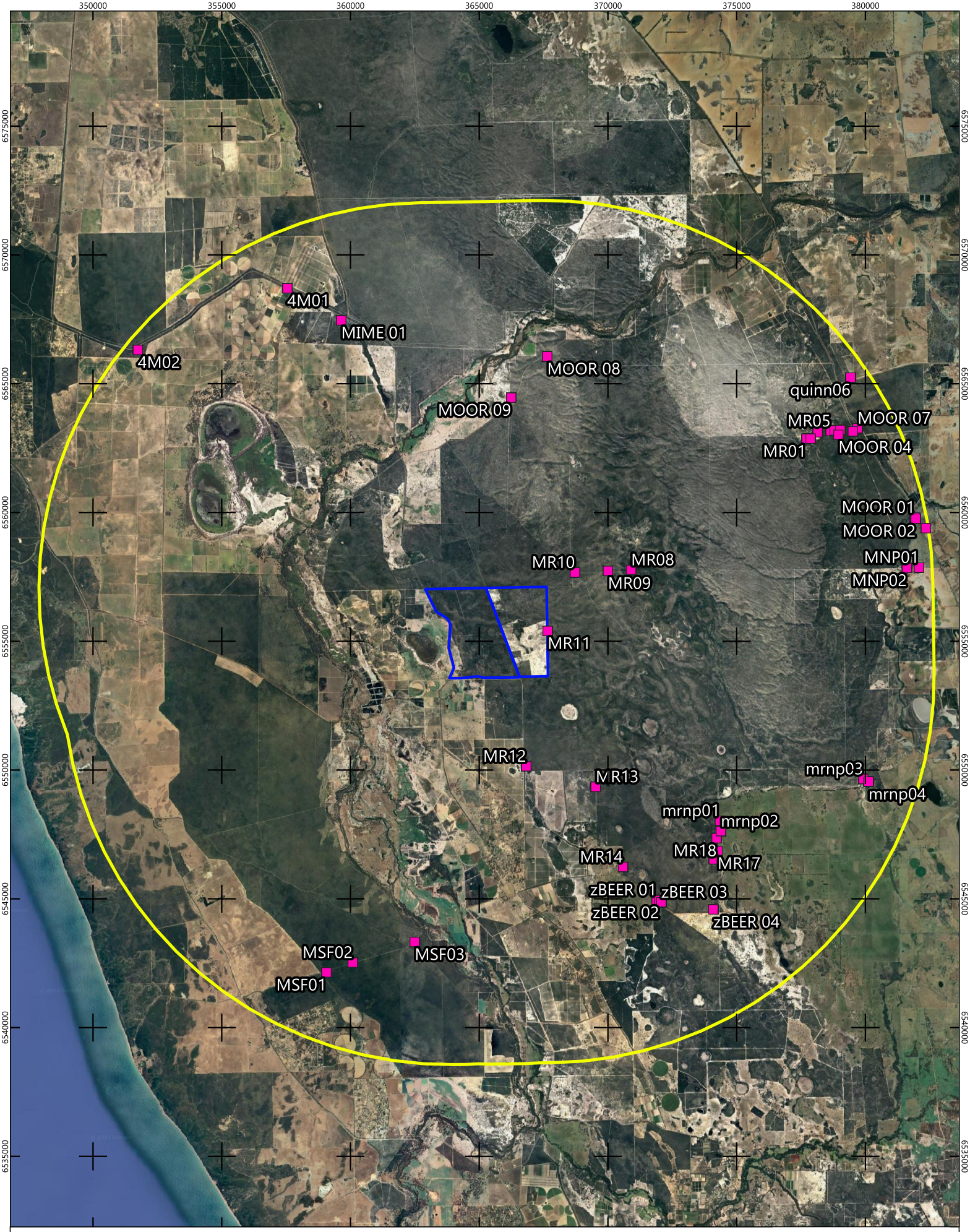


Figure 11b - Threatened and Priority Ecological Communities (Keighery *et al.* (2012) Quadrats)

5.1.4 Expected Fauna Assemblage

The NatureMap Species Report (DBCA 2021b) (**Appendix A**), PMST Report (DAWE, 2021d) (**Appendix B**), DBCA database search (DBCA 2021c) and the BCE internal database identified 296 vertebrate species for the study area, of which 47 are significant. Of the species identified, 199 are considered potentially occurring within the survey area, comprising of ten frogs, 49 reptiles, 116 birds, 16 native and six introduced mammals. Ninety-seven vertebrate species are considered unlikely to occur as no suitable habitat is present and/or the species are considered locally extinct. In addition to vertebrates, the survey area is expected to support a vast number of invertebrates which are largely undocumented in databases. Better-documented and of interest are significant invertebrates, of which there are eight species with the potential to occur in the survey area (**Table 18**). A complete species list of expected fauna species is listed in **Appendix I**.

5.1.5 Significant Fauna

Of the 47 significant vertebrate species that were considered to potentially occur within the study area, 24 vertebrate and an additional eight significant invertebrate species are expected within the survey area (**Table 18**). Those species that are not expected to occur within the survey area are considered to either have no suitable habitat provided (14 species), be locally extinct (two species) or are out of range (six species) (**Figure 12**). Of the potentially occurring species within the survey area, seven are CS1, which includes:

- Carnaby's Black-Cockatoo (regular visitor)
- Baudin's Black-Cockatoo (vagrant)
- Forest Red-tailed Black-Cockatoo (irregular visitor)
- Fork-tailed Swift (irregular visitor)
- Peregrine Falcon (resident)
- Chuditch (vagrant)
- Short-tongue bee (resident).

Of the three Black-Cockatoo species, only two are considered likely to occur within the survey area regularly, Carnaby's Black-Cockatoo (regular visitor) and the Forest Red-tailed Black-Cockatoo (irregular visitor); Baudin's Black-Cockatoo is considered a vagrant.

Table 19 – Significant Fauna Potentially Occurring within the Survey Area

Species	Significance	Preferred Habitat	Pre-Survey Expected Occurrence	Source
REPTILES				
Ctenotus gemmule (Jewelled Sand-plain Skink	CS2 (P3)	Sandplains supporting heath with banksia or mallee woodlands	resident	4
Neelaps calonotos (Black-striped Snake)	CS2 (P3)	Sandy soils supporting heath and banksia/eucalypt woodland	resident	1
Lerista christinae (Bold-striped Slider)	CS3	Heath and Banksia woodlands	resident	4
Morelia spilota imbricata (Carpet Python (south-west population))	CS3	Diverse, often associated with rocks and/or fallen timber	resident	2
BIRDS				
Apus pacificus (Fork-tailed Swift)	CS1 (M, S5)	Aerial	irregular visitor	1,3
Calyptorhynchus banksii naso (Forest Red-tailed Black-Cockatoo)	CS1 (VU, S3[v])	Eucalypt forests and woodlands	irregular visitor	1,2,3
Calyptorhynchus latirostris (Carnaby's Black-Cockatoo)	CS1 (EN, S2[e])	Sandplain banksia/eucalypt woodlands	regular visitor	1,2,3
Calyptorhynchus baudinii (Baudin's Black-Cockatoo)	CS1 (VU, S2[e])	Karri and Marri forests	vagrant	1
Falco peregrinus (Peregrine Falcon)	CS1 (S7)	Diverse, nesting often on cliffs or in large trees	resident	1
Ninox connivens (Barking Owl)	CS2 (P2, WR)	Eucalypt forests and woodlands	vagrant	4
Tyto novaehollandiae (Masked Owl)	CS2 (P2, WR)	Eucalypt forests and woodlands	vagrant	4
Lophoictinia isura (Square-tailed Kite)	CS3 (WR)	Open forests, heathlands, scrub	regular visitor	1
Platycercus icterotis (Western Rosella)	CS3 (WR)	Open eucalypt forests and woodlands	irregular visitor	1,2
Stipiturus malachurus (Southern Emu-wren)	CS3 (HS)	Low, dense heath	regular visitor	1
Myiagra inquieta (Restless Flycatcher)	CS3 (HS)	Open forests, woodlands	irregular visitor	1,2
MAMMALS				
Dasyurus geoffroii (Chuditch)	CS1 (V, S3[v])	Forest, woodlands, often associated with rocky areas	vagrant	2,3
Cercartetus concinnus (Western Pygmy-possum)	CS3 (LS)	Eucalypt forests, woodlands and mallee	resident	4
Hydromys chrysogaster (Rakali, Water-Rat)	CS2 (P4)	Natural or man-made freshwater bodies	irregular visitor	2
Notamacropus irma (Brush Wallaby)	CS2 (P4)	Banksia woodland and eucalypt forests to woodlands with dense understorey	resident	1,2
Isoodon fusciventer (Quenda)	CS2 (P5)	Dense heaths and understorey around wetlands or banksia/jarrah woodlands	vagrant	4
Mormopterus kitcheneri (Western Freetail-Bat)	CS3 (LS)	Dry sclerophyll forest or heath, mallee woodland	resident	4

Species	Significance	Preferred Habitat	Pre-Survey Expected Occurrence	Source
Pseudomys albocinereus (Noodji, Ash-grey Mouse)	CS3 (LS)	Banksia woodlands and heaths on sand	resident	1,2
Sminthopsis 'dolichura' (Little Dunnart)	CS3 (LS)	Banksia woodlands with well-developed understorey	resident	4
Sminthopsis fuliginosus (Grey-bellied Dunnart)	CS3 (LS)	Banksia woodlands with well-developed understorey	resident	4
Tarsipes rostratus (Honey Possum)	CS3 (LS)	Species-rich proteaceous woodlands and heaths	resident	4
INVERTEBRATES				
Hesperocolletes douglasi (short-tongued bee)	CS1 (S3[Ex])	Banksia woodland	resident	1
Hylaeus globuliferus (Woollybush Bee)	CS2 (P3)	Banksia woodland	resident	2
Glossurocolletes bilobatus (short-tongued bee)	CS2 (P2)	Banksia woodland	resident	1
Leioproctus contrarius (short-tongued bee)	CS2 (P3)	Banksia woodland	resident	1,2
Synemon gratiosa (Graceful Sun-Moth)	CS2 (P4)	Banksia woodland and coastal heath; dependent on few food-plant species (*Lomandra* spp.)	irregular visitor	2
Antichiropus UBS2 (millipede)	CS3 (SRE)	Banksia woodland	resident	4
Aname mellosa group (spider)	CS3 (SRE)	Banksia woodland	resident	4
Kwonkan sp. (spider)	CS3 (SRE)	Banksia woodland	resident	4

Sources: 1 (Atlas of Living Australia, ALA 2021), 2 (NatureMap, DBCA 2021b), 3 (PMST, DAWE 2021d), 4 (BCE database)

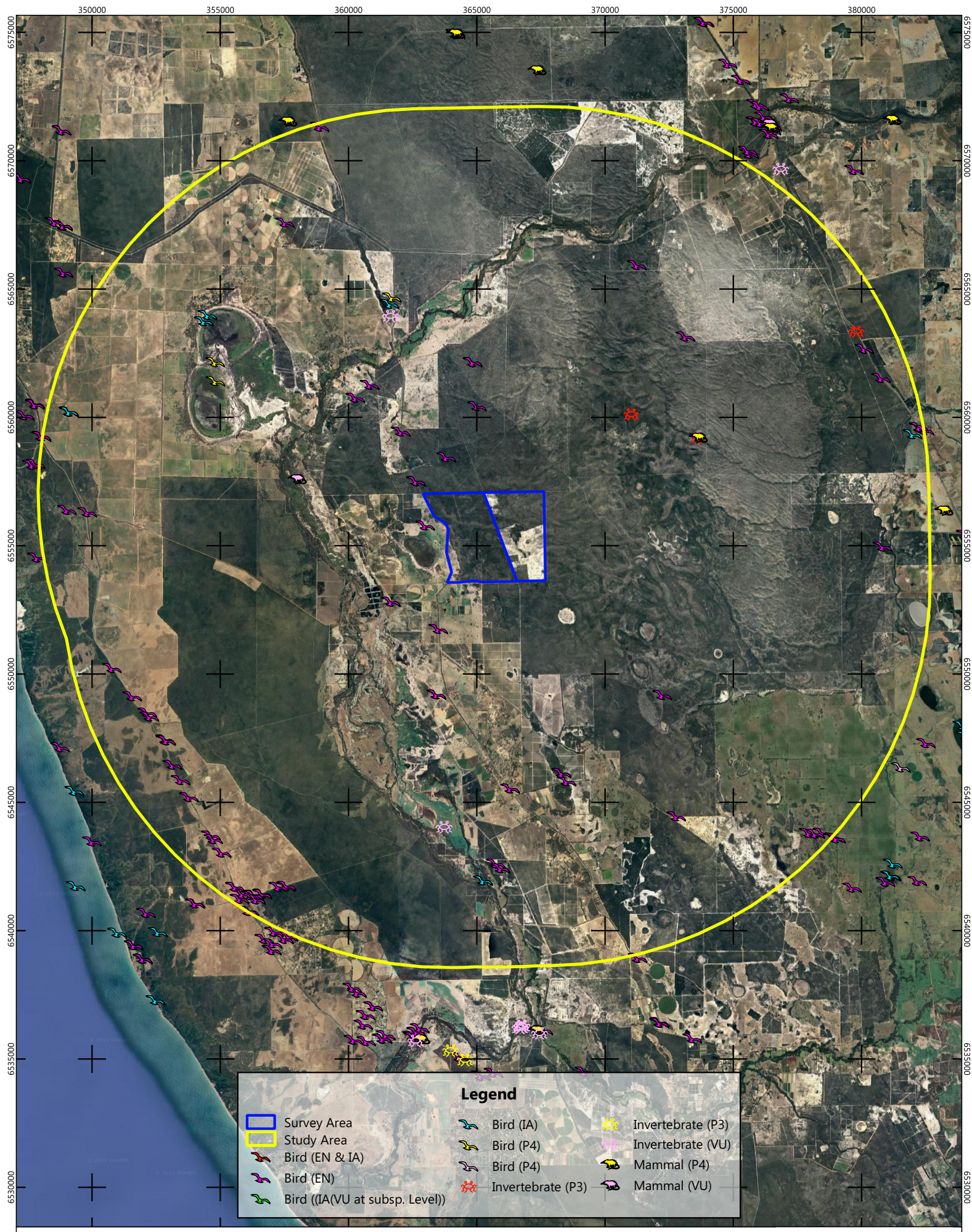


Figure 12 - Significant Fauna

FOCUSED VISION consulting

5.1.6 Black-Cockatoo Habitats

The desktop assessment identified no known Black-Cockatoo breeding or roosting sites that occur within the survey area. However, the survey area occurs within the buffer of a confirmed Carnaby's Black-Cockatoo breeding area, with others adjacent and a known Black-Cockatoo breeding site located approximately 15 km east of the survey area. Two known Black-Cockatoo roosting sites are located approximately 7 km and 13 km south of the survey area (**Figure 13**).

Both Carnaby's and Forest Red-tailed Black-Cockatoos are known to roost communally, and often use the same sites over long time periods (Peck *et al.* 2017). Two confirmed Carnaby's Black-Cockatoo roosts are located within 20 km (one north and one south) of the survey area (**Figure 13**), suggesting that the survey area is within their active range. The desktop assessment revealed that no confirmed or unconfirmed Black-Cockatoo breeding or roosting sites occur within the survey area. However, as the survey area is within the buffer of confirmed Carnaby's Black-Cockatoo breeding areas, it could potentially support breeding habitat.

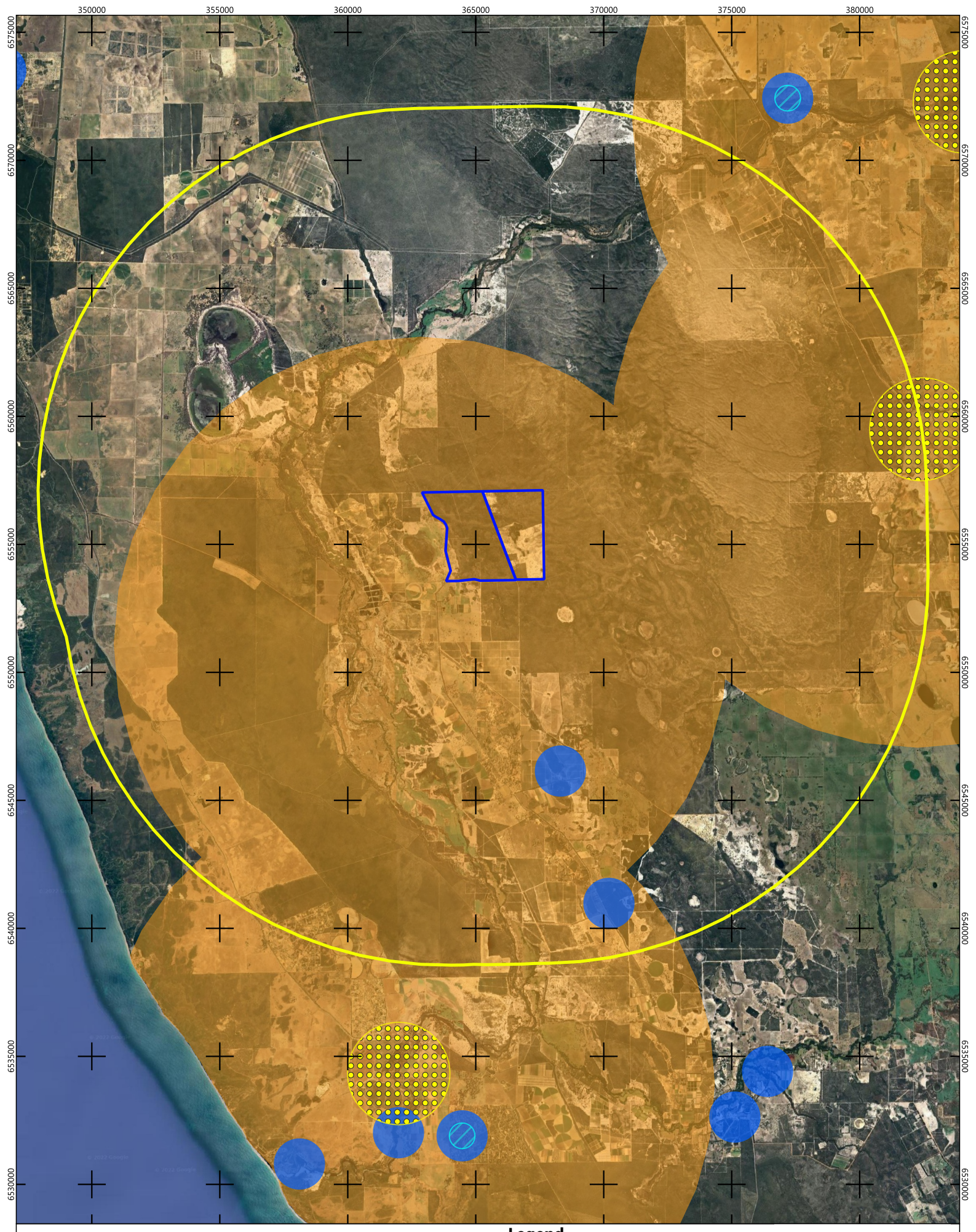


Figure 13 - Black-Cockatoo Habitat

FOCUSED VISION consulting

5.2 FIELD ASSESSMENT

5.2.1 Flora

A total 354 flora species, from 154 genera and 48 families were recorded. The dominant families were found to be Myrtaceae (Mrytle family – 49 taxa species), Fabaceae (Pea family – 32 taxa) and Proteaceae (Protea family – 26 taxa). The total includes 326 (92.09%) native species and 28 (7.91%) introduced (weed) species. The full list of vascular flora species recorded is presented by vegetation unit in **Appendix E**, with individual quadrat data is presented in **Appendix F**.

The average number of species within Banksia woodland vegetation units was 38.4 species (n=32), where Melaleuca vegetation units recorded an average of 22.3 species (n=10). The species accumulation curve demonstrates the adequacy of quadrat sampling, represented in **Figure 14**. A total of 353 flora species were identified after 42 quadrats. Based on the logarithmic trendline equation, if 100 quadrats were to be sampled, a total of 402 species would be recorded. Therefore, an additional 48 quadrats would only potentially record an additional 49 species.

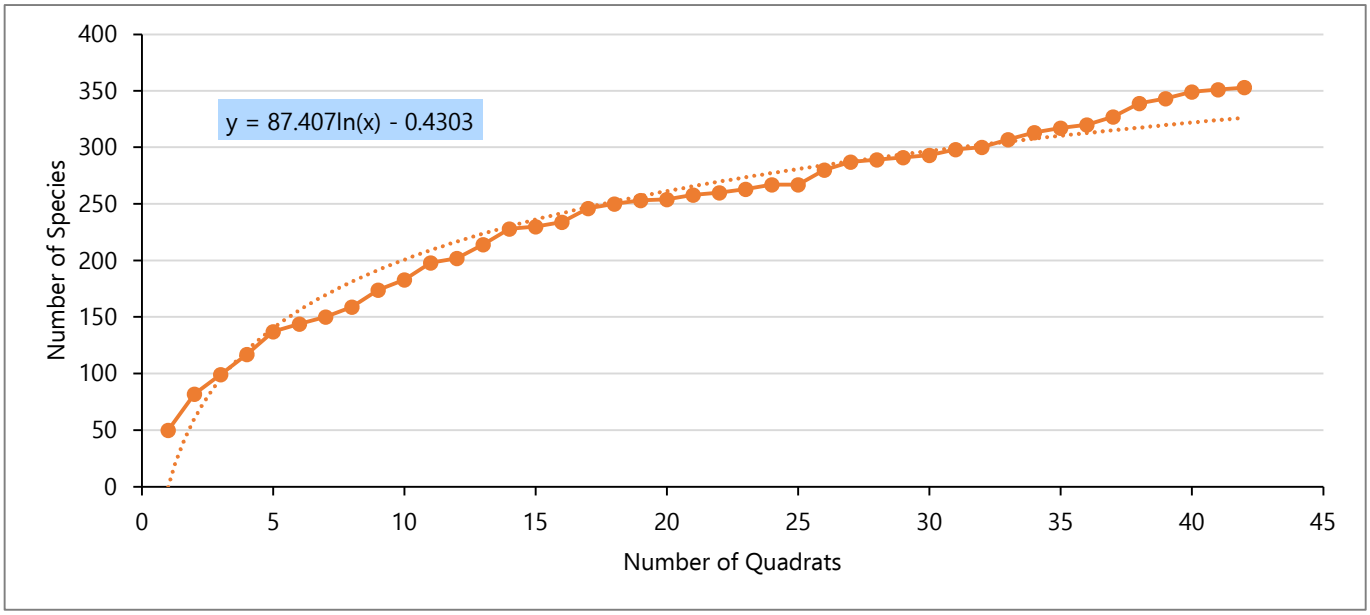


Figure 14 – Species Accumulation Curve

5.2.2 Introduced Flora

A total of 28 introduced species were recorded within the survey area, none of which are considered WoNS or DP plants under the BAM Act (DAWE 2021b, DPIRD 2021). Of the 28 species, 11 are considered high impact, two are medium impact, three are low impact and 12 are unknown/unrated (DPaW 2013). None of the recorded flora are exhibiting an extension beyond their currently documented range, in accordance with records of the Western Australian Herbarium (WAH 1998-).

Weed species diversity across quadrats of Banksia woodland vegetation units was lower than that of Melaleuca woodlands quadrats, totalling 10 and 26 species, respectively. The most widespread weed species were **Ursinia anthemoides* (18 quadrats) and **Hypochaeris glabra* (15 quadrats), which were present within all vegetation units.

5.2.3 Significant Flora

No species listed as Threatened flora under the BC Act or under the EPBC Act were recorded during the field assessment. A total of four Priority flora species were recorded, these being *Banksia dallanneyi* subsp. *pollosta* (P3), *Dillwynia dillwynioides* (P3), *Dodonaea hackettiana* (P4) and *Verticordia lindleyi* subsp. *lindleyi* (P4) (**Table 20**). The locations of significant species are presented in **Figure 15** and **Appendix G**. Re-assessment of the

likelihood of occurrence of significant flora was carried out to further refine these conclusions, based on field observations (**Table 21**). It was determined that six Threatened flora species and 27 Priority-listed species may occur.

No range extending flora were recorded within the survey area; however one taxa considered likely to (denoted by the '?' in the determination) represent an undescribed species, *Scholtzia* ?sp. Wongonderrah (M.E. & M.R. Trudgen 12000) was recorded within vegetation unit BaBmEt.

Banksia dallanneyi subsp. *pollosta* (P3) has a known range from south near Lancelin, north to Coorow and east to Wongan Hills. This species grows on sandy soils within Banksia and Eucalypt woodlands (WAH 1998-). Despite numerous collections of *Banksia dallanneyi* specimens being made throughout the survey area, only one occurrence of the Priority sub-species was confirmed, within vegetation unit MrKgMt (quadrat 31) (**Table 20**), with all other collections identified as *Banksia dallanneyi* subsp. *dallanneyi*, which has no conservation-listing.

Dillwynia dillwynioides (P3) is known to occur across a stretch of approximately 260 km on the Swan Coastal Plain, from Bunbury to Regans Ford (WAH 1998-). Two previously recorded populations occur within 15 km of the survey area, on grey sandy loam clays supporting healthlands of *Pericalymma ellipticum* and *Kunzea recurva* and sedgelands of *Baumea pressii* (DBCA 2021d). One occurrence of *Dillwynia dillwynioides* was recorded within the survey area, within the vegetation unit MpCp (quadrat 9), where vegetation consistent with this species preferred habitat was recorded (**Table 20**). Vegetation within the survey area that was considered suitable habitat for *Dillwynia dillwynioides* was targeted by conducting parallel search traverses in selected areas and opportunistic traverses between sites.

Growing from 1 to 5 m tall, *Dodonaea hackettiana* (P4) is a spreading shrub, found on the Swan Coastal Plain on limestone outcropping and sand, predominantly within the Perth Metropolitan Region (between Rockingham and Perth) with a northern population at Cowalla (WAH 1998-). The northern populations occur within Banksia woodlands over mixed heath and/or in areas of disturbance, such as roadsides. Twenty-one previously recorded locations for this species occur within 15 km of the survey area, with one point located less than 2 km from the survey boundary recording 100 individuals in 2005 (DBCA 2021d). Within the survey area, 27 individuals were recorded within 50 m of existing tracks across two vegetation units (BaBmEt, BaBmMp) (**Table 20**), consistent with this species known habitat.

Verticordia lindleyi subsp. *lindleyi* (P4) populations occur on the Swan Coastal Plain, between Serpentine and Cervantes, with one population recorded as far south as Bunbury (WAH 1998-). Thirteen previously recorded populations occur within 15 km of the study area (DBCA 2021d), on sandy/clay, and winter-wet depressions that support Banksia woodlands and/or heathlands of Proteaceous and Myrtaceous species (WAH 1998-). Within the survey area, one occurrence of this species was recorded opportunistically within vegetation unit MrKgMt (**Table 20**), consistent with this species preferred habitat.

Table 20 –Significant Flora Recorded in the Survey Area

Species	Vegetation Unit	No. Individuals Recorded in Survey Area	Minimum No. Individuals Present Within 15 km (DBCA 2021d)
Banksia dallanneyi subsp. *pollosta* (P3)	MrKgMt	1	7
Dillwynia dillwynioides (P3)	MpCp	1	5
Dodonaea hackettiana (P4)	BaBmMp	1	22
	BaBmMp	20	
	BaBmEt	6	
Verticordia lindleyi subsp. *lindleyi* (P4)	MpBaBm	1	13

Table 21 – Post-Field Survey Threatened and Priority Flora Likelihood of Occurrence for Assessment Results for the Survey Area

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Chorizema varium	EN	T	Low, erect to spreading shrub growing to 0.3 m high with long, hairy branches. Produces flowers with yellow, orange and red parts in erect, dense clusters from September to October (possibly June).	Sandy soil. Coastal heath with limestone, hills and outcrops.	**Unlikely** – Suitable habitat is not present within the survey area.	1, 2, 3
Drakaea elastica	EN	T	Tuberous, perennial herb growing to 0.1-0.3 m high with a single bright green, glossy, prostrate heart-shaped leaf. Produces distinctive flower with red and green-yellow parts from October to November.	Bare patches of white or grey sandy soils. Low-lying situations adjoining winter-wet swamps.	**May occur** – Suitable habitat in vegetation units MpCp and MrKgMt is present in survey area.	1, 2, 3
Lepidosperma rostratum	EN	T	Rhizomatous, tufted perennial grass-like sedge growing to 0.5 m high. Produces brown flowers in narrow, spike-like inflorescence and fruits in June to August.	Peaty sand, sand, clayey soils. Winter wet swamps.	**May occur** – Suitable habitat in vegetation units MpCp and MrKgMt is present in survey area.	1, 2, 3
Paracaleana dixonii	EN	T	Tuberous perennial herb growing to 0.2 m high with single, linear leaf. Produces 1-2 distinct flower with green, brown and yellow parts from October to January.	Grey sand, sometimes with gravel. Flats and slopes.	**May occur** – Suitable habitat in vegetation unit BaBmEt, BaBmMp and MpBaBm vegetation units.	1, 2, 3
Anigozanthos viridis subsp. *terraspectans*	VU	T	Small, rhizomatous perennial herb growing to 0.2 m high. Produces paw like yellow-green flowers from August to December on 0.1-0.15 m stems. Distinguished from *A. v.* ssp. *Virdis* by having shorter flowering stems and smaller, narrower flowers.	Grey-yellow sand, clay loam soils. Winter wet depressions and drainage lines.	**May occur** – Suitable habitat in vegetation units MpBaBm, MpCp and MrKgMt.	1, 2, 3
Banksia mimica		T	Prostrate, lignotuberous shrub growing to 0.15-0.4 m high with leaves growing up to 0.4 m long. Produces yellow-brown flowers from December to February.	White or grey sand, sandy loam soils over laterite. Slopes and flats.	**May occur** – Suitable habitat present in vegetation units BaBmEt, BaBmMp and MpBaBm.	1, 2
Macarthuria keigheryi		T	Small, erect shrub growing to 0.4 m high with bright yellow to green stems. Leaves mainly at the base of stems and on young growth. Produces flowers with white and green parts from September to December and February to March.	Open patches of white or grey sandy soil. Winter wet depressions, jarrah and banksia woodlands.	**May occur** – Suitable habitat in Banksia woodlands vegetation units; BaBmEt, BaBmMP and MpBaBm.	1, 2
Marianthus paralius		T	Prostrate, scrambling to climbing, woody shrub with twining stems. Produces red flowers from September to November.	White sandy soil over limestone. Limestone ridges, coastal cliffs and limestone outcropping.	**Unlikely** – Suitable habitat/geology is not present within the survey area.	1

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Baeckea sp. Limestone (N. Gibson & M.N. Lyons 1425)		P1	Compact shrub growing to 1.2 m high. Produces pink or pale pink to white flowers from September to December.	Grey, yellow sandy soil with limestone. Hills and outcrops.	**Unlikely** – Suitable habitat/geology is not present within the survey area.	1
Grevillea evanescens		P1	Erect, robust shrub growing to 3-4 m high. Produces red flowers from July to November.	Brown clayey loam, sandy loam soils. Winter wet depressions and drainage lines, swamps.	**May occur** – Suitable habitat present in survey area in swales, containing vegetation units MpBaBm, MpCp and MrKgMt	1, 2
Dampiera tephrea		P2	Erect perennial herb or shrub growing to 0.6 m high. Produces blue/purple flowers from August to October.	Sand, gravelly loam soils often over limestone. Flats, sloping breakaways, riverbanks.	**Unlikely** – Suitable habitat/geology is not present within the survey area.	1, 2
Eryngium pinnatifidum subsp. Umbraphilum (G.J. Keighery 13967)		P2	Tuberous, perennial herb growing to 0.5 m high. Produces blue or white flowers from October to November.	Sandy clay soil. Wetlands, winter wet flats.	**May occur** – Suitable habitat present in vegetation units MpCp and MrKgMv.	1, 2
Goodenia xanthotricha		P2	Erect shrub growing to 0.9 m high. Produces blue flowers from November to March.	Sandy clay, sand. Hilltops, slopes and flats, sometimes with laterite rocks.	**May occur** – Suitable habitat present throughout the survey area,	1, 2
Hakea oligoneura		P2	Densely branched shrub growing to 1.5-2 m high. Produces white flowers from August to September.	Grey-brown sandy soil with limestone. Ridges, limestone outcrops, slopes.	**Unlikely** – Suitable habitat/geology is not present within the survey area.	1, 2
Haloragis aculeolata		P2	Slender erect perennial herb growing to 0.4 m high. Produces green flowers from September to December.	Sand, loam or clay soils, sometimes over limestone. Winter-wet areas, flats and slopes.	**May occur** – Suitable habitat present in vegetation units MpCp and MrKgMt.	1
Hypocalymma sp. Cataby (G.J. Keighery 5151)		P2	Erect and spreading shrub growing to 1 m high and 1 m wide. Produces white flowers in August.	Grey sand.	**May occur** – Suitable habitat present within Banksia woodland vegetation units.	1, 2
Lepyrodia curvescens		P2	Dioecious, shortly creeping, tufted rhizomatous herb growing from 0.24 to 0.4 m high. Produces dark red-purple flowers from September to November.	Grey sandy loam, sand, clayey sand soils with laterite. Seasonally inundated swampland, low rises and slopes.	**May occur** – Suitable habitat present throughout the survey area.	1

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Leucopogon squarrosus subsp. *trigynus*		P2	Erect shrub growing to 0.7 m high. Produces white flowers from June to October.	Sandy soil. Low-lying flats and slopes.	**May occur** – Suitable habitat present throughout the survey area.	1, 2
Schoenus loliaceus		P2	Small, annual sedge growing to 0.06 m high.	Sandy soils. Winter-wet depressions.	**May occur** – Suitable habitat present throughout the survey area.	1
Arnocrinum drummondii		P3	Rhizomatous, perennial, herb, 0.15-0.5 m high. Produces purple flowers between September to December.	White or yellow sand.	**May occur** – Suitable habitat present within Banksia woodland vegetation units.	1
Babingtonia urbana		P3	Erect to sprawling shrub growing to 0.5 m high. Produces pink flowers from October to March.	Brown clay loam, sandy soils. Flats and winter wet depressions.	**May occur** – Suitable habitat present in MpBaBm, MpCp and MrKgMt vegetation units.	1, 2
Banksia dallanneyi subsp. *pollosta*		P3	Prostrate, sprawling, lignotuberous shrub growing to 0.3 m high. Produces flowers with brown, yellow and orange parts from August to September.	Grey, yellow sandy soil. Hilltops, slopes and flats.	**Present –** recorded in vegetation unit MrKgMt, suitable habitat presents throughout the survey area.	1, 2
Calytrix ecalycata subsp. *brevis*		P3	Upright shrub growing to 1 m high. Produces flowers between August and September.	Dry yellow sand. Sandplains, low rises	**May Occur** – Suitable habitat present within Banksia woodland vegetation units.	4
Conostylis bracteata		P3	Tufted, rhizomatous perennial grass like herb growing to 0.2-0.4 m high. Produces yellow flowers from August to November.	Sandy soil. Dunes, sometimes with limestone outcropping.	**May occur** – Suitable habitat present within vegetation unit BaBmEt.	1, 2
Desmocladus biformis		P3	Rhizomatous, densely tufted perennial, herb (sedge-like) growing from 0.1-0.2 m high. Flowers September to October.	Sand, sandy clay, lateritic soils. Dry sites.	**May occur** – Suitable habitat present within vegetation unit BaBmEt.	1, 2
Dillwynia dillwynioides		P3	Decumbent or erect shrub growing between 0.3-1.2 m high. Produces flowers with red, orange and yellow parts from August to December.	Sand, loam, clay soils. Seasonally wet depressions, wetlands.	**Present –** recorded within vegetation unit MpCp. Suitable habitat also present in vegetation unit MrKgMt.	1, 2
Haemodorum loratum		P3	Bulbaceous, erect perennial herb growing between 0.45-1.2(-2) m high. Produces black-dark green flowers from October to November.	Sand. Slopes and flats.	**May occur** – Suitable habitat present throughout survey area.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Hensmania stoniella		P3	Tufted, stilt-rooted perennial, herb, 0.1-0.2 m high. Produces yellow-cream-white flowers, between September to November.	White, grey or lateritic sand, often winter-wet.	**May occur** – Suitable habitat present within vegetation units BaBmMp and MpBaBm.	1, 2
Hibbertia leptotheca		P3	Small shrub growing to 0.3-0.5 m high. Produces yellow flowers from August to October.	Sand with limestone. Limestone ridges, outcrops, slopes and dunes.	**Unlikely** – Suitable habitat is not present within the survey area.	1
Isotropis cuneifolia subsp. *glabra*		P3	Rhizomatous perennial herb or shrub growing to 0.2 m high. Produces flowers with yellow, red and orange parts, with distinct venation on the back of the flower, from August to October.	Sand, brown/black clay loam soils. Winter-wet flats, swamps and low rises.	**May occur** – Suitable habitat present in vegetation units MpCp and MrKgMt.	1, 2
Leucopogon sp. Yanchep (M. Hislop 1986)		P3	Erect shrub growing to 1 m high and 0.6 m wide. Produces white/pink flowers from April to June or September.	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	**Unlikely** – Suitable habitat/geology is not present within the survey area.	1, 2
Persoonia rudis		P3	Erect, often spreading shrub growing to 1 m high. Produces yellow flowers from September to December.	Sandy soil. Hills, slopes and flats, often associated with laterite.	**Unlikely** – Unsuitable geology within the survey area.	1, 2
Petrophile biternata		P3	Stout, rigid and non-lignotuberous shrub growing to 0.8 to 1.5 m high. Produces yellow/cream-yellow flowers between August to October.	Yellow/grey sand & gravel, laterite, quartzite soils. Lateritic ridges, plains.	**Unlikely** – Suitable geology is not present within the survey area.	1, 2
Phlebocarya pilosissima subsp. *pilosissima*		P3	Compactly tufted, rhizomatous perennial grass-like shrub growing from 0.15 to 0.4 m high. Produces cream-white flowers between August to October.	White or grey sandy soil, sometimes with lateritic gravel. Slopes.	**May occur** – Suitable habitat present in Banksia woodland vegetation units.	1, 2
Pimelea calcicola		P3	Erect to spreading shrub growing to 0.2 to 1 m high. Produces white flowers with some pink from September to November.	Brown sandy loam, white-grey sandy soil associated with limestone. Coastal limestone ridges.	**Unlikely** – Unsuitable geology within the survey area.	1, 2
Platysace ramosissima		P3	Perennial, clumping, multi-stemmed herb growing to 0.3 m high. Produces cream-white flowers from December to January.	Sand, sandy clay soils. Seasonally wet flats, slopes.	**May occur** – Suitable habitat present throughout survey area.	1
Sarcozona bicarinata		P3	Herbaceous succulent shrubs growing to 0.1 m high. Produces white flowers in August.	White or grey sand over limestone.	**Unlikely** – Unsuitable geology within the survey area.	1

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Stylidium maritimum		P3	Caespitose perennial, herb growing to 0.7 m high. Leaves tufted, linear to narrowly oblanceolate, 10-40 cm long, 1-5.5 mm wide, apex acute to mucronate, margin involute, glabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Produces white/purple flowers between September to November.	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	**Unlikely** – Unsuitable geology within the survey area.	1
Stylidium nonscandens		P3	Erect perennial, herb growing to 0.46 m high, Leaves in whorls, linear, 0.2-4.2 cm long, 0.4-1.2 mm wide, apex subacute to acute, margin entire, glabrous. Scape glabrous. Inflorescence racemose. Produces pink flowers, Sep to Nov.	Sand over laterite. Hillslopes and crests. Banksia woodland, heath, mallee shrubland.	**May occur** – Suitable habitat in the form of Banksia woodlands present.	1, 2
Thryptomene sp. Lancelin (M.E. Trudgen 14000)		P3	Shrub growing to 0.5 m high. Produces pink flowers in September.	Calcareous sand.	**Unlikely** – Suitable soils are not present within the survey area.	1
Anigozanthos humilis subsp. *chrysanthus*		P4	Rhizomatous perennial herb growing to 0.8 m high. Produces yellow paw like flowers from July to October.	Grey, yellow sandy soil. Flats and undulating plains.	**May occur** – Suitable habitat present in vegetation units BaBmEt, BaBmMp and MpBaBm.	1, 2
Caladenia speciosa		P4	Tuberous perennial herb growing to 0.2 m high with single, hairy, erect leaf 15-25 cm long. Produces up to 3 white flowers with red tinges from September to October.	Sand and loamy soils. Slopes and flats, swampy areas.	**May occur** – Suitable habitat present vegetation units MpCp and MrKgMt.	1, 2
Conostylis pauciflora subsp. *euryrhipis*		P4	Dense, rhizomatous perennial grass like herb growing to 0.2 m high with sinuous leaves. Produces yellow flowers from August to October.	Sandy soil. Limestone ridges, dunes, slopes and flats.	**May occur** – Suitable habitat present in vegetation units BaBmEt, BaBmMp and MpBaBm.	1, 2
Dodonaea hackettiana		P4	Erect shrub or tree growing 1 to 5 m high. Produces yellow flowers with green and red parts mainly between July to October.	Sandy soils, associated with limestone outcropping. Limestone ridges, slopes and dunes.	**Present –** recorded in vegetation units BaBmEt and BaBmMp.	1, 2
Eucalyptus macrocarpa subsp. *elachantha*		P4	Spreading or sprawling mallee with smooth grey over salmon bark growing from 0.8 to 4 m high. Produces red-pink flowers between August to September and November to December.	White or grey sand over laterite. Hillslopes, ridges, sandplains.	**May occur** – Suitable habitat present in vegetation units BaBmEt, BaBmMp and MpBaBm.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Lepidobolus densus		P4	Rhizomatous, caespitose perennial sedge growing to 0.4 m high.	Sand, sometimes with lateritic gravel. Flats, slopes and sandplains.	**May occur** – Suitable habitat present in vegetation units BaBmEt, BaBmMp and MpBaBm.	1
Rumex drummondii		P4	Erect perennial herb growing to 0.9 m high. Produces cream flowers turning reddish from August to November.	Sandy clay, peaty soils. Winter-wet areas, creeklines and disturbed areas.	**May occur** – Suitable habitat present vegetation units MpCp and MrKgMt.	1, 2
Schoenus griffinianus		P4	Small, tufted perennial grass-like herb growing to 0.1 m high. Produces brown flowers from September to October.	White/grey sandy soil. Undulating plains, depressions.	**May occur** – Suitable habitat present throughout the survey area.	1, 2
Tripterococcus sp. Brachylobus (A.S. George 14234)		P4	Slender, erect, multi-stemmed perennial herb to 0.6 m high. Produces orange-yellow flowers from October to February.	Grey-white sand, peaty sand over clay soils. Winter wet flats, shallow depressions, dry flats and slopes.	**May occur** – Suitable habitat present in vegetation units MpBaBm, MpCp and MrKgMt.	1, 2
Verticordia lindleyi Schauer subsp. *lindleyi*		P4	Erect shrub growing from 0.2 to 0.75 m high. Produces pink flowers with white fringes from November to January (also known from May).	Sand, sandy clay soils. Winter-wet depressions.	**Present –** recorded within vegetation unit MpBaBm. Suitable habitat also present in MrKgMt.	1, 2
Verticordia paludosa		P4	Erect shrub growing to 0.9 m high. Produces pink-white flowers from January to May.	Sand, peaty sand and gravelly clayey sandy soils. Flats, slopes and winter-wet low-lying areas.	**May occur** – Suitable habitat present in vegetation unit MpBaBm, MpCp and MrKgMt.	1, 2

Sources of information: 1 (DBCA, DBCA 2021c), 2 (NatureMap, DBCA 2021b), 3 (PMST, DAWE 2021d), 4 (Ecoedge 2019b)

5.2.4 Vegetation

A total of six vegetation units and two 'other' mapped areas were recorded and mapped within the survey area as described in **Table 22** and presented spatially in **Figure 15**. Together, the Banksia woodland vegetation units (BaBmEt, BaBmMp and MpBaBm) make up more than half of the survey area, accounting for 64.36% (890.71 ha) of the total area. Although these vegetation units differ, they all support *Banksia attenuata* and *B. menziesii* as dominant trees with the upper slopes generally also dominated by species such as *Eucalyptus todtiana, Eremaea pauciflora* subsp. *pauciflora* and *Mesomelaena pseudostygia*. While vegetation units on lower slopes (BaBmMp and MpBaBm) support species such as *Melaleuca preissiana* and *Kunzea glabrescens*, which have a greater dependency on water. Based on dominant flora taxa, two of the recorded units, Melaleuca shrublands, MpBaBm and MpCp are considered to represent wetland vegetation that would be dependent on groundwater and/or surface water for at least part of the year.

Cleared areas make up 19.35% (267.79 ha) of the survey area. These areas have been subject to historical clearing and grazing practices with vegetation consisting predominantly of fields of *Podotheca gnaphalioides* or invasive **Ehrharta calycina*. Vegetation unit Xp exhibits little vegetation structure, due to historic disturbances; with remnant vegetation generally consisting of scattered trees (*Melaleuca preissiana, Eucalyptus todtiana* and *Nuytsia floribunda*) and/or a mid-storey of scattered *Xanthorrhoea preissii*.

Table 22 – Summary of Recorded Vegetation Units in the Survey Area

Vegetation Unit Code	Vegetation Unit and Description	Quadrat No.	Area (ha)	Area (%)
BaBmEt	**Banksia Woodlands (upper slopes)** Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	C01*, C03*, C05*, C07*, C10*, C15*, C21*, C23*, C24*, C25*, C30*, C32*, C35*, C36* and C41*	400.82	28.96
BaBmMp	**Banksia Woodlands (lower slopes)** *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri, Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	C02*, C06*, C16*, C18*, C19*, C20*, C26*, C27*, C28*, C29*, C33* and C38*	437.97	31.65
MpBaBm	**Melaleuca and Banksia Shrubland (floodplain)** Low open woodland of *Melaleuca preissiana, Banksia menziesii* and *Banksia attenuata* over shrublands of *Banksia incana, Calytrix fraseri* and *Adenanthos cygnorum* subsp. *cygnorum* over mixed low sparse herb/sedgeland.	C12*, C13, C14, C22 and C34*	51.92	3.75
MpCp	**Melaleuca and Callitris Shrubland (floodplain)** Low open forest of *Melaleuca preissiana* with scattered *Banksia littoralis* and areas of *Callitris pyramidalis* over mixed shrublands of *Hypocalymma angustifolium*, *Xanthorrhoea preissii* and *Kunzea micrantha* subsp. *micrantha* and *Banksia telmatiaea* over mixed dense herb/sedgeland.	C04, C08, C09, C40 and C42	100.14	7.24
MrKgMt	**Melaleuca Shrubland (floodplain)** Low open woodland of *Melaleuca rhaphiophylla* over shrubland of *Kunzea glabrescens*, *Melaleuca viminea* subsp. *viminea* and *Melaleuca teretifolia* over mixed low Cyperaceae sedgelands and **Hypochaeris glabra*.	C11, C17, C31, C37 and C39	81.65	5.90
Xp	**Scattered Xanthorrhoea (degraded)** Open paddocks with scattered trees of *Melaleuca preissiana, Nuytsia floribunda* and *Eucalyptus todtiana* over scattered *Xanthorrhoea preissii* over **Ehrharta calycina* and *Podotheca gnaphalioides.*	NA	43.25	3.13
OW	**OW** Open water associated with altered water bodies for agricultural use.	NA	0.24	0.02
CD	**Cleared** Cleared areas comprising sandy area and/or paddocks.	NA	267.79	19.35
		TOTAL	**1,383.78**	**100**

*indicates quadrats that were re-assessed in Phase 2.

5.2.5 Vegetation Condition

The condition of the vegetation within the survey area ranged from 'Excellent' to 'Completely Degraded'. More than half of the vegetation was observed to be in 'Excellent' condition, making up 57.51% (795.96 ha) of the survey area, with 20.72% (286.71 ha) considered to be in 'Degraded' or poorer condition (**Table 23**). Areas that have been subject to disturbance such as historical clearing and pastoral activities are considered 'Completely Degraded' or 'Degraded', or a rating between the two (**Figure 16**). Of the 255.75 ha (18.48%) of vegetation that is in 'Degraded to Completely Degraded' condition, a substantial portion (247.14 ha) of that is within Lot 8037, and the degradation is a result of past clearing and agricultural activity.

Open water makes up 0.02% (0.29 ha) of the total survey area, associated with six water bodies located within the pastoral area of Lot 8037. A total of 71.83% (993.93 ha) of the vegetation was recorded to be in 'Very Good' to 'Excellent' condition, with areas in poorer condition than this, generally located in adjacent to disturbance or inundation, where threats such as weeds, and erosion, from human disturbance and associated activities that impact the quality of vegetation (**Figure 16**).

