FLORA, VEGETATION AND FAUNA ASSESSMENT
FRANKLAND PARK, HAMMOND PARK

OCTOBER 2018

CITY OF COCKBURN

FOCUSED VISION consulting

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EXECUTIVE SUMMARY

The City of Cockburn (the City) is preparing to develop public sporting grounds to meet community demand, with a growing population, particularly in the City's southern suburbs. A site at Frankland Park, has been identified as a likely site.

Focused Vision Consulting Pty Ltd (FVC) was commissioned by the City to undertake a spring flora, vegetation and fauna assessment of Frankland Park, with a follow-up targeted Banksia Woodland TEC assessment.

A single-phase detailed flora and vegetation assessment and a Level 1 terrestrial vertebrate fauna and habitat assessment was carried out Gabriela Martinez (Senior Botanist), Lisa Chappell (Senior Botanist) and Greg Harewood (Senior Zoologist) on 25 October 2017. A follow-up targeted Banksia Woodland TEC assessment was conducted by Lisa Chappell and Kellie Bauer-Simpson (Principal Ecologist) during June 2018. A targeted *Caladenia huegelii* survey was also conducted with the proposed footprint by Kellie Bauer-Simpson and Will Bauer-Simpson (Technician) during on 4 October 2018.

The assessments for flora, vegetation (including Banksia woodland TEC), fauna and habitat (including Black-cockatoo habitat) values, were recorded and reported in accordance with relevant technical guidelines and standards.

The key findings of the assessments within the study area are as follows:

- No flora of conservation significance was recorded during any of the field assessments, despite targeted surveys for *Caladenia huegelii*.
- One intact vegetation unit, BaBmOW, was described and mapped within the study area and defined as a Banksia Woodland, and representative of FCT SCP28 (Spearwood *Banksia attenuata* or *Banksia attenuata – Eucalyptus* woodlands), which is considered to represent the Banksia woodland TEC.
- Two fauna habitats, consisting of Banksia woodland and a degraded area were described and mapped across the study area.
- Evidence of Threatened Carnaby's Black-cockatoos and the Priority 4 species, Southern Brown Bandicoot/Quenda was recorded during the field assessment.
- Based on the habitats present and current documented distributions, *Lerista lineata* (Perth Lined Lerista), *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo), *Falco peregrinus* (Peregrine Falcon), *Merops ornatus* (Rainbow Bee-eater) and *Macropus irma* (Western Brush Wallaby) are considered to possibly occur within or occasionally utilise Frankland Park
- No breeding, potential breeding (habitat) or existing roosting trees were positively identified within the study area during the field survey.
- A targeted Banksia Woodland TEC assessment has confirmed that the areas of intact remnant native vegetation present within the Frankland Park site, represented by vegetation unit BaBmOW are representative of the TEC.
- The Banksia woodland at and surrounding the Frankland Park study area is part of a medium-sized patch of 140.24 ha.
- The Banksia woodland within the study area is in mostly 'Very Good – Excellent' condition. And based on the condition and size of the patch mapped, in accordance with the conservation advice, the entire patch (140.24 ha) is considered eligible as the TEC.

- Any proposed clearing and development that directly impacts on significant biological values, including the Banksia woodland TEC and Carnaby's Black-cockatoo habitat would be considered a significant impact under the EPBC Act.
- Any closely adjacent impacts that may result in indirect impacts such as weed invasion, dieback introduction, increased fire risk, and albeit unlikely, accidental over-clearing of significant biological values, including the Banksia woodland TEC and Black-cockatoo habitat would be considered a significant impact under the EPBC Act.

The majority of the area proposed for the sporting grounds development is cleared or degraded (if not completely degraded), supporting little value in terms of flora, vegetation, fauna or habitats, however a very small proportion of the footprint is in better condition and supports more significant values (Banksia woodland TEC and Black-cockatoo foraging habitat). Impact mitigating adjustments to the placement of the proposed development footprint have resulted in a significantly reduced area of impact for both MNES.