Table 23 – Summary of Recorded Vegetation Condition in the Survey Area

Condition	Total	
	Area (ha)	Area (%)
Excellent	795.86	57.51
Very Good to Excellent	85.50	6.18
Very Good	112.57	8.14
Good	32.15	2.32
Degraded to Good	31.85	2.30
Degraded	31.00	2.24
Degraded to Completely Degraded	255.71	18.48
Cleared	38.85	2.81
Open Water	0.29	0.02
TOTAL	**1,383.78**	100

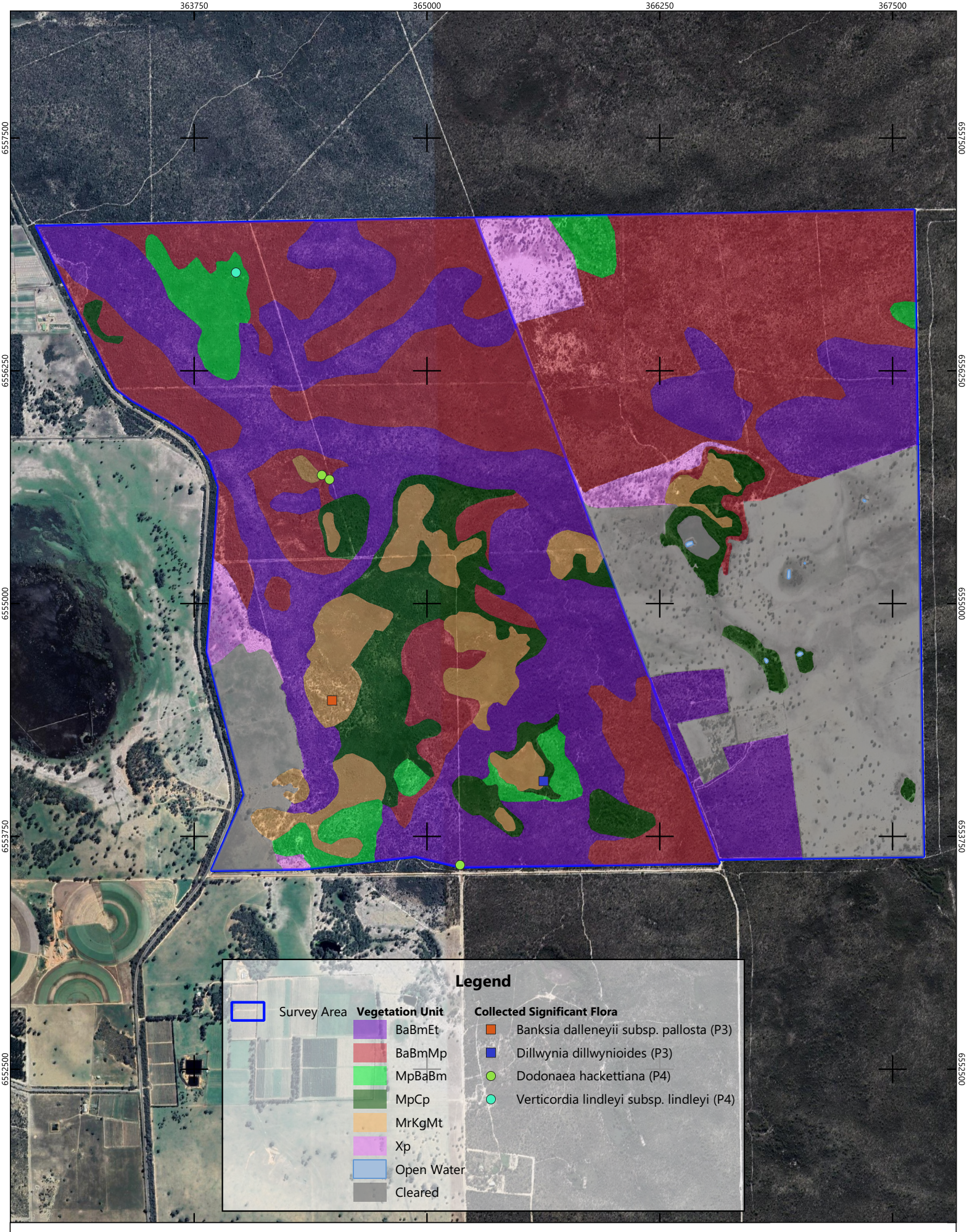


Figure 15 - Vegetation Units and Signficant Flora

FOCUSED VISION consulting

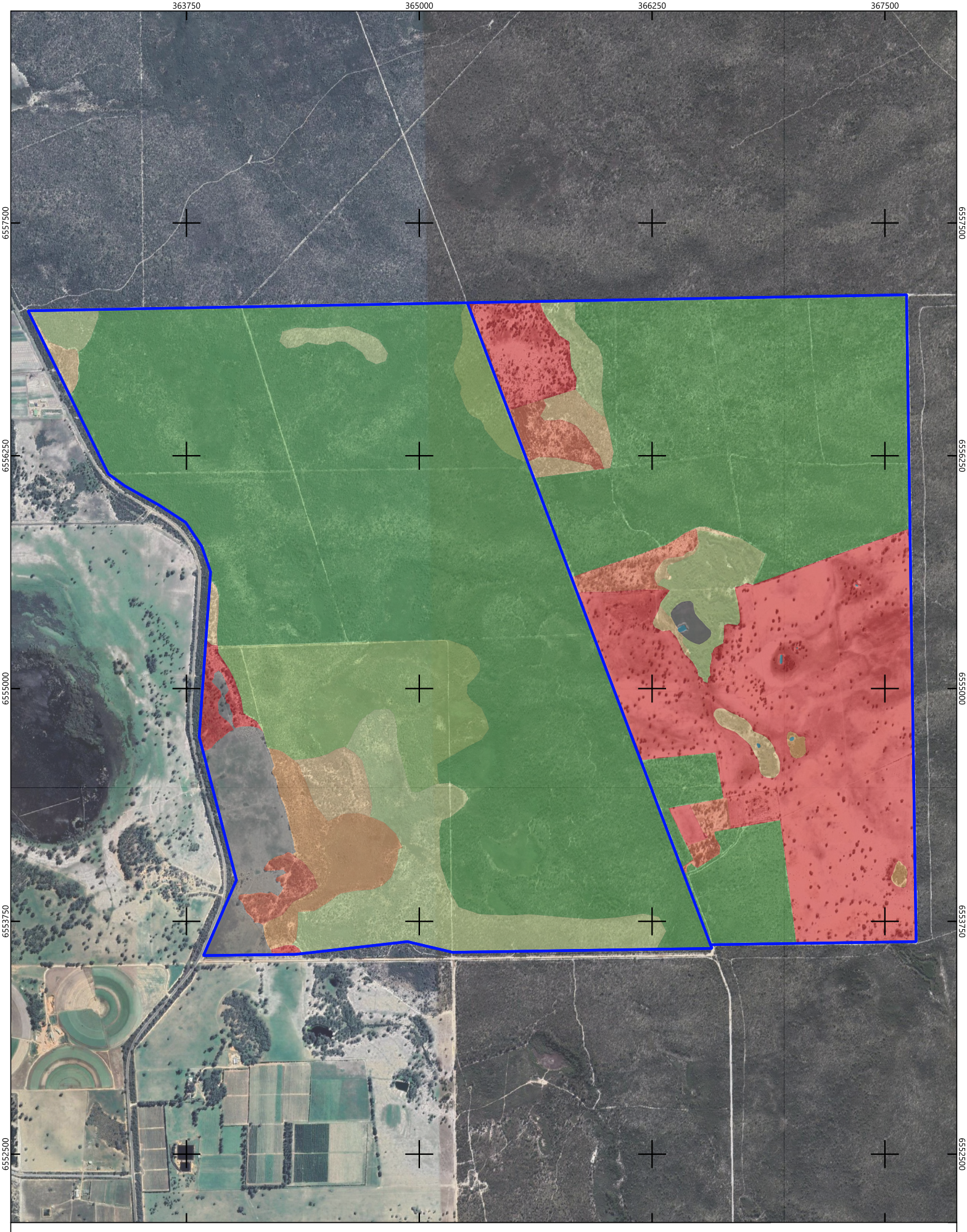


Figure 16 - Vegetation Condition

FOCUSED VISION consulting

5.2.6 Floristic Community Types

FCTs classify vegetation based on a combination of species composition, structure and the landform on which they occur, and the FCTs of the Swan Coastal Plain have been defined by Gibson *et al.* (1994) and Keighery *et al.* (2012). Multivariate analysis using PATN was conducted to compare floristic data collected from within the survey area with the Keighery *et al.* (2012) and Gibson *et al.* (1994) datasets to determine the most likely FCT for each vegetation unit.

The results of the floristic analysis split the 42 survey quadrats into five groupings, clustering with four different FCTs as 'nearest neighbour' in the dendrogram and/or FCTs that dominate the cluster in which the groupings of quadrats fall, as presented in **Figure 17**.

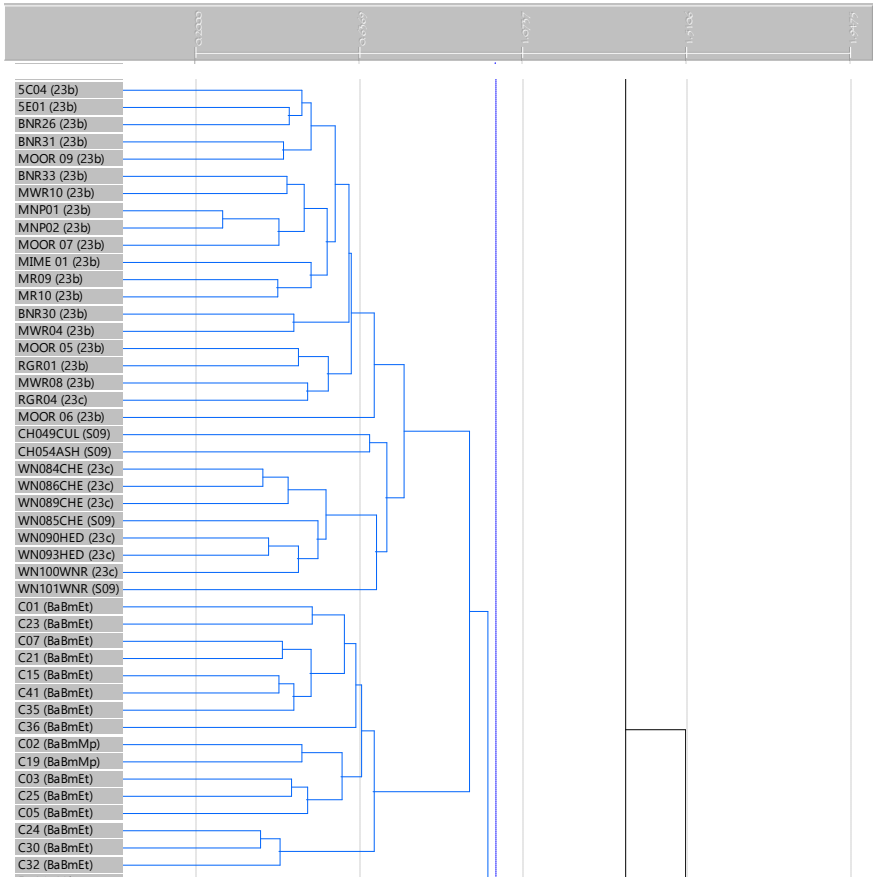
The first cluster (**17a**), grouped 16 survey quadrats with Keighery *et al.* (2012) and Gibson *et al.* (1994) quadrats that represent three FCTs; S09, 23b and 23c. All FCTs which cluster with these 16 survey quadrats are representative of the Commonwealth-listed (Endangered) Banksia woodlands TEC, which is also a State-listed Priority 3 ecological community. The survey quadrats in cluster 17a comprise of two vegetation units, BaBmEt (all quadrats) and BaBmMp (most quadrats).

The second cluster (**17b**), groups 16 survey quadrats with Keighery *et al.* (2012) and Gibson *et al.* (1994) quadrats that represent three FCTs; S02, 21c and 22. These 16 survey quadrats were found to align with FCT 21c, based on nearest neighbour and the dominant FCT in the cluster. The surveyed quadrats in this cluster comprised of all those sampled from vegetation unit MpBaBm and two from vegetation unit BaBmMp.

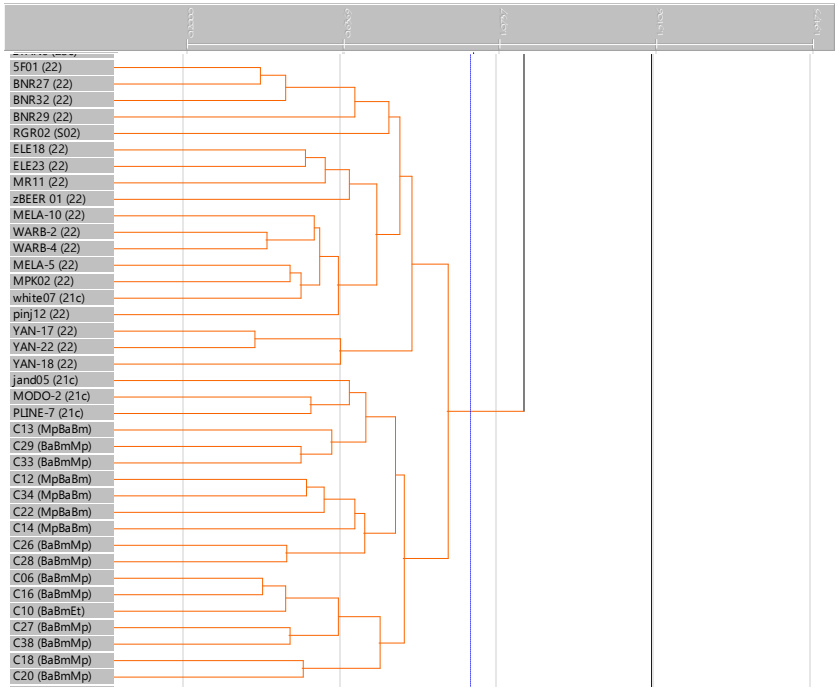
The third clusters (**17c**) consist of one cluster of nine quadrats that cluster with FCTs 5, 17 and S20. Adjacent to this cluster, a single sampled quadrat (C17) clusters FCTs S04, 22 and S10.

To further analyse floristic affinities of survey collected quadrat data with the Keighery *et al.* (2012) and Gibson *et al.* (1994) datasets and therefore infer FCTs represented, also using PATN, dissimilarity indices were determined, as presented in **Table 24**.

17a – Quadrats from Vegetation Units BaBmEt and BaBmMp



17b – Quadrats from Vegetation Units BaBmEt, BaBmMp and MpBaBm



17c – Quadrats from Vegetation Units MpCp and MrKgMt

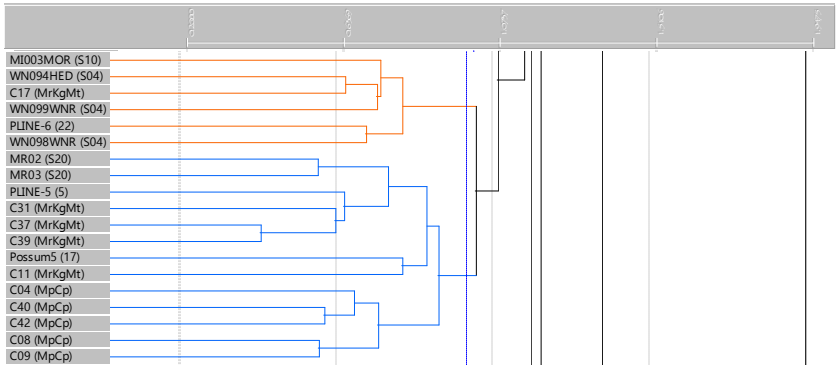


Figure 17 – Selections of Dendrograms for FCT Inferences

Table 24 – Summary of PATN Analysis Results against Keighery *et al.* (2012) and Gibson *et al.*(1994) dataset

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
BaBmEt	C01	23b, 23c, S09	S09	MR14	41.76	23c	zBEER 03	41.24	S09	4M02	38.26	**23b**	Dendrogram indicates greatest affinity the FCT 23b. Greatest similarity to Keighery *et al.* (2012) quadrat MR14 (FCT S09, 41.76%), approximately 8.5 km south of the survey area. Also showing affinities FCT 23c (Keighery *et al.* (2012) zBEER 03, 39.6%) and clustering with reference quadrats of FCT 23a and 23c. Each of these FCTs exhibit similar species composition and structure, with *Banksia attenuata* and *Banksia menziesii* being dominant, similar to C01. Since other quadrats in BaBmEt are inferred to represent FCT 23b, quadrat C01 is also.
	C03	23b, 23c, S09	23b	ELE24	44.21	23b	5E01	43.30	20a	5C03	43.14	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE24 (FCT 23b, 44.21%), approximately 76 km from the survey area. Greatest dendrogram affinity also with FCT 23b. Species composition in C03 shows an affinity with FCT 23b, with four Keighery *et al.* (2012) quadrats representing FCT 23b found within 5 km of the survey area. Key dominant species recorded within C03 (*Eucalyptus todtiana* and *Banksia prionotes*) have not been recorded within FCT 20a and therefore unlikely to represent FCT 20a.
	C05	23b, 23c, S09	23b	MR09	47.31	23b	YAN-20	46.02	23c	WN086 CHE	46.00	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat MR09 (FCT 23b, 47.31%), approximately 3 km from the survey area. FCT 23c and FCT 23b reference quadrats occur within 15 km of the survey area, both of which have similar dominant species; however, based on dendrogram clustering, species similarity, topography and on-ground observations, C05 shows greatest affinity with FCT 23b.
	C07	23b, 23c, S09	23b	MR10	50.00	23b	MR09	47.42	23b	YAN-20	44.44	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat MR10 (FCT 23b, 50.00%), occurring approximately 1.2 km from the survey area. Greatest dendrogram affinity also with FCT 23b.
	C10	21c, 22	23b	MUK01	50.00	23b	BNR03	47.37	23b	MOOR 08	46.94	**23b**	Greatest similarity to Gibson *et al.* (1994) quadrat MUK01 (FCT 23b, 50.00%), occurring approximately 28 km from the survey area. Dominant flora of C10 and FCTs 21c and 22 do not align. C10 is considered to represent FCT 23b, based on species composition and greatest floristic similarity to FCT 23b reference plots.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
BaBmEt (cont.)	C15	23b, 23c, S09	23b	MOOR 08	50.00	21a	PLINE-3	48.00	23b	ELDO-1	47.42	**23b**	Greatest dendrogram affinity to FCT 23b and greatest similarity to Keighery *et al.* (20120) MOOR 08 (FCT 23b, 50.00%), occurring approximately 9 km from the survey area. Key species (*Eucalyptus marginata*) of FCT 21a are not present within C10. Species composition in C15 shows an affinity with FCT 23b, with four Keighery *et al.* (2012) quadrats representing FCT 23b found within 5 km of the survey area.
	C21	23b, 23c, S09	23b	MUK01	40.0	23b	ELDO-1	40.0	23b	BNR03	40.0	**23b**	Equal greatest similarity between Gibson *et al.* (1994) and Keighery *et al.* (2012) quadrats MUCK01, ELDO-1 and BNR03 (both FCT 23b, 40.0%), occurring between 25 and 27 km from the survey area. C21 consistently shows greatest affinity to FCT 23b, based on dendrogram clustering, species similarity and dominant species composition.
	C23	23b, 23c, S09	23b	MR09	50.00	23b	YAN-20	40.38	20a	KOON-1	39.62	**23b**	Species composition in C23 shows an affinity with FCT 23b, with four Keighery *et al.* (2012) quadrats representing FCT 23b found within 5 km of the survey area. Greatest similarity to Keighery *et al.* (2012) quadrat MR09 (FCT 23b, 50.00%), occurring approximately 2.5 km from the survey area. Dendrogram clustering also shows greatest affinity to FCT 23b.
	C24	23b, 23c, S09	23b	YAN-20	46.30	23b	MR09	45.45	20a	KOON-2	44.44	**23b**	Species composition shows an affinity with FCT 23b, with four Keighery *et al.* (2012) quadrats representing FCT 23b found within 5 km of the survey area. Greatest similarity to Gibson *et al.* (2012) quadrat YAN-20 (FCT 23b, 46.30%), occurring approximately 41 km from the survey area. Dendrogram affinity is also greatest with FCT 23b.
	C25	23b, 23c, S09	23b	MOOR 09	47.42	23b	MR10	45.24	23b	MR09	44.94	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat MOOR 09 (FCT 23b, 47.42%), occurring approximately 7 km from the survey area. C25 is considered to represent FCT 23b, based on all analyses (species similarity and clustering in the dendrogram).

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
BaBmEt (cont.)	C30	23b, 23c, S09	23b	MR09	45.16	23b	MR05	42.86	23a	BULL-3	42.37	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat MR09 (FCT 23b, 45.16%), occurring approximately 2.5 km from the survey area. With FCT 23a and 23b having similar species composition, they are defined by being 'Central' or 'Northern'. Species composition in C30 is representative of FCT 23a and 23b; however, four Keighery *et al.* (2012) quadrats representing FCT 23b are found within 5 km of the survey area, while the closest FCT 23a quadrat (pinj14) is approximately 53 km south of the survey area. Dendrogram affinity is also greatest with FCT 23b.
	C32	23b, 23c, S09	23b	MR09	40.48	23b	YAN-20	40.38	23a	BULL-3	40.37	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat MR09 (FCT 23b, 40.48%), occurring approximately 2.5 km from the survey area. With FCT 23a and 23b having similar species composition, they are defined by being 'Central' or 'Northern'. Species composition in C32 is representative of FCT 23a and 23b; however, four Keighery *et al.* (2012) quadrats representing FCT 23b are found within 5 km of the survey area, while the closest FCT 23a quadrat (pinj14) is approximately 53 km south of the survey area. Dendrogram affinity is also greatest with FCT 23b.
	C35	23b, 23c, S09	23a	Light01	48.89	28	WATERRD1	45.93	28	MILT-4	45.52	**23b**	Dendrogram affinity is greatest with FCT 23b. Greatest similarity to Keighery *et al.* (2012) quadrat Light01 (FCT 23a, 48.89%), occurring approximately 85 km from the survey area. C35 has a species composition similar to FCTs 23a, 23b and 28; however, FCT 23a is described as 'Central' with the closest reference quadrat (punj14) occurring approximately 53 km south of the survey area. While Gibson *et al.* (1994) quadrat WATERBD1 (FCT 28, 42.0%) occurs approximately 40 km south of the survey area, the closest FCT 28 reference quadrat (M03, Keighery *et al.* 2012) occurs approximately 15 km from the survey area. Inferred to represent FCT 23b due to dendrogram clustering and the affinity of other quadrats of BaBmEt to FCT 23b.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
BaBmEt (cont.)	C36	23b, 23c, S09	23a	jand07	42.99	23a	Light01	42.37	23b	ELE28	41.98	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat jand07 (FCT 23a, 42.99%), which occurs approximately 107 km from the survey area. With FCT 23a and 23b having similar species composition, they are defined by being 'Central' or 'Northern'. Species composition in C36 is representative of FCT 23a and 23b; however, four Keighery *et al.* (2012) quadrats representing FCT 23b are found within 5 km of the survey area, while the closest FCT 23a quadrat (pinj14) is approximately 53 km south of the survey area. Dendrogram affinity is also greatest with FCT 23b.
	C41	23b, 23c, S09	23b	YAN-20	48.00	28	MILT-4	45.07	28	tokyu03	43.86	**23b**	Greatest similarity to Gibson *et al.* (1994) quadrat YAN-20 (FCT 23b, 48.00%), which occurs approximately 42 km from the survey area. C41 has a species composition similar to both FCT 23a and FCT 28. While no Keighery *et al.* (2012) FCT 28 quadrats occur within 15 km of the survey area and 14 FCT 23b quadrats do occur. It is more likely that C41 represents FCT 23b; based on dendrogram clustering, the greatest similarity with a FCT 23b site and the proximity of reference sites.
BaBmMp	C02	23b, 23c, S09	23b	RAAF-3	47.62	23b	SINT-1	46.46	23b	YAN-20	45.10	**23b**	Consistently greatest affinity and similarity to FCT 23b; including clustering in the dendrogram and greatest similarity to Gibson *et al.* (1994) quadrat RAAF-3 (FCT 23b, 47.62%), occurring approximately 41 km from the survey area.
	C06	21c, 22	23a	WAND-1	40.78	23b	MUK01	40.48	23b	ELE01	38.20	**23b**	Greatest similarity to Gibson *et al.* (2012) WAND-1 (FCT 23a, 40.78%), which occurs approximately 120 km from the survey area. With FCT 23a and 23b having similar species composition, they are defined by being 'Central' or 'Northern'. Species composition in C06 is representative of FCT 23a and 23b; however, four Keighery *et al.* (2012) quadrats representing FCT 23b are found within 5 km of the survey area, while the closest FCT 23a quadrat (pinj14) is approximately 53 km south of the survey area.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
BaBmMp (cont.)	C16	21c, 22	23b	ELE17	48.65	23b	ELE01	48.10	22	MR11	46.87	**21c**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE17 (FCT 23b, 48.65%), occurring approximately 73 km from the survey area. Due to the lack of key dominant *B. ilicifolia* in C12, the quadrat is not considered to be representative of FCT 22. The presence of *M. preissiana* indicates a representation of FCT 21c as this species has not been recorded within FCT 22 or FCT 23b sites.
	C18	21c, 22	23b	OYR01	36.11	23b	MWR08	34.37	23a	WAND-1	34.15	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat OYR01 (FCT 23b, 36.11%), occurring approximately 24 km from the survey area. Dominant species within C18 are *Banksia prionotes* and *Banksia attenuata*. Only 13 reference sites across seven FCTs (5, 23b, 23c, 28, S09, S10, S16) recorded *B. prionotes*. Quadrat C18 shows greater similarity with two quadrats of FCT 23b and since dominant species align, this FCT is considered the most likely.
	C19	23b, 23c, S09	23b	MWR10	44.44	23b	ELE28	42.42	23b	MR09	42.11	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat MWR10 (FCT 23b, 44.44%), occurring approximately 16 km from the survey area. C19 is considered to represent FCT 23b, based on clustering in the dendrogram, species composition and the greatest similarity to FCT 23b sites.
	C20	21c, 22	22	MELA-5	37.14	23a	jand07	36.96	23a	WHITE-1	33.33	**22**	Greatest similarity to Gibson *et al.* (1994) quadrat MELA-5 (FCT 22, 22%), occurs approximately 63 km from the survey area. FCT 23a is defined as 'Central *Banksia attenuata – B. menziesii* woodlands' with its closest reference quadrat (pinj14) occurring approximately 53 km south of the survey area. FCT 22 is defined as *'B. illicifolia* woodlands'. However, no *B. illicifolia* was recorded within the quadrat. However, vegetation observations near C20 (75 m away) recorded *B. illicifolia,* therefore, C20 is considered to represent FCT 22.
	C26	21c, 22	23b	MR12	36.67	23b	BNR33	35.14	23b	RGR01	34.37	**23b**	Greatest similarity to Keighery *et al.* (2012) quadrat MR12 (FCT23b, 36.67%), occurring approximately 3 km from the survey area with next-greatest similarities with a further two FCT 23b sites. C26 is considered to represent FCT 23b, based on dominant species and the greatest similarity to FCT 23b sites.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
BaBmMp (cont.)	C27	21c, 22	21c	low07	45.71	23b	Cavs11	40.51	21a	MPK03	40.48	**21c**	Greatest similarity to Gibson *et al.* (1994) quadrat low07 (FCT 21c, 45.71%), occurring approximately 134 km from the survey area. Dendrogram affinity is also greatest with FCT 21c. C27 has a dominant overstorey of *C. calophylla*. FCT 21a is 'Central *B. attenuata -E. marginata* woodlands', and with no *E. marginata* present in C27 it is unlikely to be representative. Both FCT 23b and 21c are dominated by *B. attenuata* and *B. menziesii,* while FCT 21c is described as 'Low-lying''. C27 was sampled on the periphery of a wetland, indicating it is 'low-lying' and more representative of FCT 21c.
	C28	21c, 22	22	MR11	45.28	22	5F01	40.00	22	ELE18	40.00	**22**	Greatest similarity to Keighery *et al.* (2012) quadrat MR11 (FCT 22, 45.28%), occurring approximately 13m from the east boundary of the survey area. Next-greatest similarities were found with a further two FCT 22 sites. C28 is considered to represent FCT 22, based on species composition and the greatest similarity of quadrats to FCT 22.
	C29	21c, 22	23b	MR12	44.44	21c	low06b	42.50	21c	TWIN-8	42.11	**21c**	Greatest similarity with Keighery *et al.* (2012) quadrat MR12 (FCT 23b, 44.44%), occurring approximately 3 km from the survey area. FCT 23b and FCT 21c have similar dominant species; *B. attenuata* and *B. menziesii*. However, other dominant species of C29, *E. todtiana* and *M. preissiana* have both been recorded in reference quadrats for FCT 21c, while only *E. todtiana* has been recorded at FCT 23b sites. Dendrogram affinity is also greatest with FCT 21c. It considered that C29 is representative of FCT 21c.
	C33	21c, 22	4	cas04	43.90	21c	MODO-2	41.46	5	HARRY -3	38.89	**21c**	Greatest similarity with Keighery *et al.* (2012) quadrat cas04 (FCT 4, 43.90%), occurring approximately 124 km from the survey area. FCT 4 is '*Melaleuca preissiana* damplands', and although *M. preissiana* is dominant within C33, *B. menziesii* and *B. attenuata* are also. This combination of dominant species is considered to be more representative of FCT 21c, the 'Low lying *B. attenuata* woodlands or shrublands. Dendrogram affinity is also greatest with FCT 21c.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
BaBmMp (cont.)	C38	21c, 22	21c	ELE29	42.42	23a	cas03	41.67	28	much01	40.00	**21c**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE29 (FCT 21c, 42.42%), occurring approximately 75 km from the survey area. C38 has a dominant overstorey of *C. calophylla*. FCTs 21c, 23a and 28 have similar dominant species, these being *B. attenuata* and *B. menziesii*. FCT 28 has no *M. preissiana* present within any reference sites, while this species was recorded within C38. Comparing species compositions of ELE29 (FCT 21c) and cas03 (FCT 23a) with C38, more similarities are present with ELE29, indicating C38 is representative of FCT 21c. Dendrogram affinity is also greatest with FCT 21c.
MpBaBm	C12	21c, 22	22	YAN-22	37.29	22	BNR29	36.67	22	BNR29	35.29	**21c**	Greatest similarity to Gibson *et al.* (1994) quadrat YAN-22 (FCT 22, 37.29%), occurring approximately 41 km from the survey area. FCT 22 is identified as '*B. ilicifolia* woodlands'. Due to the lack of characteristic *B. ilicifolia*, it is not considered representative of FCT 22. Dendrogram results indicates greatest affinity to FCT 21c.
	C13	21c, 22	4	ELE32	38.10	23b	MUK01	36.36	21c	MODO-2	35.29	**21c**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE32 (FCT 4, 38.10%), occurring 75 km from the survey area. FCT 4 is '*M. preissiana* woodlands' with FCTs 23b and 21c both *Banksia* dominated woodlands. *M. preissiana* is not present at FCT 23b sites, and *B. attenuata* is not present at FCT 4 sites; therefore, C13 is more likely representative of FCT 21c. Dendrogram affinity is also greatest with FCT 21c.
	C14	21c, 22	S02	ELE06	35.71	S02	ELE31	34.48	4	PLINE-4	34.29	**4**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE06 (FCT S02, 35.71%), occurring approximately 75 km from the survey area. FCT 4 is '*M. preissiana* woodlands' and FCT S02 is 'Northern *Pericalymma ellipticum* dense low shrublands'. C14 is considered a *M. preissiana* open woodland; therefore, is likely to represent FCT 4.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
MpBaBm (cont.)	C22	21c, 22	4	perth10	35.48	4	Ravs01	35.29	4	ELE32	33.96	**4**	Similarity values identified the greatest affinity to Keighery *et al.* (2012) quadrat perth10 (FCT S02, 35.48%), occurring approximately 75 km from the survey area. Key characteristic *Banksia* species of FCT 21c and FCT22 were not recorded to occur and therefore it is considered unlikely to be representative of these FCTs. C22 is considered to represent FCT 4, based on species composition and the greatest similarity of quadrats to FCT 4. Characteristic species of FCT4 (*Melaleuca preissiana, Hypocalymma angustifolium, Adenanthos cygnorum* and *Hypolaena exsulca*) have been previously recorded to occur within FCT4.
	C34	21c, 22	21c	ELE22	40.74	23b	MUCK-1	38.24	22	MR11	37.74	**21c**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE22 (FCT 21c, 40.74%), occurring approximately 75 km from the survey area. C34 has numerous *Banksia* spp., with *B. littoralis* and *B. menziesii* as dominant. Both FCT 23b and 21c are dominated by *B. attenuata* and *B. menziesii,* while FCT 21c is described as 'Low-lying''. C34 was sampled on the periphery of a wetland, indicating it is 'Low-lying' and more representative of FCT 21c. Dendrogram affinity is also greatest with FCT 21c.
MpCp	C04	17, 5, S20	11	AUSTB-3	23.81	S01	gosn06	23.26	5	low08	22.64	**4**	Greatest similarity to Gibson *et al.* (1994) quadrat AUSTB-3 (FCT 11, 23.81%), occurring approximately 163 km from the survey area. Characteristic species of FCT 11, *Eucalyptus rudis,* was not recorded within C04. C04 is dominated by *Melaleuca rhaphiophylla* over *Hypocalymma angustifolium* and *Kunzea micrantha* subsp. *micrantha.* Species dominant in C04 occur within FCTs 4, 5 and S01. Although C04 clusters with FCTs 17, 5 and S20 in the dendrogram, the remaining quadrats within vegetation MpCp are inferred as FCT 4; therefore, C04 is determined to be also representative of FCT 4.
	C08	17, 5, S20	21a	ELE04	35.82	4	cas04	34.78	4	WHITE-2	34.29	**4**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE04 (FCT 21a, 35.82%), occurring approximately 75 km from the survey area. Key species of FCT 21a (Central *B. attenuata – E. marginata* woodlands) were not recorded within C08; however, *M. preissiana* is a dominant species of FCT 4 (*M. preissiana* woodlands). Therefore, C08 is more representative of FCT 4.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
MpCp (cont.)	C09	17, 5, S20	5	GUTHR-2	43.08	4	cas04	36.67	5	GUTHR -4	36.07	**4**	Greatest similarity to Keighery *et al.* (2012) quadrat GUTHR-2 (FCT 5, 43.08%), occurring approximately 215 km from the survey area. FCT 5 (Mixed shrub damplands) and FCT 4 (*M. preissiana* woodlands) have similar species composition; however, C09 represents a *M. preissiana* open forest, representative of FCT 4.
	C40	17, 5, S20	S05	ELE10	36.84	S02	MP02	34.48	S06	MR16	34.04	**4**	Greatest similarity to Keighery *et al.* (2012) quadrat ELE10 (FCT S05, 36.84%), occurring approximately 75 km form the survey area. FCT 5 (Mixed shrub damplands) and FCT 4 (*M. preissiana* woodlands) have similar species composition; however, C40 represents a *M. preissiana* open forest, representative of FCT 4.
	C42	17, 5, S20	5	AUSTB-6	27.59	21c	ELE29	23.53	26b	YALG-6	22.47	**4**	Greatest similarity to Gibson *et al.* (1994) quadrat AUSTB-6 (FCT 5, 27.59%), occurring approximately 162 km from the survey area. FCT 21c is a Banksia woodland community dominated by *Banksia attenuata* and *Banksia menziesii.* Neither species were recorded within C42. FCT 26b occurs on limestone, which does not occur within the survey area. Dominant species of C42, *Callitris pyramidalis,* has not been recorded within any reference sites, while the secondary dominant species *M. viminea* subsp. *viminea* has been recorded within FCT 5 reference quadrats. The majority of all other MpCp quadrats show the greatest similarity to FCT 4 and therefore, it is considered that C42 best aligns with this FCT.
MrKgMt	C11	17, 5, S20	11	HYMUS01	26.32	28	wire02	23.88	24	TRIG-5	22.22	**Inconclusive (degraded)**	Greatest similarity to Gibson *et al.* (1994) quadrat HYMUS01 (FCT 11, 26.32%), occurring approximately 135 km from the survey area. Dominant species of C11, *M. teretifolia,* has only been recorded in Gibson *et al.* (1994) quadrat TWIN-11 (FCT 11) between FCTs 11, 28 and 24. Due to the high weed presence within C11, similarities are considered likely to be skewed. Four Keighery *et al.* (2012) quadrats (MR01 to MR04) of FCT S20 occur approximately 11 km from the survey area and show similarities between 6.25 and 15.38% with C11. C11 is too degraded to accurately infer a representative FCT.

Vegetation Unit	Quadrat	Dendrogram Clusters with / Dominant FCT in Cluster*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	FCT*	Site	Similarity (%)*	Inferred FCT	Comments
MrKgMt (cont.)	C17	S04	S04	WN094HED	33.33	5	perth02	29.79	S02	hart03	28.57	**Inconclusive (FCT 5 or S20)**	Greatest similarity to Keighery *et al.* (2012) quadrat WN094HED (FCT S04, 33.33%), occurring approximately 39 km from the survey area. FCT S04 is '*Regelia ciliata* Dandaragan Plateau wetlands' and FCT S02 is 'Northern *Pericalymma ellipticum* dense low shrublands'. C17 recorded *Pericalymma ellipticum,* but this species is not dominant. Dominant species of C17, *M. rhaphiophylla,* is found within FCT 5 and FCT S20. Four Keighery *et al.* (2012) quadrats occur 11 km from the survey area, while the closest FCT 5 quadrat (MILT-1) is located 29 km from the survey area. Therefore, C17 is inconclusive as it could either represent FCT 5 or FCT S20.
	C31	S20, 5	26b	Guild09	32.79	5	PLINE-5	31.82	26b	YAN-11	31.25	**5**	Greatest similarity to Keighery *et al.* (2012) quadrat Guild09 (FCT 26b, 32.79%), occurring approximately 26 km from the survey area. FCT 26b occurs on limestone, which does not occur within the survey area. Dominant species of C17, *M. rhaphiophylla,* is found within FCT 5 quadrats; therefore, C31 is likely to be representative of FCT 5. Dendrogram also shows some affinity with FCT 5.
	C37	S20, 5	5	PLINE-5	39.02	S20	MR02	32.43	S20	MR03	30.77	**S20**	Greatest similarity to Gibson *et al.* (1994) quadrat PLINE-5 (FCT 5, 39.02%), occurring approximately 51 km from the survey area. Dominant species of C37 are present in both FCT 5 and FCT S20 sites, except *Acacia pulchella* subsp. *glaberima,* which has been recorded in FCT S20, with four Keighery *et al.* (2012) FCT S20 sites located less than 12 km from the survey area. Dendrogram shows greatest affinity with FCT S20, ,herefore, C37 is considered to be representative of FCT S20.
	C39	S20, 5	5	PLINE-5	35.29	S20	MR02	33.33	S20	MR03	31.25	**Inconclusive (5 or S20)**	Greatest similarity to Gibson *et al.* (1994) quadrat PLINE-5 (FCT 5, 35.29%), occurring approximately 51 km from the survey area. Dominant species within C39 could be representative of either FCT 5 or FCT S20. Four Keighery *et al.* (2012) quadrats occur 11 km from the survey area, while the closest FCT 5 quadrat (MILT-1) is located 29 km from the survey area. Dendrogram shows affinity with FCTs S20 and 5. Therefore, C17 is inconclusive and could represent either FCT 5 or S20.

*Listed in order of most dominant FCTs in the cluster

5.2.7 Summary of Recorded FCTs

As illustrated in **Table 24**, and summarised in **Table 25**, the assessment of each survey quadrat against Gibson *et al.* (1994) and Keighery *et al.* (2012) quadrats, considering their location and species composition, determined that six FCTs are represented within the survey area.

Table 25 – Summary of Inferred FCTs of the Survey Area

Vegetation Unit	Quadrat	Inferred FCT	Commonwealth Status	WA Status
BaBmEt	C01, C03, C05, C07, C10, C15, C21, C23, C24, C25, C30, C32, C35, C36, C41	FCT 23b – Northern *Banksia attenuata – Banksia menziesii* woodlands	(part Endangered)[#]	Priority 3 (part Priority 3)[*]
BaBmMp	C16, C27, C29, C33, C38	FCT 21c – Low lying *Banksia attenuata* woodlands or shrublands	(part Endangered)[#]	Priority 3 (part Priority 3)[*]
	C20, C28	FCT 22 – *Banksia illicifolia* woodlands	(part Endangered)[#]	Priority 3 (part Priority 3)[*]
	C02, C06, C18, C19, C26	FCT 23b – Northern *Banksia attenuata – Banksia menziesii* woodlands	(part Endangered)[#]	Priority 3 (Part Priority 3)[*]
MpBaBm	C14, C22	FCT 4 – *Melaleuca preissiana* damplands		
	C12, C13, C34	FCT 21c – Low lying *Banksia attenuata* woodlands or shrublands	(part Endangered)[#]	Priority 3 (part Priority 3)[*]
MpCp	C04, C08, C09, C40, C42	FCT 4 – *Melaleuca preissiana* damplands		
MrKgMt	C17, C37, C39 (inconclusive)	FCT S20 – Northern shrublands on sandy clays		
	C17, C31, C39	FCT 5 – Mixed Shrub Damplands		
	C11	No inferred FCT		

forms part of the Commonwealth-listed Endangered Banksia Woodlands of the Swan Coastal Plain TEC
*forms part of the State listed Priority 3 Banksia Woodlands of the Swan Coastal Plain PEC

5.2.8 Banksia Woodlands TEC

The desktop assessment identified the Banksia woodlands TEC may be present throughout the study area. The field assessment allowed for the confirmation of the extent and condition of Banksia woodland and the FCTs present within the survey area. Vegetation units BaBmEt, BaBmMp and MpBaBm were found to be likely representation of FCTs associated with the Banksia woodlands TEC and a more detailed diagnosis of the TEC's presence in the survey area is provided below.

5.2.8.1 Banksia Woodland TEC Characterisation

Only quadrats containing characteristic Banksia species of the Commonwealth listed Banksia woodlands TEC were assessed against the key diagnostic characters, as stipulated in the Conservation Advice (TSSC 2016), to confirm representation of the Banksia woodlands TEC. Results determined that 30 of the 42 survey quadrats representing vegetation units BaBmEt, BaBmMp and MpBaBm (part of), are characteristic of the Banksia woodlands TEC (**Table 26**).

Banksia Woodland Extent

Based on the characterisation of Banksia woodland within the survey area (**Table 26**) it is considered that vegetation units BaBmEt, BaBmMp and MpBaBm (part of) are representative to Banksia woodland that is characteristic of the Banksia woodlands TEC. The extent of Banksia woodland across the survey area represented by a mosaic of FCTs 23b, 22 and 21c and presented in **Figure 18**. The Banksia woodland TEC occupies 876.43 ha (63.34%) of the 1,383.78 ha survey area (**Table 27**).

Table 26 - Banksia Woodlands TEC Characterisation of the Quadrats Supporting Characteristic Banksia

Key Character (see key)	BaBmEt															BaBmMp
	C01	C03	C05	C07	C10	C15	C21	C23	C24	C25	C30	C32	C35	C36	C41	C02
a).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
b).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
c).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
d).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
e).	+	+	+	+	+	+	+	-	-	-	+	-	+	+	+	-
f).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
g).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Considered BWL TEC	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Key Character (see key)	BaBmMp (cont)											MpBaBm			MpCp	
	C06	C16	C18	C19	C20	C26	C27	C28	C29	C33	C38	C12	C13	C34	C04	C09
a).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
b).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
c).	+	+	+	+	+	+	-	+	+	+	+	+	+	+	-	-
d).	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
e).	-	-	+	-	-	-	+	-	+	-	-	-	-	-	-	-
f).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
g).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Considered BWL TEC	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**

Key:

a) Swan Coastal Plain or Jarrah Forest location
b) Soils and landform either deep Bassendean, Spearwood or occasionally Quindalup sands, sandy colluvium, Aeolian sands of the Ridge Hill Shelf or Whicher/Dandaragan Scarp
c) Distinctive upper sclerophyllous layer dominated by *Banksia attenuata, Banksia menziesii, Banksia ilicifolia* or *Banksia prionotes*
d) With (although can be without) an emergent tree layer of *Corymbia calophylla, Eucalyptus marginata* or *Eucalyptus gomphocephala*
e) With (although can be without) other trees including *Eucalyptus todtiana, Nuytsia floribunda, Allocasuarina fraseriana, Callitris arenaria, Callitris pyramidalis* or *Xylomelum occidentale*
f) Understorey/mid-ground sclerophyllous shrub layer including mostly Asteraceae, Dilleniaceae, Droseraceae, Ericaceae, Fabaceae, Haemodoraceae, Iridaceae, Myrtaceae, Orchidaceae, Proteaceae, Restionaceae
g) Herbaceous ground layer including mostly Apiaceae, Asteraceae, Cyperaceae, Haemodoraceae, Poaceae, Restionaceae, Stylidiaceae

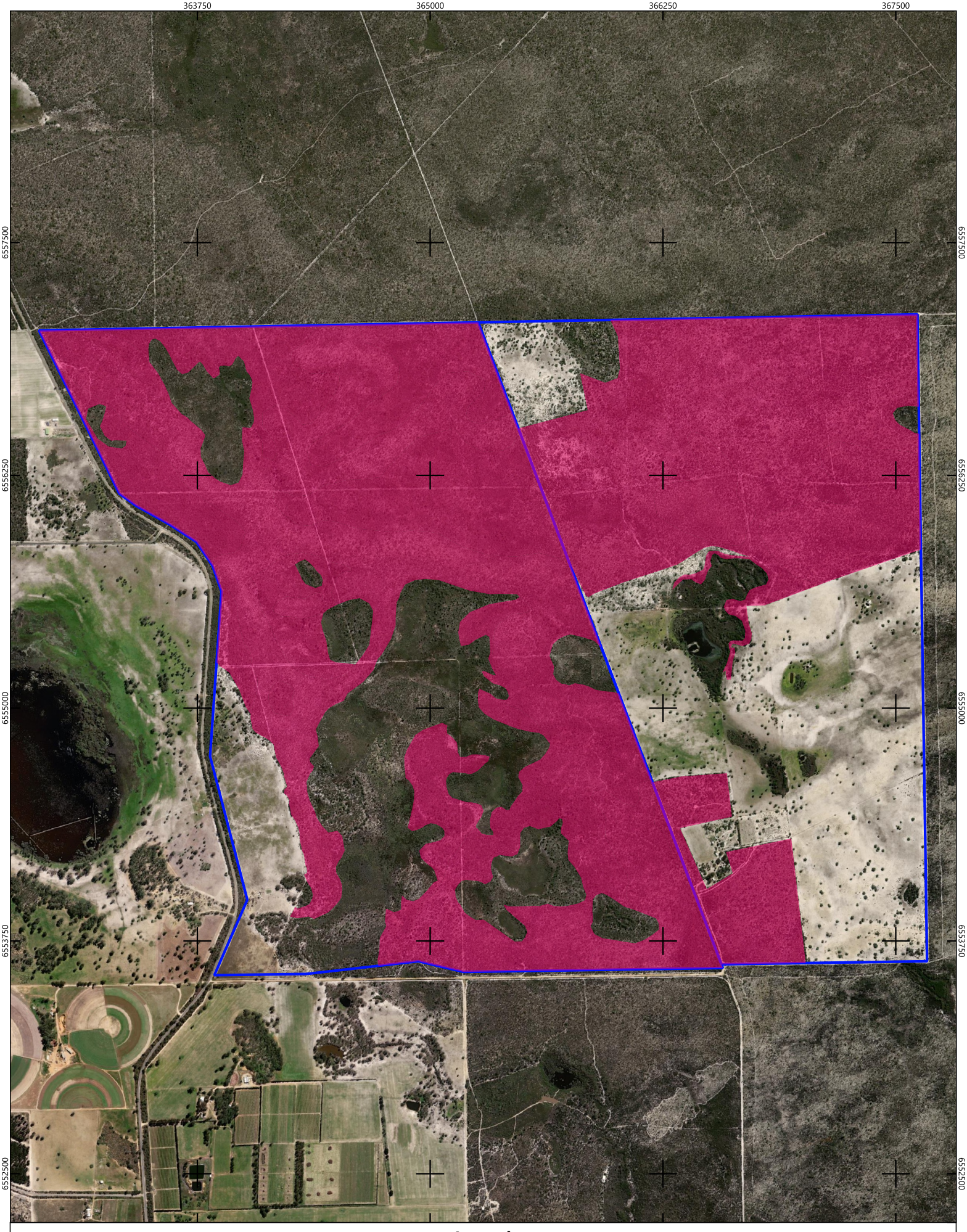


Figure 18 - Banksia Woodlands TEC Extent

5.2.8.2 Banksia Woodland Patch Assessment

The Banksia woodlands TEC within the survey area comprises one patch that forms part of a larger patch of Banksia woodland that spans much of the surrounding region.

This patch is situated in a region of historical disturbance, primarily for agriculture. The patch is relatively intact with large areas of remnant vegetation existing in conservation areas, such as the Moore River National Park and Moore River Nature Reserve. The overall, conservative average condition of the regional Banksia woodland patch that is connected to the Banksia woodland within the survey area is considered to be 'Good' or better, and in most cases would likely be in 'Excellent' condition.

The Conservation Advice (TSSC 2016) specifies minimum patch sizes based on vegetation condition as follows:

- Pristine – no minimum patch size
- Excellent – 0.5 ha
- Very Good – 1 ha
- Good – 2 ha.

To be considered MNES-protectable under the EPBC Act, a Banksia woodland patch must meet at least the 'Good' condition category as outlined in the Conservation Advice (TSSC 2016).

The condition of the Banksia woodland vegetation within the survey area ranges from 'Completely Degraded to Degraded' to 'Excellent'. Just over half (51.52%) of the survey area is made up of Banksia woodland that is considered to be in 'Excellent' condition. Banksia woodland in 'Good' or worse condition makes up less than 3.04% of the entire survey area (**Table 27**). These areas are located mostly in the southern section of Lot 5324 and the north-west section of Lot 8037.

Table 27 – Vegetation Condition of the Banksia Woodland within the Survey Area

Condition Category	Area within Survey Area (ha)	Percentage of the Survey Area (%)
Excellent	712.88	51.52
Very Good to Excellent	47.83	3.46
Very Good	73.66	5.32
Good	14.66	1.06
Degraded to Good	14.06	1.02
Degraded	11.87	0.86
Completely Degraded to Degraded	1.47	0.11
TOTAL	**876.43**	**63.44**

The extent of the broader regional Banksia woodland patch that is connected to the Banksia woodland within the survey area have been mapped, primarily at a desktop level, based on aerial imagery, regional vegetation complex mapping, project-specific ground-truthing and previous (FVC) survey mapping in the region. This desktop mapping has determined a broader regional patch of 19,064.75 ha is connected to the Banksia woodland within the survey area, as presented in **Figure 19**.

Based on the conservative average condition across the patch within the survey area and the size of the regional patch, the Banksia woodlands within the survey area are considered eligible for inclusion as the Banksia woodlands TEC.