The adjusted impact areas that result from the Commonwealth Biodiversity Offsets Calculator for the proposed development are as follows:

- 1.42 ha for Banksia woodland TEC
- 1.22 ha for Black-cockatoo habitat.

These adjusted impact areas would be able to be rationalised against proposed offset areas in the calculator, once potential offset sites are selected and proposed, and once the scales for arriving at the habitat quality score discussed above have been agreed with DEE.

Since a proportion of the Banksia woodland within the proposed clearing footprint is significantly degraded and has regenerated from historic clearing, clearing of this vegetation may not be considered to represent a significant impact, and therefore referral of the wider proposed clearing may not be necessary, although DEE should be consulted on the matter.

The following mitigation measures and other recommendations are suggested for consideration with regards to proposed impacts to biological values:

- If possible, avoid clearing and residual impacts on all areas of remnant vegetation, which represents Banksia woodland TEC and Black-cockatoo foraging habitat MNES.
- Undertake a fauna trapping and translocation program prior to clearing, particularly aimed at the Priority 4 species, Quenda.
- Maintain the presence of a suitably qualified zoologist on site during clearing, so that any fauna that may be encountered can be relocated to adjacent bushland areas.

1 INTRODUCTION

1.1 BACKGROUND

The City of Cockburn (the City) is preparing to develop public sporting grounds to meet community demand, with a growing population, particularly in the City's southern suburbs. A site at Frankland Park, on Frankland Avenue, Hammond Park, near the junction of with and Wattleup Roads has been identified as a likely site (**Figure 1**).

Focused Vision Consulting Pty Ltd (FVC) was commissioned by the City to undertake a spring flora, vegetation and fauna assessment of the entire area at Frankland Park, including the current proposed footprint for the sporting grounds. This report presents the findings of the assessments conducted within the study area as part of the development process.

1.2 SCOPE OF WORK

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

- undertake a detailed (formerly referred to as a Level 2) flora and vegetation assessment within the entire Frankland Park site, during spring 2017
- undertake a Level 1 fauna and targeted Black-cockatoo habitat assessment within the entire Frankland Park site, during spring 2017
- undertake a follow-up targeted Banksia woodland assessment
- undertake a follow-up targeted survey for *Caladenia huegelii* within the proposed project footprint
- prepare a submit a technical report that presents the assessment findings and is suitable to assist in the City's preparation of approvals documentation for both State and Commonwealth regulatory authorities.

Figure 1 - Study Area

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2 EXISTING ENVIRONMENT

2.1 CLIMATE

The Swan Coastal Plain has a warm Mediterranean climate which is characterised by hot dry summers and cool to mild wet winters (Mitchell *et al* 2002). Jandakot (Site Number 009172) is one of the Bureau of Meteorology (BoM) meteorological recording stations which has been recording since 1989 and has recorded an average annual rainfall of 818.6 mm (BoM 2018). The annual mean maximum temperature ranges from 17.9°C in winter to 31.6°C in summer (BoM 2018) (**Figure 2**).