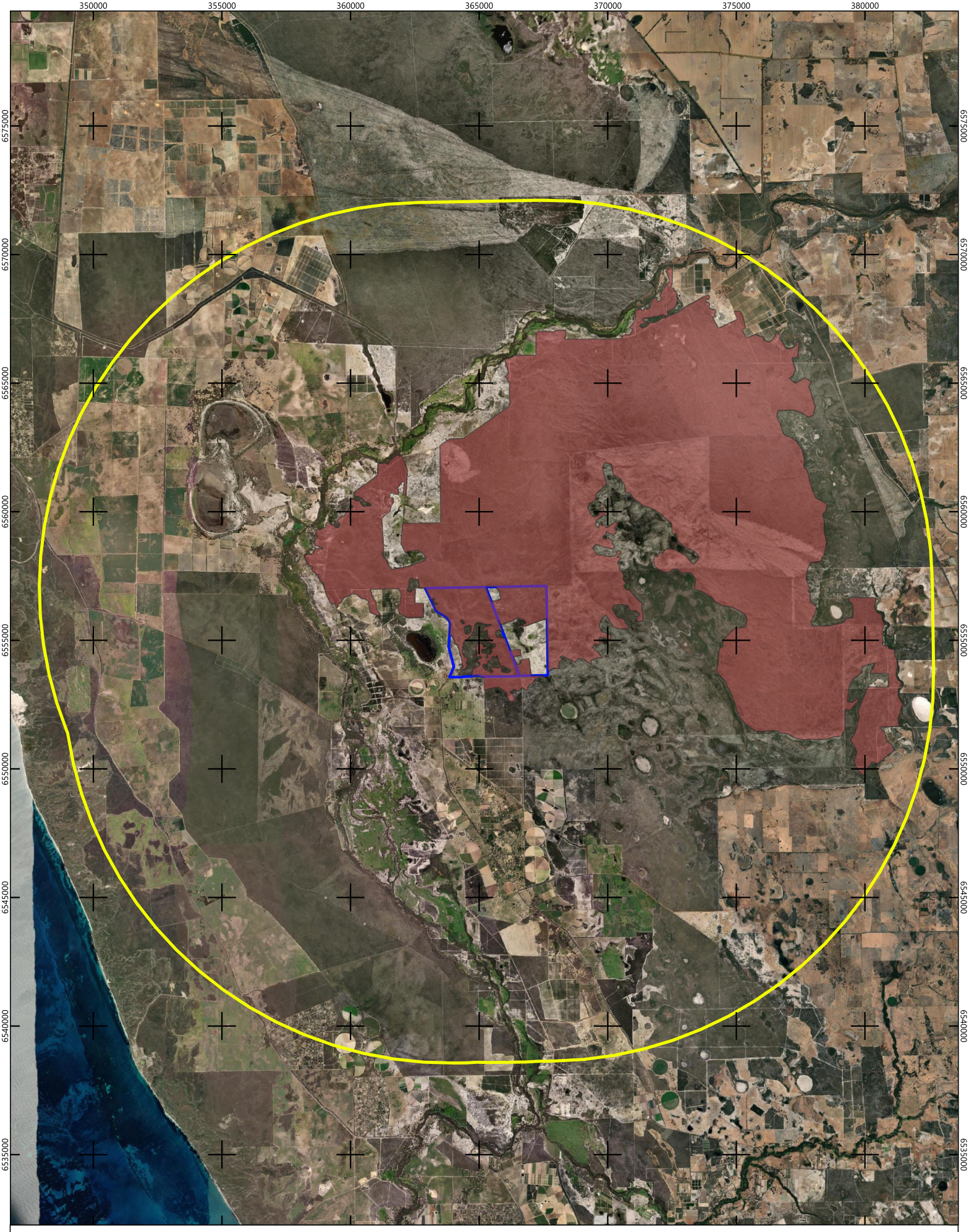


Figure 19 - Banksia Woodland Patch

5.2.9 FCTs of Significance

The representation of FCTs of significance, arising from the desktop assessment (as representations of TECs and PECs) in the survey area is assessed in the following sections.

5.2.9.1 FCT 21c – Low-lying Banksia attenuata woodland or shrublands

DBCA data did not identify, FTC 21c the Low-lying *Banksia attenuata* woodlands or shrublands TEC as likely to occur within the survey area (**Figure 11**). Floristic analysis of all quadrats inferred that eight quadrats recorded from within vegetation units BaBmMp and MpBaBm show the greatest affinity to FCT 21c sites. It is therefore concluded that these vegetation units (or at least part of these vegetation units) represent FCT SCP 21c.

5.2.9.2 FCT 22 – Banksia ilicifolia woodlands

Floristic analysis of the survey data against the Gibson *et al.* (1994) and Keighery *et al.* (2012) datasets identified that two quadrats sampled within vegetation unit BaBmMp are likely representative of FCT 22 (*Banksia ilicifolia* woodlands). The vegetation within this vegetation unit was also inferred to potentially be representative of FCT 21c and 23b, however, the clustering in the dendrogram favours FCT 22 (**Figure 17b**), a State-listed Priority 3 ecological community, and a component of the Commonwealth-listed (Endangered) Banksia woodlands TEC, which is also a State-listed Priority 3 ecological community. Furthermore, two Keighery *et al.* (2012) sampled quadrats for FCT 22 are located within the study area, suggesting a greater likelihood that FCT 22 is represented in the survey area.

5.2.9.3 FCT 23b - Northern Banksia attenuata – Banksia menziesii woodlands

Floristic analysis of the survey data identified that all quadrats sampled within vegetation unit BaBmEt are representative of the State-listed Priority 3 FCT 23b (Northern *Banksia attenuata – Banksia menziesii* woodlands). Dissimilarity index analysis has majority of BaBmEt quadrats showing the greatest similarity with reference quadrats representing FCT 23b. Given that within the 15 km study area, there are numerous reference quadrats representing FCT 23b, similarities between survey quadrats and FCT 23b reference quadrats was likely. Therefore, FCT 23b represented by vegetation unit BaBmEt covers 28.96% (400.82 ha) of the survey area.

5.2.9.4 Clay Pans of the Swan Coastal Plain

Floristic analysis determined that none of the quadrats assessment within the survey area align with FCTs of the Clay Pans TEC, specifically FCT 7 or FCT 9. Furthermore, species characteristic of the suite of ecological communities that make up the Clay Pans TEC were not recorded within the survey area. Therefore, it can be concluded that the Clay Pans TEC and its synonymous communities are not present within the survey area.

5.2.9.5 Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain

Floristic analysis of the survey data against the Gibson *et al.* (1994) and Keighery *et al.* (2012) dataset identified no similarity of recorded quadrats to the FCTs associated with the Tuart woodlands TEC. Furthermore, no *Eucalyptus gomphocephala* trees were recorded within the survey area and therefore, it can be confirmed that the Tuart woodlands and forests TEC is not supported by the survey area.

5.2.10 Groundwater Dependent Vegetation

An array of wetlands occur across the study area and the survey area supports numerous wetlands, including Conservation category wetlands. Characteristic of wetland vegetation and communities are the flora taxa that are dependent on surface water, groundwater or both for their long-term survival.

The vegetations units MpBaBm, MpCp and MrKgMt defined and mapped within the survey area are all dominated by *Melaleuca preissiana, Melaleuca rhaphiophylla* and/or *Banksia littoralis* in the upper canopy. These trees are

dependent on groundwater for at least part of the year and therefore, the vegetation units in which they occur represent GDV which potentially represent terrestrial GDEs.

5.2.11 Fauna

A total of 21 vertebrate fauna species were recorded in the field assessment, either from direct sightings, or evidence such as calls, scats, tracks, digging, foraging evidence, feathers or bones. Of the 21 species, three are introduced and 18 are birds (**Appendix H**). The introduced species included the pig (*Sus scrofa*), rabbit (*Oryctolagus cuniculus*) and Laughing Kookaburra (*Dacelo novaeguineae*); common pests in the Perth area.

5.2.11.1 Significant Fauna

One fauna species of significance, Carnaby's Black-Cockatoo (*Calyptohynchus latirostris*), was observed during the field assessment. Although both of these sightings were outside of the survey area, one group was only 200 m outside the survey area boundary. This species is listed as Endangered under the EPBC Act and as Schedule 2 under the BC Act. Although this species was observed outside the survey area, it is likely this species utilises the survey area, as discussed in **Section 6.5.2**.

The post-field survey assessment of the likelihood of occurrence of significant fauna within the survey area is presented in **Table 28**.

Table 28 – Post-Field Survey Significant Fauna Likelihood of Occurrence Assessment

Species	Significance	Preferred Habitat	Post-Survey Expected Occurrence	Source
REPTILES				
Ctenotus gemmula (Jewelled Sand-plain Skink	CS2 (P3)	Sandplains supporting heath with banksia or mallee woodlands	resident	4
Neelaps calonotos (Black-striped Snake)	CS2 (P3)	Sandy soils supporting heath and banksia/eucalypt woodland	resident	1
Lerista christinae (Bold-striped Slider)	CS3	Heath and Banksia woodlands	resident	4
Morelia spilota imbricata (Carpet Python (south-west population))	CS3	Diverse, often associated with rocks and/or fallen timber	resident	2
BIRDS				
Apus pacificus (Fork-tailed Swift)	CS1 (M, S5)	Aerial	irregular visitor	1,3
Calyptorhynchus banksii naso (Forest Red-tailed Black-Cockatoo)	CS1 (VU, S3[v])	Eucalypt forests and woodlands	irregular visitor	1,2,3
Calyptorhynchus latirostris (Carnaby's Black-Cockatoo)	CS1 (EN, S2[e])	Sandplain banksia/eucalypt woodlands	regular visitor	1,2,3
Calyptorhynchus baudinii (Baudin's Black-Cockatoo)	CS1 (VU, S2[e])	Karri and Marri forests	vagrant	1
Falco peregrinus (Peregrine Falcon)	CS1 (S7)	Diverse, nesting often on cliffs or in large trees	resident	1
Ninox connivens (Barking Owl)	CS2 (P2, WR)	Eucalypt forests and woodlands	vagrant	4
Tyto novaehollandiae (Masked Owl)	CS2 (P2, WR)	Eucalypt forests and woodlands	vagrant	4
Lophoictinia isura (Square-tailed Kite)	CS3 (WR)	Open forests, heathlands, scrub	regular visitor	1
Platycercus icterotis (Western Rosella)	CS3 (WR)	Open eucalypt forests and woodlands	irregular visitor	1,2
Stipiturus malachurus (Southern Emu-wren)	CS3 (HS)	Low, dense heath	regular visitor	1
Myiagra inquieta (Restless Flycatcher)	CS3 (HS)	Open forests, woodlands	irregular visitor	1,2
MAMMALS				
Dasyurus geoffroii (Chuditch)	CS1 (V, S3[v])	Forest, woodlands, often associated with rocky areas	vagrant	2,3

Species	Significance	Preferred Habitat	Post-Survey Expected Occurrence	Source
Cercartetus concinnus (Western Pygmy-possum)	CS3 (LS)	Eucalypt forests, woodlands and mallee	resident	4
Hydromys chrysogaster (Rakali, Water-Rat)	CS2 (P4)	Natural or man-made freshwater bodies	irregular visitor	2
Notamacropus irma (Brush Wallaby)	CS2 (P4)	Banksia woodland and eucalypt forests to woodlands with dense understorey	resident	1,2
Isoodon fusciventer (Quenda)	CS2 (P5)	Dense heaths and understorey around wetlands or banksia/jarrah woodlands	vagrant	4
Mormopterus kitcheneri (Western Freetail-Bat)	CS3 (LS)	Dry sclerophyll forest or heath, mallee woodland	resident	4
Pseudomys albocinereus (Noodji, Ash-grey Mouse)	CS3 (LS)	Banksia woodlands and heaths on sand	resident	1,2
Sminthopsis 'dolichura' (Little Dunnart)	CS3 (LS)	Banksia woodlands with well-developed understorey	resident	4
Sminthopsis fuliginosus (Grey-bellied Dunnart)	CS3 (LS)	Banksia woodlands with well-developed understorey	resident	4
Tarsipes rostratus (Honey Possum)	CS3 (LS)	Species-rich proteaceous woodlands and heaths	resident	4
INVERTEBRATES				
Hesperocolletes douglasi (short-tongued bee)	CS1 (S3[Ex])	Banksia woodland	resident	1
Hylaeus globuliferus (Woollybush Bee)	CS2 (P3)	Banksia woodland	resident	2
Glossurocolletes bilobatus (short-tongued bee)	CS2 (P2)	Banksia woodland	resident	1
Leioproctus contrarius (short-tongued bee)	CS2 (P3)	Banksia woodland	resident	1,2
Synemon gratiosa (Graceful Sun-Moth)	CS2 (P4)	Banksia woodland and coastal heath; dependent on few food-plant species (*Lomandra* spp.)	irregular visitor	2
Antichiropus UBS2 (millipede)	CS3 (SRE)	Banksia woodland	resident	4
Aname mellosa group (spider)	CS3 (SRE)	Banksia woodland	resident	4
Kwonkan sp. (spider)	CS3 (SRE)	Banksia woodland	resident	4

Source: 1 (Atlas of Living Australia, ALA 2021), 2 (NatureMap, DBCA 2021b), 3 (PMST, DAWE 2021d), 4 (BCE database)

5.2.12 Fauna Habitats

The survey area was found to support six fauna habitats (VSAs), as summarised in **Table 29**. The spatial extent of VSAs within the survey area is presented in **Figure 20**.

Table 29 - Summary of Vegetation and Substrate Associations

VSA Description	Photograph	Area (ha)	Area (%)
VSA1 - Banksia Woodland Woodland comprised of trees of *Banksia attenuata* and *Banksia menziesii* to 6 m, with isolated *Banksia ilicifolia* to 4 m and scattered *Eucalyptus todtiana* and *Corymbia calophylla* to 6 m over a complex understorey of mixed myrtaceous, proteaceous shrubs, which is often dense. Substrate is deep, pale grey sand. Excellent condition.		838.79	60.62
VSA2 - Pasture Cleared with no mid or upper storey providing a tree layer, refuge or cover. **Ehrharta calycina* present in areas. Substrate is deep, pale grey sand.		267.79	19.35
VSA3 - Open Grasstree Scrubland Bare ground with scattered *Nuytsia floribunda, Melaleuca preissiana and Eucalyptus todtiana* over stands of *Xanthorrhoea preissii* and bare ground with *Podotheca gnaphalioides*. Substrate is deep, white sand. Degraded condition.		43.25	3.13

VSA Description	Photograph	Area (ha)	Area (%)
VSA4 - Pine Scrubland Scrubland of Sandplain Pine (*Callitris* sp.) to 3 m with over a dense Myrtaceous understorey dominated by *Kunzea micrantha*. Substrate is rocky, brown sand. Good condition.		55.98	4.05
VSA5 - Melaleuca Scrubland Banksia scrubland with scattered *Melaleuca preissiana* trees to 12 m over *Kunzea micrantha* subsp. *micrantha* in flower. Substrate is rocky brown sand and pale grey to white sand. Good condition.		169.74	12.27
VSA6 - Banksia – Flooded Gum Woodland Trees of *Banksia attenuata* and *Banksia grandis* to 6 m, with *Eucalyptus rudis* to 16 m over a complex understorey of mixed Myrtaceous, Proteaceous shrubs. Substrate is white sand and pale brown sandy loam. Good condition.		7.99	0.58
Open Water		0.24	0.02
	TOTAL	**1,383.78**	**100**

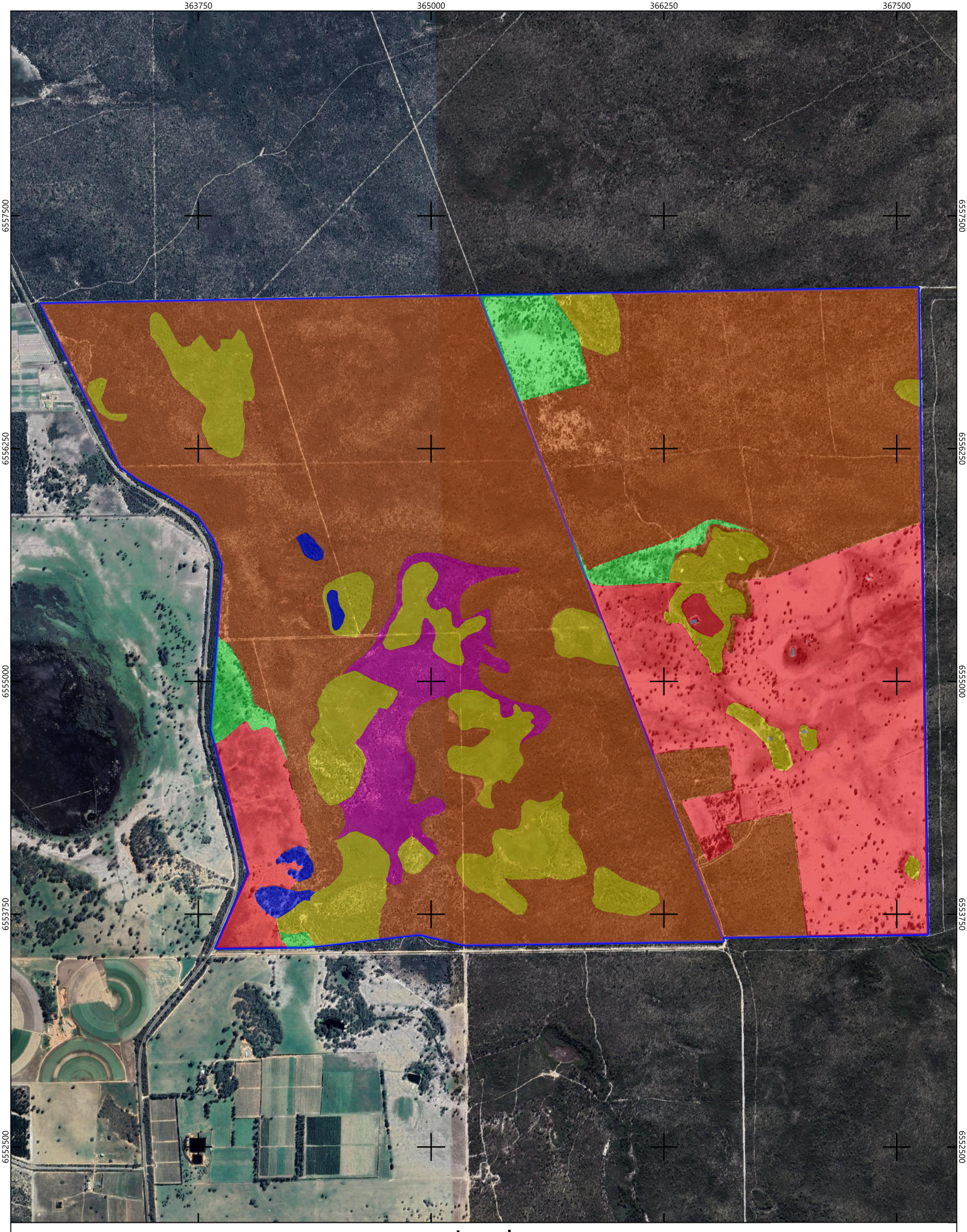


Figure 20 - Fauna VSAs

FOCUSED VISION consulting

5.2.13 Black-Cockatoo Habitat Assessment

5.2.13.1 Observed Black-Cockatoos

Two flocks of Carnaby's Black-Cockatoo were recorded during the field assessment, both outside of the survey area. One flock with an estimated minimum of 50 individuals was recorded 13 km south of the survey area within a stand of *Corymbia calophylla* and planted *Corymbia maculata* trees, adjacent to dam water sources (369415 mE, 6542177 mN). Given the early time they were recorded here (0740 hours), and the unfavourable foraging weather conditions (raining and mild), it is possible the stand of trees was the flock's night roost. A targeted roost survey would be required to confirm this.

The second flock of Carnaby's Black-Cockatoos was observed only 200 m from the survey area (363669 mE, 6553361 mN), with an estimated minimum of 100 individuals. This flock was recorded at 0830 hours when rain was easing. The flock was observed foraging on roadside *Banksia attenuata* and a pastoral crop of wild radish (*Raphanus raphanistrum*).

5.2.13.2 Foraging Habitat

The majority of the survey area supports Banksia woodlands (VSA1 and VSA6) which is optimal foraging habitat for Black-Cockatoos, particularly Carnaby's Black-Cockatoo. These VSAs are in excellent condition and mostly support dense stands of Banksia trees. VSAs 4 and 5 provide some foraging habitat for Carnaby's Black-Cockatoos but little to none for Forest Red-tailed Black-Cockatoos. The areas of bare ground, or mostly bare ground (VSA2 and VSA3) provide little to no foraging habitat. Application of the foraging habitat scoring methodology resulted in foraging habitat quality as summarised in **Table 30** and shown spatially in the **Figure 21** series.

Table 30 - Summary of Black-Cockatoo Foraging Habitat Quality within the Survey Area

VSA	Habitat	Habitat Quality Scores			
		Vegetation Characteristics	Site Context	Stocking Rate/ Species Density	Total Score
	Carnaby's Black-Cockatoo				
1	Banksia Woodland	4	2	1	**7**
2	Pasture	1	NA	NA	**1**
3	Open Grasstree Scrubland	2	NA	NA	**2**
4	Pine Scrubland	2	NA	NA	**2**
5	Melaleuca Scrubland	3	2	1	**6**
6	Banksia – Flooded Gum Woodland	3	2	1	**6**
	Forest Red-tailed Black-Cockatoo				
1	Banksia Woodland	2	NA	NA	**2**
2	Pasture	0	NA	NA	**0**
3	Open Grasstree Scrubland	1	NA	NA	**1**
4	Pine Scrubland	0	NA	NA	**0**
5	Melaleuca Scrubland	1	NA	NA	**1**
6	Banksia – Flooded Gum Woodland	2	NA	NA	**2**

Foraging Habitat Quality Scores:
0 = none/negligible; 1 = negligible to low; 2 = low; 3 = low to moderate; 4 = moderate; 5 = moderate to high; 6 = high; ≥7 = very high
Note: context and species density scores not added where vegetation characteristics scores are <3

Carnaby's Black-Cockatoo Foraging Habitat

A total of 1,072.50 ha (77.52%) of the vegetation within the survey area was considered to be of either 'moderate' (score of 4, VSA 4), 'high' (score of 6, VSA 5 and VSA 6) or 'very high' (score of ≥7, VSA 1) foraging value for the Carnaby's Black-Cockatoo, covering a total of 838.79 ha, 177.73 ha and 55.98 ha, respectively. The abundance of high quality of foraging habitat for Carnaby's Cockatoo is predominantly due to an abundance of native tree species (*Banksia attenuata* and *B. menziesii*) within VSA 5, VSA 6 and VSA 7. These tree species are known to be mainstays of the Carnaby's Black-Cockatoo diet (Groom 2011) and their density does not vary dramatically throughout the Banksia woodland habitats (VSA1 and VSA6).

Within VSA 5, there is a relatively complex mix of Melaleuca shrubs and occasional shrubs of *Banksia telmatiaea* and *Banksia incana,* further preferred food sources are also present including Marri, *B. ilicifolia* and *Hakea* spp.. Although quality foraging habitat for Carnaby's Black-Cockatoo is present, no evidence of foraging (chewed Marri nuts or Banksia cones) was observed during the field assessment; however, vegetation within the survey area is likely to have been used previously and may be used in the future for foraging given that suitable habitat exists.

The remaining vegetation of 311.28 ha (22.48%) was considered to be of either 'low to moderate' (score of 3, VSA 3) or 'low' (score of 2, VSA 2) foraging value covering a total of 43.25 ha and 267.79 ha, respectively. None of the vegetation was considered to be of 'negligible' (score 0) or 'negligible to low' foraging value for the Carnaby's Black-Cockatoo.

Red-tailed Black-Cockatoo Foraging Habitat

Limited foraging habitat for the Forest Red-tailed Black-Cockatoo was present within the survey area. Marri and Jarrah are the mainstays for the Forest Red-tailed Black-Cockatoo, comprising 90% of the diet (Johnstone and Kirkby 1999). No Jarrah trees and a low number of Marri trees (51) were recorded within the survey area. Few scattered *Eucalyptus todtiana* trees were present which are also a known foraging tree species (M. Bamford, pers. obs).

As a result, no foraging habitat between 'low to moderate' (score 3) and 'very high' (score ≥7) value for the Red-tailed Black Cockatoo is considered to be present within the survey area. Majority of the vegetation (846.78 ha, 61.20%) is considered to be of 'low' (score 2, VSA 6 and VSA 7) foraging value with the remaining vegetation either 'negligible to low' (score 0, VSA 2 and VSA 4) or 'negligible' (score 1, VSA 3 and VSA 5), covering a total of 323.77 ha and 212.99 ha, respectively.

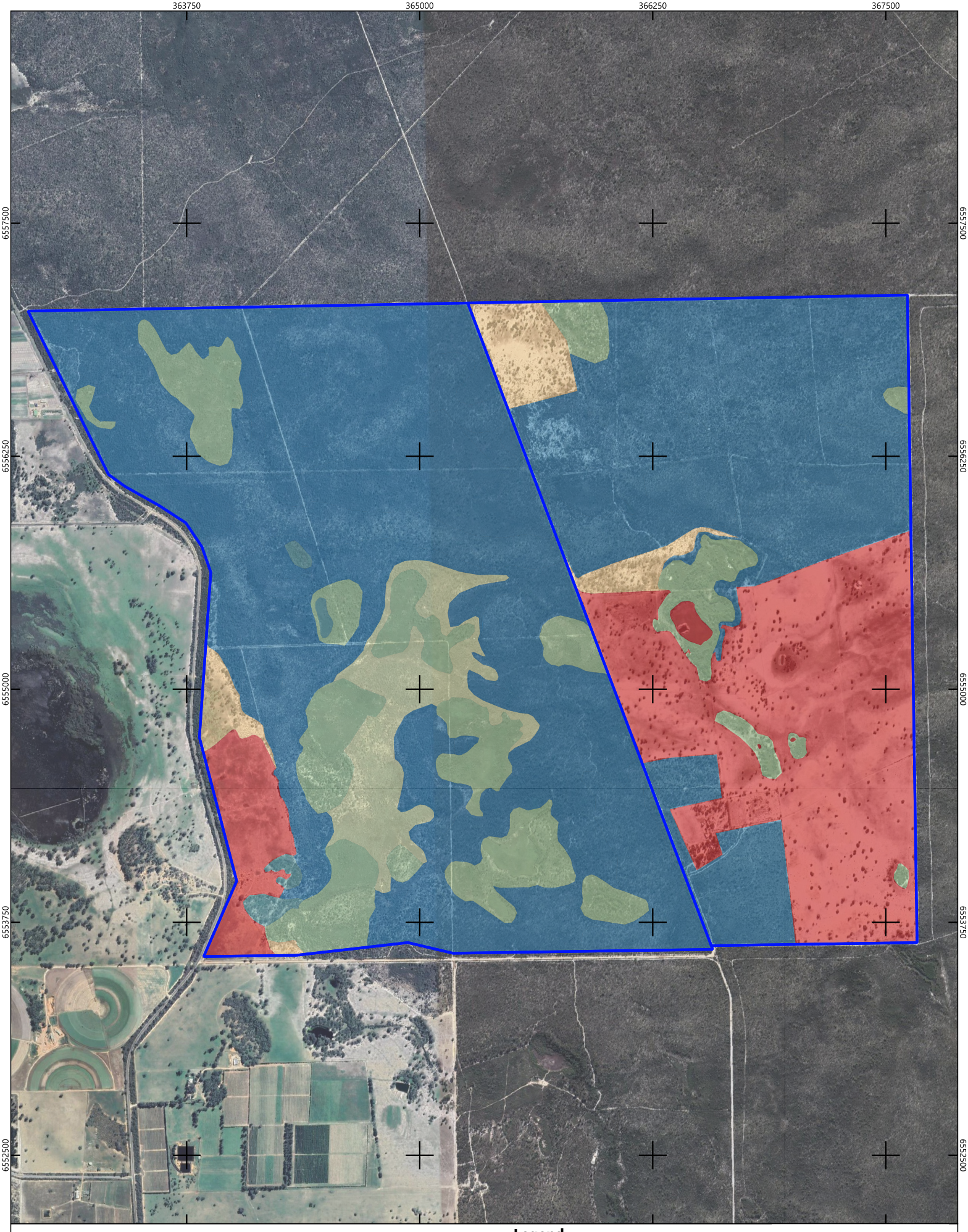


Figure 21a - Carnaby's Black-cockatoo Foraging Habitat

FOCUSED VISION consulting

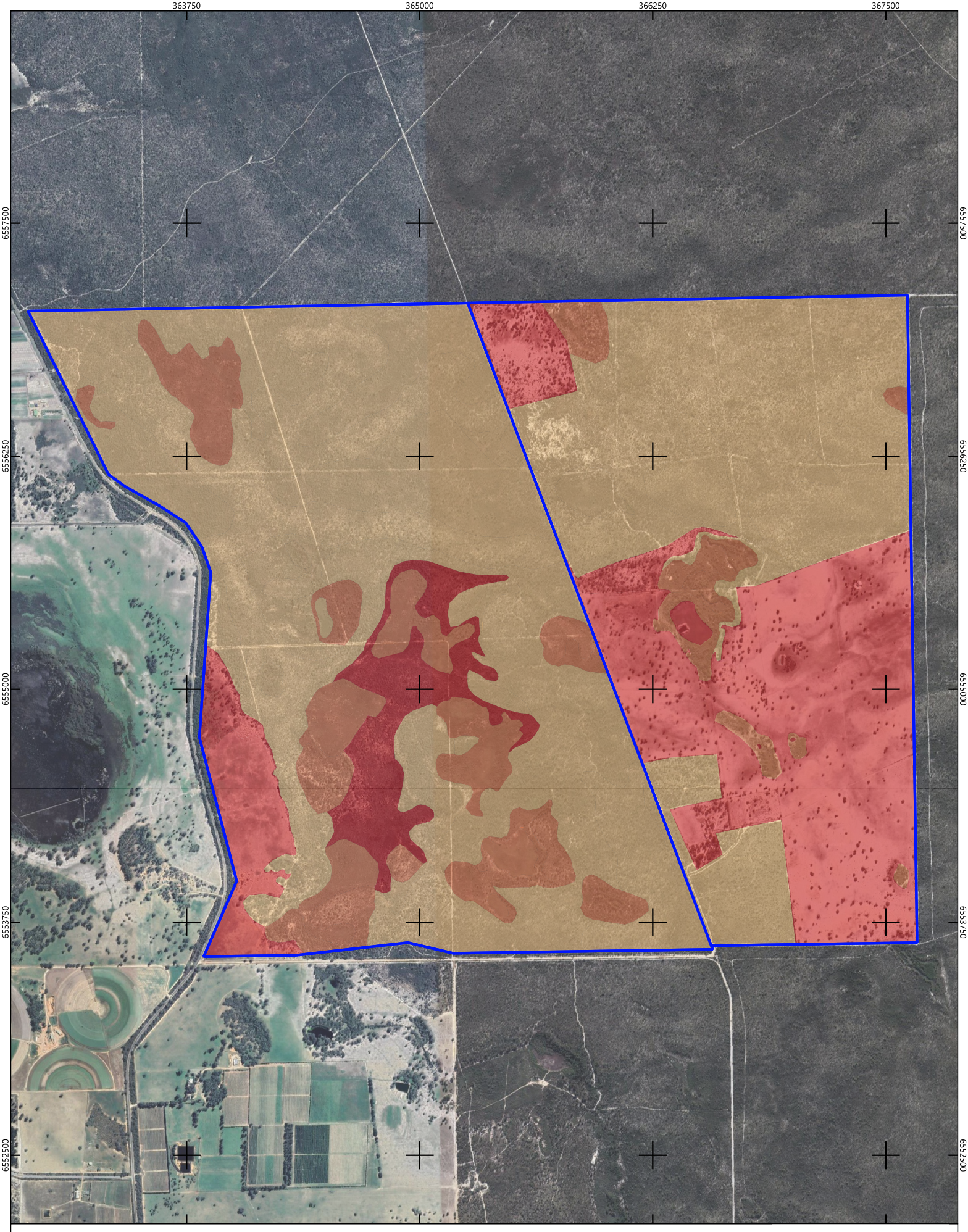


Figure 21b - Forest Red-tailed Black-cockatoo Foraging Habitat

FOCUSED VISION consulting

5.2.13.3 Breeding Habitat

A total of 21 trees suitable for Black-Cockatoo nesting (DBH >500 mm) were recorded within the survey area. All 21 trees are *Corymbia calophylla* with their rankings in regard to hollows summarised in **Table 31** and further details in **Appendix J**. Of these, 13 are rank 5 (no suitable hollows for Black-Cockatoos) and seven are rank 4 (have unsuitable hollows). One tree was found to have a potentially suitable hollow, but with no evidence of use by Black-Cockatoos (rank 3). No trees were found to be rank 2 (sufficient DBH, suitable hollow/s and evidence of use) nor rank 1 (active nest). The locations of the recorded Suitable DBH Trees are presented in **Figure 22**.

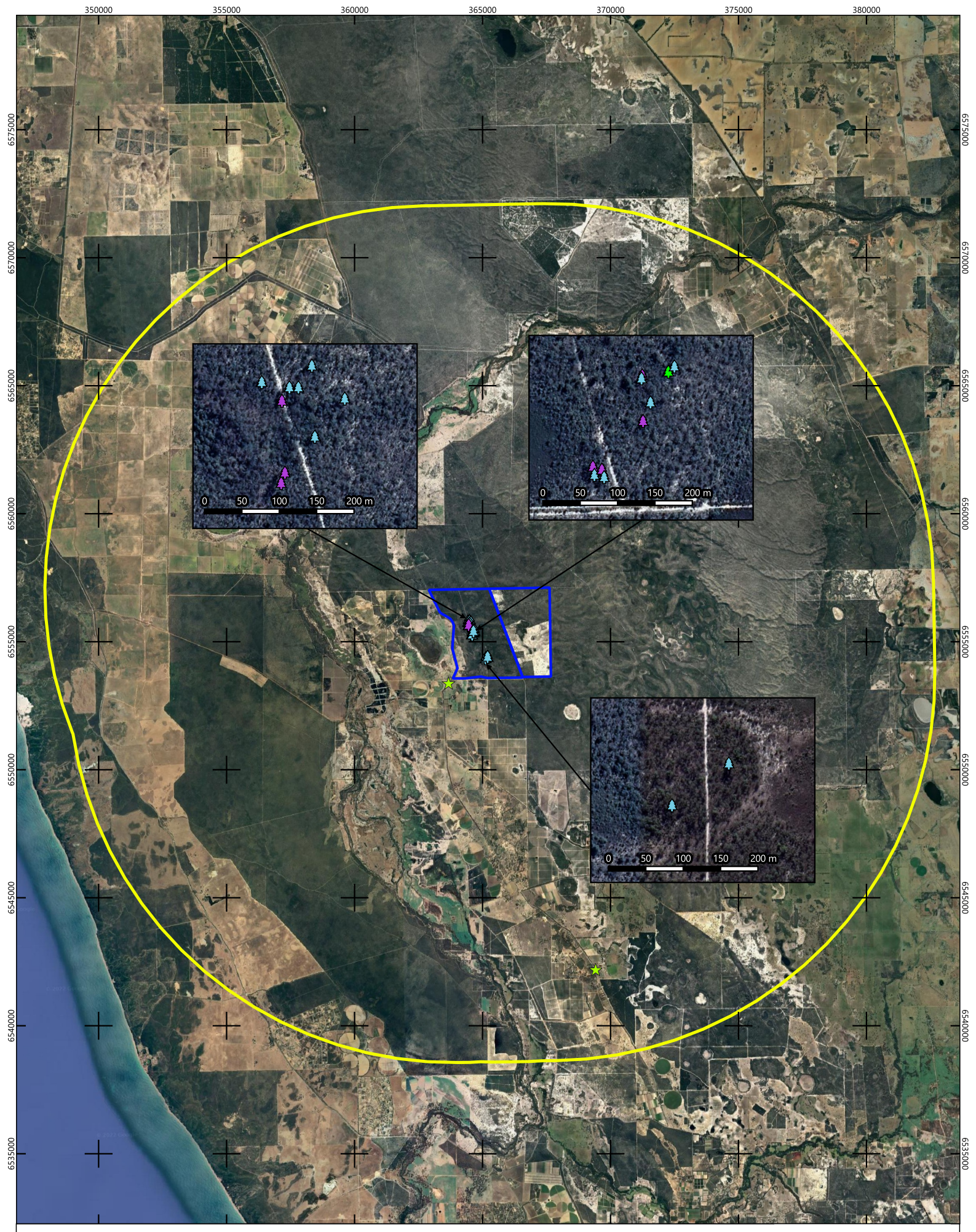
Table 31 - Summary of Suitable DBH Trees for Black-Cockatoo Breeding Habitat

Rank	Rank Description	No. of Suitable DBH Trees
5	Sufficient DBH, no hollows	13
4	Sufficient DBH and unsuitable hollow/s	7
3	Sufficient DBH, potential hollow/s, no evidence of BCs	1
2	Sufficient DBH, suitable hollow/s, evidence	0
1	Active nest	0
X	Sufficient DBH, potential hollow/s colonised by bees	0
	TOTAL	**21**

5.2.13.4 Roosting Habitat

The desktop identified two potential roosting sites 7 km and 13 km south of the survey area, with no known roosting sites within the study area. No existing night-roosts were positively identified during the field survey; however, there is the potential for roosting to occur amongst the taller trees (*Corymbia calophylla, Eucalyptus rudis* and tall *E. todtiana*) in Lot 5324, particularly within VSA6 (**Figure 20**, **Figure 22**). No large trees were found within Lot 8037.

Adjacent and nearby to the survey area are several patches of tall trees (Marri, Pine and Spotted Gum) along Cowalla Road, which may also provide roosting habitat for Black-Cockatoos. The first flock of Carnaby's Black-Cockatoo observed during the field assessment was located at the unconfirmed roost site identified from the desktop assessment, approximately 13 km south of the survey area (**Figure 22**).



0 2 4 6 8 km

GDA 94 / MGA Zone 50

Figure 22 - Black-Cockatoo Potential Breeding Habitat

Legend

- Survey Area
- Study Area
- ***Corymbia calophylla* Rank**
- Suspected Roost Site
- 3 - potential hollow/s, no BC evidence
- 4 - unsuitable hollow/s
- 5 - no hollows

FOCUSED VISION consulting

6 DISCUSSION

6.1 FLORA

A total of 354 flora species was recorded from the two-phase flora and vegetation field assessment, which includes 326 (92.09%) native species and 28 (7.91%) introduced (weed) species. The low proportion of weeds can be attributed to the relatively large areas of contiguous vegetation not subject to edge effects including weed invasion. Weed densities were observed to be higher in areas adjacent to current pastoral activity and historic clearing.

The native floral diversity (326 species) of the survey area is considered high, which is largely attributable to excellent vegetation condition, favourable seasonal conditions and a robust survey consisting of two phases of field assessment.

Fifty-three (15%) of the flora specimens collected were not able to be identified with certainty to species level, due to inadequate or sterile material for identification purposes. However, this represents a small proportion of the total collected taxa, and not considered a constraint for the survey.

The timing of the field surveys (October and November) is considered to have been optimal for the identification of flowering flora and annual and ephemeral species and therefore, it is likely that a large proportion of species supported by the survey area were recorded. Re-assessment of flora likelihood of occurrence did not suggest that Threatened flora is likely to occur within the survey area, based on observations and vegetation assessment within the field. Rather, the conclusions for Threatened flora were that they 'may' occur. Further targeted surveys to detect Threatened flora are considered unlikely to be necessary.

No species listed as Threatened flora under the BC Act or under the EPBC Act were recorded. Four Priority flora species, *Banksia dallanneyi* subsp. *pollosta* (P3), *Dillwynia dillwynioides* (P3), *Dodonaea hackettiana* (P4) and *Verticordia lindleyi* subsp. *lindleyi* (P4), were recorded during the field assessment, which were identified during the pre-field desktop assessment as 'may occur'. The survey area is considered to provide suitable potential habitat for a number of Threatened and Priority flora. However, when combined with known distribution and survey effort, no species further to those recorded are considered 'likely to occur' within the survey area.

Whilst no Threatened flora were recorded during the field assessment, based on the proximity and currency of previous records and since suitable habitat is provided in the survey area, the post-field survey likelihood of assessment of Threatened and Priority flora (**Table 15**) determined that the following eight State-listed Threatened flora (six of which are also Commonwealth-listed Threatened flora) may occur in the survey area:

- *Chorizema varium*
- *Drakaea elastica*
- *Lepidosperma rostratum*
- *Paracaleana dixonii*
- *Anigozanthos viridis* subsp. *terraspectans*
- *Banksia mimica*
- *Macarthuria keigheryi*
- *Marianthus paralius.*

None of the abovementioned Threatened flora are considered likely to occur in the survey area, however, whilst not considered necessary, further intensive targeted searches may record populations, or provide further certainty regarding the conclusions regarding their likelihood of occurrence.

No DP plants or WoNS were recorded within the survey area; however, a total of 28 introduced species were recorded. Two of the introduced flora recorded, **Ursinia anthemoides* and **Hypochaeris glabra* are considered widespread, occurring in 15 and 18 quadrats across the survey area, respectively. **Ursinia anthemoides* is considered 'unrated' in its impact; and is known to spread rapidly through native vegetation (DPaW 2013). **Hypochaeris glabra* is considered a weed of 'high' impact generally in areas where water availability is greater (DPaW 2013). **Ehrharta calycina* was not recorded abundantly throughout intact vegetation; however, its presence in high density within and adjacent to cleared areas of Lot 5327 provides opportunity for this species to invade nearby vegetation. Establishment of this species could increase the risk of fire and diminish vegetation condition within the survey area.

6.2 VEGETATION

6.2.1 Vegetation Units

Six vegetation units and two 'other' mapped areas were recorded across the survey area from 42 quadrats. The number of quadrats recorded is considered to have adequately sampled the various vegetation units, between five and 15 quadrats sampled within each vegetation unit. Vegetation unit 'Xp' was not defined from quadrats, as it was in Degraded to Completely Degraded condition.

Five of the vegetation units (all besides vegetation unit Xp) are broadly classified as either 'Banksia woodlands' on the upper and mid-slopes, or 'Melaleuca woodlands' on lower slopes, valley floors and in the wetlands areas. Vegetation unit 'MpBaBm' supports species that are characteristic of both Banksia (FCT 21c) and Melaleuca (FCT 4) Woodlands identifying, and typically occurs on the lower slopes and at the interface between lower wetland areas and mid- to upper-slope Banksia woodlands.

Three of the defined vegetation units (BaBmEt, BaBmMp and part of MpBaBm) are considered to be representative of three FCTs (FCT 21c, 22 and 23b) of which are part of the 'Banksia woodlands TEC', based on species composition and habitat, see **Section 6.3**.

Floristic analysis indicated a greater diversity of vegetation units than what was observed in the field, with three (BaBmMp, MpBaBm and MrKgMt) concluded to support more than one FCT.

6.2.2 Vegetation Condition

The condition of the vegetation within the survey area ranges from 'Excellent' to 'Completely Degraded', with more than half of the survey area found to be in 'Excellent' condition. Areas in 'Excellent' condition are predominantly found within Banksia woodland vegetation units (BaBmEt, BaBmMp and MpBaBm). Vegetation unit Xp has been subject to disturbance and historic clearing and is in 'Degraded to Completely Degraded' or 'Completely Degraded' condition, void of native vegetation or generally presenting open spaces of with only sparse native upper storey species (*Melaleuca preissiana, Eucalyptus todtiana, Xanthorrhoea preissii* and *Nuytsia floribunda*) and little to no native understorey.

Areas where vegetation condition was in 'Very Good' or poorer condition are generally located in areas adjacent to areas of disturbance and areas of inundation where threats such as weeds, human disturbance can impact the quality of vegetation.

6.3 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

Of the eight potentially occurring significant ecological communities identified in the desktop assessment, three State-listed Priority 3 PECs of which are also components of the Commonwealth-listed (Endangered) and State-listed (Priority 3) Banksia woodlands TEC are considered to occur:

- FCT 21c – Low-Lying *Banksia attenuata* woodlands or shrublands (part of BaBmMp and MpBaBm)
- FCT 22 - *Banksia ilicifolia* woodlands (part of BaBmMp)
- FCT 23b - *Banksia attenuata – Banksia menziesii* woodlands (BaBmEt).

Vegetation representative of the Banksia woodlands TEC covers a total of 876.43 ha within the survey area, and forms part of a greater regional Banksia woodland patch that is 19,064.75 ha in size. Vegetation units BaBmEt, BaBmMp and MpBaBm (part of) are floristically similar to FCTs that comprise the Banksia woodlands TEC (FCTs 21c, 22 and 23b) and meet the key characteristics outlined by the Conservation Advice (TSSC 2016).

Mapping and determining areas of each FCT is often not possible when the vegetation units support a combination of more than one FCT, as is the case within the survey area.

Inferring individual FCTs to each vegetation unit is a key component in assisting to determine the presence of Threatened and Priority Ecological Communities. In some instances, the statistical analysis of flora data, produced inconclusive or illogical results. More certainty in the PATN analysis results might be achieved by using a "single site insertion" methodology.

6.4 VEGETATION OF SIGNIFICANCE

6.4.1 Nationally Significant Vegetation

The National significance of the vegetation units was assessed based on presence of:

- Populations of Threatened (EPBC listed) species
- TECs listed as nationally (EPBC) significant
- Ramsar Wetlands of International Importance (DAWE 2021a).

6.4.1.1 Threatened Flora

No EPBC listed Threatened flora were recorded in the field assessment therefore, none of the recorded vegetation units are of significance due to this factor.

6.4.1.2 Threatened Ecological Communities

Vegetation units BaBmEt, BaBmMp and part of MpBaBm are representative of the EPBC listed Banksia woodlands TEC and are therefore of significance due to this factor.

6.4.1.3 Ramsar Wetlands

No Ramsar wetlands occur within the survey area and therefore, none of the recorded vegetation units are of significance due to this factor.

6.4.2 State Significant Vegetation

The State significance of the vegetation units was assessed based on presence of:

- State-listed Threatened flora or TECs
- land within (or areas recommended by DBCA for inclusion) the State-managed conservation estate.

6.4.2.1 Threatened Flora

No State-listed Threatened flora were recorded within the survey area, nor are any likely to occur, and therefore, none of the recorded vegetation units are of significance due to this factor.

6.4.2.2 Threatened Ecological Communities

None of the vegetation units recorded in the survey area are representative of any TEC listed under the BC Act, therefore, none are of significance due to this factor.

6.4.2.3 Conservation Estate

There are no areas (or areas recommended by DBCA for inclusion) within the State-managed conservation estate and therefore, none of the recorded vegetation units are of significance due to this factor.

6.4.3 Regionally Significant Vegetation

The regional significance of the vegetation units was assessed based on:

- the presence of populations of Priority flora or ecological communities
- the presence of ESAs or areas relevant to a conservation scheme
- the presence of conservation category wetlands
- their role in maintaining important ecological processes
- the presence of high diversity of flora, fauna, communities, or community structure
- the presence of flora species exhibiting range extensions or undescribed species
- having a restricted regional distribution
- being represented by less than 30% of the pre-European extent.

6.4.3.1 Priority Flora

Four Priority flora were recorded during the field assessment (**Table 19**), comprising of two Priority 3 species and two Priority 4 species across five vegetation units. Therefore, the vegetation units within which these species occur, BaBmEt, BaBmMp, MpBaBm, MpCp and MrKgMt, may be considered regionally significant due to this factor. Collectively, these vegetation units account for 1,072.49 ha (77.5%) of the survey area.

6.4.3.2 Priority Ecological Communities

Four Priority 3 State-listed PECs (FCTs 21c, 22, 23b and Banksia woodlands) were identified to occur within the study area and are represented by vegetation units, BaBmEt (FCT 23b and Banksia woodland), BaBmMp (FCT 21c, 22, 23b and Banksia woodland) and part of MpBaBm (FCT 21c and Banksia woodland). Therefore, a total area of 876.43 ha (63.34%) of the 1,383.78 ha survey area is of regional significance due to this factor.

6.4.3.3 ESAs or Conservation Areas

There are no conservation areas found within the study area; however, several ESAs are present found where Conservation category geomorphic wetlands are situated. The ESAs found fall within all six vegetation units and the Cleared / Open Water areas. Therefore, all recorded and mapped vegetation units are considered to be of regional significance due to this factor.

6.4.3.4 Conservation Category Wetlands

There are seven conservation category wetlands within the survey area, their collective boundaries intersecting all vegetation units within the survey area. The predominant vegetation units supporting floodplain and fringing vegetation are BaBmMp, MpBaBm, MpCp and MrKgMt. Therefore, these vegetation units are considered to be of regional significance due to this factor.

6.4.3.5 Maintaining Important Ecological Processes

All vegetation units (BaBmEt, BaBmMp, MpBaBm, MpCp and MrKgMt) defined and mapped within the survey area are considered to play a role in maintaining ecological processes, being that they represent potential groundwater dependent ecosystems (GDEs), and play a role in the cycling of groundwater, particularly where geomorphic wetlands are present. Sections of the survey area where geomorphic wetlands are mapped are classified as either 'High potential GDE (national assessment)' or 'Moderate potential GDE (national assessment)' (BoM 2012). Overall, it is considered that these vegetation units support potential GDEs as they support an ecosystem with vegetation dependent on shallow groundwater, specifically wetland associated species such as; *Melaleuca preissiana, Melaleuca rhaphiophylla* and *Banksia littoralis.* Therefore, all vegetation units within the survey area are considered to be of regional significance due to this factor.

6.4.3.6 High Diversity

The Banksia woodlands are considered highly diverse and complex, with an average of 50 species per 100 m^2 (TSSC 2016). The Banksia woodland associated vegetation units BaBmEt, BaBmMp and MpBaBm recorded an average of 47.4, 34.2 and 21.8 species per 100 m^2, respectively. A total of 26 Keighery *et al.* (2012) quadrats associated with Banksia woodlands FCTs are present within the study area, recording an average of 46.1 species per 100 m^2, with individual quadrats recording between 13 and 81 species. This indicates that vegetation units BaBmMp and MpBaBm recorded less than the average species diversity of the local area, while BaBmEt recorded higher species diversity.

A total of 16 Keighery *et al.* (2012) quadrats associated with Melaleuca woodland FCTs (7, S02, S03, S06 and S20) are present within the study area, recording an average of 29.4 species per 100 m^2, with individual quadrats recording between 7 and 60 species. Within the survey area, vegetation units MpCp and MrKgMt recorded an average of 24.0 and 20.6 species per 100 m^2, respectively. This indicates that vegetation units MpCp and MrKgMt support species diversity slightly below the average of the local area.

In conclusion, vegetation unit BaBmEt was found to support high species diversity and is therefore considered to be of regional significance due to this factor.

6.4.3.7 Range Extending and Undescribed Flora

Of the recorded flora, none are considered to be exhibiting an extension beyond their currently documented range of occurrence, in accordance with records of the WAH (WAH 1998-). One undescribed and indetermined species *Scholtzia* ?sp. Wongonderrah (M.E. & M.R. Trudgen 12000) was recorded within vegetation unit BaBmEt; therefore, this vegetation unit is considered to be of regional significance due to this factor.

6.4.3.8 Restricted Regional Representation and Distribution

The most important aspect in the consideration of regional significance of vegetation is the representation of that vegetation in the region. Vegetation units are considered significant if they are poorly represented regionally. Two vegetation associations defined by Shephard *et al.* (2002) are found within the survey area, these being, '37 – Shrublands; teatree-thicket' and '949 – Low woodland' Banksia'. In order to gain a wider context for assessing the regional representation (and remaining extent of the vegetation units of the current study, as discussed further in the following section), each vegetation unit was also aligned with the broad, regional vegetation associations described in Shepherd *et al.* (2002) within each IBRA region.

Five of the six vegetation units recorded within the survey area align with these two vegetation associations. The three Banksia woodland vegetation units (BaBmEt, BaBmMp and MpBaBm) align with association 949 and the Melaleuca woodland vegetation units (MpCp and MrKgMt) align with association 37. Vegetation unit Xp is considered too degraded to align with a vegetation association.

Both the 'Shrubland; teatree-thickets' and 'Low woodland; Banksia' vegetation associations are considered well-represented, regionally, with extents of more than 4,012 ha and 81,731 ha across the Shire of Gingin, respectively.

Therefore, none of the vegetation units are considered to be regionally significant due to this factor.

6.4.3.9 Extent Remaining

The EPA's current objective, to protect flora and vegetation so that biological diversity and ecological integrity are maintained (EPA 2016b) was identified in EPA Guidance Statement 33. This is achieved by ensuring that ecological communities are maintained above certain threshold levels. These levels are considered to be 30% of the original extent in unconstrained areas and 10% in constrained areas, such as urban zones. This objective is also in accordance with the principles of Bush Forever (Government of Western Australia 2000).

The survey area is considered to be an unconstrained area and as such, the minimum retention target of 30% of the original, pre-European vegetation extent applies. The vegetation associations (Beard 1990) and the vegetation complexes (Heddle *et al.* 1980, Webb *et al.* 2016) relevant to the survey area all exceed the 30% retention threshold in State, regional and local contexts; besides the vegetation complex Karrakatta Complex - North described by Heddle *et al* (1980). This complex is currently represented by 28.24% of its pre-European extent across the State, which falls below the retention threshold considered appropriate to meet the EPA objective. The Karrakatta Complex - North vegetation complex intersects with a very small portion (0.017 ha) of the survey area in the south-west corner. In this location, no vegetation remains, as a result of previous clearing. Therefore, n\one of the vegetation units are considered representative of this complex (as vegetation has been cleared) and none are considered significant due to this factor.

6.4.4 Locally Significant Vegetation

The local significance of the vegetation units was assessed based on:

- the presence small, isolated communities
- their local extent (proportion) and distribution.

6.4.4.1 Small, Isolated Communities

None of the recorded intact vegetation units are considered small or isolated, therefore, none are considered locally significant due to this factor.

6.4.4.2 Limited Extent and Distribution

As discussed above in Section **6.4.3.8**, the intact vegetation units all align with the two vegetation associations defined by Beard (1990) and Shephard *et* al. (2002), both of which are widespread across the local and regional areas. Therefore, none of the vegetation units are considered locally significant due to this factor.

6.4.5 Summary of Vegetation Significance

The significant vegetation units of the survey area, along with the aspects determining their significance, are summarised in **Table 32**. The level of significance for each vegetation unit is broadly summarised in **Table 33**.

Table 32 - Summary of Vegetation Units of Potential Significance

Scale	Significance Aspect	Vegetation Units
National Significance	Populations of Threatened (EPBC listed) species	-
	Presence of EPBC listed TECs	BaBmEt, BaBmMp, MpBaBm
	Presence of Ramsar wetlands	-
State Significance	Presence of State-listed Threatened flora	-
	Presence of State-listed TECs	-
	Land within in the Conservation Estate	-
Regional Significance	Presence of Priority flora	BaBmEt, BaBmMp, MpBaBm, MpCp, MrKgMt
	Presence of PECs	BaBmEt, BaBmMp, MpBaBm
	Presence of ESAs or areas relevant to a conservation scheme	BaBmEt, BaBmMp, MpBaBm, MpCp, MrKgMt, Xp
	Presence of conservation category wetlands	BaBmEt, BaBmMp, MpBaBm, MpCp, MrKgMt, Xp
	Role in maintaining important ecological process	BaBmMp, BaBmMp, MpBaBm, MpCp, MrKgMt, Xp
	High diversity of flora, fauna, communities, or community structure	BaBmEt
	Presence of flora species exhibiting a range extension	-
	Presence of undescribed flora	BaBmEt
	Having a restricted regional representation and distribution	-
	Represented by less than 30% of the pre-European extent	-
Local Significance	Small, isolated communities	-
	Having a limited local extent	-
	Having a limited distribution	-

Table 33 - Summary of Level of Significance

Vegetation Unit	Overall Significance – Factor of Significance	Area (ha)	Survey Area (%)
BaBmEt	National significance - presence of EPBC listed TECs Regional significance – presence of Priority flora Regional significance – presence of a PEC (FCT 23b) Regional significance – occurring with an ESA (as part of a CCW) Regional significance – has a role in maintaining ecological processes (GDE) Regional significance - high diversity of flora, fauna, communities, or community structure Regional significance – presence of undescribed flora	400.82	28.98
BaBmMp	National significance - presence of EPBC listed TECs Regional significance – presence of Priority flora Regional significance – presence of a PEC (FCT 23b) Regional significance – occurring with an ESA (as part of a CCW) Regional significance – has a role in maintaining ecological processes (GDE)	437.97	31.64
MpBaBm	National significance - presence of EPBC listed TECs Regional significance – presence of Priority flora Regional significance – presence of a PEC (FCT 22) Regional significance – occurring with an ESA (as part of a CCW) Regional significance – has a role in maintaining ecological processes (GDE)	51.92	3.75
MpCp	Regional significance – presence of Priority flora Regional significance – occurring with an ESA (as part of a CCW) Regional significance – has a role in maintaining ecological processes (GDE)	100.14	7.24
MrKgKt	Regional significance – presence of Priority flora Regional significance – occurring with an ESA (as part of a CCW) Regional significance – has a role in maintaining ecological processes (GDE)	81.65	5.90
	TOTAL	**1,072.50**	**77.50**

6.5 FAUNA

6.5.1 Fauna Assemblage

The desktop assessment determined that a total of 296 vertebrate fauna species have been previously recorded in the vicinity of the study area, with 199 species having the potential to occur within or utilise sections of the survey area. The list of 199 potential fauna species assumes that each species is not locally extinct, and that suitable habitat exists for each species. Therefore, such lists are often an overestimation of the fauna assemblage realistically applicable to a survey area.

The expected fauna assemblage compiled as part of the desktop assessment is typical of Banksia woodlands of the Swan Coastal Plain with this assemblage expected in similar habitats across the plain nearby. However, the high degree of connectivity and intact condition of the bushland within the survey area means that it is likely to support a number of woodland birds, reptiles and several small mammal species that are less prevalent in remnant bushland areas in the region, particularly closer to Perth. This area represents both the southern and northern extent of the range of some reptiles and mammals. The assemblage is likely to be intact in terms of frogs, reptiles and birds due to the extent and intact condition of the environment, but incomplete in terms of mammals due to the loss of some mammal species as a result of habitat loss and feral predation (Mike Bamford, pers. comm.).

A total of 20 terrestrial vertebrate fauna species were observed or positively identified from field evidence within the survey area during the October 2022 field survey. This included the introduced species, pig, rabbit and Laughing Kookaburra. The presence of invasive mammals such as the pig and rabbit has a negative impact on the native environment, including competition with native fauna for resources (shelter, food), disease transmission, damage to native vegetation and impacts to substrates (compaction, digging).

One species of significance, Carnaby's Black-Cockatoo (Endangered under the EPBC Act; Schedule 2 under the BC Act) was observed adjacent to the survey area and is considered a regular visitor due to the species' proximity and the availability of quality resources within the survey area. This species is further discussed in **Section 6.5.2**.

The relatively low abundance and diversity of fauna recorded during the field assessment can be attributed to unfavourable weather conditions and the low intensity nature of the assessment (basic assessment in accordance with EPA (2020)). However, understanding the significant fauna species and their habitats associated with the survey area is considered adequate. This is due to the thorough desktop assessment that was completed, coupled with a targeted field survey for relevant significant species, including Black-Cockatoos.

6.5.2 Significant Fauna

The desktop assessment identified 24 vertebrate and eight invertebrate species of significance considered likely to occur within the survey area. The field assessment did not record any significant species, however, Carnaby's Black-Cockatoo (Endangered under the EPBC Act; Schedule 2 under the BC Act) was observed within 200 m of the survey area.

Based on the habitats present and current documented distributions, it is considered possible that the 31 additional significant species may use the survey area (at least as irregular visitors) for some purpose at times. No evidence of these species was found within the survey area and as a result, their status within the survey area remains uncertain. These species are discussed in more detail below.

Based on the outcomes of the post-survey likelihood of occurrence assessment, and since suitable habitat is provided in the survey area, it is considered that the following additional significant species may occur:

- *Apus pacificus* Fork-tailed Swift – CS1 (M, S5) – irregular visitor
  This is a non-breeding migrant from Asia but is a largely aerial species of unpredictable occurrence in southern Western Australia. It does not rely heavily on terrestrial habitats, maintaining a large proportion of their life on the wing.
- *Calyptorhynchus banksii naso* Forest Red-tailed Black-Cockatoo – CS1 (EN, S2) – irregular visitor
  Although the species occurs in the general region, limited food resources are present in the survey area which would only support short visits and a small number of birds.
- *Calyptorhynchus baudinii* Baudin's Black-Cockatoo – CS1 (VU, S2) – vagrant
  This species is expected to be a vagrant visitor to the survey area. Species distribution occurs as far north as Gidgegannup (approximately 67 km south of the survey area) (TSSC 2018).
- *Dasyurus geoffroii* Chuditch – CS1 (VU, S3) – vagrant
  The Chuditch may occur in the general region and is considered vagrant to the survey area. As a highly mobile species with a population known in the region, the continuous connectivity of the survey area to the north and east provide habitat for which this species can move. Recent records include a dead specimen at Regans Ford (24 km away) in 2001 (DBCA data), Ellenbrook (77 km away) in 2004 (M. Bamford, pers. obs.) and Bindoon (66 km away) in the last 12 months (M. Bamford, pers. obs.). Indicating a known population utilises habitat within 66 km of the survey area and a potential population utilises habitat within 24 km. Given no known current populations are nearby and this species has home ranges of 15 km^2 for males and 3-4 km^2 for females, this species is not considered to be resident or a regular visitor of the survey area, but rather vagrant (such as dispersing males moving across the landscape).*Falco peregrinus* Peregrine Falcon – CS1 (S7) – resident
  This species is expected to be a resident in the survey area and is found in a wide variety of habitats, with its distribution often linked to the abundance of prey. Blakers *et al.* (1984) consider that Australia is one of the strongholds of the species since it has declined in many other parts of the world. With a breeding pair observed two years ago in Chandala (M. Bamford, pers. obs.), the survey area is expected to be within the home range of individuals of this species.
- *Ctenotus gemmula* Jewelled Sand-plain Skink – CS1 (P3) – resident
  This species has a limited distribution on the Swan Coastal Plain. The closest BCE record of this species is found near Cataby in vegetation comparable to VSA 1 (Banksia woodlands) (M. Bamford, pers. obs.), approximately 50 km from the survey area. With majority of the survey area considered Banksia woodlands (60.61%), this species is expected to be resident.

  Hydromys chrysogaster Rakali – CS2 (P4) – irregular visitor
  The Rakali is known to occur in drainage systems across the south-west, specifically within the immediate area. Previous DBCA records include secondary signs of Rakali along Moore River and Gingin Brook (17 km south) in 2011 and capture at Regans Ford in 1972 (20 km north-east). Further records, include a 2010-2015 community survey in Ellenbrook (Trocini *et al.* 2015), captures at Lake Goollelal, Lake Joondalup and Lake Loch McNess (Valentine *et al.* 2009) and observations in Lake Mariginiup (M. Bamford, pers. obs.). As a result of previous records and appropriate habitat present (drainage lines) in proximity and/or within the survey area, this species is considered to be an irregular visitor in seasonally-inundated, low-lying areas from the wetland to the west of the survey area or nearby dams.

- *Isoodon fusciventer* Quenda – CS2 (P5) –vagrant
  This species is usually easily detected as it leaves distinctive foraging holes. No signs of foraging were found during the field assessment, and the nearest known records are just north of Muchea, some 20 km to the south (Mike Bamford, pers. obs.). It therefore could be locally extinct, but with suitable habitat (dense, low vegetation, including around damplands) and nearby records, it may occur as vagrant within the survey area.
- *Neelaps calonotos* Black-striped Snake – CS2 (P3) – resident
  This species has a limited distribution on the Swan Coastal Plain. Previous records of this species include north of Muchea at the western end of Timaru Road, approximately 10 km east of Gingin within vegetation similar to VSA 1 (Banksia woodlands) (M, Bamford, pers. obs.) and on the northern Swan Coastal Plain in the Gnangara Sustainability Strategy (GSS) (Valentine *et al.* 2009). No Black-striped Snakes were recorded in targeted searches during the field assessment; however, they can confidently be predicted to be resident within the survey area based on habitat and previous nearby records.
- *Ninox connivens* Barking Owl – CS2 (P2, WR) – vagrant
  This species occupies dry forest or woodland, often along watercourses, and nests in tree hollows. It is considered common in northern Australia but rare and declining in the south-west. The decline is mainly due to habitat loss and degradation and competition from Honeybees for tree hollows (Johnstone and Storr 1998). This species may occur as a vagrant within the survey area.
- *Macropus irma* Brush Wallaby – CS2 (P4) – resident
  This species is known to occur within the northern Swan Coastal in damp low-lying areas; it is expected to be resident in the survey area and likely to utilise the denser areas such as the Melaleuca shrublands (VSA 5).
- *Tyto novaehollandiae* Masked Owl – CS2 (P2, WR) –vagrant
  This species inhabits a variety of forests and woodlands but is more common through the deep south-west where it nests in hollows of large old trees. The survey area is at the edge of its range and it may occur as a vagrant.
- *Lerista cristinae* Bold-striped Slider – CS3 - resident
  The Bold-striped Slider is found on sandplains with or without Banksia and as such may occur throughout the survey area. Close to the southern end of their range (the most southerly mainland record is Ellenbrook approximately 80 km to the south). It is considered to be resident in the survey area and locally significant due to its small and poorly-documented distribution within the bioregion.
- CS3 birds – resident/irregular visitors
  There are four bird species considered to be CS3, including the *Lophoictina isura* (Square-tailed Kite) – regular visitor, *Platyercus icterotis* (Western Rosella) – irregular visitor, *Stipiturus malachurus* (Southern Emu-wren) – resident and *Myiagra inquieta* (Restless Flycatcher) – irregular visitor. The Square-tailed Kite and Western Rosella are of local significance as they are wide-ranging species with reduced populations on the Swan Coastal Plain. The Southern Emu-wren and Restless Flycatcher are habitat specialists with reduced distributions on the coastal plain.
- CS3 Mammals – resident
  There are six mammal species considered to be CS3 and they have all declined on the Swan Coastal Plain, including *Certartetus concinnus* (Western Pygmy Possum), *Mormopterus kitcheneri* (Western Freetail Bat), *Pseudomys albocinereus* (Noodji/Ash-grey Mouse), *Sminthopsis 'dolichura'* (Little Dunnart and *Sminthopsis fuliginosus* (Grey-bellied Dunnart).

All are expected to be residents within the survey area but they may be declining even in large reserves such as Melaleuca Park and Yeal Nature Reserve. The survey area represents the edge of the current range for many species, including the Noodji and the Little Dunnart. The Little and Grey-bellied Dunnarts are likely to be extinct in Perth, with the survey area located near the southern end of their range.

- Invertebrates – irregular visitor/resident
  Information on the invertebrate assemblage of the survey area is limited, but eight invertebrate species of significance were returned from databases and may be present. There is too little information available on their biology to predict their status on the site, but all bar one (*Synemon gratiosa* Graceful Sunmoth (CS3 / P4) - irregular visitor) could be resident. They include a native bee that was presumed extinct under the WA BC Act (CS1) but which was recently rediscovered nearby in Pinjar in March 2019, three native bees and one moth listed as Priority (CS2), and a millipede and two spiders considered to be short range endemics (SRE; therefore CS3).

6.5.2.1 Carnaby's Black-Cockatoo

Carnaby's Black-Cockatoo is listed as Schedule 2 under the BC Act and as Endangered under the EPBC Act. The species is confined to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noongar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km east south-east of Condingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

The habitat of Carnaby's Black-Cockatoo includes forests, woodlands, heathlands, farms. The species feeds preferentially on Banksia, Hakea and Marri, but also other Proteaceous species and fruits from introduced trees such as Pines and Cape Lilac.

Carnaby's Black-Cockatoo has specific nesting site requirements, with nests mostly in smoothed-barked eucalypts and in hollows ranging from 2.5 to 12 m above the ground, an entrance from 23 to 30 cm in diameter and a depth of 0.1 to 2.5 m (Johnstone and Storr 1998).

Breeding occurs in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow bearing trees to nest in (Morcombe 2004). Judging from records in the Storr-Johnstone Bird Data Bank, this species is currently expanding its breeding range westward and south into the Jarrah – Marri forest of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain, including the region between Mandurah and Bunbury. Carnaby's Black-Cockatoo has been known to breed close to the town of Mandurah, as well as at Dawesville, Lake Clifton and Baldivis (Ron Johnstone, pers. comm.*)* and there are small resident populations on the southern Swan Coastal Plain near Mandurah, Lake Clifton and near Bunbury. At each of these sites the birds forage in remnant vegetation and adjacent pine plantations (Johnstone and Kirkby 2008).

Carnaby's Black-Cockatoo lays eggs from July or August to October or November, with most clutches being laid in August and September (Saunders 1986). Birds in inland regions may begin laying up to three weeks earlier than those in coastal areas (Saunders 1977). The female incubates the eggs over a period of 28 to 29 days. The young depart the nest 10 to 12 weeks after hatching (Saunders 1977; Smith and Saunders 1981).

No evidence of foraging activity was observed within the survey area during the field assessment; however, activity was noted just outside the boundary on Banksia cones and wild radish (*Raphanus raphanistrum*). A large portion of the survey area comprises Banksia woodlands containing numerous flora species that are known to be a food source for Carnaby's Black-Cockatoos. As the species was observed in proximity to the survey area, the remnant vegetation represents a potential/likely foraging habitat.

No existing roosting trees (trees used at night by Black-Cockatoos to rest) were positively identified within the survey area during the field survey. One potential night roost tree was observed approximately 300 m SW of the survey area boundary. Given the presence of this species nearby, and that several potential habitat trees and quality foraging habitats are present within the survey area, it is considered likely that Carnaby's Black-Cockatoos utilise vegetation within the survey area.

6.5.3 Fauna Habitats

Six fauna habitats, referred to as VSAs, were recorded, described and mapped within the survey area. Areas that are in poor condition as a result of historic disturbance were mapped into two VSAs (VSA2 and VSA3). In these areas, vegetation lacks structure, with little understorey to provide cover for small ground-dwelling fauna. The cleared or partly cleared areas primarily consist of a combination of grasslands, dominated the introduced Perennial Veldt Grass, **Ehrharta calycina* and herblands dominated by the naturalised daisy, *Podotheca gnaphalioides.* This poorer quality vegetation provides little value for native fauna and has a lower capacity to support most fauna species.

Banksia woodland VSAs (VSA1 and VSA6) and Melaleuca woodland VSAs (VSA4 and VSA5) provide higher value of habitat for native fauna. Being of 'Good' to 'Excellent' vegetation condition and containing numerous native flora species, these VSAs support high structural complexity. The most dominant habitat, 'VSA1 - Banksia woodland' was mapped to occupy 60.62% of the survey area and is considered of greatest significance with regards to fauna, also providing the best quality foraging habitat for Threatened Black-Cockatoos.

6.6 BLACK-COCKATOO HABITAT

Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo are considered likely to utilise the survey area, with Baudin's Black-Cockatoo considered vagrant. Two flocks of Carnaby's Black-Cockatoo were recorded during the field assessment. Although both sightings were outside the survey area, they were close by, 13 km and just 200 m for the survey area boundary.

The presence and value of foraging, breeding and roosting habitat for Black-Cockatoos within the survey area was assessed as a desktop level and in the field, the key results of which are discussed further in the following sections.

6.6.1 Foraging Habitat

The survey area provides foraging habitat for Black-Cockatoos of variable quality, ranging from 'none/negligible' to 'very high'. At a species level, foraging habitat quality for Carnaby's Black-Cockatoo ranges from 'low to moderate' (3) to 'very high' (7), and for the Forest Red-tailed Black-Cockatoo, ranges from 'none/negligible' (0) to 'low' (2).

The Banksia woodland habitats (VSA1 and VSA6) provide the highest quality foraging habitat for both species ('very high' (7) for Carnbaby's Black-Cockatoo and 'low' (2) for Forest Red-tailed Black-Cockatoo), due to the presence of *Banksia* spp. and *Corymbia calophylla* trees, which collectively comprise a total 846.78 ha (61.20%) of the survey area.

Although mostly completely lacking in native vegetation, excluding remnant trees within VSA3, the Pasture and Open Grasstree scrubland habitats (VSA2 and VSA3, respectively) provide 311.04 ha (22.48%) of foraging habitat ('low to moderate' and 'negligible to low' quality, score 3 and 1, respectively) for Carnaby's Black-Cockatoo, but no foraging quality for the Forest Red-tailed Black-Cockatoo. This is due to pasture and grass species that Carnaby's Black-Cockatoo will forage on, in the absence of other food sources, although these are not preferred food source species.

It was observed that opportunities for foraging by Carnaby's Black-Cockatoos are located outside of the survey area, such as scattered Pines, areas with an understorey of Proteaceous species that occur in road verges, fruit orchards and dams. Furthermore, in a local context, vast areas of Banksia woodland in similar condition to that which is provided in the survey areas is present in the surrounding region, including in areas connected to the survey area habitat, which provides further foraging opportunities for Black-Cockatoos.

6.6.2 Breeding Habitat

The desktop assessment did not identify any known or potential breeding sites for Black-Cockatoos within the study area; however, the entire survey area falls within the buffer of a known Carnaby's Black-Cockatoo breeding area.

Forest Red-tailed Black-Cockatoos nest in woodland/forested areas on the scarp and further south of the survey area, whilst Carnaby's Black-Cockatoos generally breed in the Wheatbelt (Johnstone *et. al.* 2013). Carnaby's Black-Cockatoos commonly occur in the general region of the study area, as the species is a regular (breeding) seasonal migrant, and falls well within the future breeding range modelled by DEE (2017). Therefore, breeding could be occurring within a few years, and is likely to occur in the future, especially if breeding habitat depletion within the current breeding range continues.

The field assessment did not observe any breeding activity within the survey area. Thirty-one trees were identified as Suitable DBH Trees, as defined by the referral guidelines (DSEWPaC 2012), with one of these identified to contain a hollow potentially suitable for Black-Cockatoo breeding, but with no signs of evidence of use by Black-Cockatoos (Rank 3). The majority of the Suitable DBH Trees identified in the survey area were ranked as either Rank 5 (13 trees of adequate DBH, but without hollows) or Rank 4 (seven trees with hollows that are unsuitable).

6.6.3 Roosting Habitat

The desktop assessment identified no confirmed or potential Black-Cockatoo roosting sites within the survey area, however, two flocks were identified in suspected roosting trees outside the survey area during the field assessment. As one of the flocks was recorded in close proximity to a potential roost site within the study area, as identified from the desktop assessment, a targeted roost survey would be required to confirm this.

No stands of suitable roosting trees were identified within the survey area; however, there is the potential for Carnaby's Black-Cockatoo roosting to occur amongst the taller trees (*Corymbia calophylla, Eucalyptus rudis* and *Eucalyptus todtiana*) in Lot 5324, in particular within VSA 6. No large trees were found within Lot 8037. There are several patches of large trees (Marri, Pine and Spotted Gum) along Cowalla Road which may also provide roosting habitat for Black-Cockatoos.

7 CONCLUSIONS

The key findings and conclusions arising from the flora, vegetation, fauna and habitat assessment within the survey area are as follows:

- The timing of the field surveys (October and November) was considered optimal for the identification of biological values, especially flowering flora and annual and ephemeral species. A two-phase floristic survey was conducted within Banksia woodland quadrats.
- No Threatened flora under the BC Act or under the EPBC Act were recorded.
- Four Priority flora listed by DBCA, *Banksia dallanneyi* subsp. *pollosta* (P3), *Dillwynia dillwynioides* (P3), *Dodonaea hackettiana* (P4) and *Verticordia lindleyi* subsp. *lindleyi* (P4) were recorded across five of the six mapped vegetation units.
- Based on the findings of desktop assessment, combined with field observations regarding habitat suitability, further to the four recorded Priority flora, it is considered that eight species of Threatened flora and 38 species of Priority flora may occur in the survey area.
- No DP plants or WoNS listed under the BAM Act were recorded within the survey area.
- Remnant vegetation of the survey area supports six vegetation units broadly characterised as Banksia woodlands (BaBmEt, BaBmMp and MpBaBm), Melaleuca woodlands (MpCp and MrKgMt) and a vegetation unit (Xp), that has been subject to significant modification, including clearing.
- The majority of the survey area (993.93 ha, 71.83%) supports vegetation with a condition of 'Very Good' to 'Excellent', with more than half of the Banksia woodland vegetation units in 'Excellent' condition, occupying 60.30% (834.37 ha) of the survey area.
- The Commonwealth-listed TEC and State-listed PEC '*Banksia woodlands of the Swan Coastal Plain ecological community*' was confirmed to occur throughout the survey area. The three vegetation units (BaBmEt, BaBmMp and MpBaBm) described and mapped within the survey area were determined to be characteristic of the Banksia woodlands TEC which occupies 64.36% (890.71 ha) of the survey area, and is part of a regional patch that spans approximately 19,064.75 ha.
- Two State-listed Priority 3 ecological communities occur within the survey area, FCT 22 - '*Banksia ilicifolia* woodlands' and FCT 23b – 'Northern *Banksia attenuata – Banksia menziesii* woodlands'. Floristic analysis and consideration of species composition determined that vegetation unit MpBaBm is likely representative of FCT 22, while vegetation units BaBmEt and BaBmMp are considered representative of FCT 23b.
- No fauna species of significance were recorded within the survey area; however, the Commonwealth-listed Carnaby's Black-Cockatoo is considered likely to regularly utilise the survey area for foraging and was observed adjacent to the survey area during the field assessment. No other fauna species of significance was observed in the survey area.
- Based on the findings of desktop assessment, combined with field observations confirming habitat provided in the survey area, it is considered that 31 significant fauna species may occur as residents, vagrants or irregular visitors.
- Six fauna habitats, referred to as VSAs, were recorded, described and mapped within the survey area, and the Banksia woodland VSAs (VSA1 and VSA6) and Melaleuca woodland VSAs (VSA4 and VSA5) provide higher value of habitat for native fauna, with the most dominant habitat, 'VSA1 - Banksia woodland' (60.62% of the survey area) is considered of greatest significance with regards to fauna, also providing the best quality foraging habitat for Threatened Black-Cockatoos.
- Carnaby's Black-Cockatoos are considered regular visitors, Forest Red-tailed Black-Cockatoo irregular visitors and Baudin's Black-Cockatoo vagrant to the survey area.

- Banksia woodlands make up 64.36% (890.71 ha) of the survey area provide high quality foraging habitat for Carnaby's Black-Cockatoo; however, all VSAs within the survey area are considered to be of low to negligible foraging value for Forest Red-tailed Black-Cockatoos.
- A total of 21 Suitable DBH Trees were identified within the survey area, one of which contains a hollow potentially suitable to support Black-Cockatoo breeding but with no evidence of use by Black-Cockatoos.
- No trees suitable for Black-Cockatoo roosting are present in the survey area.

8 LIST OF PARTICIPANTS

The personnel who contributed to the project are summarised in **Table 34**.

Table 34 – Project Team

Name	Qualification	Years of Relevant Experience	Role
Kellie Bauer–Simpson Principal Ecologist	BSc. (Biological Science)	23	Project manager, field assessment, GIS mapping, authorisation review
Dr Mike Bamford Supervising Zoologist	BSc. (Hons.) (Biology) PhD. (Biology)	40	Report inputs, technical review
Natalia Huang Principal Zoologist	Bsc. (Zoology) Hons. (Conservation Biology) MBA	15	Report preparation
Jeni Alford Senior Botanist/Taxonomist	BEnvSc. (Hons) (Applied Science)	40	Field assessment and flora identifications
Daniel Roberts Botanist/Ecologist	BSc (Environmental Biology)	8	Field assessment, report preparation [Flora Collecting License No. FB62000435]
Natalie Krawczyk Botanist/Ecologist	BSc. (Hons) Conservation Biology and Management	7	Field assessment, technical support [Flora Collecting License No. FB62000338]
Megan Gray Graduate Botanist/Ecologist	BSc. Environmental Biology	3	Field assessment, GIS mapping, PATN™ analysis, data management, report preparation [Flora Collecting License No. FB62000334]
Kristen Bleby Senior Ecologist	B.Sc. (Hons) Natural Resource Management PhD (Ecology)	10	Report technical review
Margaret Collins Botanist/Taxonomist	PhD (Botany) BSc. (Hons.) (Organic Chemistry) BSc. (Microbiology) Masters (Biotechnology and Molecular Biology)	30	Flora identifications
Shibi Chandran Botanist/Taxonomist	BSc. (Zoology) MSc. (Fisheries and Aquaculture)	11	Flora identifications
Kathya Tippur Botanist/Taxonomist	BSc. (Chemistry, Botany, Zoology) MSc. (Botany)	9	Flora identifications
Dr Jamie Wadey Zoologist/Ecologist	BSc (Zoology) BSc. (Hons) (Ecology) PhD. (Ecology)	10	Field assessment, report preparations
Yasmyn Skinner Graduate Ecologist	BSc. (Zoology and Conservation Biology)	1	Report preparation
Jake Bamford Technician	BA. (Script writing and game design)	2	Field assessment
Will Bauer–Simpson Technician/Advisor	Cert IV (Health and Safety)	9	GIS mapping, spatial analysis, spatial data management
Megan Meadowcroft Administration		5	Data entry, editorial support

9 REFERENCES

360 Environmental (2018) *Mogumber Road West, Application for a Native Vegetation Clearing Permit – Area Permit*. Unpublished report prepared for Santrev Pty Ltd

360 Environmental (2020) *Lot 10 Mogumber Road West, Mogumber Native Vegetation Clearing Permit: Offset Revegetation Management Plan*. Unpublished report prepared for Western Riverlands Poultry

Apace WA (2022) Apace Nursery WA and Community Education website. https://www.apace.org.au

Atlas of Living (ALA) (2021) *Atlas of Living Australia*. http://www.ala.org.au. Accessed 25 September 2021

Astron (2016) *Indian Ocean Drive Passing Lanes: SLK 52.49 to 54.82, 56.07 to 57.77, 61.08 to 62.7 and 64 to 65.83, Biological Survey*. Unpublished report prepared for Main Roads Western Australia

Beard, J.S. (1990) *Plant Life of Western Australia.* Kangaroo Press, Kenthurst NSW

Belbin L. (2013) PATN. Available at http://www.patn.org

Blakers, M., Davies, S. and Reilly, P. (1984) *The Atlas of Australian Birds*. Melbourne University Press, Melbourne

Bureau of Meteorology (BoM) (2021) *Climate statistics for Australian locations*. Monthly climate statistic. Gingin Aero (009178) http://www.bom.gov.au/climate/averages/tables/cw_009178.shtml Accessed 15 November 2021.

Bureau of Meteorology (BoM) (2012) *Groundwater Dependent Ecosystems Atlas. http://www.bom.gov.au/water/groundwater/gde/*

Churchward, H. M. and McArthur, W. M. (1980) *Landforms and Soils of the Darling System*, In: Atlas of Natural Resources, Darling Systems, Western Australia. Department of Conservation and Environment, Western Australia.

Commonwealth of Australia (2001) *National Objectives and Targets for Biodiversity Conservation 2001-2005*. Canberra.

Commonwealth of Australia (2013) Draft Survey Guidelines for Australia's threatened orchids. Department of the Environment.

Department of Agriculture, Water and Environment (DAWE) (2021a) *Australian Ramsar Wetlands*. https://www.awe.gov.au/water/wetlands/australian-wetlands-database/australian-ramsar-wetlands.

Department of Agriculture, Water and the Environment (DAWE) (2021b) *Weeds of National Significance (WoNS)*. Weeds Australia. Centre for Invasive Species Solutions. https://weeds.org.au/weeds-profiles/. Accessed 4 January 2021.

Department of Agriculture, Water and the Environment (DAWE) (2021c) *Australia's Bioregions (IBRA)* http://www.environment.gov.au/land/nrs/science/ibra Accessed 18 January 2022.

Department of Agriculture, Water and the Environment (DAWE) (2021d) *Protected Matters Search Tool*. Report created 20 September 2021. http://environment.gov.au/epbc/protected-matters-search-tool. Accessed 20 September 2021.

Department of Biodiversity, Conservation and Attractions (DBCA) (2017) *Priority Ecological Communities for Western Australia Version 27. 30 June 2017*. Publicly available list prepared by Department of Biodiversity, Conservation and Attractions.

Department of Biodiversity, Conservation and Attractions (DBCA) (2018) *Threatened and Priority Flora List. 5 December 2018.* Publicly available list prepared by Department of Biodiversity, Conservation and Attractions.

Department of Biodiversity, Conservation and Attractions (DBCA) (2019a) *2018 Statewide Vegetation Statistics formerly CAR Reserve Analysis): Full Report. Remote Sensing and Spatial Analysis Program. Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions, Perth. Available online from: https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics. Accessed 18 January 2022.

Department of Biodiversity, Conservation and Attractions (DBCA) (2019b) *National Recovery Plan for the Clay pans of the Swan Coastal Plain Ecological Community*. Department of Biodiversity, Conservation and Attractions, Perth, Western Australia.

Department of Biodiversity, Conservation and Attractions (DBCA) (2021a) *Threatened species and communities*. https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities.

Department of Biodiversity, Conservation and Attractions (DBCA) (2021b) *NatureMap Species Report.* Created 20 September 2021.

Department of Biodiversity, Conservation and Attractions (DBCA) (2021c) *Threatened and Priority Ecological Communities database search request*.

Department of Biodiversity, Conservation and Attractions (DBCA) (2021d) *Threatened and Priority flora database search request*.

Department of Biodiversity, Conservation and Attractions (DBCA) (2021e) *Threatened and Priority fauna database search request*.

Department of Biodiversity, Conservation and Attractions. (DBCA) (2020f) *Black Cockatoo Breeding and Roosting Sites.* Spatial data files (Carnabys Cockatoo Confirmed Roost Sites (DBCA-050), Carnabys Cockatoo Unconfirmed Roost Sites (DBCA-051), Carnabys Cockatoo Confirmed Roost Sites Buffered 6 km (DBCA-052), Carnabys Cockatoo Unconfirmed Roost Sites Buffered 6km (DBCA-053), Carnabys Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054), Black Cockatoo Breeding Sites - Buffered (DBCA-063), Black Cockatoo Roosting Sites - Buffered (DBCA-064).

Department of Conservation and Land Management (CALM) (1999) *Environmental Weed Strategy of Western Australia*. Environmental Protection Branch. Como, Western Australia.

Department of Environment and Conservation (DEC) (2007) *Conserving Threatened Ecological Communities.* Publicly available brochure prepared by the Department of Environment and Conservation in conjunction with National Heritage Trust.

Department of Environment and Conservation (DEC) (2013) *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities.* Publicly available list prepared by the Department of Environment and Conservation, Western Australia. https://www.dpaw.wa.gov.au/images/plants-animals/threatened-species/definitions_categories_and_criteria_for_threatened_and_priority_ecological_communities.pdf. Accessed 18 January 2022.

Department of Environment and Energy (DEE) (2017a) *Revised draft referral guideline for three threatened Black-Cockatoo species: Carnaby's Cockatoo* Calyptorhynchus latirostris*, Baudin's Cockatoo* Calyptorhynchus baudinii*, Forest Red-tailed Black Cockatoo* Calyptorhynchus banksii *naso.* Commonwealth of Australia, Canberra, Australian Capital Territory.

Department of Environment and Energy (DEE) (2017b). *Approved Conservation Advice for Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain. http://www.environment.gov.au/biodiversity/threatened/communities/pubs/21-conservation-advice.pdf.*

Department of Environment and Energy (DEE) (2019) *Tuart Woodlands and Forests of the Swan Coastal Plain: A Nationally Significant Ecological Community.* Australian Government.

https://www.awe.gov.au/environment/biodiversity/threatened/publications/tuart-woodlands-forests-swan-coastal-plain-guide.

Department of Environment Regulation (DER) (2014) *A Guide to the Exemptions and Regulations for Clearing Native Vegetation Under Part V of the Environmental Protection Act 1986*. Government of Western Australia, April 2014.

Department of Parks and Wildlife (DPaW) (2013) *Weed Prioritisation Process for DPaW (formerly DEC) – "An integrated approach to Weed Management on DPaW managed lands in WA".*

Department of Primary Industries and Regional Development (DPIRD) (2021) *Western Australian Organism List (WAOL)* https://www.agric.wa.gov.au/organisms Accessed 4 January 2021.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012) *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered)* Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable)* Calyptorhynchus baudinii*, Forest red-tailed black cockatoo (vulnerable)* Calyptorhynchus banksii naso*.*

Department of Water and Environmental Regulation (DWER) (2018) *Clearing permits. Regulatory Services Factsheet*. https://www.der.wa.gov.au/our-work/clearing-permits Accessed 6 July 2021.

Ecoedge (2019a) *Orange Springs Road Fauna Assessment Report*. Unpublished report prepared for the Shire of Gingin.

Ecoedge (2019b) *Reconnaissance and Targeted Flora and Vegetation Orange Springs Road, Gingin*. Unpublished report prepared for the Shire of Gingin.

Environmental Protection Authority (EPA) (2000) Position Statement No. 2: *Environmental Protection of Native Vegetation in Western Australia: Clearing Native Vegetation with Particular Reference to Agricultural Areas.*

Environmental Protection Authority (EPA) (2007) *State of the Environment Report: Western Australia 2007.* Environmental Protection Authority.

Environmental Protection Authority (EPA) (2008) *Guidance Statement No. 33: Environmental Guidance for Planning and Development.* Environmental Protection Authority. May 2008.

Environmental Protection Authority (EPA) (2016a) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment.* Environmental Protection Authority. December 2016.

Environmental Protection Authority (EPA) (2016b) *Environmental Factor Guideline – Flora and Vegetation*. Environmental Protection Authority. December 2016.

Environmental Protection Authority (EPA) (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for Environmental Impact Assessment.* June 2020.

George, Alex S. (1999). Flora of Australia. Vol. 17B. Canberra: Australian Biological Resources Study, Canberra. pp. 353–357.

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

Government of Western Australia (2000) *Bush Forever, Volume 2: Directory of Bush Forever sites*. Department of Environmental Protection, Perth, Western Australia.

Government of Western Australia (2005) *Environmental Protection (Environmentally Sensitive Areas) Notice 2005, Western Australia*. https://legislation.wa.gov.au Accessed 6 September 2021.

Groom, C. (2011). *Plants Used by Carnaby's Black Cockatoo.* Department of Environment and Conservation, Perth, Western Australia.

Hao, M., Corral-Rivas, J. J, Gonzalez-Elizondo, M., Ganeshaiah, K., Nava-Miranda., M., Zhang, C., Zhao, X. and von Gadow, K. (2019) Assessing biological dissimilarities between five forest communities. *Forest Ecosystems* (2019) **6**:30.

Heddle, E. M., Loneragan, O. W., and Havel, J. J. (1980) *Atlas of Natural Resources*. Western Australia Department of Conservation and Environment.

Johnstone, R. E. and Storr, G. M. (1998) Handbook of Western Australian birds. Volume 1: Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth, Western Australia.

Johnstone, R. E. and Kirkby, T. (1999) Food in the Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* in south-west Western Australia. *Western Australian Naturalist*. 22(3):167-177.

Johnstone, R. E. and Kirkby, T. (2008) White-tailed Black Cockatoos on the Northern Swan Coastal Plain (Lancelin – Perth) Western Australia. Report June 2008 for DEWHA.

Johnstone, R. E., Kirkby, T. and Sarti, K. (2013) The breeding biology of the Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso Gould in south-western Australia. II. Breeding behavior and diet. *Pacific Conservation Biology* 19(2): 143-155

Keighery, B. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community,* Nedlands, Wildflower Society of WA (Inc.).

Keighery, B., Keighery, G., Webb, A., Longman. V. and Griffin, E. (2008) *A floristic Survey of the Whicher Scarp.* Report prepared for the Department of Environment and Conservation

Keighery, B., Keighery, G., Longman, V. M., and Clarke, K. A. (2012) *Weed and native flora quadrat data compiled between 1990 – 1996 for the Swan Coastal Plain*. Data compiled for the Departments of Environmental Protection and Conservation and Land Management.

Main Roads Western Australia (MRWA) (2021) *Threatened Ecological Community Banksia Woodlands of the Swan Coastal Plain Ecological Community Factsheet*. D17#526749. July 2021.

Maguire. A., French. D. and O'Reilly, D. (2016) Residential segregation, dividing walls and mental health: a population based record linkage survey. *Epidemiol Community Health 2016*, **70**:845-854.

Mitchell, D., Williams, K. and Desmond, A. (2002) *Swan Coastal Plain 2 (SWA2 – Swan Coastal Plain subregion)* in A biodiversity audit of Western Australia's 53 Biogeographical Subregions in 2002, eds Department of Conservation and Land Management, Perth, pp. 606-623.

Morcombe, M. (2004) *Field Guide to Australian Birds*. Steve Parish Publishing, Archerfield, Queensland

Peck, A., Barrett, G. and Williams, M. (2017) The 2016 Great Cocky Count: A community-based survey for Carnaby's Black-Cockatoo (Calyptorhynchus latirostris) and Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso). BirdLife Australia and Department of Parks and Wildlife, Perth, Western Australia.

Saunders, D. A., and Smith, G. T. (1981) Egg dimensions and egg weight loss during incubation in five species of cockatoo, and the use of measurements to determine the stage of incubation of birds' eggs. *Aust. Wildl. Res.* 8, 411-19.

Saunders, D. A. (1977) Red-tailed Black Cockatoo breeding twice a year in the south-west of Western Australia. *Emu* 77: 107–110.

Saunders, D. A. (1986). Breeding season, nestling success and nestling growth in Carnaby's Black-Cockatoo, Calyptorhynchus funereus latirostris, over 16 years at Coomallo Creek, and a method for assessing the viability of populations in other areas. *Australian Wildlife Research* 13: 261-273.

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2002) *Native Vegetation in Western Australia Extent, Type and Status*. Department of Agriculture and Food, Government of Western Australia. Shire of Serpentine-Jarrahdale (2018) Weed and Pest Management Plan. OCM018.1

Threatened Species Scientific Committee (TSSC) (2016) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *(s 266B) Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community*. http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf.

Threatened Species Scientific Committee (TSSC) (2018) *Conservation Advice Calyptorhynchus baudinii Baudin's cockatoo*. https://www.environment.gov.au/biodiversity/threatened/species/pubs/769-conservation-advice-15022018.pdf.

Threatened Species Scientific Committee (TSSC) (2019) *Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain Ecological Community*. http://www.environment.gov.au/biodiversity/threatened/communities/pubs/153-conservation-advice.pdf.

Trocini, S, Barrett, G., Howard, K. and Ramalho, C. (2015) *Rakali Community Survey 2014-2015.* Report prepared by WWF-Australia and the Western Australia Department of Parks and Wildlife. WWF-Australia, Perth, WA.

Urban Bushland Council (2011) *Perth's Banksia Woodlands, Precious and Under Threat.* Proceedings of a symposium on the ecology of these ancient woodlands and their need for protection from neglect and destruction, 25 March 2011.

Valentine, L., Wilson, B., Reaveley, A., Huang, N., Johnson, B and Brown, P. (2009) *Patterns of ground-dwelling vertebrate biodiversity in the Gnangara Sustainability Strategy study area.* Department of Environment and Conservation, Perth, WA.

Webb, A., Kinloch, J., Keighery, G. and Pitt, G. (2016) *The Extension of Vegetation Complex Mapping to Landform boundaries within the Swan Coastal Plain Landform and Forested Region of South West Western Australia*. Department of Parks and Wildlife, Bunbury, WA.

Western Australian Herbarium (WAH) (1998-) *Florabase – the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions (DBCA). http://florabase.dpaw.wa.gov.au. Accessed 18 January 2022.

Western Australian Local Government Association (WALGA) (2004) *Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region*. Western Australian Local Government Association, Perth, Western Australia.

Western Australian Museum (WAM) (2021) *Checklist of the Terrestrial Vertebrate Fauna of Western Australia* https://museum.wa.gov.au/research/departments/terrestrial-zoology/checklist-terrestrial-vertebrate-fauna-western-australia. Accessed 18 January 2022.