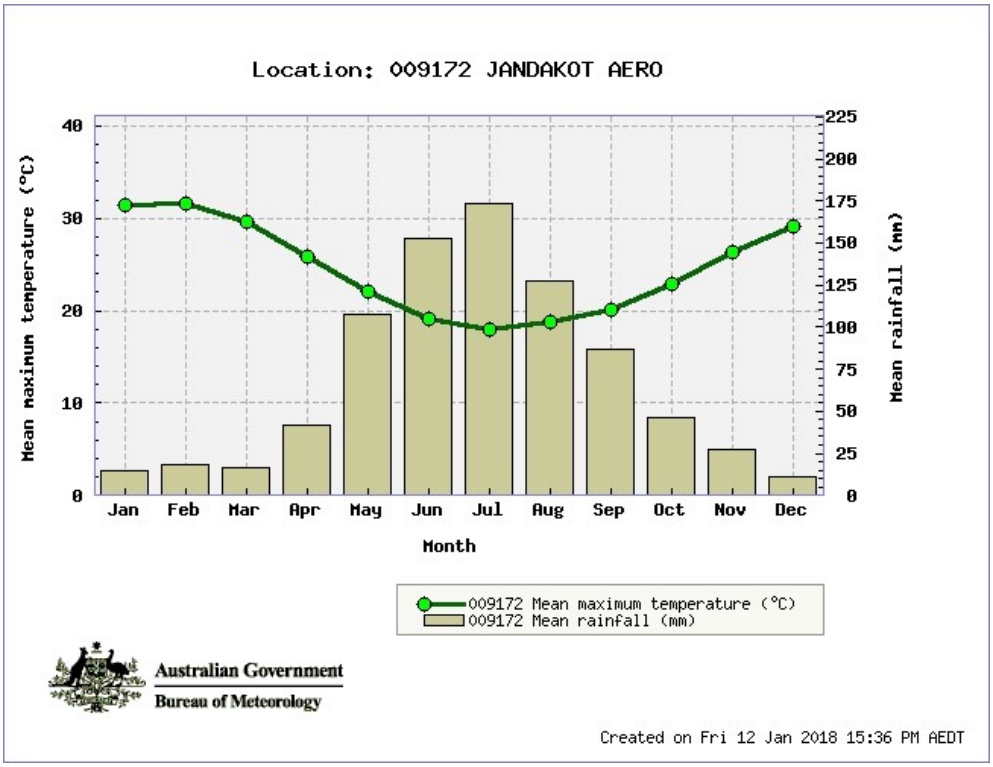

Figure 2 Climate Data for Jandakot

2.2 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 (Commonwealth of Australia 2013). The study area lies within the Swan Coastal Plain IBRA region and, at a finer scale, within the Perth subregion (Mitchell *et al* 2002).

This subregion is part of the South West Botanical Province which has a very high degree of species diversity. Mitchell *et al.* (2002) describe the Swan Coastal Plain as a low lying coastal plain mainly covered with woodlands. It is dominated by *Banksia* or Tuart on sandy soils, *Casuarina obesa* on outwash plains and paperbarks in swampy areas.

2.3 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 study area is situated on the Bassendean Dunes System(Government of Western Australia 2000).

The Bassendean Dune System consists of very old leached sands to various depths (GHD 2015) and are the oldest of the three dune systems occurring on the Swan Coastal Plain. Sands within this system contain very little silt or clay and very low levels of nutrient elements (ESWA 2016).

2.4 VEGETATION

Vegetation of the Perth subregion comprises heath and/or Tuart (*Eucalyptus gomphocephala*) woodlands on limestone, Jarrah (*Eucalyptus marginata*) and *Banksia* woodlands on Quaternary marine dunes and Marri (*Corymbia calophylla*) on colluvial and alluvial sands (Mitchell *et al.* 2002).

The study area is located on the Swan Coastal Plain and has been broadly characterised by Beard (1990). The Beard vegetation associations supported by the study area and the remaining extent across a range of contexts are presented in **Table 1** and spatially in **Figure 3**.

Table 1 Pre-European Vegetation of the Study Area (Beard 1990, DPaW 2017b)

Veg. Association No.	Veg System Association	Broad Vegetation Description	Extent Context	Pre–European Extent (ha)	Current Extent (ha)	% Pre European Extent Remaining	% Current Extent Protected (IUCN I –IV)
1001	1001.1	e2Mb cbLi - Medium very sparse woodland; jarrah, with low woodland; Banksia & Casuarina	Western Australia	57,410.23	12,791.61	22.28	2.80
			Swan Coastal Plain	57,410.23	12,791.61	22.28	2.80
			City of Cockburn	7,328.39	2,102.24	28.69	4.08

Vegetation complexes within the study area have also been defined by Heddle *et al.* (1980) and are based on vegetation in association with landforms and underlying geology. One vegetation complex, 'Bassendean Complex – central and south' as described by Heddle *et al.* (1980) occurs within the study area (**Table 2**, **Figure 4)**. The vegetation of the Bassendean Complex – central and south ranges from woodland of *Eucalyptus marginata* (Jarrah) – *Allocasuarina fraseriana* (Sheoak) – *Banksia* species to low woodland of *Melaleuca* species and sedgelands on the moister sites (Heddle 1980).