APPENDIX A - DBCA NATUREMAP SEARCH REPORT

NatureMap
Mapping Western Australia's biodiversity

Cowalla NatureMap Species Report

Created By Guest user on 20/09/2021

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 35' 29" E,31° 07' 40" S
Buffer 20km
Group By Species Group

Species Group	Species	Records
Alga	3	3
Amphibian	8	113
Bird	142	2561
Bryopsid (Moss)	4	5
Dicotyledon	556	1619
Fish	8	11
Fungus	6	9
Gymnosperm	2	3
Invertebrate	45	119
Mammal	12	44
Monocotyledon	197	399
Pteridophyte (Fern)	2	4
Reptile	27	57
Slime Mould	2	2
TOTAL	**1014**	**4949**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Alga					
1.	26712	*Curdiea obesa*			
2.	26998	*Laurencia brongniartii*			
3.	27318	*Struvea plumosa*			
Amphibian					
4.	25399	*Crinia glauerti (Clicking Frog)*			
5.	25400	*Crinia insignifera (Squelching Froglet)*			
6.	25410	*Heleioporus eyrei (Moaning Frog)*			
7.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
8.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
9.	25388	*Litoria moorei (Motorbike Frog)*			
10.	25426	*Neobatrachus pelobatoides (Humming Frog)*			
11.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Bird					
12.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
13.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
14.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
15.	24262	*Acanthiza inornata (Western Thornbill)*			
16.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
17.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
18.	25536	*Accipiter fasciatus (Brown Goshawk)*			
19.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
20.	24312	*Anas gracilis (Grey Teal)*			
21.		*Anas platyrhynchos subsp. domesticus*			
22.	24315	*Anas rhynchotis (Australasian Shoveler)*			
23.	24316	*Anas superciliosa (Pacific Black Duck)*			
24.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
25.	24561	*Anthochaera carunculata (Red Wattlebird)*			
26.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
27.	24285	*Aquila audax (Wedge-tailed Eagle)*			
28.	41324	*Ardea modesta (great egret, white egret)*			
29.	24340	*Ardea novaehollandiae (White-faced Heron)*			
30.	24341	*Ardea pacifica (White-necked Heron)*			
31.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
32.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
33.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
34.	24318	*Aythya australis (Hardhead)*			
35.		*Barnardius zonarius*			
36.	24319	*Biziura lobata (Musk Duck)*			
37.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
38.	25716	*Cacatua sanguinea (Little Corella)*			
39.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
40.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
41.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
42.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
43.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
44.	24564	*Certhionyx variegatus (Pied Honeyeater)*			
45.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
46.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
47.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
48.		*Chroicocephalus novaehollandiae*			
49.	24288	*Circus approximans (Swamp Harrier)*			
50.	24289	*Circus assimilis (Spotted Harrier)*			
51.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
52.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
53.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
54.	24416	*Corvus bennetti (Little Crow)*			
55.	25592	*Corvus coronoides (Australian Raven)*			
56.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
57.	25595	*Cracticus tibicen (Australian Magpie)*			
58.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
59.	25596	*Cracticus torquatus (Grey Butcherbird)*			
60.	24322	*Cygnus atratus (Black Swan)*			
61.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
62.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
63.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
64.	24470	*Dromaius novaehollandiae (Emu)*			
65.		*Egretta novaehollandiae*			
66.		*Elanus axillaris*			
67.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
68.		*Eolophus roseicapillus*			
69.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
70.	24567	*Epthianura albifrons (White-fronted Chat)*			
71.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
72.	25621	*Falco berigora (Brown Falcon)*			
73.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
74.	25623	*Falco longipennis (Australian Hobby)*			
75.	25727	*Fulica atra (Eurasian Coot)*			
76.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
77.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
78.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
79.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
80.	25530	*Gerygone fusca (Western Gerygone)*			
81.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
82.	24443	*Grallina cyanoleuca (Magpie-lark)*			
83.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
84.	24295	*Haliastur sphenurus (Whistling Kite)*			
85.	47965	*Hieraaetus morphnoides (Little Eagle)*			
86.	25734	*Himantopus himantopus (Black-winged Stilt)*			
87.	24491	*Hirundo neoxena (Welcome Swallow)*			
88.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	
89.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
90.	25638	*Larus pacificus (Pacific Gull)*			
91.	24557	*Leipoa ocellata (Malleefowl)*		T	
92.	25661	*Lichmera indistincta (Brown Honeyeater)*			
93.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
94.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
95.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
96.	25654	*Malurus splendens (Splendid Fairy-wren)*			
97.	24583	*Manorina flavigula (Yellow-throated Miner)*			
98.	25758	*Megalurus gramineus (Little Grassbird)*			
99.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
100.	24598	*Merops ornatus (Rainbow Bee-eater)*			
101.		*Microcarbo melanoleucos*			
102.	25693	*Microeca fascinans (Jacky Winter)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
103.	25610	*Myiagra inquieta (Restless Flycatcher)*			
104.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
105.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
106.	34011	*Oreoica gutturalis subsp. gutturalis (Crested Bellbird (southern))*			
107.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
108.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
109.	24624	*Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)*			
110.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
111.	25682	*Pardalotus striatus (Striated Pardalote)*			
112.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
113.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
114.	48061	*Petrochelidon nigricans (Tree Martin)*			
115.	48066	*Petroica boodang (Scarlet Robin)*			
116.	24659	*Petroica goodenovii (Red-capped Robin)*			
117.	25697	*Phalacrocorax carbo (Great Cormorant)*			
118.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
119.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
120.	25699	*Phalacrocorax varius (Pied Cormorant)*			
121.	24409	*Phaps chalcoptera (Common Bronzewing)*			
122.	24802	*Philomachus pugnax (Ruff, reeve)*		IA	
123.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
124.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
125.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
126.	25720	*Platycercus icterotis (Western Rosella)*			
127.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
128.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
129.	25704	*Podiceps cristatus (Great Crested Grebe)*			
130.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
131.	25722	*Polytelis anthopeplus (Regent Parrot)*			
132.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
133.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
134.	24771	*Porzana tabuensis (Spotless Crake)*			
135.		*Purpureicephalus spurius*			
136.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
137.	48096	*Rhipidura albiscapa (Grey Fantail)*			
138.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
139.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
140.	30948	*Smicrornis brevirostris (Weebill)*			
141.	25597	*Strepera versicolor (Grey Currawong)*			
142.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
143.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
144.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
145.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
146.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
147.	48597	*Thalasseus bergii (Crested Tern)*		IA	
148.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
149.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
150.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
151.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
152.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
153.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

Bryopsid (Moss)

154.	32328	*Bruchia brevipes*			
155.	32353	*Entosthodon apophysatus*			
156.	32370	*Funaria hygrometrica*			
157.	32380	*Gemmabryum pachythecum*			

Dicotyledon

158.	15466	*Acacia applanata*			
159.	3231	*Acacia auronitens*			
160.	15470	*Acacia barbinervis subsp. borealis*			
161.	15471	*Acacia brumalis*			
162.	14061	*Acacia clydonophora*			
163.	12672	*Acacia cupularis*			
164.	20435	*Acacia daphnifolia*			
165.	11229	*Acacia drummondii subsp. affinis*		P3	
166.	3374	*Acacia huegelii*			
167.	3376	*Acacia idiomorpha*			
168.	15721	*Acacia lasiocarpa var. sedifolia*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
169.	3442	*Acacia microbotrya (Manna Wattle, Kalyang)*			
170.	3502	*Acacia pulchella (Prickly Moses)*			
171.	3525	*Acacia rostellifera (Summer-scented Wattle)*			
172.	30033	*Acacia saligna subsp. lindleyi*			
173.	3532	*Acacia scirpifolia*			
174.	3543	*Acacia shuttleworthii*			
175.	15484	*Acacia sphacelata subsp. sphacelata*			
176.	15486	*Acacia sphacelata subsp. verticillata*			
177.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
178.	3602	*Acacia willdenowiana (Grass Wattle)*			
179.	3184	*Acaena echinata (Sheep's Burr)*			
180.	6205	*Actinotus leucocephalus (Flannel Flower)*			
181.	11837	*Adenanthos cygnorum subsp. cygnorum (Common Woollybush)*			
182.	1729	*Allocasuarina grevilleoides*		P3	
183.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
184.	13908	*Allocasuarina lehmanniana subsp. lehmanniana*			
185.	1734	*Allocasuarina microstachya*			
186.	1739	*Allocasuarina thuyoides (Horned Sheoak)*			
187.	4905	*Alyogyne hakeifolia*			
188.	13267	*Amyema linophylla subsp. linophylla*			
189.	6311	*Andersonia heterophylla*			
190.	6312	*Andersonia involucrata*			
191.	6314	*Andersonia lehmanniana*			
192.	41738	*Andersonia sp. Mysosma (E.A. Griffin 2213)*			
193.	7827	*Angianthus cunninghamii (Coast Angianthus)*			
194.	7833	*Angianthus preissianus*			
195.	7836	*Angianthus tomentosus (Camel-grass)*			
196.	6947	*Anthocercis ilicifolia*			
197.	11725	*Anthocercis ilicifolia subsp. ilicifolia*			
198.	6949	*Anthocercis littorea (Yellow Tailflower)*			
199.	6210	*Apium annuum*			
200.	12040	*Apium prostratum subsp. prostratum var. prostratum (Sea Celery)*			
201.	7838	*Arctotheca calendula (Cape Weed, African Marigold)*	Y		
202.	20283	*Astartea scoparia (Common Astartea)*			
203.	6328	*Astroloma glaucescens*			
204.	6330	*Astroloma macrocalyx (Swan Berry)*			
205.	6331	*Astroloma microcalyx (Native Cranberry)*			
206.	6332	*Astroloma microdonta (Sandplain Cranberry)*			
207.	6334	*Astroloma pallidum (Kick Bush)*			
208.	6336	*Astroloma serratifolium (Kondrung)*			
209.	6339	*Astroloma xerophyllum*			
210.	2471	*Atriplex prostrata (Hastate Orache)*	Y		
211.	45416	*Babingtonia grandiflora (Large-flowered Babingtonia)*			
212.	45402	*Babingtonia urbana (Coastal Plain Babingtonia)*		P3	
213.	16815	*Baeckea sp. Mingenew (M.E. Trudgen 12029)*			
214.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
215.	1807	*Banksia burdettii (Burdett's Banksia)*			
216.	1809	*Banksia candolleana (Propeller Banksia)*			
217.	32623	*Banksia carlinoides (Pink Dryandra)*			
218.	32576	*Banksia dallanneyi (Couch Honeypot)*			
219.	32580	*Banksia dallanneyi subsp. dallanneyi var. dallanneyi*			
220.	32696	*Banksia dallanneyi subsp. pollosta*		P3	
221.	32556	*Banksia echinata*			
222.	32518	*Banksia hewardiana*			
223.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
224.	32215	*Banksia kippistiana var. kippistiana*			
225.	1826	*Banksia laricina (Rose Banksia)*			
226.	11386	*Banksia leptophylla var. melletica*			
227.	1834	*Banksia menziesii (Firewood Banksia)*			
228.	32211	*Banksia mimica (Summer Honeypot)*		T	
229.	32203	*Banksia nivea subsp. nivea*			
230.	32200	*Banksia nobilis subsp. nobilis*			
231.	1842	*Banksia prionotes (Acorn Banksia)*			
232.	32077	*Banksia sessilis var. cygnorum*			
233.	32074	*Banksia shuttleworthiana (Bearded Dryandra)*			
234.	1852	*Banksia telmatiaea (Swamp Fox Banksia)*			
235.	5382	*Beaufortia elegans (Elegant Beaufortia)*			
236.	46793	*Beaufortia kwongkanicola (Lesueur Beaufortia)*			
237.	5393	*Beaufortia squarrosa (Sand Beaufortia, Sand Bottlebrush, Puno)*			
238.	48868	*Bellardia viscosa*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
239.	34236	*Beyeria cinerea subsp. cinerea*		P3	
240.	7856	*Blennospora drummondii*			
241.	11381	*Boronia ramosa subsp. anethifolia*			
242.	16639	*Boronia scabra subsp. scabra*			
243.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
244.	3719	*Bossiaea spinescens*			
245.	7867	*Brachyscome bellidioides*			
246.	7878	*Brachyscome iberidifolia*			
247.	3000	*Brassica tournefortii (Mediterranean Turnip)*	Y		
248.	5396	*Calothamnus accedens*		P4	
249.	5411	*Calothamnus hirsutus*			
250.	5421	*Calothamnus pachystachyus*		P4	
251.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
252.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower, Pindak)*			
253.	5439	*Calytrix angulata (Yellow Starflower)*			
254.	48450	*Calytrix cravenii*			
255.	5458	*Calytrix flavescens (Summer Starflower)*			
256.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
257.	5465	*Calytrix leschenaultii*			
258.	5476	*Calytrix sapphirina*			
259.	5479	*Calytrix strigosa*			
260.	5481	*Calytrix sylvana*			
261.	7909	*Carduus pycnocephalus (Slender Thistle)*	Y		
262.	2948	*Cassytha aurea*			
263.	11351	*Cassytha aurea var. hirta*			
264.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
265.	11211	*Cassytha glabella forma dispar*			
266.	7916	*Centaurea melitensis (Maltese Cockspur, Malta Thistle)*	Y		
267.	17800	*Centaurium pulchellum*	Y		
268.	6214	*Centella asiatica*			
269.	2889	*Cerastium glomeratum (Mouse Ear Chickweed)*	Y		
270.	5498	*Chamelaucium uncinatum (Geraldton Wax)*			
271.	13111	*Chorizema aciculare subsp. laxum*			
272.	3764	*Chorizema varium (Bush Flame Pea)*		T	
273.	7937	*Cirsium vulgare (Spear Thistle, Scotch Thistle)*	Y		
274.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
275.	4551	*Comesperma ciliatum*			
276.	1857	*Conospermum acerosum (Needle-leaved Smokebush)*			
277.	15607	*Conospermum acerosum subsp. acerosum*			
278.	15041	*Conospermum canaliculatum*			
279.	15516	*Conospermum canaliculatum subsp. canaliculatum*			
280.	1874	*Conospermum glumaceum (Hooded Smokebush)*			
281.	1876	*Conospermum incurvum (Plume Smokebush)*			
282.	1882	*Conospermum stoechadis (Common Smokebush)*			
283.	15520	*Conospermum stoechadis subsp. sclerophyllum*			
284.	15611	*Conospermum stoechadis subsp. stoechadis (Common Smokebush)*			
285.	1885	*Conospermum triplinervium (Tree Smokebush)*			
286.	6347	*Conostephium minus (Pink-tipped Pearl flower)*			
287.	6348	*Conostephium pendulum (Pearl Flower)*			
288.	6349	*Conostephium preissii*			
289.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
290.	11709	*Crassula colorata var. acuminata*			
291.	11563	*Crassula colorata var. colorata*			
292.	29054	*Crepis foetida subsp. foetida (Stinking Hawksbeard)*	Y		
293.	13527	*Croninia kingiana*			
294.	31571	*Cryptandra intermedia*			
295.	4809	*Cryptandra pungens*			
296.	4810	*Cryptandra scoparia*			
297.	7451	*Dampiera lavandulacea*			
298.	7454	*Dampiera linearis (Common Dampiera)*			
299.	7475	*Dampiera spicigera (Spiked Dampiera)*			
300.	7481	*Dampiera tephrea*		P2	
301.	7482	*Dampiera teres (Terete-leaved Dampiera)*			
302.	5504	*Darwinia acerosa (Fine-leaved Darwinia)*		T	
303.	5507	*Darwinia carnea (Mogumber Bell)*		T	
304.	5524	*Darwinia pinifolia*			
305.	3793	*Daviesia angulata*			
306.	19747	*Daviesia decurrens subsp. decurrens*			
307.	3807	*Daviesia divaricata (Marno)*			
308.	18560	*Daviesia divaricata subsp. divaricata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
309.	15505	*Daviesia incrassata subsp. incrassata*			
310.	15506	*Daviesia incrassata subsp. teres*			
311.	12329	*Daviesia nudiflora subsp. hirtella*			
312.	16585	*Daviesia nudiflora subsp. nudiflora*			
313.	29279	*Dicrastylis globiflora*			
314.	3863	*Dillwynia dillwynioides*		P3	
315.	4453	*Diplolaena angustifolia (Yanchep Rose)*			
316.	15275	*Diplolaena obovata*			
317.	7054	*Dischisma arenarium*	Y		
318.	4754	*Dodonaea aptera (Coast Hop-bush)*			
319.	4763	*Dodonaea hackettiana (Hackett's Hopbush)*		P4	
320.	13381	*Drosera citrina*			
321.	13203	*Drosera closterostigma*			
322.	48751	*Drosera drummondii*			
323.	3097	*Drosera gigantea (Giant Sundew)*			
324.	3101	*Drosera heterophylla (Swamp Rainbow)*			
325.	48768	*Drosera hirsuta*			
326.	3105	*Drosera leucoblasta (Wheel Sundew)*			
327.	48709	*Drosera minutiflora*			
328.	3118	*Drosera pallida (Pale Rainbow)*			
329.	3131	*Drosera stolonifera (Leafy Sundew)*			
330.	3133	*Drosera subhirtella (Sunny Rainbow)*			
331.	8915	*Drosera thysanosepala (Fringed Rainbow)*			
332.	13950	*Eremaea asterocarpa subsp. asterocarpa*			
333.	5540	*Eremaea fimbriata*			
334.	5541	*Eremaea pauciflora*			
335.	14103	*Eremaea pauciflora var. calyptra*			
336.	14104	*Eremaea pauciflora var. pauciflora*			
337.	45215	*Ericomyrtus tenuior*			
338.	4332	*Erodium botrys (Long Storksbill)*	Y		
339.	41800	*Eryngium pinnatifidum subsp. Umbraphilum (G.J. Keighery 13967)*		P2	
340.	41810	*Eryngium sp. Subdecumbens (G.J. Keighery 5390)*		P3	
341.	13091	*Eucalyptus argutifolia (Wabling Hill Mallee)*		T	
342.	5615	*Eucalyptus decipiens (Limestone Marlock, Moit)*			
343.	15494	*Eucalyptus diminuta*			
344.	5649	*Eucalyptus foecunda (Narrow-leaved Red Mallee)*			
345.	5658	*Eucalyptus gittinsii (Northern Sandplain Mallee)*			
346.	5659	*Eucalyptus gomphocephala (Tuart, Duart)*			
347.	11295	*Eucalyptus loxophleba subsp. loxophleba (York Gum)*			
348.	13531	*Eucalyptus macrocarpa subsp. elachantha (Small-leaved Mottlecah)*		P4	
349.	13541	*Eucalyptus petrensis*			
350.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
351.	13511	*Eucalyptus rudis subsp. rudis*			
352.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
353.	12905	*Eucalyptus wandoo subsp. pulverea*			
354.	3872	*Euchilopsis linearis (Swamp Pea)*			
355.	3879	*Eutaxia parvifolia*			
356.	3880	*Eutaxia virgata*			
357.	6221	*Foeniculum vulgare (Fennel)*	Y		
358.	7321	*Galium divaricatum*	Y		
359.	7323	*Galium murale (Small Goosegrass)*	Y		
360.	3887	*Gastrolobium acutum*			
361.	20515	*Gastrolobium axillare*			
362.	20505	*Gastrolobium celsianum*			
363.	20483	*Gastrolobium linearifolium*			
364.	3910	*Gastrolobium obovatum (Boat-leaved Poison)*			
365.	46134	*Glebionis segetum*	Y		
366.	3945	*Gompholobium aristatum*			
367.	3950	*Gompholobium knightianum*			
368.	19295	*Gompholobium pungens*			
369.	11083	*Gompholobium scabrum*			
370.	3956	*Gompholobium shuttleworthii*			
371.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
372.	6161	*Gonocarpus pithyoides*			
373.	7495	*Goodenia berardiana*			
374.	29362	*Goodenia coerulea*			
375.	12516	*Goodenia convexa*			
376.	12522	*Goodenia glareicola*			
377.	12551	*Goodenia micrantha*			
378.	7538	*Goodenia pulchella*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
379.	19284	*Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)*			
380.	7566	*Goodenia xanthotricha (Yellow-haired Goodenia)*		P2	
381.	15763	*Grevillea biformis subsp. biformis*			
382.	1997	*Grevillea endlicheriana (Spindly Grevillea)*			
383.	2001	*Grevillea eriostachya (Flame Grevillea, Kaliny-kalinypa)*			
384.	15813	*Grevillea evanescens*		P1	
385.	8836	*Grevillea obtusifolia (Obtuse Leaved Grevillea)*			
386.	15839	*Grevillea preissii subsp. preissii*			
387.	17745	*Grevillea shuttleworthiana subsp. canarina*			
388.	2115	*Grevillea umbellulata*			
389.	5013	*Guichenotia micrantha (Small Flowered Guichenotia)*			
390.	2783	*Gyrostemon racemiger*			
391.	16084	*Gyrostemon sp. Mogumber (T.J. Hawkeswood 250)*		P1	Y
392.	2788	*Gyrostemon subnudus*			
393.	17670	*Hakea anadenia*			
394.	2135	*Hakea bucculenta (Red Pokers)*			
395.	2143	*Hakea conchifolia (Shell-leaved Hakea)*			
396.	2146	*Hakea costata (Ribbed Hakea)*			
397.	2164	*Hakea gilbertii*			
398.	2166	*Hakea incrassata (Marble Hakea)*			
399.	2175	*Hakea lissocarpha (Honey Bush)*			
400.	35502	*Hakea oligoneura*		P2	
401.	2197	*Hakea prostrata (Harsh Hakea)*			
402.	12233	*Hakea psilorrhyncha*			
403.	2203	*Hakea ruscifolia (Candle Hakea)*			
404.	2205	*Hakea smilacifolia*			
405.	2206	*Hakea stenocarpa (Narrow-fruited Hakea)*			
406.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
407.	2215	*Hakea undulata (Wavy-leaved Hakea)*			
408.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
409.	16933	*Hemiandra glabra*			
410.	6838	*Hemiandra linearis (Speckled Snakebush)*			
411.	6839	*Hemiandra pungens (Snakebush)*			
412.	6842	*Hemigenia barbata*			
413.	6849	*Hemigenia diplanthera*			
414.	6856	*Hemigenia incana (Silky Hemigenia)*			
415.	41020	*Hemiphora bartlingii (Woolly Dragon)*			
416.	41042	*Hemiphora uncinata*			
417.	5108	*Hibbertia acerosa (Needle Leaved Guinea Flower)*			
418.	5112	*Hibbertia aurea*			
419.	5114	*Hibbertia commutata*			
420.	5116	*Hibbertia crassifolia*			
421.	5120	*Hibbertia desmophylla*			
422.	20059	*Hibbertia hemignosta*			
423.	45534	*Hibbertia hypericoides subsp. hypericoides*			
424.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
425.	43280	*Hibbertia sericosepala*			
426.	5171	*Hibbertia spicata*			
427.	11481	*Hibbertia spicata subsp. spicata*			
428.	5172	*Hibbertia stellaris (Orange Stars)*			
429.	48381	*Hibbertia striata*			
430.	5173	*Hibbertia subvaginata*			
431.	6222	*Homalosciadium homalocarpum*			
432.	3966	*Hovea pungens (Devil's Pins, Puyenak)*			
433.	3967	*Hovea stricta*			
434.	3968	*Hovea trisperma (Common Hovea)*			
435.	12741	*Hyalosperma cotula*			
436.	5216	*Hybanthus calycinus (Wild Violet)*			
437.	35074	*Hypocalymma angustifolium subsp. Dandaragan plateau (S. Patrick 702A)*			
438.	35070	*Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)*			
439.	14493	*Hypocalymma sp. Cataby (G.J. Keighery 5151)*		P2	
440.	31431	*Hypocalymma sp. Nambung (R. Spjut & R. Smith s.n. 22/09/1992)*			
441.	5829	*Hypocalymma xanthopetalum*			
442.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
443.	2219	*Isopogon adenanthoides (Spider Coneflower)*			
444.	29775	*Isopogon drummondii*		P3	
445.	2229	*Isopogon dubius (Pincushion Coneflower)*			
446.	2232	*Isopogon linearis*			
447.	2238	*Isopogon teretifolius (Nodding Coneflower)*			
448.	7396	*Isotoma hypocrateriformis (Woodbridge Poison)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
449.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
450.	16317	*Isotropis cuneifolia subsp. glabra*		P3	
451.	3995	*Isotropis juncea (Slender Lamb Poison)*			
452.	14783	*Jacksonia calcicola*			
453.	4010	*Jacksonia floribunda (Holly Pea)*			
454.	4015	*Jacksonia hakeoides*			
455.	14778	*Jacksonia nutans*			
456.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
457.	4044	*Kennedia prostrata (Scarlet Runner)*			
458.	15498	*Kunzea glabrescens (Spearwood)*			
459.	5835	*Kunzea micrantha*			
460.	17785	*Kunzea micrantha subsp. petiolata*			
461.	17505	*Kunzea praestans*			
462.	11289	*Labichea lanceolata subsp. lanceolata*			
463.	6777	*Lachnostachys albicans*			
464.	15528	*Lambertia multiflora var. multiflora*			
465.	5036	*Lasiopetalum lineare*			
466.	4052	*Latrobea tenella*			
467.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
468.	7574	*Lechenaultia floribunda (Free-flowering Leschenaultia)*			
469.	7580	*Lechenaultia linarioides (Yellow Leschenaultia)*			
470.	7586	*Lechenaultia stenosepala (Narrow-sepaled Leschenaultia)*			
471.	7590	*Lechenaultia tubiflora (Heath Leschenaultia)*			
472.	8099	*Leontodon saxatilis (Hairy Hawkbit)*	Y		
473.	2344	*Leptomeria empetriformis*			
474.	17852	*Leptorhynchos scaber (Lanky Buttons)*			
475.	5847	*Leptospermum erubescens (Roadside Teatree)*			
476.	5857	*Leptospermum spinescens*			
477.	6360	*Leucopogon australis (Spiked Beard-heath)*			
478.	6369	*Leucopogon cinereus*			
479.	6370	*Leucopogon cochlearifolius*			
480.	6374	*Leucopogon conostephioides*			
481.	6400	*Leucopogon gracillimus*			
482.	6421	*Leucopogon oliganthus*			
483.	6425	*Leucopogon oxycedrus*			
484.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
485.	6430	*Leucopogon planifolius*			
486.	6434	*Leucopogon polymorphus*			
487.	6436	*Leucopogon propinquus*			
488.	6440	*Leucopogon racemulosus*			
489.	39501	*Leucopogon sp. Coomallo (R.J. Cranfield 1457)*			
490.	20086	*Leucopogon sp. Northern Scarp (M. Hislop 2233)*			
491.	19460	*Leucopogon sp. Yanchep (M. Hislop 1986)*		P3	
492.	6444	*Leucopogon sprengelioides*			
493.	40804	*Leucopogon squarrosus subsp. trigynus*		P2	
494.	7677	*Levenhookia stipitata (Common Stylewort)*			
495.	4362	*Linum marginale (Wild Flax)*			
496.	36160	*Liparophyllum capitatum*			
497.	9289	*Lobelia anceps (Angled Lobelia)*			
498.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
499.	7406	*Lobelia rhombifolia (Tufted Lobelia)*			
500.	7407	*Lobelia rhytidosperma (Wrinkled-seeded Lobelia)*			
501.	4066	*Lupinus cosentinii*	Y		
502.	6458	*Lysinema elegans*			
503.	34736	*Lysinema pentapetalum*			
504.	2838	*Macarthuria apetala*			
505.	2839	*Macarthuria australis*			
506.	17106	*Macarthuria keigheryi*		T	
507.	17633	*Marianthus erubescens*			
508.	37580	*Melaleuca acutifolia*			
509.	5887	*Melaleuca cardiophylla (Tangling Melaleuca)*			
510.	17982	*Melaleuca carrii*			
511.	5888	*Melaleuca ciliosa*			
512.	19387	*Melaleuca clavifolia*			
513.	5893	*Melaleuca concreta*			
514.	5900	*Melaleuca cuticularis (Saltwater Paperbark)*			
515.	19952	*Melaleuca dichroma*			
516.	5920	*Melaleuca huegelii (Chenille Honeymyrtle)*			
517.	13271	*Melaleuca huegelii subsp. huegelii*			
518.	13273	*Melaleuca incana subsp. incana*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
519.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
520.	5958	*Melaleuca radula (Graceful Honeymyrtle)*			
521.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
522.	5964	*Melaleuca seriata*			
523.	18598	*Melaleuca systena*			
524.	5978	*Melaleuca teretifolia (Banbar)*			
525.	5981	*Melaleuca thyoides*			
526.	5983	*Melaleuca trichophylla*			
527.	5986	*Melaleuca urceolaris*			
528.	5987	*Melaleuca viminea (Mohan)*			
529.	13280	*Melaleuca viminea subsp. viminea*			
530.	8105	*Millotia myosotidifolia*			
531.	14344	*Millotia tenuifolia var. tenuifolia (Soft Millotia)*			
532.	4091	*Mirbelia floribunda (Purple Mirbelia)*			
533.	4100	*Mirbelia spinosa*			
534.	4104	*Mirbelia trichocalyx*			
535.	4662	*Monotaxis grandiflora (Diamond of the Desert)*			
536.	19585	*Monotaxis grandiflora var. grandiflora*			
537.	2415	*Muehlenbeckia polybotrya*			
538.	7291	*Myoporum insulare (Blueberry Tree, boobialla)*			
539.	8114	*Myriocephalus appendiculatus (White-tip Myriocephalus)*			
540.	14293	*Oenothera indecora subsp. bonariensis*	Y		
541.	2367	*Olax scalariformis*			
542.	32716	*Olearia lehmanniana*			
543.	8149	*Olearia rudis (Rough Daisybush)*			
544.	42024	*Olearia sp. Kennedy Range (G. Byrne 66)*			
545.	18255	*Opercularia vaginata (Dog Weed)*			
546.	46254	*Orianthera spermacocea*			
547.	36177	*Ornduffia albiflora*			
548.	4113	*Ornithopus compressus (Yellow Serradella)*	Y		
549.	7089	*Parentucellia latifolia (Common Bartsia)*	Y		
550.	4346	*Pelargonium littorale*			
551.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
552.	16477	*Pericalymma ellipticum var. ellipticum*			
553.	16478	*Pericalymma ellipticum var. floridum*			
554.	13911	*Persicaria decipiens*			
555.	11052	*Persicaria prostrata*			
556.	2258	*Persoonia comata*			
557.	2270	*Persoonia quinquenervis*			
558.	2271	*Persoonia rudis*		P3	
559.	2281	*Persoonia trinervis*			
560.	20368	*Petrophile axillaris*			
561.	2285	*Petrophile biternata*		P3	
562.	2286	*Petrophile brevifolia*			
563.	48780	*Petrophile brevifolia subsp. rosea*			
564.	2288	*Petrophile chrysantha*			
565.	2292	*Petrophile divaricata*			
566.	20391	*Petrophile juncifolia*			
567.	2299	*Petrophile linearis (Pixie Mops)*			
568.	2301	*Petrophile macrostachya*			
569.	16874	*Petrophile recurva*			
570.	2306	*Petrophile rigida*			
571.	2308	*Petrophile seminuda*			
572.	2309	*Petrophile serruriae*			
573.	19825	*Petrorhagia dubia*	Y		
574.	18529	*Philotheca spicata (Pepper and Salt)*			
575.	19417	*Philotheca spicata subsp. Moore River National Park (G. & D. Woodman Op 47)*			
576.	16825	*Phyllangium divergens*			
577.	16177	*Phyllangium paradoxum*			
578.	4675	*Phyllanthus calycinus (False Boronia)*			
579.	6009	*Pileanthus filifolius (Summer Coppercups)*			
580.	33460	*Pilostyles coccoidea*			
581.	2408	*Pilostyles hamiltonii*			
582.	5237	*Pimelea calcicola*		P3	
583.	5243	*Pimelea ferruginea*			
584.	5244	*Pimelea floribunda*			
585.	5246	*Pimelea gilgiana*			
586.	11402	*Pimelea imbricata var. piligera*			
587.	5254	*Pimelea leucantha*			
588.	5268	*Pimelea sulphurea (Yellow Banjine)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
589.	18353	*Pithocarpa pulchella var. pulchella*			
590.	8177	*Podolepis lessonii*			
591.	8183	*Podotheca chrysantha (Yellow Podotheca)*			
592.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
593.	29919	*Polianthion wichurae*			
594.	4689	*Poranthera ericoides (Heath Poranthera)*			
595.	4691	*Poranthera microphylla (Small Poranthera)*			
596.	13255	*Pterochaeta paniculata*			
597.	2733	*Ptilotus humilis*			
598.	2742	*Ptilotus manglesii (Pom Poms, Mulamula)*			
599.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
600.	40841	*Ptilotus stirlingii subsp. stirlingii*			
601.	8195	*Quinetia urvillei*			
602.	3061	*Raphanus raphanistrum (Wild Radish)*	Y		
603.	6012	*Regelia ciliata*			
604.	18547	*Rhadinothamnus anceps*			
605.	11341	*Rhagodia baccata subsp. baccata*			
606.	11930	*Rhagodia baccata subsp. dioica (Sea Berry Saltbush)*			
607.	11254	*Rhagodia preissii subsp. preissii*			
608.	13300	*Rhodanthe citrina*			
609.	19942	*Ricinocarpos undulatus*			
610.	2433	*Rumex crispus (Curled Dock)*	Y		
611.	2435	*Rumex drummondii*		P4	
612.	2440	*Rumex pulcher (Fiddle Dock)*	Y		
613.	6483	*Samolus junceus*			
614.	6484	*Samolus repens (Creeping Brookweed)*			
615.	6485	*Samolus valerandi (Water Pimpernel)*	Y		
616.	2356	*Santalum acuminatum (Quandong, Warnga)*			
617.	7603	*Scaevola canescens (Grey Scaevola)*			
618.	7613	*Scaevola glandulifera (Viscid Hand-flower)*			
619.	7614	*Scaevola globulifera*			
620.	7634	*Scaevola phlebopetala (Velvet Fanflower)*			
621.	29356	*Scaevola repens subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445)*			
622.	13181	*Scaevola repens var. angustifolia*			
623.	13182	*Scaevola repens var. repens*			
624.	13152	*Scaevola thesioides subsp. thesioides*			
625.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
626.	49121	*Scholtzia laciniata (Ragged-leaved Scholtzia)*		P2	
627.	6037	*Scholtzia parviflora*			
628.	20382	*Scholtzia sp. Wongonderrah (M.E. & M.R. Trudgen MET 12000)*			
629.	20161	*Senecio pinnatifolius*			
630.	25884	*Senecio pinnatifolius var. latilobus*			
631.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
632.	14583	*Siloxerus multiflorus*			
633.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
634.	47173	*Solanum lycopersicum (Tomato)*	Y		
635.	7025	*Solanum oldfieldii*			
636.	9367	*Sonchus hydrophilus (Native Sowthistle)*			
637.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
638.	17551	*Sphaerolobium drummondii*			
639.	4207	*Sphaerolobium medium*			
640.	4828	*Spyridium globulosum (Basket Bush)*			
641.	4713	*Stachystemon axillaris (Leafy Stachystemon)*			
642.	9069	*Stackhousia huegelii*			
643.	9070	*Stackhousia pubescens (Downy Stackhousia)*			
644.	13475	*Stenanthemum humile*			
645.	15066	*Stenanthemum notiale subsp. chamelum*			
646.	3076	*Stenopetalum filifolium*			
647.	2316	*Stirlingia latifolia (Blueboy)*			
648.	2317	*Stirlingia simplex*			
649.	30278	*Stylidium androsaceum*			
650.	25831	*Stylidium araeophyllum (Stilt Walker)*			
651.	30276	*Stylidium bicolor*			
652.	7709	*Stylidium crossocephalum (Posy Triggerplant)*			
653.	7710	*Stylidium cygnorum*			
654.	7716	*Stylidium diuroides (Donkey Triggerplant)*			
655.	11808	*Stylidium diuroides subsp. diuroides*			
656.	7749	*Stylidium leptophyllum (Needle-leaved Triggerplant)*			
657.	7762	*Stylidium miniatum (Pink Butterfly Triggerplant)*			
658.	25829	*Stylidium neurophyllum (Coastal Plain Triggerplant)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
659.	7766	*Stylidium nonscandens*		P3	
660.	7768	*Stylidium obtusatum (Pinafore Triggerplant)*			
661.	7773	*Stylidium petiolare (Horn Triggerplant)*			
662.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
663.	25837	*Stylidium purpureum (Purple Fountain Triggerplant)*			
664.	7785	*Stylidium repens (Matted Triggerplant)*			
665.	20521	*Stylidium rigidulum*			
666.	25806	*Stylidium scariosum*			
667.	7798	*Stylidium schoenoides (Cow Kicks)*			
668.		*Stylidium sp.*			
669.	33081	*Stylidium sp. Moora (J.A. Wege 713)*		P2	
670.	25836	*Stylidium spiciforme (Spiciform Triggerplant)*			
671.	20608	*Stylidium stenosepalum*			
672.	3181	*Stylobasium australe*			
673.	48293	*Styphelia ciliosa*			
674.	15532	*Synaphea spinulosa subsp. spinulosa*			
675.	2791	*Tersonia cyathiflora (Button Creeper)*			
676.	4540	*Tetratheca pilifera*		P3	
677.	5105	*Thomasia triphylla*			
678.	6057	*Thryptomene hyporhytis*			
679.	6060	*Thryptomene mucronulata*			
680.	19041	*Trachymene coerulea subsp. coerulea*			
681.	6280	*Trachymene pilosa (Native Parsnip)*			
682.	15659	*Trifolium lappaceum var. lappaceum*	Y		
683.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
684.	44444	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4	
685.	1139	*Trithuria bibracteata*			
686.	11665	*Trymalium ledifolium var. ledifolium*			
687.	8254	*Urospermum picroides (False Hawkbit)*	Y		
688.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
689.	7157	*Utricularia violacea (Violet Bladderwort)*			
690.	7158	*Utricularia volubilis (Twining Bladderwort)*			
691.	7665	*Velleia trinervis*			
692.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
693.	15725	*Verbesina encelioides*	Y		
694.	7666	*Verreauxia reinwardtii (Common Verreauxia)*			
695.	12388	*Verticordia acerosa var. preissii*			
696.	12396	*Verticordia blepharophylla*			
697.	12402	*Verticordia chrysanthella*			
698.	12411	*Verticordia densiflora var. cespitosa*			
699.	15432	*Verticordia densiflora var. densiflora*			
700.	6077	*Verticordia drummondii (Drummond's Featherflower)*			
701.	6083	*Verticordia grandis (Scarlet Featherflower)*			
702.	15433	*Verticordia huegelii var. huegelii*			
703.	12430	*Verticordia huegelii var. stylosa*			
704.	12437	*Verticordia laciniata*			
705.	14714	*Verticordia lindleyi subsp. lindleyi*		P4	
706.	6101	*Verticordia nitens (Morrison Featherflower, Kodjeningara)*			
707.	10822	*Verticordia nobilis*			
708.	6103	*Verticordia ovalifolia*			
709.	12446	*Verticordia paludosa*		P4	
710.	6107	*Verticordia pennigera*			
711.	12449	*Verticordia plumosa var. brachyphylla*			
712.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
713.	6289	*Xanthosia huegelii*			

Fish

714.		*Afurcagobius suppositus*			
715.		*Atherinosoma elongata*			
716.		*Bostockia porosa*			
717.	34028	*Galaxias occidentalis (Western Minnow)*			
718.		*Gnathophis longicaudatus*			
719.		*Plectorhinchus flavomaculatus*			
720.		*Pseudogobius olorum*			
721.		*Tandanus bostocki*			

Fungus

722.	38755	*Amanita ochroterrea*			
723.	38757	*Amanita xanthocephala*			
724.		*Boletus sp.*			
725.		*Gyroporus cyanescens*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
726.	38808	*Limacella pitereka*			
727.		*Phytophthora cinnamomi*			
Gymnosperm					
728.	36600	*Callitris pyramidalis (Swamp Cypress)*			
729.	18119	*Macrozamia fraseri*			
Invertebrate					
730.		*Acariformes sp.*			
731.		*Acercella falcipes*			
732.		*Aname mainae*			
733.		*Araneus cyphoxis*			
734.		*Austracantha minax*			
735.		*Caenidae sp.*			
736.		*Calamoecia tasmanica subattenuata*			
737.		*Ceinidae sp.*			
738.		*Ceratopogonidae sp.*			
739.		*Cercophonius granulosus*			
740.		*Cherax quinquecarinatus*			
741.		*Chironominae sp.*			
742.		*Corduliidae sp.*			
743.		*Corixidae sp.*			
744.		*Daphnia sp.*			
745.		*Dytiscidae sp.*			
746.		*Ecnomidae sp.*			
747.		*Gomphidae sp.*			
748.		*Hydraenidae sp.*			
749.		*Hydrodroma australis*			Y
750.		*Hydrophilidae sp.*			
751.		*Hydropsychidae sp.*			
752.	33977	*Hylaeus globuliferus (woolybush bee)*		P3	
753.		*Lampona cylindrata*			
754.	33982	*Leioproctus contrarius (a short-tongued bee)*		P3	
755.		*Leptoceridae sp.*			
756.		*Libellulidae sp.*			
757.		*Lycosa godeffroyi*			
758.		*Maratus pavonis*			
759.		*Oligochaeta sp.*			
760.		*Orthocladiinae sp.*			
761.		*Palaemonidae sp.*			
762.		*Parastacidae sp.*			
763.		*Protochelifer cavernarum*			
764.		*Raveniella cirrata*			
765.		*Richardsonianidae sp.*			
766.		*Simuliidae sp.*			
767.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
768.		*Tabanidae sp.*			
769.		*Tanypodinae sp.*			
770.		*Tipulidae sp.*			
771.		*Urodacus hartmeyeri*			
772.		*Veliidae sp.*			
773.		*Venator koyuga*			
774.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Mammal					
775.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
776.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
777.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
778.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
779.	24168	*Macrotis lagotis (Bilby, Dalgyte, Ninu)*		T	
780.	24223	*Mus musculus (House Mouse)*	Y		
781.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
782.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
783.	24230	*Pseudomys albocinereus (Ash-grey Mouse)*			
784.	24245	*Rattus rattus (Black Rat)*	Y		
785.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
786.	24206	*Vespadelus regulus (Southern Forest Bat)*			
Monocotyledon					
787.	1205	*Acanthocarpus canaliculatus*			
788.	1056	*Alexgeorgea nitens*			
789.	20755	*Alstroemeria psittacina*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
790.	199	*Amphipogon strictus (Greybeard Grass)*			
791.	200	*Amphipogon turbinatus*			
792.	1059	*Anarthria humilis*			
793.	1409	*Anigozanthos humilis (Catspaw)*			
794.	11957	*Anigozanthos humilis subsp. chrysanthus (Golden Catspaw)*		P4	
795.	11434	*Anigozanthos humilis subsp. humilis*			
796.	1411	*Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)*			
797.	1414	*Anigozanthos pulcherrimus (Yellow Kangaroo Paw)*			
798.	29436	*Anigozanthos viridis subsp. Cataby (S.D. Hopper 1786)*			
799.	13891	*Anigozanthos viridis subsp. terraspectans (Dwarf Green Kangaroo Paw)*		T	
800.	1264	*Arnocrinum preissii*			
801.	1201	*Asparagus officinalis (Asparagus)*	Y		
802.	17233	*Austrostipa campylachne*			
803.	17237	*Austrostipa elegantissima*			
804.	17240	*Austrostipa flavescens*			
805.	17241	*Austrostipa hemipogon*			
806.	17244	*Austrostipa macalpinei*			
807.	740	*Baumea arthrophylla*			
808.	741	*Baumea articulata (Jointed Rush)*			
809.	745	*Baumea preissii*			
810.	1417	*Blancoa canescens (Winter Bell)*			
811.	749	*Bolboschoenus caldwellii (Marsh Club-rush)*			
812.	1272	*Borya scirpoidea*			
813.	8661	*Brachypodium distachyon (False Brome)*	Y		
814.	249	*Bromus diandrus (Great Brome)*	Y		
815.	1383	*Burchardia bairdiae*			
816.	12770	*Burchardia congesta*			
817.	1385	*Burchardia multiflora (Dwarf Burchardia)*			
818.	29439	*Caesia sp. Wongan (K.F. Kenneally 8820)*			
819.	15348	*Caladenia flava subsp. flava*			
820.	15502	*Caladenia footeana*			
821.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
822.	15358	*Caladenia longicauda subsp. albella*			
823.	15360	*Caladenia longicauda subsp. borealis*			
824.	15363	*Caladenia longicauda subsp. eminens*			
825.	17760	*Caladenia nobilis*			
826.	13862	*Caladenia speciosa*		P4	
827.	19309	*Calectasia narragara*			
828.	753	*Carex appressa (Tall Sedge)*			
829.	760	*Caustis dioica*			
830.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
831.	1129	*Centrolepis glabra (Smooth Centrolepis)*			
832.	11878	*Chamaescilla corymbosa var. paradoxa*			
833.	8788	*Chamaescilla versicolor*			
834.	17833	*Chordifex microcodon*			
835.	17706	*Chordifex sinuosus*			
836.	1418	*Conostylis aculeata (Prickly Conostylis)*			
837.	11826	*Conostylis aculeata subsp. aculeata*			
838.	11552	*Conostylis aculeata subsp. bromelioides*			
839.	1421	*Conostylis angustifolia*			
840.	1423	*Conostylis aurea (Golden Conostylis)*			
841.	1425	*Conostylis bracteata*		P3	
842.	11438	*Conostylis candicans subsp. candicans*			
843.	1436	*Conostylis juncea*			
844.	1437	*Conostylis latens*			
845.	11388	*Conostylis pauciflora subsp. euryrhipis*		P4	
846.	1446	*Conostylis prolifera (Mat Cottonheads)*			
847.	1451	*Conostylis seminuda*			
848.	11543	*Conostylis teretifolia subsp. planescens*			
849.	11870	*Conostylis teretifolia subsp. teretifolia*			
850.	1458	*Conostylis teretiuscula*			
851.	1285	*Corynotheca micrantha (Sand Lily)*			
852.	11834	*Corynotheca micrantha var. acanthoclada*			
853.	11883	*Corynotheca micrantha var. elongata*			
854.	11283	*Corynotheca micrantha var. micrantha*			
855.	768	*Cyathochaeta avenacea*			
856.	40660	*Cycnogeton huegelii*			
857.	283	*Cynodon dactylon (Couch)*	Y		
858.	783	*Cyperus congestus (Dense Flat-sedge)*	Y		
859.	794	*Cyperus gymnocaulos (Spiny Flat-sedge)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
860.	10916	*Cyrtostylis huegelii*			
861.	17663	*Desmocladus asper*			
862.	16593	*Desmocladus biformis*		P3	
863.	16595	*Desmocladus flexuosus*			
864.	46362	*Desmocladus lateriflorus*			
865.	17662	*Desmocladus lateriticus*			
866.	16455	*Desmocladus virgatus*			
867.	11636	*Dianella revoluta var. divaricata*			
868.	1509	*Dioscorea hastifolia (Warrine, Wararn)*			
869.	1634	*Diuris laxiflora (Bee Orchid)*			
870.	1635	*Diuris longifolia (Common Donkey Orchid)*			
871.	42229	*Diuris segregata*			
872.	1638	*Diuris setacea (Bristly Donkey Orchid)*			
873.	44162	*Diuris tinkeri*			
874.	1639	*Drakaea elastica (Glossy-leaved Hammer Orchid)*		T	
875.	1640	*Drakaea glyptodon (King-in-his-carriage)*			
876.	1066	*Ecdeiocolea monostachya*			
877.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
878.	351	*Ehrharta villosa (Pyp Grass)*	Y		
879.	822	*Eleocharis acuta (Common Spikerush)*			
880.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
881.	1645	*Epiblema grandiflorum (Babe-in-a-cradle)*			
882.	15415	*Eriochilus scaber subsp. scaber*			
883.	10802	*Eriochilus tenuis*			
884.	18404	*Georgeantha hexandra*			
885.	17043	*Glyceria declinata*	Y		
886.	1465	*Haemodorum discolor*			
887.	1468	*Haemodorum laxum*			
888.	1469	*Haemodorum loratum*		P3	
889.	1470	*Haemodorum paniculatum (Mardja)*			
890.	1472	*Haemodorum simplex*			
891.	1475	*Haemodorum spicatum (Mardja)*			
892.	1476	*Haemodorum venosum*			
893.	439	*Hemarthria uncinata (Matgrass)*			
894.	1292	*Hensmania stoniella*		P3	
895.	1293	*Hensmania turbinata*			
896.	452	*Hyparrhenia hirta (Tambookie Grass)*	Y		
897.	1070	*Hypolaena exsulca*			
898.	14540	*Isolepis hystrix*	Y		
899.	917	*Isolepis marginata (Coarse Club-rush)*			
900.	19632	*Johnsonia pubescens subsp. pubescens*			
901.	1179	*Juncus caespiticius (Grassy Rush)*			
902.	11922	*Juncus kraussii subsp. australiensis*			
903.	1188	*Juncus pallidus (Pale Rush)*			
904.	1195	*Juncus subsecundus (Finger Rush)*			
905.	20019	*Lachnagrostis filiformis*			
906.	11911	*Laxmannia ramosa subsp. ramosa*			
907.	1308	*Laxmannia sessiliflora (Nodding Lily)*			
908.	11464	*Laxmannia sessiliflora subsp. australis*			
909.	11732	*Laxmannia sessiliflora subsp. sessiliflora*			
910.	1309	*Laxmannia squarrosa*			
911.	1075	*Lepidobolus preissianus*			
912.	18074	*Lepidobolus preissianus subsp. preissianus*			
913.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
914.	942	*Lepidosperma rostratum*		T	
915.	944	*Lepidosperma scabrum*			
916.	1653	*Leporella fimbriata (Hare Orchid)*			
917.	1077	*Leptocarpus canus (Hoary Twine-rush)*			
918.	1080	*Leptocarpus scariosus*			
919.	15418	*Leptoceras menziesii*			
920.	1090	*Lepyrodia muirii*			
921.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
922.	1228	*Lomandra hermaphrodita*			
923.	14542	*Lomandra micrantha subsp. micrantha*			
924.	1239	*Lomandra preissii*			
925.	1246	*Lomandra suaveolens*			
926.	1097	*Lyginia barbata*			
927.	955	*Mesomelaena pseudostygia*			
928.	12761	*Microtis media subsp. densiflora*			
929.	15419	*Microtis media subsp. media*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
930.	492	*Neurachne alopecuroidea (Foxtail Mulga Grass)*			
931.	11749	*Orthrosanthus laxus var. laxus (Morning Iris)*			
932.	13867	*Paracaleana dixonii*		T	
933.	1667	*Paracaleana nigrita (Flying Duck Orchid)*			
934.	30472	*Patersonia occidentalis var. occidentalis*			
935.	551	*Phalaris minor (Lesser Canary Grass)*	Y		
936.	20460	*Pheladenia deformis*			
937.	1478	*Phlebocarya ciliata*			
938.	1479	*Phlebocarya filifolia*			
939.	11557	*Phlebocarya pilosissima subsp. pilosissima*		P3	
940.	573	*Poa drummondiana (Knotted Poa)*			
941.	577	*Poa poiformis (Coastal Poa)*			
942.	582	*Polypogon monspeliensis (Annual Beardgrass)*	Y		
943.	110	*Potamogeton drummondii*			
944.	1672	*Prasophyllum fimbria (Fringed Leek Orchid)*			
945.	1677	*Prasophyllum macrostachyum (Laughing Leek Orchid)*			
946.	1680	*Prasophyllum parvifolium (Autumn Leek Orchid)*			
947.	48677	*Pterostylis ectypha*			
948.	48674	*Pterostylis orbiculata*			
949.	12217	*Pterostylis sanguinea*			
950.	40431	*Rytidosperma acerosum*			
951.	40425	*Rytidosperma caespitosum*			
952.	40426	*Rytidosperma occidentale*			
953.	48356	*Schoenoplectus tabernaemontani*			
954.	978	*Schoenus brevisetis*			
955.	979	*Schoenus caespititius*			
956.	984	*Schoenus curvifolius*			
957.	986	*Schoenus efoliatus*			
958.	17606	*Schoenus griffinianus*		P4	
959.	998	*Schoenus latitans*			
960.	1003	*Schoenus natans (Floating Bog-rush)*		P4	
961.	1007	*Schoenus pedicellatus*			
962.	1009	*Schoenus pleiostemoneus*			
963.	1023	*Schoenus tenellus*			
964.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
965.	1260	*Stypandra glauca (Blind Grass)*			
966.	1702	*Thelymitra campanulata (Shirt Orchid)*			
967.	1318	*Thysanotus arbuscula*			
968.	1319	*Thysanotus arenarius*			
969.	1338	*Thysanotus manglesianus (Fringed Lily)*			
970.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
971.	1343	*Thysanotus patersonii*			
972.	1353	*Thysanotus spiniger*			
973.	1357	*Thysanotus thyrsoideus*			
974.	1358	*Thysanotus triandrus*			
975.	1481	*Tribonanthes australis (Southern Tiurndin)*			
976.	1485	*Tribonanthes violacea (Violet Tiurndin)*			
977.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
978.	29481	*Tricoryne sp. Eneabba (E.A. Griffin 1200)*			
979.	151	*Triglochin striata*			
980.	152	*Triglochin trichophora*			
981.	12072	*Wurmbea dioica subsp. alba*			
982.		*Xanthorrhoea sp.*			
983.	1049	*Zantedeschia aethiopica (Arum Lily)*	Y		
Pteridophyte (Fern)					
984.		*Cheilanthes sp.*			
985.	54	*Cyclosorus interruptus*			
Reptile					
986.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
987.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
988.	42380	*Brachyurophis fasciolatus subsp. fasciolatus (Narrow-banded Shovel-nosed Snake)*			
989.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
990.	30893	*Cryptoblepharus buchananii*			
991.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
992.	25039	*Ctenotus fallens*			
993.	25087	*Cyclodomorphus celatus (Western Slender Blue-tongue)*			
994.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
995.	25251	*Echiopsis curta (Bardick)*			
996.	25100	*Egernia napoleonis*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
997.	25119	*Hemiergis quadrilineata*			
998.	25133	*Lerista elegans*			
999.	25165	*Lerista praepedita*			
1000.	25005	*Lialis burtonis*			
1001.	42414	*Lucasium alboguttatum*			
1002.	25184	*Menetia greyii*			
1003.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
1004.	25192	*Morethia obscura*			
1005.	25255	*Parasuta nigriceps*			
1006.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
1007.	25261	*Pseudechis australis (Mulga Snake)*			
1008.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
1009.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
1010.	24942	*Strophurus spinigerus subsp. spinigerus*			
1011.	25207	*Tiliqua rugosa subsp. rugosa*			
1012.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			

Slime Mould

1013.	38969	*Arcyria minuta*			
1014.	39097	*Trichia decipiens*			

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

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

APPENDIX B - EPBC PROTECTED MATTERS SEARCH REPORT

Australian Government

Department of Agriculture, Water and the Environment

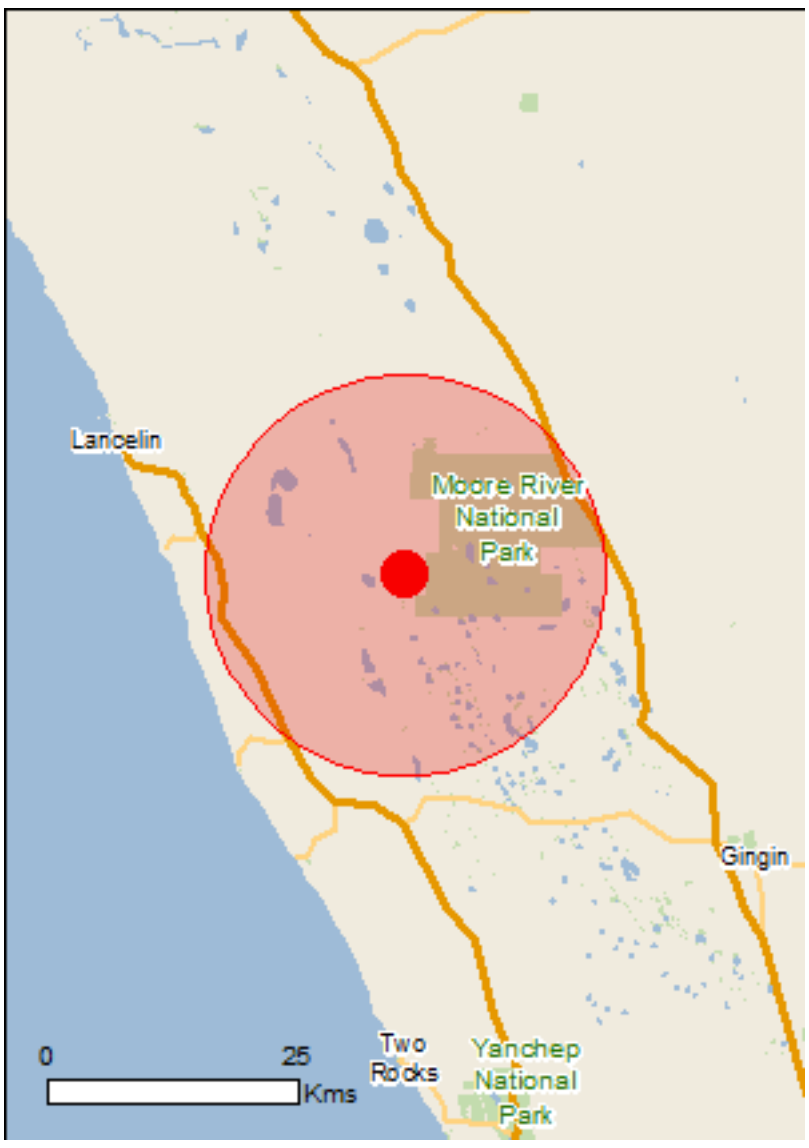
EPBC Act Protected Matters Report

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

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

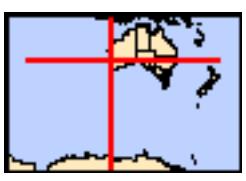
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 20/09/21 15:23:08



Coordinates

Buffer: 20.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	29
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	8
Regional Forest Agreements:	None
Invasive Species:	22
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Community known to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Fish		
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat may occur within area
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat known to occur within area
Asterolasia nivea Bindoon Starbush [8225]	Vulnerable	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [88881]	Endangered	Species or species habitat may occur within area
Chorizema varium Limestone Pea [16981]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat known to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat known to occur within area
Paracaleana dixonii Sandplain Duck Orchid [86882]	Endangered	Species or species habitat known to occur within area
Ptychosema pusillum Dwarf Pea [11268]	Vulnerable	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area
Reptiles		
Pseudemydura umbrina Western Swamp Tortoise [1760]	Critically Endangered	Translocated population known to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Gingin Stock Route	WA
Moore River	WA
Moore River	WA
Nabaroo	WA
Namming	WA
Sand Spring Well	WA
South Mimegarra	WA
Unnamed WA21164	WA

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis		
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis		
Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Karakin Lakes	WA

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.128 115.59159

Acknowledgements

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

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

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

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

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

APPENDIX C – DBCA DESKTOP (PRE-SURVEY) SIGNIFICANT FLORA

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Chorizema varium	EN	T	Low, erect to spreading shrub growing to 0.3 m high with long, hairy branches. Produces flowers with yellow, orange and red parts in erect, dense clusters from September to October (possibly June).	Sandy soil. Coastal heath with limestone, hills and outcrops.	**May occur** - Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2, 3
Drakaea elastica	EN	T	Tuberous, perennial herb growing to 0.1-0.3 m high with a single bright green, glossy, prostrate heart-shaped leaf. Produces distinctive flower with red and green-yellow parts from October to November.	Bare patches of white or grey sandy soils. Low-lying situations adjoining winter-wet swamps.	**May occur** - Suitable habitat. Previous specimen located approximately 7 km from survey area.	1, 2, 3
Lepidosperma rostratum	EN	T	Rhizomatous, tufted perennial grass-like sedge growing to 0.5 m high. Produces brown flowers in narrow, spike-like inflorescence and fruits in June to August.	Peaty sand, sand, clayey soils. Winter wet swamps.	**May occur** - Suitable habitat. Previous specimen located approximately 8 km from survey area.	1, 2, 3
Paracaleana dixonii	EN	T	Tuberous perennial herb growing to 0.2 m high with single, linear leaf. Produces 1-2 distinct flower with green, brown and yellow parts from October to January.	Grey sand, sometimes with gravel. Flats and slopes.	**May occur** - Suitable habitat. Previous specimen located approximately 14 km from survey area.	1, 2, 3
Anigozanthos viridis subsp. *terraspectans*	VU	T	Small, rhizomatous perennial herb growing to 0.2 m high. Produces paw like yellow-green flowers from August to December on 0.1-0.15 m stems. Distinguished from *A. v.* ssp. *virdis* by having shorter flowering stems and smaller, narrower flowers.	Grey-yellow sand, clay loam soils. Winter wet depressions and drainage lines.	**May occu**r - Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2, 3
Eucalyptus argutifolia	VU	T	Mallee with smooth grey to pale coppery bark growing to 2-4 m high. Produces white flowers from March to April.	Grey sand soil. Limestone outcrops, ridges and breakaways.	**Likely to occur** - Suitable habitat. Previous specimen located approximately 12 km from survey area.	1, 2, 3
Banksia mimica		T	Prostrate, lignotuberous shrub growing to 0.15-0.4 m high with leaves growing up to 0.4 m long. Produces yellow-brown flowers from December to February.	White or grey sand, sandy loam soils over laterite. Slopes and flats.	**May occur** - Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Darwinia acerosa		T	Densly branched, spreading, compact shrub growing to 0.6 m high and 1 m wide with whitish branchlets and crowded leaves. Produces densely	Sandy clay and gravelly soils. Hills, outcrops and slopes associated with granite.	**Unlikely to occur** - Unsuitable habitat.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
			clustered flower heads of yellowish-green and red colour from August to November.			
Darwinia carnea		T	Spreading shrub, 0.2-0.45 m high. Produces green & red flowers, Oct to Dec.	Lateritic loam & gravel.	**Unlikely to occur** - Unsuitable habitat.	1, 2
Macarthuria keigheryi		T	Small, erect shrub growing to 0.4 m high with bright yellow to green stems. Leaves mainly at the base of stems and on young growth. Produces flowers with white and green parts from September to December and February to March.	Open patches of white or grey sandy soil. Winter wet depressions, jarrah and banksia woodlands.	**May occur** - Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Marianthus paralius		T	Prostrate, scrambling to climbing, woody shrub with twining stems. Produces red flowers from September to November.	White sandy soil over limestone. Limestone ridges, coastal cliffs and limestone outcropping.	**May occur** - Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Babingtonia delicata		P1	No available information.	No available information.	**Unlikely to occur -** Insufficient information.	1
Baeckea sp. Limestone (N. Gibson & M.N. Lyons 1425)		P1	Compact shrub growing to 1.2 m high. Produces pink or pale pink to white flowers from September to December.	Grey, yellow sandy soil with limestone. Hills and outcrops.	**May occur** - Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Grevillea evanescens		P1	Erect, robust shrub growing to 3-4 m high. Produces red flowers from July to November.	Brown clayey loam, sandy loam soils. Winter wet depressions and drainage lines, swamps.	**May occur** - Suitable habitat. Previous specimen located approximately 5 km from survey area.	1, 2
Gyrostemon sp. Mogumber (T.J. Hawkeswood 250)		P1	No available information.	No available information.	**Unlikely to occur -** Insufficient information.	1, 2
Dampiera tephrea		P2	Erect perennial herb or shrub growing to 0.6 m high. Produces blue/purple flowers from August to October.	Sand, gravelly loam soils often over limestone. Flats, sloping breakaways, riverbanks.	**May occur** - Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2
Eryngium pinnatifidum subsp. Umbraphilum (G.J. Keighery 13967)		P2	Tuberous, perennial herb growing to 0.5 m high. Produces blue or white flowers from October to November.	Sandy clay soil. Wetlands, winter wet flats.	**May occur** - Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2
Goodenia xanthotricha		P2	Erect shrub growing to 0.9 m high. Produces blue flowers from November to March.	Sandy clay, sand. Hilltops, slopes and flats, sometimes with laterite rocks.	**Likely to occur** - Suitable habitat. Previous specimen located approximately 11 km from survey area.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Hakea oligoneura		P2	Densly branched shrub growing to 1.5-2 m high. Produces white flowers from August to September.	Grey-brown sandy soil with limestone. Ridges, limestone outcrops, slopes.	**Likely to occur** - Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Haloragis aculeolata		P2	Slender erect perennial herb growing to 0.4 m high. Produces green flowers from September to December.	Sand, loam or clay soils, sometimes over limestone. Winter-wet areas, flats and slopes.	**May occur** - Suitable habitat. Previous specimen located approximately 18 km from survey area.	1
Hypocalymma sp. Cataby (G.J. Keighery 5151)		P2	Erect, spreading shrub, 0.5-1 m high, to 1 m wide. Produces white flowers, Aug.	Grey sand.	**May occur** - Suitable habitat. Previous specimen located approximately 9 km from survey area.	1, 2
Lepyrodia curvescens		P2	Dioecious, shortly creeping, tufted rhizomatous herb growing to 0.24-0.4 m high. Produces dark red-purple flowers from September to November.	Grey sandy loam, sand, clayey sand soils with laterite. Seasonally inundated swampland, low rises and slopes.	**May occur** - Suitable habitat. Previous specimen located approximately 18 km from survey area.	1
Leucopogon squarrosus subsp. trigynus		P2	Erect shrub growing to 0.7 m high. Produces white flowers from June to October.	Sandy soil. Low-lying flats and slopes.	**Likely to occur** - Suitable habitat. Previous specimen located approximately 9 km from survey area.	1, 2
Schoenus loliaceus		P2	Small, annual sedge growing to 0.06 m high.	Sandy soils. Winter-wet depressions.	**May occur** - Suitable habitat. Previous specimen located approximately 18 km from survey area.	1
Scholtzia laciniata		P2	No available information.	No available information.	**Unlikely to occur** - Insufficient information.	1
Stylidium sp. Moora (J.A. Wege 713)		P2	No available information.	No available information.	**Unlikely to occur** - Insufficient information.	1, 2
Tetratheca hirsuta subsp. *boonanarring*		P2	Thin multi stemmed spreading sub-shrub growing to 0.6 m high. Produces pink/lilac flowers from September to October.	Sandy soil with laterite. Hills, slopes and flats.	**Unlikely to occur -** Unsuitable habitat.	1
Acacia drummondii subsp. *affinis*		P3	Erect shrub growing between 0.3-1 m high. Produces golden-yellow flowers in long cylindrical heads from July to December.	Sandy loam soil. Laterite plateaus and hillsides.	**Unlikely to occur** - Unsuitable habitat.	1, 2
Allocasuarina grevilleoides		P3	Lignotuberous shrub growing to 0.15-0.4 m high. Dioecious, flowers from September to December.	Brown sandy loam soil with laterite gravel. Hilltops, outcrops, slopes and flats.	**Unlikely to occur -** Unsuitable habitat.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Arnocrinum drummondii		P3	Rhizomatous, perennial, herb, 0.15-0.5 m high. Produces purple flowers, Sep to Dec.	White or yellow sand.	**May occur** - Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Austrostipa sp. Cairn Hill (M.E. Trudgen 21176)		P3	Erect, tufted perennial grass growing to 0.6 m high. Flowering unknown.	Yellow-brown sand, loam soils. Slopes and valley floors.	**Unlikely to occur -** Unsuitable habitat.	1
Babingtonia urbana		P3	Erect to sprawling shrub growing to 0.5 m high. Produces pink flowers from October to March.	Brown clay loam, sandy soils. Flats and winter wet depressions.	**May occur** - Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Banksia dallanneyi subsp. pollosta		P3	Prostrate, sprawling, lignotuberous shrub growing to 0.3 m high. Produces flowers with brown, yellow and orange parts from August to September.	Grey, yellow sandy soil. Hilltops, slopes and flats.	**May occur** - Suitable habitat. Previous specimen located approximately 8 km from survey area.	1, 2
Beyeria cinerea subsp. *cinerea*		P3	Low spreading shrubs to 30cm, narrow lime green leaves with pale underside and tuberculate fruits.	Limestone ridges, slopes and hilltops, sand over limestone	**Unlikely to occur -** Unsuitable habitat.	1, 2
Conostylis bracteata		P3	Tufted, rhizomatous perennial grass like herb growing to 0.2-0.4 m high. Produces yellow flowers from August to November.	Sandy soil. Dunes, sometimes with limestone outcropping.	**May occur** - Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Desmocladus biformis		P3	Rhizomatous, densely tufted perennial, herb (sedge-like), 0.1-0.2 m high. Flowers Sep to Oct.	Sand, sandy clay, lateritic soils. Dry sites.	**May occur** - Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Dillwynia dillwynioides		P3	Decumbent or erect shrub growing between 0.3-1.2 m high. Produces flowers with red, orange and yellow parts from August to December.	Sand, loam, clay soils. Seasonally wet depressions, wetlands.	**May occur** - Suitable habitat. Previous specimen located approximately 10 km from survey area.	1, 2
Haemodorum loratum		P3	Bulbaceous, erect perennial herb growing between 0.45-1.2(-2) m high. Produces black-dark green flowers from October to November.	Sand. Slopes and flats.	**May occur** - Suitable habitat. Previous specimen located approximately 12 km from survey area.	1, 2
Hensmania stoniella		P3	Tufted, stilt-rooted perennial, herb, 0.1-0.2 m high. Produces yellow-cream-white flowers, Sep to Nov.	White, grey or lateritic sand, often winter-wet.	**May occur** - Suitable habitat. Previous specimen located approximately 14 km from survey area.	1, 2
Hibbertia leptotheca		P3	Small shrub growing to 0.3-0.5 m high. Produces yellow flowers from August to October.	Sand with limestone. Limestone ridges, outcrops, slopes and dunes.	**May occur** - Suitable habitat. Previous specimen located approximately 20 km from survey area.	1

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Isopogon autumnalis		P3	Erect multi stemmed shrub growing to 0.5 - 1 m high. Produces yellow flowers from February to June.	White, grey, yellow sandy soil with laterite gravel. Flats and slopes, rocky.	**Likely to occur** - Suitable habitat. Previous specimen located approximately 12 km from survey area.	1
Isotropis cuneifolia subsp. glabra		P3	Rhizomatous perennial herb or shrub growing to 0.2 m high. Produces flowers with yellow, red and orange parts, with distinct venation on the back of the flower, from August to October.	Sand, brown/black clay loam soils. Winter-wet flats, swamps and low rises.	**May occur** - Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Leucopogon sp. Yanchep (M. Hislop 1986)		P3	Erect shrub, 0.15-1 m high, to 0.6 m wide. Produces white/pink flowers, Apr to Jun or Sep.	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	**Likely to occur** - Suitable habitat. Previous specimen located approximately 4 km from survey area.	1, 2
Persoonia rudis		P3	Erect, often spreading shrub growing to 1 m high. Produces yellow flowers from September to December.	Sandy soil. Hills, slopes and flats, often associated with laterite.	**May occur** - Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Petrophile biternata		P3	Stout, rigid, non-lignotuberous shrub, 0.8-1.5 m high. Produces yellow/cream-yellow flowers, Aug to Oct.	Yellow/grey sand & gravel, laterite, quartzite soils. Lateritic ridges, plains.	**May occur** - Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Phlebocarya pilosissima subsp. pilosissima		P3	Compactly tufted, rhizomatous perennial grass-like shrub growing to 0.15-0.4 m high. Produces cream-white flowers from August to October.	White or grey sandy soil, sometimes with lateritic gravel. Slopes.	**May occur** - Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Pimelea calcicola		P3	Erect to spreading shrub growing to 0.2 to 1 m high. Produces white flowers with some pink from September to November.	Brown sandy loam, white-grey sandy soil associated with limestone. Coastal limestone ridges.	**May occur** - Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Platysace ramosissima		P3	Perennial, clumping, multi-stemmed herb growing to 0.3 m high. Produces cream-white flowers from December to January.	Sand, sandy clay soils. Seasonally wet flats, slopes.	**May occur** - Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Sarcozona bicarinata		P3	Herbaceous succulent shrubs to 0.1 m high. Produces white flowers in August.	White or grey sand over limestone	**May occur** - Suitable habitat. Previous specimen located approximately 20 km from survey area.	1
Stylidium maritimum		P3	Caespitose perennial, herb, 0.3-0.7 m high, Leaves tufted, linear to narrowly oblanceolate, 10-40 cm long, 1-5.5 mm wide, apex acute to mucronate, margin involute, glabrous. Membraneous scale leaves present at base of mature leaves. Scape	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	**May occur** - Suitable habitat. Previous specimen located approximately 20 km from survey area.	1

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
			glandular throughout. Inflorescence paniculate. Produces white/purple flowers, Sep to Nov.			
Stylidium nonscandens		P3	Erect perennial, herb, 0.18-0.46 m high, Leaves in whorls, linear, 0.2-4.2 cm long, 0.4-1.2 mm wide, apex subacute to acute, margin entire, glabrous. Scape glabrous. Inflorescence racemose. Produces pink flowers, Sep to Nov.	Sand over laterite. Hillslopes and crests. Banksia woodland, heath, mallee shrubland.	**May occur** - Suitable habitat. Previous specimen located approximately 11 km from survey area.	1, 2
Tetratheca pilifera		P3	Spreading shrub growing to 0.3 m high. Produces purple flowers from August to October.	Brown clay loam soils. Outcrops, gullies and drainage lines.	**Unlikely to occur -** Unsuitable habitat.	1, 2
Thryptomene sp. Lancelin (M.E. Trudgen 14000)		P3	Shrub, ca 0.5 m high. Fl. pink, Sep.	Calcareous sand.	**May occur** - Suitable habitat. Previous specimen located approximately 17 km from survey area.	1
Anigozanthos humilis subsp. *chrysanthus*		P4	Rhizomatous perennial herb growing to 0.4 (0.8) m high. Produces yellow paw like flowers from July to October.	Grey, yellow sandy soil. Flats and undulating plains.	**May occur** - Suitable habitat. Previous specimen located approximately 10 km from survey area.	1, 2
Caladenia speciosa		P4	Tuberous perennial herb growing to 0.2 m high with single, hairy, erect leaf 15-25 cm long. Produces up to 3 white flowers with red tinges from September to October.	Sand and loamy soils. Slopes and flats, swampy areas.	**May occur** - Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Calothamnus accedens		P4	Erect and slender shrub growing to 2 m high. Produces pink-red flowers from July to January.	Brown sandy loam soil. Hilltops and slopes.	**Unlikely to occur -** Unsuitable habitat.	1, 2
Calothamnus pachystachyus		P4	Erect, much branched, often straggly shrub growing between 0.6-1.7 m high with twisting foliage. Produces red flowers from August to October.	Sandy loam, sandy clay, lateritic gravel. Ridges, breakaways and slopes.	**Unlikely to occur -** Unsuitable habitat.	1, 2
Conostylis pauciflora subsp. *euryrhipis*		P4	Dense, rhizomatous perennial grass like herb growing to 0.2 m high with sinuous leaves. Produces yellow flowers from August to October.	Sandy soil. Limestone ridges, dunes, slopes and flats.	**May occur**- Suitable habitat. Previous specimen located approximately 13 km from survey area.	1, 2
Dodonaea hackettiana		P4	Erect shrub or tree growing to 1-5 m high. Produces yellow flowers with green and red parts mainly between July to October.	Sandy soils, associated with limestone outcropping. Limestone ridges, slopes and dunes.	**Likely to occur** - Suitable habitat. Previous specimen located within survey area.	1, 2

Species	Cons. Status		Description	Preferred Habitat	Likelihood of Occurrence	Source
	EPBC	WA				
Eucalyptus macrocarpa subsp. *elachantha*		P4	(Spreading or sprawling mallee), 0.8-4 m high, bark smooth, grey over salmon pink. Produces red-pink flowers, Aug to Sep or Nov to Dec.	White or grey sand over laterite. Hillslopes, ridges, sandplains.	**May occur** - Suitable habitat. Previous specimen located approximately 16 km from survey area.	1, 2
Lepidobolus densus		P4	Rhizomatous, caespitose perennial sedge growing to 0.4 m high.	Sand, sometimes with lateritic gravel. Flats, slopes and sandplains.	**May occur** - Suitable habitat. Previous specimen located approximately 19 km from survey area.	1
Rumex drummondii		P4	Erect perennial herb growing to 0.9 m high. Produces cream flowers turning reddish from August to November.	Sandy clay, peaty soils. Winter-wet areas, creeklines and disturbed areas.	**May occur** - Suitable habitat. Previous specimen located approximately 17 km from survey area.	1, 2
Schoenus griffinianus		P4	Small, tufted perennial grass-like herb growing to 0.1 m high. Produces brown flowers from September to October.	White/grey sandy soil. Undulating plains, depressions.	**May occur** - Suitable habitat. Previous specimen located approximately 14 km from survey area.	1, 2
Schoenus natans		P4	Aquatic annual (possibly short-lived perennial) sedge growing to 0.3 m high. Produces red-brown flowers from September to November.	Dark grey/brown clay. Seasonally inundated depressions, claypans and creeklines.	**Unlikely to occur** - Unsuitable habitat.	1, 2
Tripterococcus sp. Brachylobus (A.S. George 14234)		P4	Slender, erect, multi-stemmed perennial herb to 0.6 m high. Produces orange-yellow flowers from October to February.	Grey-white sand, peaty sand over clay soils. Winter wet flats, shallow depressions, dry flats and slopes.	**May occur** - Suitable habitat. Previous specimen located approximately 15 km from survey area.	1, 2
Verticordia lindleyi subsp. *lindleyi*		P4	Erect shrub growing to 0.2 to 0.75 m high. Produces pink flowers with white fringes from November to January (also known from May).	Sand, sandy clay soils. Winter-wet depressions.	**May occur** - Suitable habitat. Previous specimen located approximately 6 km from survey area.	1, 2
Verticordia paludosa		P4	Erect shrub growing to 0.9 m high. Produces pink-white flowers from January to May.	Sand, peaty sand and gravelly clayey sandy soils. Flats, slopes and winter-wet low-lying areas.	**May occur** - Suitable habitat. Previous specimen located approximately 6 km from survey area.	1, 2

Sources of information: 1 (DBCA, DBCA 2021c), 2 (NatureMap, DBCA 2021b), 3 (PMST, DAWE 2021d)

APPENDIX D – DBCA DESKTOP (PRE-SURVEY) SIGNIFICANT FAUNA

Species	Significance	Preferred Habitat	Pre-Survey Expected Occurrence	Source
FISH				
Nannatherina balstoni (Balston's Pygmy-perch)	CS1 (VU)	Near-coastal streams, lakes and wetlands	out of range	3
REPTILES				
Ctenotus gemmule (Jewelled Sand-plain Skink	CS2 (P3)	Sandplains supporting heath with banksia or mallee woodlands	resident	4
Neelaps calonotos (Black-striped Snake)	CS2 (P3)	Sandy soils supporting heath and banksia/eucalypt woodland	resident	1
Lerista christinae (Bold-striped Slider)	CS3	Heath and Banksia woodlands	resident	4
Morelia spilota imbricata (Carpet Python (south-west population))	CS3	Diverse, often associated with rocks and/or fallen timber	resident	2
BIRDS				
Actitis hypoleucos (Common Sandpiper)	CS1 (M, S5)	Marine and inland shorelines	no suitable habitat	3
Apus pacificus (Fork-tailed Swift)	CS1 (M, S5)	Aerial	irregular visitor	1,3
Botaurus poiciloptilus (Australasian Bittern)	CS1 (EN, S2)	Swamps, streams with extensive rushbeds	no suitable habitat	1
Calidris acuminata (Sharp-tailed Sandpiper)	CS1 (M, S5)	Coastal and interior wetlands; often freshwater	no suitable habitat	1, 3
Calidris canutus (Red Knot)	CS1 (EN)	Tidal mudflats	no suitable habitat	1, 3
Calidris ferruginea (Curlew Sandpiper)	CS1 (M, S5)	Coastal and inland mudflats	no suitable habitat	1, 3
Calidris melanotos (Pectoral Sandpiper)	CS1 (M, S5)	Coastal and inland swamps	no suitable habitat	1, 3
Calyptorhynchus banksii naso (Forest Red-tailed Black-Cockatoo)	CS1 (VU, S3[v])	Eucalypt forests and woodlands	irregular visitor	1,2,3
Calyptorhynchus latirostris (Carnaby's Black-Cockatoo)	CS1 (EN, S2[e])	Sandplain banksia/eucalypt woodlands	regular visitor	1,2,3
Calyptorhynchus baudinii (Baudin's Black-Cockatoo)	CS1 (VU, S2[e])	Karri and Marri forests	vagrant	1
Falco peregrinus (Peregrine Falcon)	CS1 (S7)	Diverse, nesting often on cliffs or in large trees	resident	1
Haliaeetus leucogaster (White-bellied Sea-Eagle)	CS1 (M, S5)	Coastal seas, large rivers, lakes	no suitable habitat	1, 3
Leipoa ocellata (Malleefowl)	CS1 (Vu)	Dry inland scrub, dense heath, mallee	out of range	3

Species	Significance	Preferred Habitat	Pre-Survey Expected Occurrence	Source
Limosa lapponica (Bar-tailed Godwit)	CS1 (M, S5)	Tidal flats	no suitable habitat	1, 3
Motacilla cinerea (Grey Wagtail)	CS1 (M)	Diverse, near water	out of range	3
Numenius madagascariensis (Eastern Curlew)	CS1 (M, S5)	Coastal estuaries, mudflats, mangroves	no suitable habitat	3
Pandion cristatus (Eastern Osprey)	CS1 (M, S5)	Rivers, estuaries, mangroves, coastal islands	no suitable habitat	1,2,3
Plegadis falcinellus (Glossy Ibis)	CS1 (M, S5)	Freshwater wetlands, damp paddocks	no suitable habitat	1,2
Recurvirostra novaehollandiae (Australian Red-necked Avocet)	CS1 (M, S5)	Fresh to brackish inland wetlands	no suitable habitat	1,2
Sterna dougallii (Roseate Tern)	CS1 (M)	Oceanic	no suitable habitat	1,3
Sternula nereis (Australian Fairy Tern)	CS1 (V)	Coasts, estuaries	out of range	1,3
Tringa nebularia (Common Greenshank)	CS1 (M, S5)	Mudflats, shallow inland water	no suitable habitat	1,2,3
Ninox connivens (Barking Owl)	CS2 (P2, WR)	Eucalypt forests and woodlands	vagrant	4
Tyto novaehollandiae (Masked Owl)	CS2 (P2, WR)	Eucalypt forests and woodlands	vagrant	4
Lophoictinia isura (Square-tailed Kite)	CS3 (WR)	Open forests, heathlands, scrub	regular visitor	1
Platycercus icterotis (Western Rosella)	CS3 (WR)	Open eucalypt forests and woodlands	irregular visitor	1,2
Stipiturus malachurus (Southern Emu-wren)	CS3 (HS)	Low, dense heath	regular visitor	1
Malurus pulcherrimus (Blue-breasted Fairy-wren)	CS3 (HS)	Heath, mallee and woodlands with dense understorey	out of range	1
Malurus elegans (Red-winged Fairy-wren)	CS3 (HS)	Dense riparian thickets	out of range	1
Myiagra inquieta (Restless Flycatcher)	CS3 (HS)	Open forests, woodlands	irregular visitor	1,2
MAMMALS				
Dasyurus geoffroii (Chuditch)	CS1 (V, S3[v])	Forest, woodlands, often associated with rocky areas	vagrant	2,3
Parantechinus apicalis (Dibbler)	CS1 (E)	Dense heath	locally extinct	3
Macrotis lagotis (Bilby, Dalgyte)	CS1 (V, S3), LE	Diverse woodlands, shrubland and grasslands on sand to sandy-loam	locally extinct	1,2
Cercartetus concinnus (Western Pygmy-possum)	CS3 (LS)	Eucalypt forests, woodlands and mallee	resident	4
Hydromys chrysogaster (Rakali, Water-Rat)	CS2 (P4)	Natural or man-made freshwater bodies	irregular visitor	2
Notamacropus irma (Brush Wallaby)	CS2 (P4)	Banksia woodland and eucalypt forests to woodlands with dense understorey	resident	1,2

Species	Significance	Preferred Habitat	Pre-Survey Expected Occurrence	Source
Isoodon fusciventer (Quenda)	CS2 (P5)	Dense heaths and understorey around wetlands or banksia/jarrah woodlands	vagrant	4
Mormopterus kitcheneri (Western Freetail-Bat)	CS3 (LS)	Dry sclerophyll forest or heath, mallee woodland	resident	4
Pseudomys albocinereus (Noodji, Ash-grey Mouse)	CS3 (LS)	Banksia woodlands and heaths on sand	Resident	1,2
Sminthopsis 'dolichura' (Little Dunnart)	CS3 (LS)	Banksia woodlands with well-developed understorey	resident	4
Sminthopsis fuliginosus (Grey-bellied Dunnart)	CS3 (LS)	Banksia woodlands with well-developed understorey	resident	4
Tarsipes rostratus (Honey Possum)	CS3 (LS)	Species-rich proteaceous woodlands and heaths	resident	4
INVERTEBRATES				
Hesperocolletes douglasi (short-tongued bee)	CS1 (S3[Ex])	Banksia woodland	resident	1
Hylaeus globuliferus (Woollybush Bee)	CS2 (P3)	Banksia woodland	resident	2
Glossurocolletes bilobatus (short-tongued bee)	CS2 (P2)	Banksia woodland	resident	1
Leioproctus contrarius (short-tongued bee)	CS2 (P3)	Banksia woodland	resident	1,2
Synemon gratiosa (Graceful Sun-Moth)	CS2 (P4)	Banksia woodland and coastal heath; dependent on few food-plant species (*Lomandra* spp.)	irregular visitor	2
Antichiropus UBS2 (millipede)	CS3 (SRE)	Banksia woodland	resident	4
Aname mellosa group (spider)	CS3 (SRE)	Banksia woodland	resident	4
Kwonkan sp. (spider)	CS3 (SRE)	Banksia woodland	resident	4

Source: 1 (Atlas of Living Australia, ALA 2021), 2 (NatureMap, DBCA 2021b), 3 (PMST, DAWE 2021d), 4 (BCE database)

APPENDIX E – FLORA SPECIES BY VEGETATION UNIT

*denotes introduced (weed) species

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Anarthriaceae	*Lyginia barbata*	+	+			
Anarthriaceae	*Lyginia imberbis*	+		+		+
Apiaceae	*Actinotus leucocephalus*	+				
Apiaceae	*Daucus glochidiatus*					+
Apiaceae	*Xanthosia huegelii*	+			+	
Araliaceae	*Hydrocotyle tetragonocarpa*				+	
Araliaceae	*Trachymene pilosa*	+	+	+	+	+
Asparagaceae	*Dichopogon preissii*		+			
Asparagaceae	*Laxmannia ramosa*	+				
Asparagaceae	*Lomandra ?caespitosa*	+	+	+	+	
Asparagaceae	*Lomandra ?hermaphrodita*	+	+			
Asparagaceae	*Lomandra caespitosa*	+	+			
Asparagaceae	*Lomandra hermaphrodita*	+	+			
Asparagaceae	*Lomandra integra*		+			
Asparagaceae	*Lomandra micrantha* subsp. *micrantha*				+	
Asparagaceae	*Lomandra preissii*	+	+			
Asparagaceae	*Sowerbaea laxiflora*		+			
Asparagaceae	*Thysanotus manglesianus*	+				
Asparagaceae	*Thysanotus patersonii*		+			
Asparagaceae	*Thysanotus* sp.	+	+			
Asparagaceae	*Thysanotus sparteus*	+				
Asparagaceae	*Thysanotus thyrsoideus*	+	+			
Asparagaceae	*Xanthorrhoea brunonis*	+	+		+	
Asparagaceae	*Xanthorrhoea drummondii*	+				
Asparagaceae	*Xanthorrhoea preissii*	+	+	+	+	
Asphodelaceae	*Arnocrinum preissii*	+				
Asphodelaceae	*Corynotheca ?micrantha*	+				
Asphodelaceae	*Corynotheca micrantha*	+				
Asteraceae	**Arctotheca calendula*		+		+	+
Asteraceae	*Asteraceae* sp.				+	
Asteraceae	*Brachyscome bellidioides*	+				
Asteraceae	*Cotula coronopifolia*				+	
Asteraceae	**Erigeron bonariensis*					+
Asteraceae	*Hyalosperma cotula*			+		
Asteraceae	**Hypochaeris glabra*	+	+		+	+
Asteraceae	**Hypochaeris radicata*			+		
Asteraceae	*Lagenophora gracilis*	+	+			
Asteraceae	*Lagenophora huegelii*		+			+
Asteraceae	*Podotheca chrysantha*	+	+	+	+	
Asteraceae	*Podotheca gnaphalioides*	+	+			+
Asteraceae	*Pterochaeta paniculata*	+				
Asteraceae	*Quinetia urvillei*	+	+			+
Asteraceae	*Rhodanthe citrina*		+		+	
Asteraceae	*Siloxerus filifolius*		+	+	+	

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Asteraceae	*Siloxerus humifusus*	+	+		+	
Asteraceae	**Sonchus oleraceus*					+
Asteraceae	**Ursinia anthemoides*	+	+	+	+	+
Asteraceae	*Waitzia suaveolens* var. *suaveolens*	+	+		+	
Brassicaceae	**Brassica barrelieri* subsp. *oxyrrhina*					+
Brassicaceae	*Heliophila pusilla*				+	
Campanulaceae	*Lobelia rhytidosperma*	+				
Campanulaceae	*Lobelia tenuior*	+	+			
Campanulaceae	**Wahlenbergia capensis*	+	+			
Campanulaceae	*Wahlenbergia gracilenta*		+		+	
Caryophyllaceae	**Petrorhagia dubia*					+
Caryophyllaceae	**Silene gallica var. gallica*					+
Casuarinaceae	*Allocasuarina humilis*	+				
Celastraceae	*Tripterococcus brunonis*	+	+			
Centrolepidaceae	*Centrolepis* aff. *drummondiana*		+			
Centrolepidaceae	*Centrolepis alepyroides*				+	
Centrolepidaceae	*Centrolepis drummondiana*					+
Colchicaceae	*Burchardia congesta*	+	+		+	
Crassulaceae	*Crassula colorata*	+	+		+	
Crassulaceae	*Crassula colorata* var. *acuminata*	+				
Crassulaceae	*Crassula colorata* var. *colorata*		+			
Cupressaceae	*Callitris arenaria*					+
Cupressaceae	*Callitris pyramidalis*				+	
Cyperaceae	*Chaetospora curvifolia*	+	+	+		
Cyperaceae	*Cyathochaeta avenacea*		+	+	+	
Cyperaceae	*Cyperaceae* sp. 1					+
Cyperaceae	*Cyperaceae* sp. 2		+			+
Cyperaceae	*Gahnia trifida*				+	
Cyperaceae	*Isolepis marginata*	+	+	+		
Cyperaceae	*Lepidosperma leptostachyum*	+	+			
Cyperaceae	*Lepidosperma pubisquameum*	+				
Cyperaceae	*Lepidosperma* sp.				+	
Cyperaceae	*Lepidosperma squamatum*		+			
Cyperaceae	*Machaerina juncea*					+
Cyperaceae	*Mesomelaena pseudostygia*	+	+			
Cyperaceae	*Schoenus caespitosus*	+	+		+	
Cyperaceae	*Schoenus clandestinus*	+				
Cyperaceae	*Schoenus curvifolius*	+				
Cyperaceae	*Schoenus laevigatus*	+			+	+
Cyperaceae	*Schoenus latitans*	+				
Cyperaceae	*Schoenus pedicellatus*		+		+	
Cyperaceae	*Schoenus pleiostemoneus*	+				
Cyperaceae	*Schoenus* sp.		+			
Cyperaceae	*Schoenus unispiculatus*	+				
Dasypogonaceae	*Calectasia narragara*	+				
Dilleniaceae	*Hibbertia ?huegelii*	+				
Dilleniaceae	*Hibbertia crassifolia*	+	+			

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Dilleniaceae	*Hibbertia huegelii*	+				
Dilleniaceae	*Hibbertia hypericoides*	+	+			+
Dilleniaceae	*Hibbertia hypericoides* subsp. *hypericoides*	+	+			
Dilleniaceae	*Hibbertia stellaris*					+
Dilleniaceae	*Hibbertia striata*	+	+			
Dilleniaceae	*Hibbertia subvaginata*	+	+	+		
Droseraceae	*Drosera ?erythrorhiza*	+	+			
Droseraceae	*Drosera ?minutiflora*	+				+
Droseraceae	*Drosera closterostigma*	+	+	+		
Droseraceae	*Drosera eneabba*	+	+			
Droseraceae	*Drosera erythrogyne*			+		
Droseraceae	*Drosera erythrorhiza*	+	+			
Droseraceae	*Drosera glanduligera*		+		+	+
Droseraceae	*Drosera humilis*	+				
Droseraceae	*Drosera macrantha*	+	+			
Droseraceae	*Drosera menziesii*	+	+	+	+	
Droseraceae	*Drosera miniata*	+				
Droseraceae	*Drosera closterostigma*	+				
Ericaceae	*Conostephium minus*			+		
Ericaceae	*Conostephium pendulum*	+	+	+		
Ericaceae	*Ericaceae* sp.	+				
Ericaceae	*Leucopogon ?borealis*		+			
Ericaceae	*Leucopogon cinereus*		+			
Ericaceae	*Leucopogon conostephioides*	+		+		
Ericaceae	*Leucopogon polymorphus*	+	+	+		
Ericaceae	*Lysinema ?pentapetalum*	+				
Ericaceae	*Lysinema elegans*	+	+			
Ericaceae	*Styphelia ?propinqua*		+			
Ericaceae	*Styphelia conostephioides*	+				
Ericaceae	*Styphelia erubescens*	+	+			
Ericaceae	*Styphelia xerophylla*	+	+			+
Euphorbiaceae	*Monotaxis grandiflora* var. *grandiflora*	+				
Euphorbiaceae	*Monotaxis occidentalis*		+			
Fabaceae	*?Aotus* sp.			+		
Fabaceae	*?Sphaerolobium linophyllum*		+			
Fabaceae	*Acacia applanata*	+			+	
Fabaceae	*Acacia auronitens*	+				
Fabaceae	*Acacia barbinervis* subsp. *borealis*		+			
Fabaceae	*Acacia pulchella*	+			+	
Fabaceae	*Acacia pulchella* var. *glaberrima*	+		+		+
Fabaceae	*Acacia pulchella* var. *pulchella*			+		
Fabaceae	*Acacia saligna*		+		+	+
Fabaceae	*Acacia sessilis*	+				
Fabaceae	*Acacia sphacelata* subsp. *sphacelata*	+				
Fabaceae	*Acacia stenoptera*	+	+			
Fabaceae	*Bossiaea eriocarpa*	+	+	+		
Fabaceae	*Daviesia ?incrassata*		+			

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Fabaceae	*Daviesia divaricata* subsp. *divaricata*	+				
Fabaceae	*Daviesia incrassata* subsp. *incrassata*	+	+			
Fabaceae	*Dillwynia dillwynioides*				+	
Fabaceae	*Dillwynia* sp.			+		
Fabaceae	*Euchilopsis linearis*		+	+		
Fabaceae	*Fabaceae* sp.	+	+			
Fabaceae	*Gastrolobium linearifolium*	+				
Fabaceae	*Gompholobium* sp.			+		
Fabaceae	*Gompholobium tomentosum*	+	+	+	+	
Fabaceae	*Hovea trisperma*	+	+			+
Fabaceae	*Jacksonia ?floribunda*	+				
Fabaceae	*Jacksonia ?sternbergiana*	+				
Fabaceae	*Jacksonia foliosa*	+				
Fabaceae	*Jacksonia furcellata*		+	+	+	
Fabaceae	*Jacksonia nutans*	+				+
Fabaceae	*Jacksonia sternbergiana*	+	+	+		
Fabaceae	**Trifolium dubium*					+
Fabaceae	**Trifolium* sp.					+
Geraniaceae	**Erodium botrys*					+
Goodeniaceae	*?Goodeniaceae* sp.	+				
Goodeniaceae	*Dampiera linearis*	+	+			
Goodeniaceae	*Goodenia glareicola*	+				
Goodeniaceae	*Lechenaultia floribunda*	+				
Goodeniaceae	*Lechenaultia stenosepala*	+	+	+		
Goodeniaceae	*Pyrorchis nigricans*		+			
Goodeniaceae	*Scaevola repens*		+			
Goodeniaceae	*Scaevola repens var. repens*	+				
Haemodoraceae	*Anigozanthos humilis*	+				
Haemodoraceae	*Anigozanthos humilis* subsp. *humilis*	+	+			
Haemodoraceae	*Conostylis aculeata*	+	+			
Haemodoraceae	*Conostylis aurea*	+				
Haemodoraceae	*Conostylis juncea*	+	+	+	+	
Haemodoraceae	*Conostylis setigera*	+	+	+		
Haemodoraceae	*Conostylis setigera* subsp. *setigera*	+				
Haemodoraceae	*Conostylis* sp. 1		+			
Haemodoraceae	*Conostylis* sp. 2		+	+		
Haemodoraceae	*Conostylis* sp. 3		+			
Haemodoraceae	*Conostylis teretifolia* subsp. *teretifolia*	+				
Haemodoraceae	*Haemodorum discolor*	+				
Haemodoraceae	*Haemodorum laxum*	+				
Haemodoraceae	*Haemodorum spicatum*	+	+			
Haemodoraceae	*Haemodorum venosum*	+				
Haemodoraceae	*Phlebocarya ciliata*	+	+	+	+	+
Haloragaceae	*Gonocarpus pithyoides*		+			
Hemerocallidaceae	*Caesia* sp.	+	+			
Hemerocallidaceae	*Chamaescilla corymbosa*				+	
Hemerocallidaceae	*Hensmania turbinata*		+			

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Hemerocallidaceae	*Tricoryne elatior*	+	+		+	
Hemerocallidaceae	*Tricoryne tenella*	+	+			
Iridaceae	**Gladiolus caryophyllaceus*					
Iridaceae	**Gladiolus* sp.					+
Iridaceae	*Patersonia ?occidentalis*			+		
Iridaceae	*Patersonia occidentalis*	+	+			
Iridaceae	*Patersonia occidentalis* var. *occidentalis*	+	+	+		
Lamiaceae	*Hemiandra linearis*	+				
Lamiaceae	*Hemiandra* sp.	+				
Lauraceae	*Cassytha glabella* forma *dispar*	+				+
Lauraceae	*Cassytha racemosa*	+	+	+		
Lauraceae	*Cassytha* sp.	+				
Loganiaceae	*Phyllangium divergens*				+	
Loganiaceae	*Phyllangium paradoxum*	+	+	+	+	
Loganiaceae	*Phyllangium* sp.	+	+			
Loranthaceae	*Nuytsia floribunda*	+	+			
Macarthuriaceae	*Macarthuria australis*	+				
Myrtaceae	*?Calytrix* sp.		+			
Myrtaceae	*Astartea ?affinis*			+	+	
Myrtaceae	*Calothamnus hirsutus*	+				
Myrtaceae	*Calothamnus sanguineus*	+				
Myrtaceae	*Calytrix ?angulata*		+			
Myrtaceae	*Calytrix ?flavescens*	+				
Myrtaceae	*Calytrix ?fraseri*	+				
Myrtaceae	*Calytrix fraseri*	+	+	+		
Myrtaceae	*Calytrix* sp.	+	+			
Myrtaceae	*Corymbia calophylla*		+			
Myrtaceae	*Eremaea asterocarpa*	+				
Myrtaceae	*Eremaea asterocarpa* subsp. *asterocarpa*	+				
Myrtaceae	*Eremaea fimbriata*		+			
Myrtaceae	*Eremaea pauciflora* var. *lonchophylla*	+	+			
Myrtaceae	*Eremaea pauciflora* var. *pauciflora*	+	+			
Myrtaceae	*Eremaea* sp.	+				
Myrtaceae	*Eucalyptus rudis*					+
Myrtaceae	*Eucalyptus todtiana*	+	+			
Myrtaceae	*Hypocalymma angustifolium*		+		+	
Myrtaceae	*Hypocalymma angustifolium* subsp. Swan Coastal Plain		+	+	+	
Myrtaceae	*Kunzea glabrescens*		+		+	+
Myrtaceae	*Kunzea micrantha*				+	
Myrtaceae	*Kunzea micrantha* subsp. *micrantha*				+	+
Myrtaceae	*Leptospermum* sp.		+			
Myrtaceae	*Leptospermum spinescens*	+	+			
Myrtaceae	*Melaleuca ?clavifolia*	+				
Myrtaceae	*Melaleuca ?rhaphiophylla*					+
Myrtaceae	*Melaleuca clavifolia*	+	+	+		
Myrtaceae	*Melaleuca densiflora* var. *densiflora*	+				

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Myrtaceae	*Melaleuca incana* subsp. *incana*				+	+
Myrtaceae	*Melaleuca leuropoma*	+	+			
Myrtaceae	*Melaleuca preissiana*		+	+	+	+
Myrtaceae	*Melaleuca rhaphiophylla*				+	+
Myrtaceae	*Melaleuca seriata*		+			
Myrtaceae	*Melaleuca* sp.	+			+	
Myrtaceae	*Melaleuca teretifolia*					+
Myrtaceae	*Melaleuca viminea* subsp. *viminea*				+	+
Myrtaceae	*Pericalymma ellipticum*		+			
Myrtaceae	*Pericalymma ellipticum* subsp. indet			+		+
Myrtaceae	*Pericalymma ellipticum* var. *ellipticum*		+	+	+	
Myrtaceae	*Pericalymma ellipticum* var. *floridum*		+			
Myrtaceae	*Regelia ciliata*	+				
Myrtaceae	*Scholtzia* ?sp. Wongonderrah (M.E. & M.R. Trudgen 12000)	+				
Myrtaceae	*Scholtzia involucrata*	+	+			
Myrtaceae	*Scholtzia* sp.	+	+	+		
Myrtaceae	*Verticordia ?lindleyi*					+
Myrtaceae	*Verticordia densiflora*	+				
Myrtaceae	*Verticordia densiflora var. densiflora*					+
Myrtaceae	*Verticordia nitens*	+	+	+		
Orchidaceae	*?Thelymitra sp.*		+			
Orchidaceae	*Caladenia corynephora*		+			
Orchidaceae	*Caladenia flava*	+	+	+		+
Orchidaceae	*Caladenia sp.*	+			+	
Orchidaceae	*Diuris* sp.	+				
Orchidaceae	*Drakaea glyptodon*		+			
Orchidaceae	*Elythranthera brunonis*	+	+	+	+	+
Orchidaceae	*Leporella fimbriata*	+	+			
Orchidaceae	*Pterostylis ?dilatata*				+	
Orchidaceae	*Pterostylis dilatata*		+	+	+	
Orchidaceae	*Pterostylis recurva*	+			+	
Orchidaceae	*Pterostylis* sp.	+	+	+		
Orchidaceae	*Pyrorchis nigricans*	+				+
Orchidaceae	*Thelymitra benthamiana*				+	
Orchidaceae	*Thelymitra* sp.	+	+			
Orobanchaceae	**Bellardia trixago*					+
Phyllanthaceae	*Poranthera microphylla*	+				
Poaceae	**Aira caryophyllea*	+	+		+	+
Poaceae	**Aira cupaniana*		+		+	
Poaceae	*Amphipogon turbinatus*	+	+			
Poaceae	*Austrostipa compressa*	+	+	+	+	
Poaceae	*Austrostipa macalpinei*	+		+		
Poaceae	*Austrostipa* sp.	+				
Poaceae	**Avena fatua*					+
Poaceae	**Briza maxima*		+			+
Poaceae	**Briza minor*				+	