Table 2 Vegetation Complexes within the study area (Heddle *et. al*, WALGA 2013)

Vegetation Complex	Location	Pre–European Extent (ha)	Current Extent (ha)	% Remaining
Bassendean Complex - Central and South	Swan Coastal Plain	87,392.73	24,206.24	27.70
	City of Cockburn	6,850	2,217.37	32.37

One of the objectives of the Environmental Protection Authority (EPA) in terms of vegetation protection is maintaining at least 30% of each vegetation complex. The following key criteria 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 EPA's priority for conservation in the Perth and Peel regions is to secure at least 30% of all vegetation complexes within 'unconstrained area' and in the remaining 'constrained' areas a target of 10% applies (EPA, 2015).

Approximately 32.37% of the original extent of the Bassendean Complex – central and south remains in the City of Cockburn (WALGA 2013) (**Table 2**). Other documented remaining vegetation extents (Heddle *et al,* 1980 and Beard 1990) fall below the minimum 30% threshold level (**Table 1**) and therefore does not meet the EPA objective for retention for the purpose of biodiversity.

2.5 BANKSIA WOODLANDS OF THE SWAN COASTAL PLAIN TEC

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 2001). Vegetation communities in Western Australia may be considered threatened once they have been identified as such by the Western Australian Threatened Ecological Communities Scientific Advisory Committee (Mattiske 2015).

With regards to Commonwealth significance, some TECs or Priority Ecological Communities (PECs) of State (WA) significance are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Under the Act, a person must not take an action that has or will have significant impact on a listed TEC without approval from the Commonwealth Minister for the Environment, unless those actions are not prohibited under the Act.

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. This ecological community is woodland associated with some soils of the Swan Coastal Plain with a prominent tree layer of Banksia with scattered Eucalypts and other tree species among or emerging above the canopy. The understorey is comprised of a species rich mix of sclerophyllous shrubs, graminoids and forbs (Threatened Species Scientific Committee 2016).

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. This TEC mainly occurs on deep Bassendean and Spearwood sands or occasionally on Quindalup sands at the eastern edge (Threatened Species Scientific Committee 2016).

Twenty-one Floristic Community Types (FCTs) described by Gibson *et. al* (1994), in Bush Forever (Government of Western Australia 2000), Keighery *et. al* (2008) and Urban Bushland Council (2011) best correspond to the Banksia Woodlands TEC (Threatened Species Scientific Committee 2016) and these are summarised in **Table 3**.

Table 3 Floristic Community Types corresponding to the Banksia Woodland TEC

FCT	FCT Name	WA TEC/PEC	EPBC TEC
Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau			
20a	*Banksia attenuata* woodlands over species rich dense shrublands	Endangered	
20b	Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands	Endangered	
20c	Eastern shrublands and woodlands	Critically Endangered	Endangered
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	P2	
23a	Central *Banksia attenuata - Banksia menziesii* woodlands		
23b	Northern *Banksia attenuata - Banksia menziesii* woodlands	P3	
23c	North-eastern *Banksia attenuata - Banksia menziesii* woodlands		
S09	*Banksia attenuata* woodlands over dense low shrublands		
Supergroup 4 – Uplands centred 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		
C2	Whicher Scarp Jarrah woodland on deep coloured sands WHSFCT_C2		