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Poaceae	**Bromus hordeaceus*					+
Poaceae	**Ehrharta calycina*		+			+
Poaceae	**Ehrharta longiflora*		+			+
Poaceae	**Eragrostis curvula*					+
Poaceae	*Neurachne alopecuroidea*	+				
Poaceae	*Poa porphyroclados*	+				
Poaceae	*Rytidosperma caespitosum*	+				
Poaceae	**Vulpia bromoides*				+	+
Poaceae	**Vulpia myuros*				+	
Polygalaceae	*Comesperma calymega*	+				
Polygalaceae	*Comesperma confertum*				+	
Polygalaceae	*Comesperma virgatum*	+				
Primulaceae	**Lysimachia arvensis*					+
Proteaceae	*Adenanthos cygnorum*	+	+	+		+
Proteaceae	*Adenanthos cygnorum* subsp. *cygnorum*	+	+	+		
Proteaceae	*Banksia ?laricina*		+	+		
Proteaceae	*Banksia attenuata*	+	+	+	+	
Proteaceae	*Banksia dallanneyi*		+	+		+
Proteaceae	*Banksia dallanneyi* subsp. *pollosta*					+
Proteaceae	*Banksia dallanneyi* var. *dallanneyi*			+	+	
Proteaceae	*Banksia ilicifolia*	+	+	+		
Proteaceae	*Banksia incana*		+	+		
Proteaceae	*Banksia littoralis*		+	+	+	
Proteaceae	*Banksia menziesii*	+	+	+		
Proteaceae	*Banksia nivea* subsp. *nivea*		+			
Proteaceae	*Banksia prionotes*	+	+		+	
Proteaceae	*Banksia telmatiaea*				+	+
Proteaceae	*Conospermum stoechadis*	+				
Proteaceae	*Conospermum stoechadis* subsp. *stoechadis*	+				
Proteaceae	*Hakea sulcata*				+	+
Proteaceae	*Hakea varia*				+	+
Proteaceae	*Petrophile brevifolia*	+				
Proteaceae	*Petrophile linearis*	+	+			
Proteaceae	*Petrophile macrostachya*	+				
Proteaceae	*Petrophile semifurcata*					+
Proteaceae	*Petrophile macrostachya*		+			
Proteaceae	*Proteaceae* sp.	+				
Proteaceae	*Stirlingia latifolia*	+	+	+		
Proteaceae	*Synaphea spinulosa*	+				
Proteaceae	*Synaphea spinulosa* subsp. *spinulosa*	+				
Restionaceae	*Alexgeorgea nitens*	+	+			
Restionaceae	*Chaetanthus aristatus*	+				+
Restionaceae	*Chordifex sinuosus*	+	+			
Restionaceae	*Desmocladus asper*	+				
Restionaceae	*Desmocladus fasciculatus*	+	+			
Restionaceae	*Desmocladus flexuosus*	+	+		+	
Restionaceae	*Desmocladus semiplanus*	+				

Family	Species	BaBmEt	BaBmMp	MpBaBm	MpCp	MrKgMt
Restionaceae	*Desmocladus virgatus*	+				
Restionaceae	*Hypolaena exsulca*	+	+	+	+	
Restionaceae	*Leptocarpus coangustatus*	+	+	+		+
Rubiaceae	*Opercularia hirsuta*	+				
Rubiaceae	*Opercularia spermacocea*	+	+	+	+	
Rubiaceae	*Opercularia vaginata*	+	+	+		+
Rutaceae	*Cyanothamnus ramosus subsp. anethifolius*			+		
Rutaceae	*Cyanothamnus subsessilis*	+				
Rutaceae	*Philotheca spicata*	+	+			
Santalaceae	*Leptomeria empetriformis*	+				
Stylidiaceae	*Levenhookia octomaculata*	+	+			
Stylidiaceae	*Levenhookia sp.*		+			
Stylidiaceae	*Levenhookia stipitata*	+				
Stylidiaceae	*Levenhookia octomaculata*		+			
Stylidiaceae	*Stylidiaceae* sp.	+				
Stylidiaceae	*Stylidium ?perpusillum*	+	+			
Stylidiaceae	*Stylidium ?schoenoides*	+				
Stylidiaceae	*Stylidium adpressum*	+				
Stylidiaceae	*Stylidium androsaceum*		+			
Stylidiaceae	*Stylidium araeophyllum*	+		+		
Stylidiaceae	*Stylidium crossocephalum*	+	+			
Stylidiaceae	*Stylidium diuroides*	+				
Stylidiaceae	*Stylidium ecorne*	+	+		+	
Stylidiaceae	*Stylidium miniatum*	+	+			
Stylidiaceae	*Stylidium neurophyllum*	+				
Stylidiaceae	*Stylidium perpusillum*		+			
Stylidiaceae	*Stylidium piliferum*		+			
Stylidiaceae	*Stylidium purpureum*	+	+		+	
Stylidiaceae	*Stylidium repens*	+	+	+	+	
Stylidiaceae	*Stylidium schoenoides*	+				
Stylidiaceae	*Stylidium* sp.	+	+			
Thymelaeaceae	*Pimelea sulphurea*	+	+			
Violaceae	*Hybanthus calycinus*	+				

APPENDIX F – QUADRAT DATA

Site C01

Date	4/10/2021	23/11/2021
Botanist	JA/NK	DR/MG
Quadrat Size	10 x 10 m	
NW Corner Coordinates	366378mE 6554519mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Moderate	
Landform	Low rise	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	15	
Bare Ground %	20	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	A few weeds	

NO REPRESENTATIVE PHOTO

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	6	25	+	+
Banksia menziesii	4.5	6	+	+
Daviesia divaricata subsp. *divaricata*	1.6	5	+	+
Eremaea pauciflora var. *pauciflora*	1.3	5	+	+
Hibbertia hypericoides	0.6	25	+	+
Mesomelaena pseudostygia	0.6	25	+	+
Acacia auronitens			+	+
Acacia stenoptera				+
Allocasuarina humilis				+
Anigozanthos humilis			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Burchardia congesta			+	+
Caladenia sp.			+	+
Calothamnus sanguineus			+	+
aChordifex sinuosus			+	+
Conospermum stoechadis subsp. *stoechadis*			+	+
Conostylis teretifolia subsp. *teretifolia*			+	+
Corynotheca micrantha			+	+
Crassula colorata var. *acuminata*			+	
Drosera ?erythrorhiza			+	
Drosera ?minutiflora			+	
Drosera macrantha			+	
Hibbertia striata			+	+
Hovea trisperma				+
Hybanthus calycinus			+	
Lepidosperma leptostachyum				+
Leporella fimbriata			+	
Leptospermum spinescens			+	+
Leucopogon polymorphus			+	+
Lyginia barbata			+	+
Macarthuria australis			+	+
Petrophile brevifolia				+
Petrophile brevifolia				+
Petrophile macrostachya			+	+
Phyllangium paradoxum				
Phyllangium sp.			+	
Podotheca gnaphalioides			+	
Pterochaeta paniculata			+	
Pterostylis sp.			+	+
Rytidosperma caespitosum				
Schoenus clandestinus			+	+
Siloxerus humifusus			+	
Stylidium ?perpusillum			+	+
Stylidium neurophyllum			+	+
Stylidium repens				
Styphelia xerophylla			+	+
Synaphea spinulosa			+	
Thysanotus sp.			+	+
Thysanotus sparteus				+
Trachymene pilosa			+	
Ursinia anthemoides			+	+
Petrophile brevifolia				+
Petrophile macrostachya			+	+
Phyllangium paradoxum				
Phyllangium sp.			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Podotheca gnaphalioides			+	+
Pterochaeta paniculata			+	+
Pterostylis sp.			+	+
Rytidosperma caespitosum				+
Schoenus clandestinus			+	+
Siloxerus humifusus			+	+
Stylidium ?perpusillum			+	
Stylidium neurophyllum			+	
Stylidium repens				
Styphelia xerophylla			+	
Synaphea spinulosa			+	+
Thysanotus sp.			+	+
Thysanotus sparteus				
Trachymene pilosa			+	+
**Ursinia anthemoides*			+	
Eucalyptus todtiana			Associated	Associated

Site C02

Date	4/10/2021	23/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	366158mE 6554317mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Gentle	
Landform	Sandy plain	
Soil Colour	Light brown/cream	
Soil Type	Sand	
Litter %	5	
Bare Ground %	5	
Fire Age	5-10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	15	+	+
Banksia menziesii	8	2	+	+
Xanthorrhoea preissii	1.5	5	+	+
Eremaea pauciflora var. *pauciflora*	1	15	+	+
Xanthorrhoea brunonis	1	1	+	+
Phlebocarya ciliata	0.3	2	+	+
Hibbertia subvaginata	0.2	4	+	+
Acacia barbinervis subsp. *borealis*			+	+
Bossiaea eriocarpa			+	+
Burchardia congesta			+	+
Calytrix ?angulata			+	+
Calytrix fraseri				+
Chaetospora curvifolia			+	+
Conostephium pendulum			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conostylis aculeata				+
Conostylis juncea			+	+
Desmocladus flexuosus			+	+
Drosera menziesii			+	+
Eremaea pauciflora var. *lonchophylla*			+	+
Gompholobium tomentosum			+	+
Hibbertia crassifolia			+	+
Hovea trisperma			+	+
Leptospermum spinescens			+	+
Lomandra caespitosa			+	+
Lyginia barbata			+	+
Melaleuca clavifolia			+	+
Mesomelaena pseudostygia				+
Patersonia occidentalis var. *occidentalis*			+	+
Pericalymma ellipticum var. *ellipticum*			+	+
Petrophile linearis			+	+
Philotheca spicata			+	+
Phyllangium paradoxum			+	+
Pimelea sulphurea				+
Scaevola repens				Associated
Stirlingia latifolia				Associated
Stylidium ecorne			+	+
Stylidium piliferum			+	+
Styphelia erubescens			+	+
Tricoryne tenella			+	+

Site C03

Date	4/10/2021	23/11/2021
Botanist	JA/NK	DR/MG
Quadrat Size	10 x 10 m	
NW Corner Coordinates	366494mE 6553985mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii*, *Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii*, *Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Moderate	
Landform	Low rise	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	40	
Bare Ground %	10	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia prionotes	7	35	+	
Eucalyptus todtiana	6	10	+	
Adenanthos cygnorum	2	3	+	
Eremaea pauciflora var. *pauciflora*	1.2	40	+	
Xanthorrhoea preissii	1.2	8	+	
Allocasuarina humilis	1	3	+	
Hibbertia striata	0.6	2	+	
Mesomelaena pseudostygia	0.5	3	+	
Hibbertia subvaginata	0.3	1	+	
Acacia pulchella var. *glaberrima*			+	+
Acacia stenoptera			+	+
Alexgeorgea nitens			+	
Bossiaea eriocarpa			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Burchardia congesta			+	+
Calectasia narragara			+	
Conostephium pendulum			+	+
Conostylis aurea			+	
Conostylis juncea			+	+
Conostylis teretifolia subsp. *teretifolia*			+	+
Daviesia incrassata subsp. *incrassata*			+	+
Drosera ?erythrorhiza			+	
Drosera macrantha			+	+
Gompholobium tomentosum				+
Hemiandra linearis				+
Hibbertia crassifolia			+	+
Hibbertia hypericoides			+	+
Hovea trisperma				+
Jacksonia foliosa			+	
Laxmannia ramosa			+	
Lepidosperma leptostachyum			+	
Leucopogon conostephioides			+	+
Lomandra hermaphrodita				+
Lyginia imberbis			+	+
Monotaxis grandiflora var. *grandiflora*			+	+
Nuytsia floribunda			+	Associated
Patersonia occidentalis			+	+
Philotheca spicata			+	+
Podotheca gnaphalioides			+	
Pterostylis sp.			+	
Scaevola repens var. *repens*			+	+
Schoenus clandestinus			+	
Schoenus curvifolius				+
Schoenus laevigatus			+	+
Scholtzia ?sp. Wongonderrah (M.E. & M.R. Trudgen 12000)			+	+
Stirlingia latifolia			+	
Stylidium crossocephalum				+
Stylidium neurophyllum			+	
Stylidium repens				+
Styphelia erubescens			+	
Synaphea spinulosa			+	+
Trachymene pilosa			+	
Tricoryne elatior			+	+
Tripterococcus brunonis				+

Site C04

Date	4/10/2021
Botanist	MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	366050mE 6553853mN
Vegetation Unit	MpMc - Low open forest of *Melaleuca preissiana* with scattered *Banksia littoralis* and areas of *Callitris pyramidalis* over mixed shrublands of *Hypocalymma angustifolium*, *Xanthorrhoea preissii* and *Kunzea micrantha* subsp. *micrantha* and *Banksia telmatiaea* over mixed dense herb/sedgeland.
Slope	Flat
Landform	Floodplain
Soil Colour	Black brown
Soil Type	Loam
Litter %	90
Bare Ground %	1
Fire Age	3-5 Years
Vegetation Condition	Excellent
Disturbances/Impacts	Seasonal inundation

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca rhaphiophylla	10	35	+	
Hypocalymma angustifolium subsp. Swan Coastal Plain	2.5	15	+	
Kunzea micrantha subsp. *micrantha*	2.5	15	+	
**Aira cupaniana*			+	
Astartea ?affinis			+	
Asteraceae sp.			+	
Banksia attenuata			+	
**Briza minor*			+	
Cotula coronopifolia			+	
**Hypochaeris glabra*			+	
Lepidosperma sp.			+	
Melaleuca incana subsp. *incana*			+	
Pterostylis dilatata			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Rhodanthe citrina		+	+	
Siloxerus humifusus		+	+	
**Ursinia anthemoides*		+	+	

Site C05

Date	4/10/2021	23/11/2021
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	366838mE 6553757mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Flat	
Landform	Low rise	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	20	
Bare Ground %	30	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	5	6	+	+
Banksia attenuata	1.6	1	+	+
Allocasuarina humilis	1.2	5	+	+
Eremaea pauciflora var. *pauciflora*	1	25	+	+
Styphelia xerophylla	0.7	10	+	+
Hibbertia hypericoides	0.5	10	+	+
Acacia sessilis			+	+
Adenanthos cygnorum subsp. *cygnorum*			+	+
Alexgeorgea nitens			+	+
Bossiaea eriocarpa			+	+
Burchardia congesta			+	+
Calectasia narragara			+	+
Calothamnus sanguineus			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Calytrix ?fraseri			+	+
Cassytha glabella forma *dispar*			+	+
Chaetospora curvifolia			+	+
Comesperma calymega			+	+
Conostephium pendulum			+	+
Conostylis aculeata				+
Conostylis aurea			+	+
Conostylis teretifolia subsp. *teretifolia*			+	+
Dampiera linearis			+	+
Drosera ?erythrorhiza			+	
Drosera ?minutiflora			+	
Drosera macrantha			+	+
Gompholobium tomentosum			+	+
Haemodorum discolor			+	+
Hemiandra linearis				+
Hibbertia striata			+	+
Hibbertia subvaginata				+
Jacksonia ?floribunda			+	+
Leptospermum spinescens			+	+
Leucopogon polymorphus			+	+
Melaleuca clavifolia			+	+
Mesomelaena pseudostygia			+	+
Monotaxis grandiflora var. *grandiflora*			+	+
Patersonia occidentalis				+
Petrophile linearis			+	+
Petrophile macrostachya			+	+
Pimelea sulphurea			+	+
Schoenus clandestinus			+	+
Stirlingia latifolia			+	+
Stylidium ?schoenoides			+	+
Stylidium diuroides			+	+
Stylidium neurophyllum			+	
Stylidium sp.			+	
Synaphea spinulosa			+	+
Acacia pulchella			Associated	Associated
Nuytsia floribunda			Associated	Associated
Xanthorrhoea preissii			Associated	Associated

Site C06

Date	5/10/2021	24/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	363393mE 6556274mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Plain	
Soil Colour	Grey brown	
Soil Type	Sandy loam	
Litter %	60	
Bare Ground %	0	
Fire Age	3-5 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	25	+	+
Banksia menziesii	8	10	+	+
Calytrix fraseri	2.5	40	+	+
Xanthorrhoea preissii	1.5	15	+	+
Hypocalymma angustifolium	1	10	+	+
Acacia saligna			+	+
Alexgeorgea nitens			+	+
Banksia dallanneyi			+	+
Banksia ilicifolia			+	+
Banksia littoralis				+
Bossiaea eriocarpa			+	+
Calytrix ?angulata			+	
Conostephium pendulum			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conostylis juncea			+	+
Conostylis sp. 1			+	
Conostylis sp. 2			+	
Cyathochaeta avenacea			+	+
Desmocladus flexuosus			+	+
Drosera glanduligera			+	+
Drosera menziesii			+	+
Elythranthera brunonis			+	
Gompholobium tomentosum			+	+
Hibbertia crassifolia			+	
Hypolaena exsulca			+	+
Jacksonia furcellata			+	
Jacksonia sternbergiana			+	+
Lepidosperma squamatum			+	+
Leptospermum sp.			+	
Lomandra ?hermaphrodita			+	+
Lomandra caespitosa			+	+
Lomandra preissii			+	+
Melaleuca clavifolia			+	+
Opercularia spermacocea			+	+
Patersonia occidentalis var. *occidentalis*			+	+
Pericalymma ellipticum var. *ellipticum*			+	+
Phlebocarya ciliata			+	+
Schoenus pedicellatus			+	+
Siloxerus filifolius			+	
Stirlingia latifolia			+	+
Stylidium ecorne			+	
Stylidium miniatum			+	
Stylidium purpureum			+	+
Stylidium repens			+	+
Thysanotus thyrsoideus			+	
Trachymene pilosa			+	
Tricoryne elatior				+
Waitzia suaveolens var. *suaveolens*			+	

Site C07

Date	4/10/2021	23/11/2021
Botanist	JA/NK	DR/MG
Quadrat Size	10 x 10 m	
NW Corner Coordinates	365679mE 6553775mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Flat	
Landform	Sandy plain	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	15	
Bare Ground %	20	
Fire Age	5-10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	Possible fire or dieback on banksia	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	5	15	+	+
Banksia attenuata	5	10	+	+
Regelia ciliata	1.1	4	+	+
Allocasuarina humilis	1.1	3	+	+
Melaleuca clavifolia	0.6	10	+	+
Styphelia xerophylla	0.6	2	+	+
Mesomelaena pseudostygia	0.5	7	+	+
Scholtzia involucrata	0.4	5	+	+
Alexgeorgea nitens			+	+
Amphipogon turbinatus			+	+
Anigozanthos humilis subsp. *humilis*			+	+
Austrostipa macalpinei				+
Banksia ilicifolia			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Bossiaea eriocarpa			+	+
Caladenia flava			+	+
Calectasia narragara			+	+
Chordifex sinuosus			+	+
Comesperma virgatum				+
Conostephium pendulum			+	+
Conostylis setigera subsp. *setigera*				+
Conostylis teretifolia subsp. *teretifolia*			+	+
Drosera ?erythrorhiza			+	
Drosera ?minutiflora			+	
Drosera eneabba				+
Drosera macrantha			+	+
Eremaea asterocarpa			+	+
Eremaea pauciflora var. *lonchophylla*			+	+
Eucalyptus todtiana			+	+
Gompholobium tomentosum				+
Haemodorum spicatum				+
Hibbertia crassifolia			+	
Hibbertia hypericoides			+	+
Hibbertia striata			+	+
Hibbertia subvaginata			+	+
Jacksonia sternbergiana				+
Leporella fimbriata			+	
Leptospermum spinescens			+	+
Leucopogon polymorphus			+	+
Lyginia imberbis			+	+
Lysinema ?pentapetalum			+	+
Patersonia occidentalis			+	+
Petrophile linearis			+	+
Philotheca spicata			+	+
Phyllangium sp.			+	+
Pimelea sulphurea			+	+
Schoenus clandestinus			+	+
Schoenus curvifolius				+
Stirlingia latifolia			+	+
Stylidium ecorne			+	
Stylidium repens			+	+
Synaphea spinulosa			+	+
Tricoryne elatior			+	+
Verticordia nitens			+	+
Xanthorrhoea drummondii			+	+

Site C08

Date	5/10/2021
Botanist	MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	363209mE 6556592mN
Vegetation Unit	MpCp - Low open forest of *Melaleuca preissiana* with scattered *Banksia littoralis* and areas *of Callitris pyramidalis* over mixed shrublands of *Hypocalymma angustifolium*, *Xanthorrhoea preissii* and *Kunzea micrantha* subsp. *micrantha* and *Banksia telmatiaea* over mixed dense herb/sedgeland.
Slope	Flat
Landform	Floodplain
Soil Colour	Grey brown
Soil Type	Sandy loam
Litter %	5
Bare Ground %	1
Fire Age	>10 Years
Vegetation Condition	Excellent
Disturbances/Impacts	NIL

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	10	15	+	
Banksia littoralis	8	5	+	
Banksia telmatiaea	1.5	65	+	
Phlebocarya ciliata	0.5	10	+	
Cyathochaeta avenacea	0.5	5	+	
Acacia applanata			+	
Acacia saligna			+	
**Aira cupaniana*			+	
Banksia dallanneyi var. *dallanneyi*			+	
Burchardia congesta			+	
Chamaescilla corymbosa			+	
Conostylis juncea			+	
Desmocladus flexuosus			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Drosera glanduligera			+	
**Gladiolus caryophyllaceus*			+	
Hakea sulcata			+	
Hakea varia			+	
Hydrocotyle tetragonocarpa			+	
Hypocalymma angustifolium subsp. Swan Coastal Plain			+	
**Hypochaeris glabra*			+	
Hypolaena exsulca			+	
Jacksonia furcellata			+	
Lomandra ?caespitosa			+	
Phyllangium paradoxum			+	
Schoenus caespititius			+	
Schoenus pedicellatus			+	
Siloxerus filifolius			+	
Stylidium ecorne			+	
Stylidium purpureum			+	
Stylidium repens			+	
Trachymene pilosa			+	
**Ursinia anthemoides*			+	
Wahlenbergia gracilenta			+	
Waitzia suaveolens var. *suaveolens*			+	

Site C09

Date	5/10/2021
Botanist	JA/NK
Quadrat Size	10 x 10 m
NW Corner Coordinates	365626mE 6554048mN
Vegetation Unit	MpCp - Low open forest of *Melaleuca preissiana* with scattered *Banksia littoralis* and areas *of Callitris pyramidalis* over mixed shrublands of *Hypocalymma angustifolium*, *Xanthorrhoea preissii* and *Kunzea micrantha* subsp. *micrantha* and *Banksia telmatiaea* over mixed dense herb/sedgeland.
Slope	Flat
Landform	Wetland
Soil Colour	Dark grey-brown/black
Soil Type	Sandy peat/silt
Litter %	15
Bare Ground %	20
Fire Age	>10 Years
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	A few weeds

NO REPRESENTATIVE PHOTO

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	12	60	+	
Kunzea glabrescens	0.8	10	+	
Hypocalymma angustifolium	0.5	25	+	
Xanthorrhoea preissii	1	8	+	
**Aira caryophyllea*			+	
Banksia dallanneyi var. *dallanneyi*			+	
Banksia prionotes			+	
Centrolepis alepyroides			+	
Dillwynia dillwynioides			+	
Drosera glanduligera			+	
Elythranthera brunonis			+	
**Hypochaeris glabra*			+	
Hypolaena exsulca			+	
Melaleuca sp.			+	
Phlebocarya ciliata			+	
Pterostylis recurva			+	
Rhodanthe citrina			+	
Siloxerus humifusus			+	
Thelymitra benthamiana			+	
Trachymene pilosa			+	
**Ursinia anthemoides*			+	
**Vulpia bromoides*			+	
Wahlenbergia gracilenta			+	
Xanthosia huegelii			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia littoralis			Associated	
Hakea varia			Associated	

Site C10

Date	5/10/2021	23/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	363076mE 6556926mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Flat	
Landform	Plain	
Soil Colour	Light brown/grey	
Soil Type	Sand	
Litter %	15	
Bare Ground %	0	
Fire Age	5-10 Years	
Vegetation Condition	Very Good-Excellent	
Disturbances/Impacts	Poterntial dieback nearby, some dead banksias outside quadrat	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Eucalyptus todtiana	10	15	+	+
Banksia attenuata	8	1	+	+
Banksia menziesii	8	1	+	+
Calytrix fraseri	2	2	+	+
Xanthorrhoea preissii	1.5	15	+	+
Melaleuca sp.	0.3	5	+	+
Bossiaea eriocarpa	0.2	10	+	+
Alexgeorgea nitens			+	+
Austrostipa compressa			+	+
Burchardia congesta			+	+
Caladenia flava			+	
Calytrix ?flavescens			+	
Conostephium pendulum			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Dampiera linearis			+	+
Drosera erythrorhiza			+	+
Drosera menziesii			+	
Elythranthera brunonis			+	
Eremaea sp.			+	+
Gompholobium tomentosum				+
Hibbertia crassifolia			+	+
Hibbertia subvaginata			+	+
Jacksonia sternbergiana			+	+
Lepidosperma pubisquameum				+
Leucopogon conostephioides			+	+
Lomandra ?hermaphrodita			+	+
Lomandra caespitosa			+	+
Neurachne alopecuroidea			+	
Patersonia occidentalis var. occidentalis			+	+
Petrophile linearis			+	+
Phlebocarya ciliata			+	+
Phyllangium paradoxum				+
Pterostylis recurva			+	
Schoenus unispiculatus			+	+
Stirlingia latifolia			+	+
Stylidium ecorne			+	
Stylidium repens			+	
Thelymitra sp.			+	
Thysanotus thyrsoideus			+	
Trachymene pilosa			+	
Tricoryne tenella			+	+
Waitzia suaveolens var. suaveolens				+

Site C11

Date	5/10/2021
Botanist	JA/NK
Quadrat Size	10 x 10 m
NW Corner Coordinates	364709mE 6554024mN
Vegetation Unit	MrKgMt - Low open woodland of *Melaleuca rhaphiophylla* over shrubland of *Kunzea glabrescens*, *Melaleuca viminea* subsp. *viminea* and *Melaleuca teretifolia* over mixed low Cyperaceae sedgelands and **Hypochaeris glabra*.
Slope	Flat
Landform	Wetland
Soil Colour	Dark grey-brown/black
Soil Type	Sandy peat/silt
Litter %	20
Bare Ground %	2
Fire Age	>10 Years
Vegetation Condition	Degraded-Good
Disturbances/Impacts	Possible grazing and weeds

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca teretifolia	1.5	40	+	
**Avena fatua*	0.4	1	+	
Schoenus laevigatus	0.2	30	+	
**Hypochaeris glabra*	0.15	15	+	
**Arctotheca calendula*			+	
**Bromus hordeaceus*			+	
**Erigeron bonariensis*			+	
**Erodium botrys*			+	
**Gladiolus* sp.			+	
**Petrorhagia dubia*			+	
**Sonchus oleraceus*			+	
**Trifolium dubium*			+	
**Trifolium* sp.			+	
**Vulpia bromoides*			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
**Briza maxima*			Associated	
**Eragrostis curvula*			Associated	
Hakea varia			Associated	
**Lysimachia arvensis*			Associated	
**Ursinia anthemoides*			Associated	

Site C12

Date	5/10/2021	23/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	363535mE 6556947mN	
Vegetation Unit	MpBaBm - Low open woodland of *Melaleuca preissiana*, *Banksia menziesii* and *Banksia attenuata* over shrublands of *Banksia incana*, *Calytrix fraseri* and *Adenanthos cygnorum* subsp. *cygnorum* over mixed low sparse herb/sedgeland.	
Slope	Flat	
Landform	Plain	
Soil Colour	Light brown	
Soil Type	Sand	
Litter %	10	
Bare Ground %	10	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	10	+	+
Banksia menziesii	8	10	+	+
Melaleuca preissiana	3	2	+	+
Adenanthos cygnorum subsp. *cygnorum*	2	20	+	+
Calytrix fraseri	1.5	50	+	+
?Aotus sp.				+
Austrostipa compressa				+
Banksia dallanneyi			+	+
Chaetospora curvifolia			+	+
Conostylis juncea			+	+
Conostylis setigera				+
Conostylis sp. 2			+	+
Dillwynia sp.				+
Drosera closterostigma			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Drosera menziesii			+	
Elythranthera brunonis			+	+
Euchilopsis linearis			+	+
Gompholobium tomentosum			+	+
Hypolaena exsulca			+	+
Jacksonia sternbergiana			+	+
Leucopogon conostephioides			+	+
Lyginia imberbis			+	+
Melaleuca clavifolia			+	+
Patersonia occidentalis var. *occidentalis*			+	+
Pericalymma ellipticum var. *ellipticum*			+	
Phlebocarya ciliata			+	+
Phyllangium paradoxum			+	+
Stirlingia latifolia			+	+
Stylidium araeophyllum			+	+
Stylidium repens			+	+
Verticordia nitens				+

Site C13

Date	5/10/2021
Botanist	JA/NK
Quadrat Size	10 x 10 m
NW Corner Coordinates	364667mE 6553820mN
Vegetation Unit	MpBaBm - Low open woodland of *Melaleuca preissiana*, *Banksia menziesii* and *Banksia attenuata* over shrublands of *Banksia incana*, *Calytrix fraseri* and *Adenanthos cygnorum* subsp. *cygnorum* over mixed low sparse herb/sedgeland.
Slope	Flat
Landform	Sandy plain
Soil Colour	Grey-white
Soil Type	Sand
Litter %	45
Bare Ground %	15
Fire Age	>10 Years
Vegetation Condition	Excellent
Disturbances/Impacts	NIL

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	6	20	+	
Banksia attenuata	6	6	+	
Jacksonia furcellata	3	4	+	
Banksia ?laricina	2.3	20	+	
Pericalymma ellipticum subsp. indet	0.9	1	+	
Calytrix fraseri	0.7	2	+	
Lyginia imberbis	0.7	2	+	
Leptocarpus coangustatus	0.5	1	+	
Phlebocarya ciliata	0.4	5	+	
Stylidium repens	0.10	3	+	
Acacia pulchella var. *glaberrima*			+	
Gompholobium sp.			+	
Hibbertia subvaginata			+	
Hypolaena exsulca			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Leucopogon polymorphus			+	
Opercularia vaginata			+	
Pterostylis sp.			+	

Site C14

Date	5/10/2021
Botanist	MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	363966mE 6556789mN
Vegetation Unit	MpBaBm - Low open woodland of *Melaleuca preissiana*, *Banksia menziesii* and *Banksia attenuata* over shrublands of *Banksia incana*, *Calytrix fraseri* and *Adenanthos cygnorum* subsp. *cygnorum* over mixed low sparse herb/sedgeland.
Slope	Flat
Landform	Plain
Soil Colour	Light brown
Soil Type	Loam
Litter %	10
Bare Ground %	0
Fire Age	>10 Years
Vegetation Condition	Excellent
Disturbances/Impacts	NIL

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	10	2	+	
Banksia incana	2	90	+	
Austrostipa macalpinei			+	
Banksia dallanneyi var. *dallanneyi*			+	
Cyathochaeta avenacea			+	
Euchilopsis linearis			+	
Hyalosperma cotula			+	
Hypolaena exsulca			+	
Leucopogon polymorphus			+	
Lomandra ?caespitosa			+	
Pericalymma ellipticum var. *ellipticum*			+	
Stylidium repens			+	
Xanthorrhoea preissii			+	

Site C15

Date	5/10/2021	23/11/2021
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	365744mE 6554663mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Gentle	
Landform	Sandy plain	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	40	
Bare Ground %	5	
Fire Age	>10 Years	
Vegetation Condition	Very Good-Excellent	
Disturbances/Impacts	A few weeds and animal diggings looks like feral pig	

NO REPRESENTATIVE PHOTO

Species	Height (cm)	% Cover	Phase 1	Phase 2
Eucalyptus todtiana	8	20	+	+
Banksia menziesii	6	7	+	+
Banksia attenuata	5	6	+	+
Xanthorrhoea preissii	1.8	15	+	+
Phlebocarya ciliata	0.4	10	+	+
Hibbertia subvaginata	0.4	4	+	+
Acacia stenoptera				+
Alexgeorgea nitens			+	+
Austrostipa compressa			+	+
Bossiaea eriocarpa			+	+
Burchardia congesta			+	+
Caladenia flava			+	
Cassytha racemosa				+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conostephium pendulum			+	+
Conostylis setigera				+
Drosera ?erythrorhiza			+	
Drosera macrantha			+	+
Elythranthera brunonis			+	+
Gompholobium tomentosum				+
Hibbertia hypericoides			+	+
Lepidosperma leptostachyum				+
Leporella fimbriata			+	+
Leptospermum spinescens			+	+
Lomandra caespitosa			+	+
Lomandra hermaphrodita				+
Lyginia barbata			+	+
Lyginia imberbis			+	+
Melaleuca clavifolia			+	+
Opercularia hirsuta			+	
Opercularia vaginata			+	+
Patersonia occidentalis			+	+
Petrophile linearis			+	+
Philotheca spicata			+	+
Phyllangium sp.			+	+
Podotheca gnaphalioides			+	+
Pyrorchis nigricans			+	
Rytidosperma caespitosum				+
Stirlingia latifolia			+	+
Stylidium ?perpusillum			+	
Stylidium araeophyllum			+	
Stylidium repens				+
Stylidium sp.			+	
Styphelia conostephioides			+	
Thysanotus sp.				+
Trachymene pilosa			+	+
**Ursinia anthemoides*			+	+

Site C16

Date	5/10/2021	23/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364301mE 6556765mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Plain	
Soil Colour	Light brown/grey	
Soil Type	Sand	
Litter %	15	
Bare Ground %	10	
Fire Age	5-10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	10	+	+
Banksia menziesii	8	5	+	+
Melaleuca preissiana	8	5	+	+
Calytrix fraseri	2	30	+	+
Xanthorrhoea preissii	1.5	10	+	+
Bossiaea eriocarpa	0.3	2	+	+
Leucopogon polymorphus	0.3	2	+	+
Philotheca spicata	0.2	2	+	+
Burchardia congesta			+	
Conostephium pendulum			+	+
Conostylis juncea			+	+
Cyathochaeta avenacea			+	+
Desmocladus flexuosus			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Drakaea glyptodon			+	+
Drosera glanduligera			+	
Drosera menziesii			+	
Elythranthera brunonis			+	
Eremaea pauciflora var. pauciflora			+	+
Gompholobium tomentosum			+	+
Hibbertia subvaginata				+
Hypocalymma angustifolium subsp. Swan Coastal Plain			+	+
Leucopogon cinereus			+	+
Lomandra caespitosa			+	+
Lyginia barbata			+	+
Opercularia spermacocea			+	+
Patersonia occidentalis var. occidentalis			+	+
Phlebocarya ciliata			+	+
Stylidium ecorne			+	
Stylidium miniatum			+	+
Stylidium piliferum				+
Stylidium repens			+	+
Thelymitra sp.			+	+
Thysanotus sp.				+
Thysanotus thyrsoideus			+	+
Trachymene pilosa			+	
**Ursinia anthemoides*			+	
Verticordia nitens			+	

Site C17

Date	5/10/2021
Botanist	JA/NK
Quadrat Size	10 x 10 m
NW Corner Coordinates	365890mE 6555261mN
Vegetation Unit	MrKgMt - Low open woodland of *Melaleuca rhaphiophylla* over shrubland of *Kunzea glabrescens*, *Melaleuca viminea* subsp. *viminea* and *Melaleuca teretifolia* over mixed low Cyperaceae sedgelands and **Hypochaeris glabra*.
Slope	Flat
Landform	Wetland
Soil Colour	Grey-white-orange
Soil Type	Sandy peat/silt
Litter %	30
Bare Ground %	15
Fire Age	>10 Years
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	A few weeds

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca rhaphiophylla	2.2	2	+	
Adenanthos cygnorum	1.6	2	+	
Banksia telmatiaea	0.9	20	+	
Cyperaceae sp. 2	0.6	10	+	
Lyginia imberbis	0.6	10	+	
Phlebocarya ciliata	0.2	2	+	
Banksia dallanneyi	0.15	5	+	
Cassytha glabella forma *dispar*			+	
Chaetanthus aristatus			+	
Drosera ?minutiflora			+	
Hakea sulcata			+	
Hakea varia			+	
Hibbertia hypericoides			+	
Hibbertia stellaris			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
**Hypochaeris glabra*			+	
Kunzea glabrescens			+	
Leptocarpus coangustatus			+	
Melaleuca viminea subsp. *viminea*			+	
Pericalymma ellipticum subsp. indet			+	
**Petrorhagia dubia*			+	
Podotheca gnaphalioides			+	
Styphelia xerophylla			+	
**Ursinia anthemoides*			+	
Verticordia ?lindleyi			+	
Verticordia densiflora var. *densiflora*			+	
Melaleuca preissiana			+	
Petrophile semifurcata			Associated	

Site C18

Date	6/10/2021	24/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	366975mE 6556688mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Plain	
Soil Colour	Light brown	
Soil Type	Sand	
Litter %	15	
Bare Ground %	2	
Fire Age	>10 Years	
Vegetation Condition	Very Good	
Disturbances/Impacts	Dead wood around... upper story healthy, fire? natural senescense?	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia prionotes	7	15	+	+
Banksia attenuata	7	5	+	+
Nuytsia floribunda	6	3	+	+
Xanthorrhoea preissii	1.5	10	+	+
Adenanthos cygnorum subsp. *cygnorum*	1.5	5	+	+
Lechenaultia stenosepala	0.5	20	+	+
Alexgeorgea nitens			+	+
Bossiaea eriocarpa			+	+
Conostephium pendulum			+	+
Dampiera linearis			+	+
Drosera eneabba				+
Eremaea fimbriata			+	+
Gonocarpus pithyoides				+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Hibbertia crassifolia				+
Hibbertia subvaginata			+	+
Hovea trisperma				+
Jacksonia sternbergiana			+	+
Lomandra hermaphrodita				+
Patersonia occidentalis var. *occidentalis*			+	+
Schoenus caespitosus			+	+
Scholtzia sp.			+	+
Stirlingia latifolia			+	+
Stylidium crossocephalum				+
Tricoryne elatior				+
Kunzea glabrescens				Associated

Site C19

Date	5/10/2021	23/11/2021
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	365871mE 6556097mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Gentle	
Landform	Sandy plain	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	30	
Bare Ground %	5	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	25	+	+
Banksia menziesii	7	8	+	+
Nuytsia floribunda	6	6	+	+
Adenanthos cygnorum	2	15	+	+
Xanthorrhoea preissii	1.6	25	+	+
Banksia ?laricina	1.4	3	+	+
Melaleuca clavifolia	0.8	2	+	+
Hibbertia hypericoides	0.5	1	+	+
Amphipogon turbinatus			+	+
Banksia dallanneyi			+	+
Bossiaea eriocarpa			+	+
Burchardia congesta			+	+
Chaetospora curvifolia			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conostephium pendulum			+	+
Conostylis juncea			+	+
Conostylis setigera				+
Dampiera linearis			+	+
Desmocladus fasciculatus			+	+
Drosera macrantha			+	+
Eremaea pauciflora var. *lonchophylla*			+	+
Hibbertia crassifolia				+
Hibbertia striata			+	+
Hibbertia subvaginata			+	+
Leptospermum spinescens			+	+
Lyginia barbata			+	
Mesomelaena pseudostygia			+	+
Opercularia vaginata				+
Patersonia occidentalis			+	+
Scholtzia involucrata			+	+
Stirlingia latifolia			+	+
Stylidium repens				+
Stylidium sp.			+	
Tricoryne tenella				+

Site C20

Date	6/10/2021 24/11/2021
Botanist	MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	366681mE 6556736mN
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.
Slope	Flat
Landform	Plain
Soil Colour	Grey brown
Soil Type	Sand
Litter %	30
Bare Ground %	15
Fire Age	>10 Years
Vegetation Condition	Excellent
Disturbances/Impacts	Bit of dead wood around, upper story healthy, natural senescence?

NO REPRESENTATIVE PHOTO

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia littoralis	6	10	+	+
Banksia attenuata	6	5	+	+
Kunzea glabrescens	2.5	15	+	+
Adenanthos cygnorum subsp. *cygnorum*	2.5	5	+	+
Melaleuca seriata	0.5	3	+	+
Styphelia xerophylla	0.5	2	+	+
Austrostipa compressa			+	+
Bossiaea eriocarpa			+	+
Caesia sp.			+	+
Crassula colorata var. colorata			+	+
Dampiera linearis			+	+
Drosera closterostigma			+	
Hibbertia subvaginata			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Hovea trisperma			+	+
**Hypochaeris glabra*			+	+
Isolepis marginata			+	
Jacksonia sternbergiana			+	+
Lechenaultia stenosepala			+	+
Leucopogon polymorphus			+	+
Levenhookia sp.			+	+
Levenhookia octomaculata				+
Lomandra caespitosa			+	+
Patersonia occidentalis var. *occidentalis*			+	+
Phyllangium paradoxum			+	+
Podotheca chrysantha			+	+
Schoenus caespitosus			+	+
Scholtzia sp.			+	+
Siloxerus filifolius			+	+
Stirlingia latifolia				+
Styphelia ?propinqua			+	+
Trachymene pilosa			+	+
**Ursinia anthemoides*			+	+
**Wahlenbergia capensis*			+	+
Waitzia suaveolens var. *suaveolens*			+	+
Xanthorrhoea preissii				+

Site C21

Date	5/10/2021	23/11/21
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	365428mE 6556275mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Flat	
Landform	Sandy plain	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	40	
Bare Ground %	5	
Fire Age	>10 Years	
Vegetation Condition	Very Good	
Disturbances/Impacts	Possible dieback in this area	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Eucalyptus todtiana	8	15	+	+
Banksia ilicifolia	6	1	+	+
Banksia attenuata	5	5	+	+
Calytrix fraseri	2	10	+	+
Leucopogon polymorphus	0.7	2	+	+
Scholtzia involucrata	0.5	8	+	+
Schoenus laevigatus	0.5	5	+	+
Melaleuca clavifolia	0.5	3	+	+
Stirlingia latifolia	0.5	2	+	+
Actinotus leucocephalus				+
Alexgeorgea nitens			+	+
Austrostipa compressa				+
Banksia menziesii			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Burchardia congesta			+	+
Caladenia flava			+	
Cassytha glabella forma *dispar*			+	+
Chaetospora curvifolia			+	
Chordifex sinuosus				+
Cyanothamnus subsessilis			+	
Drosera eneabba				+
Drosera erythrorhiza			+	
Drosera macrantha			+	
Drosera miniata			+	
Gompholobium tomentosum			+	+
Goodenia glareicola				+
Haemodorum spicatum				+
Hemiandra linearis			+	+
Hibbertia crassifolia			+	
Hibbertia hypericoides			+	
Hibbertia striata				+
Hibbertia subvaginata			+	
Lepidosperma leptostachyum			+	+
Leporella fimbriata			+	+
Lomandra hermaphrodita				+
Lysinema ?pentapetalum			+	+
Patersonia occidentalis			+	+
Petrophile linearis			+	+
Phlebocarya ciliata				+
Phyllangium sp.			+	+
Pimelea sulphurea			+	+
Proteaceae sp.			+	+
Schoenus curvifolius				+
Stylidium araeophyllum			+	+
Stylidium repens			+	+
Styphelia xerophylla			+	+
Xanthorrhoea preissii			+	+

Site C22

Date	6/10/2021
Botanist	MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	365966mE 6556866mN
Vegetation Unit	MpBaBm - Low open woodland of *Melaleuca preissiana*, *Banksia menziesii* and *Banksia attenuata* over shrublands of *Banksia incana*, *Calytrix fraseri* and *Adenanthos cygnorum* subsp. *cygnorum* over mixed low sparse herb/sedgeland.
Slope	Flat
Landform	Floodplain
Soil Colour	Dark grey/brown
Soil Type	Silty sand
Litter %	5
Bare Ground %	1
Fire Age	>10 Years
Vegetation Condition	Excellent
Disturbances/Impacts	NIL

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	8	30	+	
Hypocalymma angustifolium subsp. Swan Coastal Plain	1.5	50	+	
Banksia incana	1.5	5	+	
Adenanthos cygnorum	1.5	1	+	
Hypolaena exsulca	0.3	2	+	
Patersonia ?occidentalis	0.3	2	+	
Acacia pulchella var. *pulchella*			+	
Astartea ?affinis			+	
Banksia dallanneyi			+	
Caladenia flava			+	
Cassytha racemosa			+	
Cyanothamnus ramosus subsp. *anethifolius*			+	
Elythranthera brunonis			+	
Euchilopsis linearis			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Gompholobium tomentosum			+	
**Hypochaeris radicata*			+	
Hypolaena exsulca			+	
Isolepis marginata			+	
Lechenaultia stenosepala			+	
Leucopogon polymorphus			+	
Patersonia occidentalis var. *occidentalis*			+	
Pericalymma ellipticum var. *ellipticum*			+	
Phlebocarya ciliata			+	
Phyllangium paradoxum			+	
Podotheca chrysantha			+	
Pterostylis dilatata			+	
Siloxerus filifolius			+	
Stylidium repens			+	
Trachymene pilosa			+	

Site C23

Date	6/10/2021	24/11/2021
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	367451mE 6556084mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Moderate	
Landform	Low rise	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	25	
Bare Ground %	15	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	Possible dieback in area	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	4.5	13	+	+
Banksia attenuata	4	5	+	+
Eremaea pauciflora var. *pauciflora*	1.2	17	+	+
Hibbertia hypericoides	0.9	20	+	+
Mesomelaena pseudostygia	0.6	8	+	+
Calothamnus hirsutus	0.6	3	+	+
Acacia sphacelata subsp. *sphacelata*			+	+
Amphipogon turbinatus			+	+
Anigozanthos humilis subsp. *humilis*			+	+
Arnocrinum preissii				+
Bossiaea eriocarpa			+	+
Burchardia congesta			+	+
Comesperma virgatum				+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conospermum stoechadis subsp. *stoechadis*			+	+
Conostephium pendulum			+	+
Conostylis setigera			+	+
Corynotheca micrantha				+
Desmocladus fasciculatus			+	+
Desmocladus semiplanus			+	+
Drosera ?erythrorhiza			+	
Drosera ?minutiflora			+	
Drosera eneabba				+
Drosera humilis			+	
Drosera menziesii			+	
Hemiandra sp.			+	+
Hibbertia ?huegelii			+	
Lepidosperma leptostachyum				+
Leptospermum spinescens			+	+
Leucopogon polymorphus			+	+
Lyginia barbata			+	+
Melaleuca clavifolia			+	+
Patersonia occidentalis			+	+
Petrophile macrostachya			+	+
Phyllangium sp.			+	+
Pimelea sulphurea			+	+
Podotheca gnaphalioides			+	+
Schoenus clandestinus			+	+
Stylidium neurophyllum			+	+
Stylidium repens			+	+
Synaphea spinulosa			+	+
Thysanotus manglesianus			+	+

Site C24

Date	6/10/2021	23/11/2022
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364494mE 6556912mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Gentle	
Landform	Low rise	
Soil Colour	Light brown/grey	
Soil Type	Sand	
Litter %	2	
Bare Ground %	30	
Fire Age	5-10 Years	
Vegetation Condition	Very Good	
Disturbances/Impacts	Some of the mature banksias are dead, possibly due to previous fire	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	15	+	+
Banksia menziesii	8	15	+	+
Eremaea asterocarpa subsp. *asterocarpa*	1	20	+	+
Melaleuca leuropoma	1	5	+	+
Mesomelaena pseudostygia	0.3	5	+	+
Patersonia occidentalis var. *occidentalis*	0.3	2	+	+
Alexgeorgea nitens			+	+
Allocasuarina humilis			+	+
Anigozanthos humilis subsp. *humilis*			+	+
Bossiaea eriocarpa			+	+
Burchardia congesta				+
Caesia sp.			+	
Cassytha racemosa			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Chaetospora curvifolia			+	+
Conostephium pendulum			+	+
Conostylis juncea			+	+
Conostylis setigera			+	+
Desmocladus fasciculatus				+
Drosera closterostigma			+	+
Drosera erythrorhiza			+	+
Drosera menziesii			+	+
Eremaea pauciflora var. *pauciflora*			+	+
Haemodorum laxum				+
Hibbertia crassifolia			+	+
Hibbertia huegelii				+
Hibbertia hypericoides subsp. *hypericoides*			+	+
Hovea trisperma			+	+
Hypolaena exsulca			+	+
Leucopogon conostephioides			+	+
Lomandra ?caespitosa			+	+
Lysinema elegans			+	+
Opercularia vaginata				+
Petrophile linearis			+	+
Petrophile macrostachya			+	+
Philotheca spicata			+	+
Phyllangium paradoxum			+	+
Pimelea sulphurea			+	+
Schoenus caespitosus			+	+
Scholtzia sp.			+	+
Stirlingia latifolia			+	+
Stylidium araeophyllum			+	+
Stylidium miniatum			+	+
Stylidium schoenoides			+	+
Tricoryne tenella			+	+
Verticordia nitens			+	+
Xanthorrhoea brunonis			+	+

Site C25

Date	6/10/2021	24/11/2022
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	367007mE 6555863mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Gentle	
Landform	Lower slope/foothills	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	30	
Bare Ground %	20	
Fire Age	>10 Years	
Vegetation Condition	Very Good-Excellent	
Disturbances/Impacts	Possible dieback in area	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	6	35	+	+
Banksia attenuata	4.5	10	+	+
Eremaea pauciflora var. *pauciflora*	0.8	15	+	+
Mesomelaena pseudostygia	0.6	25	+	+
Conostephium pendulum	0.6	3	+	+
Melaleuca clavifolia	0.5	1	+	+
Anigozanthos humilis				+
Arnocrinum preissii				+
Bossiaea eriocarpa			+	+
Calectasia narragara			+	+
Cassytha sp.			+	+
Chaetospora curvifolia			+	+
Conostylis aurea			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conostylis teretifolia subsp. *teretifolia*			+	+
Dampiera linearis			+	+
Daviesia incrassata subsp. *incrassata*			+	+
Drosera eneabba				+
Drosera menziesii			+	+
Fabaceae sp.			+	
Haemodorum laxum				+
Haemodorum venosum			+	+
Hemiandra linearis			+	+
Hibbertia crassifolia			+	+
Hibbertia hypericoides			+	+
Hibbertia striata			+	+
Hibbertia subvaginata			+	+
Lepidosperma leptostachyum			+	+
Leptocarpus coangustatus			+	
Lobelia rhytidosperma				+
Lomandra hermaphrodita				+
Lyginia imberbis			+	+
Melaleuca densiflora var. *densiflora*				+
Patersonia occidentalis			+	+
Petrophile macrostachya			+	+
Philotheca spicata			+	+
Pimelea sulphurea			+	+
Proteaceae sp.			+	+
Schoenus clandestinus			+	+
Schoenus curvifolius				+
Schoenus pleiostemoneus			+	
Scholtzia involucrata			+	+
Stirlingia latifolia			+	+
Stylidiaceae sp.			+	
Stylidium crossocephalum			+	+
Stylidium neurophyllum			+	+
Stylidium repens				+
Stylidium sp.			+	+
Trachymene pilosa			+	+
Tricoryne elatior			+	+
Tripterococcus brunonis				+
Verticordia densiflora			+	+

Site C26

Date	6/10/2021	23/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	365178mE 6556867mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Plain	
Soil Colour	Light brown/grey	
Soil Type	Sand	
Litter %	20	
Bare Ground %	1	
Fire Age	5-10 Years	
Vegetation Condition	Very Good-Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	30	+	+
Calytrix fraseri	1.5	70	+	+
Xanthorrhoea preissii	1	1	+	+
Stirlingia latifolia	0.5	2	+	+
?Thelymitra sp.			+	+
Alexgeorgea nitens			+	+
Banksia ilicifolia			+	+
Cassytha racemosa			+	+
Chaetospora curvifolia			+	+
Chordifex sinuosus				+
Daviesia incrassata subsp. *incrassata*				+
Drosera closterostigma			+	
Drosera erythrorhiza			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Elythranthera brunonis			+	
Gompholobium tomentosum				+
Haemodorum spicatum				+
Hibbertia crassifolia			+	+
Hibbertia subvaginata			+	+
Hypocalymma angustifolium subsp. Swan Coastal Plain			+	
Hypolaena exsulca			+	+
Leucopogon ?borealis			+	+
Leucopogon polymorphus			+	+
Lomandra ?caespitosa			+	+
Lomandra ?hermaphrodita			+	+
Lysinema elegans				+
Melaleuca leuropoma			+	
Mesomelaena pseudostygia				+
Patersonia occidentalis var. *occidentalis*			+	+
Schoenus caespitosus			+	
Stylidium repens			+	+
Styphelia xerophylla			+	+
Tripterococcus brunonis				+
Verticordia nitens			+	+

Site C27

Date	6/10/2021	24/11/2022
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	366736mE 6555610mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Sandy plain	
Soil Colour	Dark grey-brown/black	
Soil Type	Sand	
Litter %	90	
Bare Ground %	1	
Fire Age	>10 Years	
Vegetation Condition	Very Good-Excellent	
Disturbances/Impacts	Possible animal grazing	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Corymbia calophylla	20	35	+	+
Banksia attenuata	8	8	+	+
Banksia menziesii	3	2	+	+
Xanthorrhoea preissii	1.8	20	+	+
Scholtzia involucrata	0.6	2	+	+
Hibbertia subvaginata	0.2	1	+	+
Acacia stenoptera				+
**Aira cupaniana*				+
Bossiaea eriocarpa			+	+
**Briza maxima*			+	+
Burchardia congesta				+
Caladenia flava			+	
Crassula colorata			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Daviesia incrassata subsp. *incrassata*			+	+
Fabaceae sp.			+	+
Gompholobium tomentosum			+	+
Hibbertia crassifolia				+
Hypocalymma angustifolium				+
**Hypochaeris glabra*			+	+
Jacksonia sternbergiana			+	+
Lomandra caespitosa			+	+
Patersonia occidentalis			+	+
Phyllangium sp.			+	
Podotheca gnaphalioides			+	+
Pterostylis sp.			+	
Stylidium perpusillum			+	+
Trachymene pilosa			+	+
Tricoryne elatior			+	+
Tricoryne tenella				+
**Ursinia anthemoides*			+	+
**Wahlenbergia capensis*			+	+

Site C28

Date	6/10/2021	25/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364874mE 6556672mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Floodplain	
Soil Colour	Light brown/grey	
Soil Type	Sand	
Litter %	15	
Bare Ground %	0	
Fire Age	3-5 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	8	4	+	+
Banksia ilicifolia	6	2	+	+
Calytrix fraseri	1.5	60	+	+
Banksia incana	1.5	10	+	+
Styphelia xerophylla	0.5	5	+	+
?Calytrix sp.			+	+
Adenanthos cygnorum subsp. *cygnorum*			+	+
Alexgeorgea nitens			+	+
Cassytha racemosa			+	+
Chaetospora curvifolia			+	
Conostephium pendulum				+
Euchilopsis linearis			+	+
Hensmania turbinata				+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Hibbertia subvaginata			+	+
Hypocalymma angustifolium subsp. *Swan Coastal Plain*			+	+
Hypolaena exsulca			+	+
Leucopogon polymorphus			+	+
Lyginia barbata			+	+
Nuytsia floribunda			+	+
Patersonia occidentalis var. *occidentalis*			+	+
Petrophile linearis			+	+
Pimelea sulphurea				+
Schoenus caespitosus			+	+
Verticordia nitens				+
Melaleuca preissiana				Associated

Site C29

Date	6/10/2021	25/11/2021
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	365056mE 6554408mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Sandy plain	
Soil Colour	Grey-white-brown	
Soil Type	Sandy loam	
Litter %	80	
Bare Ground %	5	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	Possible animal grazing and ?dieback	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	15	50	+	+
Banksia menziesii	15	25	+	+
Eucalyptus todtiana	14	3	+	+
Banksia attenuata	8	3	+	+
Xanthorrhoea preissii	0.8	18	+	+
Lomandra integra	0.6	10	+	+
Lepidosperma leptostachyum	0.6	7	+	+
Leptocarpus coangustatus	0.5	1	+	+
Bossiaea eriocarpa			+	+
**Briza maxima*			+	+
Burchardia congesta			+	+
Caladenia flava			+	+
Conostylis juncea			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Desmocladus fasciculatus			+	+
Dichopogon preissii			+	
Drosera ?erythrorhiza			+	
Gompholobium tomentosum			+	+
Hibbertia crassifolia				+
Hibbertia subvaginata				+
Hypocalymma angustifolium			+	+
Hypolaena exsulca			+	
Jacksonia furcellata			+	+
Lagenophora huegelii			+	+
Leporella fimbriata			+	+
Lomandra caespitosa			+	+
Opercularia vaginata			+	+
Patersonia occidentalis				+
Pericalymma ellipticum var. *ellipticum*			+	+
Philotheca spicata			+	+
Pyrorchis nigricans			+	
Stylidium androsaceum			+	+
Stylidium repens			+	+
Thysanotus sp.				+
Trachymene pilosa			+	+

Site C30

Date	6/10/2021	25/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364798mE 6556445mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Gentle	
Landform	Low rise	
Soil Colour	Light brown	
Soil Type	Sand	
Litter %	5	
Bare Ground %	15	
Fire Age	3-5 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	8	15	+	+
Calytrix fraseri	1.5	5	+	+
Allocasuarina humilis	1.5	2	+	+
Eremaea pauciflora var. *pauciflora*	0.5	20	+	+
Mesomelaena pseudostygia	0.5	5	+	+
Alexgeorgea nitens			+	+
Anigozanthos humilis			+	+
Austrostipa compressa			+	+
Banksia attenuata				+
Burchardia congesta				+
Calectasia narragara			+	+
Cassytha racemosa			+	+
Chaetanthus aristatus			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conospermum stoechadis			+	+
Conostephium pendulum			+	+
Conostylis juncea			+	+
Conostylis setigera			+	+
Desmocladus asper			+	+
Drosera closterostigma			+	+
Drosera menziesii			+	
Eucalyptus todtiana			+	+
Haemodorum laxum			+	+
Hemiandra linearis				+
Hibbertia crassifolia			+	+
Hibbertia huegelii			+	+
Hibbertia hypericoides subsp. *hypericoides*			+	+
Hibbertia subvaginata			+	+
Jacksonia nutans				+
Levenhookia stipitata			+	+
Lobelia tenuior				+
Lomandra ?caespitosa			+	+
Neurachne alopecuroidea			+	
Opercularia vaginata				+
Patersonia occidentalis				+
Petrophile linearis			+	+
Philotheca spicata			+	+
Phyllangium paradoxum			+	+
Pimelea sulphurea			+	+
Podotheca chrysantha			+	+
Stylidium adpressum				+
Stylidium araeophyllum			+	+
Stylidium miniatum			+	+
Stylidium purpureum			+	+
Stylidium repens			+	+
Stylidium schoenoides			+	+
Styphelia xerophylla			+	+
Synaphea spinulosa subsp. *spinulosa*			+	+
Trachymene pilosa			+	+
Tricoryne tenella				+

Site C31

Date	6/10/2021
Botanist	JA/NK
Quadrat Size	10 x 10 m
NW Corner Coordinates	364490mE 6554480mN
Vegetation Unit	MrKgMt - Low open woodland of *Melaleuca rhaphiophylla* over shrubland of *Kunzea glabrescens*, *Melaleuca viminea* subsp. *viminea* and *Melaleuca teretifolia* over mixed low Cyperaceae sedgelands and **Hypochaeris glabra*.
Slope	Flat
Landform	Wetland
Soil Colour	Grey-white-brown
Soil Type	Sandy loam
Litter %	15
Bare Ground %	5
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	Animal grazing and weeds

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca rhaphiophylla	6	45	+	
Callitris arenaria	4	3	+	
**Ehrharta calycina*	0.7	2	+	
Machaerina juncea	0.6	80	+	
**Hypochaeris glabra*	<0.1	30	+	
Acacia pulchella var. *glaberrima*			+	
**Aira caryophyllea*			+	
**Arctotheca calendula*			+	
Banksia dallanneyi subsp. *pollosta*			+	
Centrolepis drummondiana			+	
Daucus glochidiatus			+	
Drosera glanduligera			+	
**Ehrharta longiflora*			+	
Kunzea micrantha subsp. *micrantha*			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Lagenophora huegelii			+	
Opercularia vaginata			+	
**Petrorhagia dubia*			+	
Podotheca gnaphalioides			+	
Pyrorchis nigricans			+	
Quinetia urvillei			+	
**Silene gallica* var. *gallica*			+	
Trachymene pilosa			+	
**Trifolium dubium*			+	
**Ursinia anthemoides*			+	

Site C32

Date	7/10/2021	24/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	363740mE 6556290mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Gentle	
Landform	Midslope	
Soil Colour	Light brown/grey	
Soil Type	Sand	
Litter %	10	
Bare Ground %	20	
Fire Age	5-10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	8	10	+	+
Banksia attenuata	8	5	+	+
Calytrix fraseri	1.5	2	+	+
Eremaea pauciflora var. *pauciflora*	0.5	60	+	+
Melaleuca ?clavifolia	0.5	10	+	+
Alexgeorgea nitens			+	+
Arnocrinum preissii			+	+
Austrostipa compressa			+	+
Cassytha racemosa			+	+
Chaetospora curvifolia			+	+
Conostylis juncea			+	+
Dampiera linearis			+	+
Drosera closterostigma			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Drosera menziesii			+	
Eremaea asterocarpa subsp. *asterocarpa*			+	
Hemiandra linearis			+	+
Hibbertia hypericoides subsp. *hypericoides*			+	+
Hovea trisperma			+	+
Hypolaena exsulca			+	+
Lechenaultia floribunda				+
Lechenaultia stenosepala			+	
Lomandra ?caespitosa			+	+
Lomandra preissii			+	+
Patersonia occidentalis var. *occidentalis*			+	+
Petrophile linearis			+	+
Phyllangium paradoxum			+	+
Pimelea sulphurea			+	+
Podotheca chrysantha			+	+
Schoenus caespitosus			+	+
Scholtzia sp.			+	+
Stirlingia latifolia			+	+
Stylidium purpureum				+
Stylidium repens				+
Styphelia xerophylla			+	+
Synaphea spinulosa subsp. *spinulosa*			+	+
Thysanotus manglesianus				+
Trachymene pilosa				+
Tricoryne tenella				+
Hibbertia huegelii				Associated
Lepidosperma leptostachyum				Associated
Mesomelaena pseudostygia				Associated
Petrophile macrostachya				Associated

Site C33

Date	7/10/2021	24/11/2021
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364183mE 6555066mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Flat	
Landform	Sandy plain	
Soil Colour	Grey-white-brown	
Soil Type	Sandy loam	
Litter %	20	
Bare Ground %	40	
Fire Age	>10 Years	
Vegetation Condition	Very Good	
Disturbances/Impacts	Animal grazing and weeds	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	7	25	+	+
Banksia attenuata	5	6	+	+
Banksia menziesii	5	4	+	+
Jacksonia furcellata	3	2	+	+
Calytrix fraseri	1.4	10	+	+
Melaleuca clavifolia	1	1	+	+
Stylidium repens	0.1	3	+	+
Gonocarpus pithyoides	0.1	1	+	+
?Sphaerolobium linophyllum				+
**Aira caryophyllea*			+	
Anigozanthos humilis subsp. *humilis*			+	+
**Arctotheca calendula*			+	
Austrostipa compressa			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia ilicifolia			+	+
Banksia nivea subsp. *nivea*			+	+
**Briza maxima*			+	+
Caladenia corynephora			+	
Caladenia flava			+	
Centrolepis aff. *drummondiana*			+	
Conostylis juncea			+	+
Conostylis sp. 3			+	
Cyperaceae sp. 2			+	+
Daviesia incrassata subsp. incrassata			+	+
**Ehrharta calycina*			+	
**Ehrharta longiflora*			+	
Eucalyptus todtiana			+	+
Gompholobium tomentosum				+
Hibbertia subvaginata			+	+
**Hypochaeris glabra*			+	
Hypolaena exsulca			+	+
Lagenophora huegelii				+
Lechenaultia stenosepala				+
Leptocarpus coangustatus			+	
Leucopogon polymorphus			+	+
Levenhookia octomaculata				+
Lobelia tenuior				+
Nuytsia floribunda			+	Associated
Opercularia vaginata			+	+
Patersonia occidentalis var. *occidentalis*			+	+
Pericalymma ellipticum				+
Pericalymma ellipticum var. *floridum*			+	+
Phyllangium sp.			+	+
Podotheca gnaphalioides			+	+
Quinetia urvillei			+	+
Rhodanthe citrina			+	+
Schoenus sp.			+	+
Siloxerus humifusus			+	+
Stylidium ?perpusillum			+	+
Trachymene pilosa			+	+
**Ursinia anthemoides*			+	+
**Wahlenbergia capensis*			+	+
Xanthorrhoea preissii				Associated

Site C34

Date	7/10/2021
Botanist	MG/DR MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	363845mE 6556270mN
Vegetation Unit	MpBaBm - Low open woodland of *Melaleuca preissiana*, *Banksia menziesii* and *Banksia attenuata* over shrublands of *Banksia incana*, *Calytrix fraseri* and *Adenanthos cygnorum* subsp. *cygnorum* over mixed low sparse herb/sedgeland.
Slope	Flat
Landform	Floodplain
Soil Colour	Brown
Soil Type	Sand
Litter %	2
Bare Ground %	0
Fire Age	5-10 Years
Vegetation Condition	Excellent
Disturbances/Impacts	NIL

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	8	10	+	+
Banksia littoralis	8	1	+	+
Adenanthos cygnorum subsp. *cygnorum*	2.5	15	+	+
Calytrix fraseri	2.5	5	+	+
Banksia incana	2	70	+	+
Stylidium repens	0.2	3	+	+
Bossiaea eriocarpa			+	+
Chaetospora curvifolia			+	+
Conostephium minus			+	+
Conostephium pendulum			+	+
Conostylis juncea			+	+
Conostylis sp. 2			+	+
Dillwynia sp.				+
Drosera erythrogyne			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Euchilopsis linearis			+	+
Hypolaena exsulca			+	+
Leucopogon polymorphus			+	+
Opercularia spermacocea			+	+
Phlebocarya ciliata			+	+
Podotheca chrysantha			+	+
Scholtzia sp.			+	+
Trachymene pilosa			+	+
**Ursinia anthemoides*			+	+
Banksia attenuata				Associated
Banksia ilicifolia				Associated
Melaleuca preissiana				Associated

Site C35

Date	7/10/2021	24/11/2022
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364326mE 6555048mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Moderate	
Landform	Low rise	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	20	
Bare Ground %	30	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	Possible animal grazing and possible dieback	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	6	15	+	+
Banksia attenuata	6	7	+	+
Eremaea pauciflora var. *pauciflora*	0.8	65	+	+
Melaleuca clavifolia	0.7	3	+	+
Mesomelaena pseudostygia	0.6	5	+	+
Patersonia occidentalis	0.5	1	+	+
Xanthorrhoea preissii			+	+
**Aira caryophyllea*			+	+
Anigozanthos humilis subsp. *humilis*			+	+
Austrostipa compressa			+	+
Bossiaea eriocarpa			+	+
Brachyscome bellidioides				+
Burchardia congesta			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Caladenia flava			+	
Calectasia narragara			+	+
Calytrix sp.			+	
Cassytha racemosa			+	+
Chaetospora curvifolia			+	
Conostylis juncea			+	+
Conostylis setigera				+
Crassula colorata			+	+
Desmocladus fasciculatus				+
Desmocladus virgatus			+	+
Drosera ?erythrorhiza			+	
Drosera ?minutiflora			+	
Drosera menziesii			+	
Drosera closterostigma				+
Eremaea asterocarpa			+	+
Ericaceae sp.			+	+
Gastrolobium linearifolium			+	+
Gompholobium tomentosum				+
Hibbertia crassifolia			+	+
Hibbertia huegelii				+
Hibbertia hypericoides			+	+
Hibbertia striata			+	+
Hibbertia subvaginata			+	+
Hovea trisperma			+	+
**Hypochaeris glabra*			+	+
Lepidosperma leptostachyum			+	+
Leporella fimbriata			+	+
Leptomeria empetriformis			+	+
Leucopogon polymorphus			+	
Lobelia tenuior				+
Monotaxis grandiflora var. *grandiflora*			+	+
Neurachne alopecuroidea				+
Opercularia vaginata			+	+
Petrophile linearis			+	+
Philotheca spicata			+	+
Phlebocarya ciliata				+
Phyllangium sp.			+	+
Pimelea sulphurea			+	+
Podotheca chrysantha			+	
Podotheca gnaphalioides			+	+
Pterostylis sp.			+	
Quinetia urvillei			+	
Schoenus laevigatus			+	+
Stirlingia latifolia			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Stylidium ?perpusillum			+	+
Stylidium repens			+	+
Trachymene pilosa			+	+
Tripterococcus brunonis			+	
**Ursinia anthemoides*			+	+
Verticordia nitens				+
**Wahlenbergia capensis*			+	+
Calytrix fraseri			Associated	Associated
Jacksonia sternbergiana			Associated	Associated
Nuytsia floribunda			Associated	Associated

Site C36

Date	7/10/2021	24/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364772mE 6555830mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Flat	
Landform	Upperslope/crest	
Soil Colour	Light brown/grey	
Soil Type	Sand	
Litter %	15	
Bare Ground %	8	
Fire Age	3-5 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	NIL	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Eucalyptus todtiana	10	30	+	+
Banksia attenuata	8	5	+	+
Banksia menziesii	8	1	+	+
Eremaea pauciflora var. *pauciflora*	1.5	30	+	+
Hibbertia hypericoides subsp. *hypericoides*	0.5	15	+	+
Mesomelaena pseudostygia	0.5	5	+	+
Stirlingia latifolia	0.5	2	+	+
?Goodeniaceae sp.				+
Acacia applanata			+	+
Acacia stenoptera				+
Anigozanthos humilis subsp. *humilis*			+	+
Austrostipa macalpinei			+	
Austrostipa sp.			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Bossiaea eriocarpa			+	+
Brachyscome bellidioides			+	+
Burchardia congesta			+	+
Chaetanthus aristatus			+	
Conostephium pendulum			+	+
Conostylis aurea			+	+
Daviesia divaricata subsp. *divaricata*			+	+
Desmocladus flexuosus			+	+
Diuris sp.			+	
Drosera closterostigma			+	
Drosera eneabba				+
Eremaea asterocarpa subsp. *asterocarpa*			+	+
Gompholobium tomentosum				+
Hibbertia subvaginata			+	
Isolepis marginata			+	+
Jacksonia ?sternbergiana			+	
Lagenophora gracilis			+	
Leucopogon polymorphus			+	+
Levenhookia octomaculata				+
Lobelia rhytidosperma				+
Lomandra hermaphrodita			+	+
Opercularia spermacocea			+	+
Patersonia occidentalis var. *occidentalis*			+	+
Petrophile linearis				+
Philotheca spicata			+	
Phyllangium paradoxum				+
Poa porphyroclados			+	+
Podotheca chrysantha			+	
Poranthera microphylla			+	+
Schoenus latitans			+	+
Scholtzia sp.			+	+
Stylidium ecorne			+	
Stylidium neurophyllum				+
Synaphea spinulosa				+
Thysanotus manglesianus			+	
Trachymene pilosa			+	+
**Ursinia anthemoides*			+	
**Wahlenbergia capensis*			+	

Site C37

Date	7/10/2021
Botanist	JA/NK
Quadrat Size	10 x 10 m
NW Corner Coordinates	364564mE 6554992mN
Vegetation Unit	MrKgMt - Low open woodland of *Melaleuca rhaphiophylla* over shrubland of *Kunzea glabrescens*, *Melaleuca viminea* subsp. *viminea* and *Melaleuca teretifolia* over mixed low Cyperaceae sedgelands and **Hypochaeris glabra*.
Slope	Flat
Landform	Wetland
Soil Colour	Dark grey-brown/black
Soil Type	Sandy peat/silt
Litter %	30
Bare Ground %	30
Fire Age	>10 Years
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	Weeds

Species	Height (cm)	% Cover	Phase 1	Phase 2
Kunzea glabrescens	2	65	+	
Melaleuca viminea subsp. *viminea*	2	25	+	
Melaleuca rhaphiophylla	1.5	3	+	
Acacia pulchella var. *glaberrima*	1.5	2	+	
Machaerina juncea	0.6	2	+	
**Aira caryophyllea*			+	
Caladenia flava			+	
Drosera ?minutiflora			+	
Drosera glanduligera			+	
Elythranthera brunonis			+	
Hakea varia			+	
**Hypochaeris glabra*			+	
Jacksonia nutans			+	
Melaleuca incana subsp. *incana*			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Podotheca gnaphalioides			+	
Trachymene pilosa			+	
**Trifolium dubium*			+	
**Ursinia anthemoides*			+	
**Vulpia bromoides*			+	
**Brassica barrelieri* subsp. *oxyrrhina*			Associated	
Cassytha glabella forma *dispar*			Associated	

Site C38

Date	7/10/2021	24/11/2021
Botanist	MG/DR	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	364397mE 6555779mN	
Vegetation Unit	BaBmMp - *Banksia attenuata, Banksia menziesii* and occasional *Melaleuca preissiana* woodland over shrublands of *Calytrix fraseri*, *Pericalymma ellipticum* subsp. *ellipticum* and *Xanthorrhoea preissii* over *Lomandra* spp. and *Lechenaultia stenosepala*.	
Slope	Gentle	
Landform	Midslope	
Soil Colour	Dark brown/grey	
Soil Type	Sandy loam	
Litter %	45	
Bare Ground %	3	
Fire Age	3-5 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	Weeds	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia attenuata	10	10	+	
Corymbia calophylla	8	25	+	
Banksia menziesii	8	2	+	
Xanthorrhoea preissii	1.5	15	+	
Hypocalymma angustifolium subsp. Swan Coastal Plain	1.5	3	+	
Xanthorrhoea brunonis	1	5	+	
Hibbertia hypericoides subsp. *hypericoides*	0.3	4	+	
Lomandra caespitosa	0.3	2	+	
Austrostipa compressa			+	
Bossiaea eriocarpa			+	
**Briza maxima*			+	
Burchardia congesta			+	
Calytrix sp.			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Cyathochaeta avenacea			+	
Daviesia ?incrassata			+	
Drosera menziesii			+	
**Ehrharta calycina*			+	
**Hypochaeris glabra*			+	
Hypolaena exsulca			+	
Jacksonia sternbergiana				
Lagenophora gracilis			+	
Lepidosperma squamatum			+	
Lobelia tenuior				
Lomandra preissii			+	
Melaleuca preissiana			+	
Monotaxis occidentalis			+	
Patersonia occidentalis var. *occidentalis*			+	
Petrophile macrostachya				
Philotheca spicata			+	
Phyllangium paradoxum			+	
Pterostylis dilatata			+	
Sowerbaea laxiflora			+	
Stirlingia latifolia			+	
Stylidium ecorne			+	
Thysanotus patersonii			+	
Trachymene pilosa			+	
Tricoryne tenella				
**Ursinia anthemoides*				
Wahlenbergia gracilenta			+	

Site C39

Date	7/10/2021
Botanist	JA/NK
Quadrat Size	10 x 10 m
NW Corner Coordinates	365134mE 6555163mN
Vegetation Unit	MrKgMt - Low open woodland of *Melaleuca rhaphiophylla* over shrubland of *Kunzea glabrescens*, *Melaleuca viminea* subsp. *viminea* and *Melaleuca teretifolia* over mixed low Cyperaceae sedgelands and **Hypochaeris glabra*.
Slope	Flat
Landform	Wetland
Soil Colour	Dark grey-brown/black
Soil Type	Sandy peat/silt
Litter %	30
Bare Ground %	5
Fire Age	>10 Years
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	Weeds, possible animal grazing

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca viminea subsp. *viminea*	1.4	80	+	
Kunzea glabrescens	1.4	1	+	
Hovea trisperma	1.2	2	+	
Cyperaceae sp. 1	0.4	2	+	
**Vulpia bromoides*	<0.1	1	+	
Acacia saligna			+	
**Aira caryophyllea*			+	
**Bellardia trixago*			+	
Cassytha glabella forma *dispar*			+	
Drosera glanduligera			+	
**Hypochaeris glabra*			+	
Melaleuca ?rhaphiophylla			+	
Melaleuca teretifolia			+	
Trachymene pilosa			+	
**Trifolium dubium*			+	

Site C40

Date	7/10/2021
Botanist	MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	365050mE 6555658mN
Vegetation Unit	MpCp - Low open forest of *Melaleuca preissiana* with scattered *Banksia littoralis* and areas *of Callitris pyramidalis* over mixed shrublands of *Hypocalymma angustifolium*, *Xanthorrhoea preissii* and *Kunzea micrantha* subsp. *micrantha* and *Banksia telmatiaea* over mixed dense herb/sedgeland.
Slope	Flat
Landform	Floodplain
Soil Colour	Dark brown/black
Soil Type	Peaty loam
Litter %	60
Bare Ground %	3
Fire Age	3-5 Years
Vegetation Condition	Excellent
Disturbances/Impacts	Herby weeds, seasonal inundation

Species	Height (cm)	% Cover	Phase 1	Phase 2
Melaleuca preissiana	15	40	+	
Xanthorrhoea preissii	3	25	+	
Kunzea micrantha subsp. *micrantha*	3	5	+	
Hakea varia	2	2	+	
Xanthorrhoea brunonis	1	10	+	
Acacia saligna			+	
**Aira cupaniana*			+	
Banksia littoralis			+	
**Briza minor*			+	
Comesperma confertum			+	
Drosera menziesii			+	
Elythranthera brunonis			+	
Gompholobium tomentosum			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Hydrocotyle tetragonocarpa			+	
Hypocalymma angustifolium subsp. Swan Coastal Plain			+	
**Hypochaeris glabra*			+	
Pericalymma ellipticum var. *ellipticum*			+	
Podotheca chrysantha			+	
Pterostylis ?dilatata			+	
Rhodanthe citrina			+	
Trachymene pilosa			+	
**Vulpia myuros*			+	

Site C41

Date	7/10/2021	25/11/2021
Botanist	JA/NK	MG/DR
Quadrat Size	10 x 10 m	
NW Corner Coordinates	365409mE 6555419mN	
Vegetation Unit	BaBmEt - Low woodland of *Banksia menziesii, Banksia attenuata* and *Eucalyptus todtiana* over open shrubland of *Xanthorrhoea preissii, Eremaea* spp. and *Calytrix fraseri* over *Hibbertia hypericoides, Melaleuca clavifolia* and *Mesomelaena pseudostygia*.	
Slope	Moderate	
Landform	Low rise	
Soil Colour	Grey-white	
Soil Type	Sand	
Litter %	35	
Bare Ground %	30	
Fire Age	>10 Years	
Vegetation Condition	Excellent	
Disturbances/Impacts	Possible animal grazing	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Banksia menziesii	6.5	20	+	+
Banksia attenuata	6.5	10	+	+
Eucalyptus todtiana	4.5	7	+	+
Calytrix fraseri	2	1	+	+
Allocasuarina humilis	1.8	4	+	+
Hibbertia hypericoides	0.5	30	+	+
Mesomelaena pseudostygia	0.5	15	+	+
Alexgeorgea nitens			+	+
Anigozanthos humilis subsp. *humilis*			+	+
Austrostipa compressa			+	+
Bossiaea eriocarpa			+	+
Brachyscome bellidioides			+	
Burchardia congesta			+	+

Species	Height (cm)	% Cover	Phase 1	Phase 2
Conospermum stoechadis subsp. *stoechadis*			+	+
Conostephium pendulum			+	+
Conostylis setigera				+
Conostylis teretifolia subsp. *teretifolia*			+	
Corynotheca ?micrantha			+	
Cyanothamnus subsessilis			+	
Desmocladus virgatus			+	+
Drosera ?erythrorhiza			+	
Drosera ?minutiflora			+	
Drosera eneabba				+
Drosera macrantha			+	+
Elythranthera brunonis			+	
Eremaea asterocarpa			+	+
Eremaea pauciflora var. *lonchophylla*			+	+
Gompholobium tomentosum				+
Hemiandra linearis				+
Hibbertia huegelii				+
Hibbertia subvaginata			+	+
Lepidosperma leptostachyum			+	+
Leporella fimbriata			+	
Leptospermum spinescens			+	+
Leucopogon polymorphus			+	+
Levenhookia octomaculata				+
Lobelia tenuior				+
Lyginia barbata			+	+
Lyginia imberbis			+	+
Opercularia vaginata				+
Petrophile linearis			+	+
Petrophile macrostachya			+	+
Phyllangium sp.			+	+
Pimelea sulphurea			+	+
Podotheca gnaphalioides			+	+
Poranthera microphylla			+	
Pyrorchis nigricans			+	
Schoenus clandestinus			+	
Stirlingia latifolia			+	+
Stylidium ?perpusillum			+	
Stylidium diuroides			+	+
Stylidium neurophyllum			+	+
Stylidium repens			+	+
Synaphea spinulosa			+	+
Thysanotus manglesianus			+	
Trachymene pilosa			+	+
Tripterococcus brunonis				+

Species	Height (cm)	% Cover	Phase 1	Phase 2
**Ursinia anthemoides*			+	+
Verticordia nitens			+	+
Xanthorrhoea preissii			+	+
Xanthosia huegelii			+	

Site C42

Date	10/7/2021
Botanist	MG/DR
Quadrat Size	10 x 10 m
NW Corner Coordinates	364968mE 6555241mN
Vegetation Unit	MpCp - Low open forest of *Melaleuca preissiana* with scattered *Banksia littoralis* and areas *of Callitris pyramidalis* over mixed shrublands of *Hypocalymma angustifolium*, *Xanthorrhoea preissii* and *Kunzea micrantha* subsp. *micrantha* and *Banksia telmatiaea* over mixed dense herb/sedgeland.
Slope	Flat
Landform	Floodplain
Soil Colour	Dark brown/black
Soil Type	Peaty loam
Litter %	10
Bare Ground %	1
Fire Age	>10 Years
Vegetation Condition	Excellent
Disturbances/Impacts	NIL

Species	Height (cm)	% Cover	Phase 1	Phase 2
Callitris pyramidalis	4	50	+	
Melaleuca viminea subsp. *viminea*	1.5	30	+	
Xanthorrhoea preissii	1.5	5	+	
Gahnia trifida	0.8	2	+	
Lomandra micrantha subsp. *micrantha*	0.5	15	+	
Schoenus laevigatus	0.5	8	+	
Acacia pulchella			+	
**Aira cupaniana*			+	
**Arctotheca calendula*			+	
Austrostipa compressa			+	
Banksia littoralis			+	
Caladenia sp.			+	
Crassula colorata			+	

Species	Height (cm)	% Cover	Phase 1	Phase 2
Elythranthera brunonis			+	
Heliophila pusilla			+	
**Hypochaeris glabra*			+	
Kunzea micrantha			+	
Opercularia spermacocea			+	
Phyllangium divergens			+	
Podotheca chrysantha			+	
Rhodanthe citrina			+	
Siloxerus filifolius			+	
Trachymene pilosa			+	
**Ursinia anthemoides*			+	

APPENDIX G – RECORDED SIGNIFICANT FLORA LOCATIONS

Species	Co-ordinates	Minimum No. Plants
Banksia dallanneyi subsp. *pollosta*	364490mE 6554480mN	1
Dillwynia dillwynioides	365626mE 6554048mN	1
Dodonaea hackettiana	364435mE 6555690mN	20
Dodonaea hackettiana	364476mE 6555667mN	1
Dodonaea hackettiana	365177mE 6553597mN	6
Verticordia lindleyi Schauer subsp. *lindleyi*	363974mE 6556778mN	1

APPENDIX H – RECORDED FAUNA SPECIES DBCA DESKTOP

Common Name	Species Name	Status	Observation
Birds			
Australian Magpie	*Cracticus tibicen*		Sighted
Australian Ringneck	*Platycercus zonarius*		Sighted
Australian White Ibis	*Threskiornis moluccus*		Sighted
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*		Sighted
Brown Honeyeater	*Lichmera indistincta*		Sighted
Carnaby's Black-Cockatoo	*Calyptorhynchus latirostris*	CS1 (EN, S2)	Sighted
Common Bronzewing	*Phaps chalcoptera*		Sighted
Laughing Kookaburra	*Dacelo novaeguineae*	Introduced	Sighted
Little Corella	*Cacatua sanguinea*		Sighted
Magpie-lark	*Grallina cyanoleuca*		Sighted
New Holland Honeyeater	*Phylidonyris novaehollandiae*		Sighted
Rufous Whistler	*Pachycephala rufiventris*		Sighted
Shining Bronze-Cuckoo	*Chalcites lucidus*		Sighted
Silvereye	*Zosterops lateralis*		Sighted
Splendid Fairy-wren	*Malurus splendens*		Sighted
Straw-necked Ibis	*Threskiornis spinicollis*		Sighted
Wedge-tailed Eagle	*Aquila audax*		Sighted
Western Wattlebird	*Anthochaera lunulata*		Sighted
Mammals			
Pig	*Sus scrofa*	Introduced	Diggings
Rabbit	*Oryctolagus cuniculus*	Introduced	Scats

APPENDIX I – EXPECTED FAUNA ASSEMBLAGE

Species	Common Name	Conservation Status	Status in survey area	Recorded	Source
FROGS					
Crinia glauerti	Clicking Froglet		regular visitor		1,2
Crinia insignifera	Squelching Froglet		regular visitor		2
Heleioporus eyrei	Moaning Frog		resident		2
Heleioporus psammophilus	Sand Frog		resident		2
Limnodynastes dorsalis	Pobblebonk		resident		1,2
Litoria adelaidensis	Slender Tree Frog		regular visitor		1, 2
Litoria moorei	Motorbike Frog		regular visitor		1,2
Myobatrachus gouldii	Turtle Frog		regular visitor		
Neobatrahus pelobatoides	Humming Frog		regular visitor		2
Pseudophryne guentheri	Crawling Toadlet		regular visitor		2
BIRDS					
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		vagrant		1,2
Acanthiza apicalis	Inland Thornbill		resident		1,2
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		resident		1,2
Acanthiza inornata	Western Thornbill		resident		1,2
Acanthorhynchus superciliosus	Western Spinebill		resident		1,2
Accipiter cirrocephalus	Collared Sparrowhawk		resident		1,2
Accipiter fasciatus	Brown Goshawk		resident		1,2
Aegotheles cristatus	Australian Owlet-nightjar		regular visitor		
Anthochaera carunculata	Red Wattlebird		resident		1,2
Anthochaera lunulata	Western Wattlebird		resident	+	1,2
Anthus novaeseelandiae	Australasian Pipit		regular visitor		1
Apus pacificus	Fork-tailed Swift	CS1 (M, S5)	irregular visitor		1,3
Aquila audax	Wedge-tailed Eagle		regular visitor	+	1,2
Artamus cinereus	Black-faced Woodswallow		resident		1,2
Artamus cyanopterus	Dusky Woodswallow		regular visitor		1,2
Cacatua galerita	Sulphur-crested Corella	Int	vagrant		1
Cacatua pastinator	Western Corella		regular visitor		1,2
Cacatua sanguinea	Little Corella		irregular visitor	+	1,2
Cacatua tenuirostris	Long-billed Corella	Int	irregular visitor		1
Cacomantis flabelliformis	Fan-tailed Cuckoo		regular visitor		1,2
Cacomantis pallidus	Pallid Cuckoo		regular visitor		1,2
Calamanthus campestris	Rufous Fieldwren		irregular visitor		1

Species	Common Name	Conservation Status	Status in survey area	Recorded	Source
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	CS1 (V, S3)	irregular visitor		1,2,3
Calyptorhynchus baudinii	Baudin's Black-Cockatoo	CS1 (V, S2)	vagrant		1
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	CS1 (E, S2)	regular visitor	+	1,2,3
Certhionyx variegatus	Pied Honeyeater		vagrant		1
Chalcites basali	Horsfield's Bronze-Cuckoo		regular visitor		1
Chalcites lucidus	Shining Bronze-Cuckoo		regular visitor	+	1
Chalcites osculans	Black-eared Cuckoo		vagrant		1
Cheramoeca leucosterna	White-backed Swallow		irregular visitor		1,2
Cincloramphus cruralis	Brown Songlark		irregular visitor		1
Cincloramphus mathewsi	Rufous Songlark		regular visitor		1
Circus assimilis	Spotted Harrier		irregular visitor		1,2
Colluricincla harmonica	Grey Shrike-thrush		resident		1,2
Columba livia	Rock Dove/Feral Pigeon	Int	vagrant		1
Coracina novaehollandiae	Black-faced Cuckoo-shrike		resident	+	1,2
Corvus bennetti	Little Crow		vagrant		1,2
Corvus coronoides	Australian Raven		resident		1,2
Coturnix pectoralis	Stubble Quail		regular visitor		1
Cracticus nigrogularis	Pied Butcherbird		vagrant		1,2
Cracticus tibicen	Australian Magpie		resident	+	1,2
Cracticus torquatus	Grey Butcherbird		resident		1,2
Dacelo novaeguineae	Laughing Kookaburra	Int	resident	+	1,2
Daphoenositta chrysoptera	Varied Sittella		resident		1,2
Dicaeum hirundinaceum	Mistletoebird		resident		1,2
Dromaius novaehollandiae	Emu		resident		1,2
Elanus caeruleus (axillaris)	Black-shouldered Kite		regular visitor		1,2
Eolophus roseicapillus	Galah		resident		1,2
Eopsaltria georgiana	White-breasted Robin		irregular visitor		1,2
Epthianura tricolor	Crimson Chat		irregular visitor		1
Falco berigora	Brown Falcon		regular visitor		2
Falco cenchroides	Nankeen Kestrel		regular visitor		1,2
Falco longipennis	Australian Hobby		resident		1,2
Falco peregrinus	Peregrine Falcon	CS1 (S7)	resident		1
Gavicalis virescens	Singing Honeyeater		resident		1
Gerygone fusca	Western Gerygone		resident		1,2
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		irregular visitor		

Species	Common Name	Conservation Status	Status in survey area	Recorded	Source
Glyciphila melanops	Tawny-crowned Honeyeater		regular visitor		1,2
Grallina cyanoleuca	Magpie-lark		resident	+	1,2
Haliastur sphenurus	Whistling Kite		regular visitor		1,2
Hieraaetus morphnoides	Little Eagle		regular visitor		1,2
Hirundo neoxena	Welcome Swallow		resident		1,2
Lalage sueurii	White-winged Triller		regular visitor		1
Lichmera indistincta	Brown Honeyeater		resident	+	1,2
Lophoictinia isura	Square-tailed Kite	CS3 (WR)	regular visitor		1
Malurus assimilis	Purple-backed Fairy-wren		resident		1,2
Malurus leucopterus	White-winged Fairy-wren		regular visitor		1,2
Malurus splendens	Splendid Fairy-wren		resident	+	1,2
Manorina flavigula	Yellow-throated Miner		regular visitor		1,2
Melanodryas cucullata	Hooded Robin		regular visitor		1
Melithreptus brevirostris	Brown-headed Honeyeater		regular visitor		1,2
Melopsittacus undulatus	Budgerigar		Vagrant		1
Merops ornatus	Rainbow Bee-eater		regular visitor		1,2
Myiagra inquieta	Restless Flycatcher	CS3 (HS)	irregular visitor		1,2
Neophema elegans	Elegant Parrot		regular visitor		1
Ninox boobook	Southern Boobook		resident		1
Ninox connivens	Barking Owl (South-west pop'n)	CS2 (P2, WR)	vagrant		
Ocyphaps lophotes	Crested Pigeon		regular visitor		1,2
Oreoica gutturalis	Crested Bellbird		irregular visitor		1
Pachycephala fuliginosa	Western Whistler		resident		1
Pachycephala rufiventris	Rufous Whistler		resident	+	1,2
Pardalotus punctatus	Spotted Pardalote		regular visitor		1
Pardalotus striatus	Striated Pardalote		resident		1,2
Petrochelidon ariel	Fairy Martin		irregular visitor		
Petrochelidon nigricans	Tree Martin		regular visitor		1,2
Petroica boodang	Scarlet Robin		resident		1,2
Petroica goodenovii	Red-capped Robin		resident		1,2
Phaps chalcoptera	Common Bronzewing		resident	+	1,2
Phaps elegans	Brush Bronzewing		resident		
Phylidonyris niger	White-cheeked Honeyeater		resident		1,2
Phylidonyris novaehollandiae	New Holland Honeyeater		resident	+	1,2
Platalea flavipes	Yellow-billed Spoonbill		irregular visitor		1,2
Platycercus icterotis	Western Rosella	CS3 (WR)	irregular visitor		1,2

Species	Common Name	Conservation Status	Status in survey area	Recorded	Source
Platycercus zonarius	Australian Ringneck		resident	+	1,2
Podargus strigoides	Tawny Frogmouth		resident		1
Polytelis anthopeplus	Regent Parrot		irregular visitor		1
Purpureicephalus spurius	Red-capped Parrot		resident		1,2
Rhipidura albiscapa	Grey Fantail		resident		1,2
Rhipidura leucophrys	Willie Wagtail		resident		1,2
Sericornis frontalis	White-browed Scrubwren		resident		1,2
Smicrornis brevirostris	Weebill		resident		1,2
Stipiturus malachurus	Southern Emu-wren	CS3 (HS)	regular visitor		1
Strepera versicolor	Grey Currawong		irregular visitor		1,2
Streptopelia chinesensis	Spotted Dove	Int	irregular visitor		1,2
Streptopelia senegalensis	Laughing Dove	Int	irregular visitor		1,2
Sugomel niger	Black Honeyeater		irregular visitor		1
Threskiornis moluccus	Australian White Ibis		regular visitor	+	1
Threskiornis spinicollis	Straw-necked Ibis		irregular visitor	+	1,2
Todiramphus sanctus	Sacred Kingfisher		regular visitor		1,2
Trichoglossus haematodus	Rainbow Lorikeet	Int	irregular visitor		
Turnix varius	Painted Button-quail		resident		
Turnix velox	Little Button-quail		resident		
Tyto javanica	Eastern Barn Owl		regular visitor		1
Tyto novaehollandeae	Masked Owl	CS2 (P3, WR)	vagrant		
Vanellus tricolor	Banded Lapwing		irregular visitor		1
Zosterops lateralis	Silvereye		resident	+	1,2
MAMMALS					
Austronomus (Tadarida) australis	White-striped Freetail-Bat		regular visitor		
Cercartetus concinnus	Western Pygmy-possum	CS3 (LS)	resident		
Chalinolobus gouldii	Gould's Wattled Bat		resident		1,2
Dasyurus geoffroii	Chuditch	CS1 (V, S3)	vagrant		2,3
Felis catus	Cat	Int	resident		3
Hydromys chrysogaster	Rakali (water-rat)	CS2 (P4)	irregular visitor		2
Isoodon fusciventer	Quenda	CS2 (P5)	vagrant		
Macropus fuliginosus	Western Grey Kangaroo		resident		1,2
Mus musculus	House Mouse	Int	resident		1,2
Notamacropus irma	Brush Wallaby	CS2 (P4)	resident		1,2
Nyctophilus geoffroyi	Lesser Long-eared Bat		resident		1,2
Nyctophilus major major	Western long-eared Bat		resident		

Species	Common Name	Conservation Status	Status in survey area	Recorded	Source
Oryctolagus cuniculus	Rabbit	Int	resident	+ (scats)	1,3
Ozimops kitcheneri	Western Freetail-Bat	CS3 (LS)	resident		
Pseudomys albocinereus	Noodji, Ash-grey Mouse	CS3 (LS)	resident		1,2
Rattus rattus	Black Rat	Int	resident		1,2
Sminthopsis dolichura	Little Long-tailed Dunnart (coastal plain form)	CS3 (LS)	resident		
Sminthopsis fuliginosus	Grey-bellied Dunnart	CS3 (LS)	resident		
Sus scrofa	Pig	Int	regular visitor	+ (diggings)	BCE
Tachyglossus aculeatus	Echidna		resident		1,2
Tarsipes rostratus	Honey Possum	CS3 (LS)	resident		
Trichosurus vulpecula	Brushtail Possum		regular visitor		
Vespadelus regulus	Southern Forest Bat		resident		1,2
Vulpes vulpes	Red Fox	Int	resident		3
REPTILES					
Anilios australis	Southern Blind Snake		resident		1
Aprasia repens	Sand-plain Worm-lizard		resident		2
Brachyurophis fasciolatus	Narrow-banded Burrowing Snake		resident		1,2
Brachyurophis semifasciatus	Southern Shovel-nosed Snake		resident		2
Chelodina oblonga	South-west Long-necked Tortoise		irregular visitor		1
Christinus marmoratus	Marbled Gecko		resident		1
Crenadactylus occelatus	Clawless Gecko		resident		1
Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink		resident		2
Ctenophorus adelaidensis	Western Heath Dragon		resident		1,2
Ctenotus australis	Western Limestone Ctenotus		resident		
Ctenotus fallens	West Coast Ctenotus		resident		2
Ctenotus gemmula	Jewelled Sand-plain Skink	CS2 (P3)	resident		
Ctenotus impar	Odd-striped Ctenotus		resident		
Cyclodomorphus celatus	Western Slender Blue-tongue		resident		1,2
Delma concinna	Javelin Legless Lizard		resident		1
Delma fraseri	Fraser's Legless Lizard		resident		1
Delma grayii	Gray's Legless Lizard		resident		
Demansia reticulata	Yellow-faced Whip Snake		resident		1,2
Echiopsis curta	Bardick		resident		1,2
Egernia kingii	King's Skink		resident		1
Egernia napoleonis	Salmon-bellied Skink		resident		1,2

Species	Common Name	Conservation Status	Status in survey area	Recorded	Source
Hemiergis quadrilineata	Two-toed Earless Skink		resident		2
Lerista christinae	Bold-striped Slider	CS3	resident		
Lerista elegans	West Coast Four-toed Slider		resident		2
Lerista lineopunctulata	West Coast Line-spotted Slider		resident		1
Lerista praepedita	West Coast Worm-slider		resident		2
Lialis burtonis	Burton's Legless Lizard		resident		1,2
Liopholis multiscutata	Bull Skink		resident		1
Lucasium alboguttatum	White Spotted Gecko		resident		2
Menetia greyii	Common Dwarf Skink		resident		1,2
Morelia spilota imbricata	Carpet Python (south-west pop'n)	CS3	resident		2
Morethia lineoocellata	Western Pale-flecked Morethia		resident		
Morethia obscura	Dusky Morethia		resident		2
Neelaps bimaculatus	Black-naped Snake		resident		1
Neelaps calonotos	Black-striped Snake	CS2 (P3)	resident		1
Notechis scutatus	Tiger Snake		resident		
Parasuta gouldii	Gould's Snake		resident		1
Parasuta nigreceps	Black-backed Snake		resident		1,2
Pletholax gracilis	Keeled Legless Lizard		resident		
Pogona minor minor	Western Bearded Dragon		resident		1,2
Pseudechis australis	Mulga Snake		resident		
Pseudonaja affinis	Dugite		resident		2
Pygopus lepidopodus	Common Scaly-foot		resident		1,2
Simoselaps bertholdi	Jan's Banded Snake		resident		
SIGNIFICANT INVERTEBRATES					
Aname mellosa group	Spider	CS3 (SRE)	resident		BCE
Antichiropus UBS2	Millipede	CS3 (SRE)	resident		BCE
Glossurocolletes bilobatus	Short-tongued bee	CS2 (P2)	resident		1
Hesperocolletes douglasi	Short-tongued bee	CS1 (Ex, S1)	resident		1
Hylaeus globuliferus	Woolybush bee	CS2 (P3)	resident		2
Kwonkan sp.	Spider	CS3 (SRE)	resident		BCE
Leioproctus contrarius	Short-tongued bee	CS2 (P3)	resident		1,2
Synemon gratiosa	Graceful Sunmoth	CS2 (P4)	irregular visitor		2

Source: 1 (Atlas of Living Australia, ALA 2021), 2 (NatureMap, DBCA 2021b), 3 (PMST, DAWE 2021d), 4 (BCE database)

APPENDIX J – SUITABLE DBH TREES

Species	Co-ordinates	Life Status	DBH (mm)	Rank
Corymbia calophylla	364463mE 6555775mN	Alive	500	5
Corymbia calophylla	364453mE 6555757mN	Alive	650	4
Corymbia calophylla	364426mE 6555782mN	Alive	600	5
Corymbia calophylla	364644mE 6555362mN	Alive	550	4
Corymbia calophylla	364654mE 6555387mN	Alive	500	5
Corymbia calophylla	365120mE 6554358mN	Alive	550	5
Corymbia calophylla	364475mE 6555775mN	Alive	500	5
Corymbia calophylla	364493mE 6555804mN	Alive	500	5
Corymbia calophylla	364537mE 6555760mN	Alive	500	5
Corymbia calophylla	364497mE 6555709mN	Alive	500	5
Corymbia calophylla	364452mE 6555647mN	Alive	800	4
Corymbia calophylla	364457mE 6555661mN	Alive	550	4
Corymbia calophylla	364577mE 6555301mN	Alive	800	4
Corymbia calophylla	364579mE 6555290mN	Alive	500	5
Corymbia calophylla	364589mE 6555297mN	Alive	500	4
Corymbia calophylla	364592mE 6555287mN	Alive	500	5
Corymbia calophylla	364643mE 6555423mN	Alive	600	4
Corymbia calophylla	**364678mE 6555428mN**	**Alive**	**700**	**3***
Corymbia calophylla	364686mE 6555435mN	Alive	600	5
Corymbia calophylla	364642mE 6555419mN	Alive	700	5
Corymbia calophylla	365196mE 6554414mN	Alive	500	5

*Tree suitable for breeding (Rank 3)