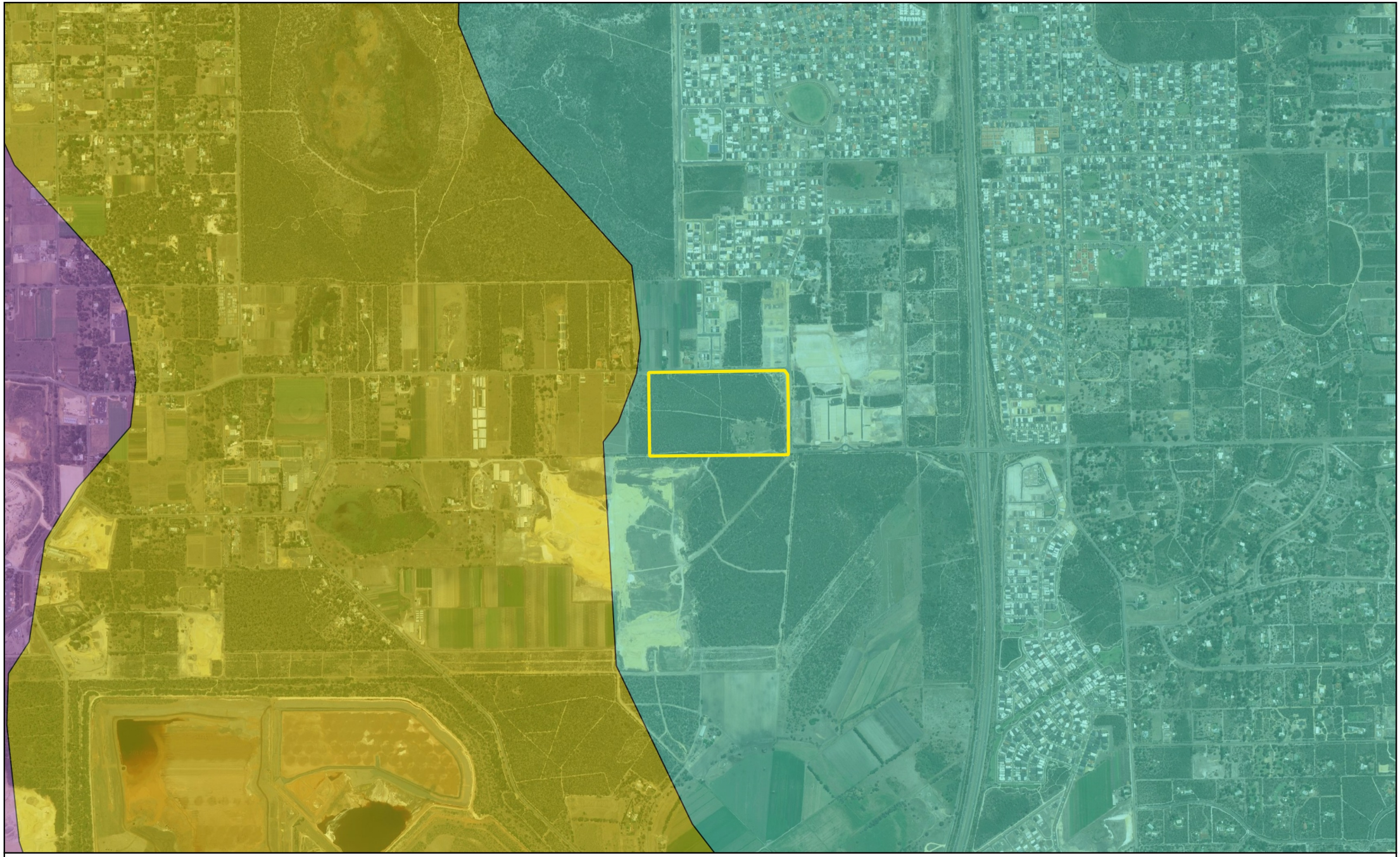

Figure 3 - Pre-European Vegetation

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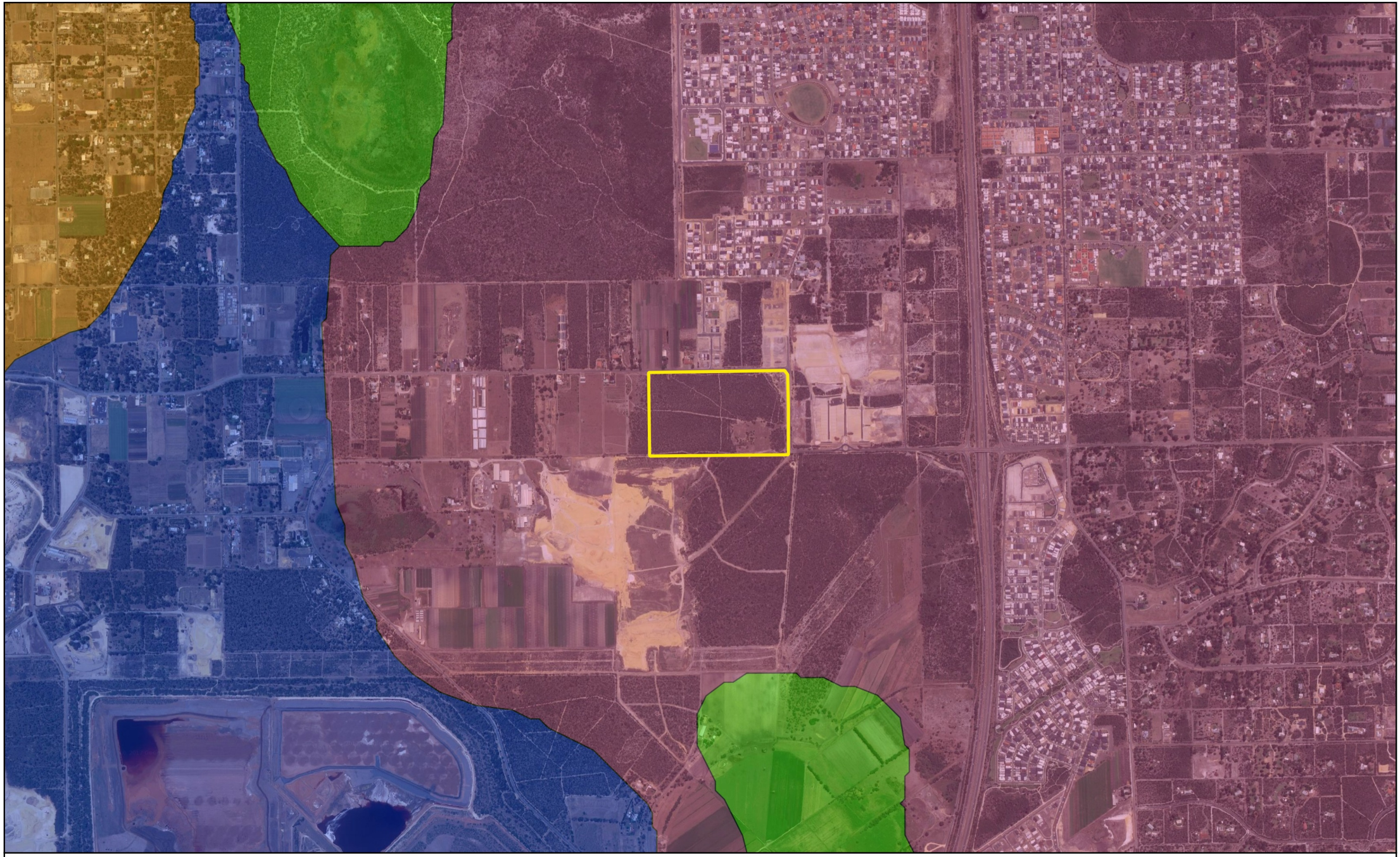

Figure 4 - Vegetation Complexes

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3 METHODOLOGY

A single-phase detailed flora and vegetation assessment and a Level 1 terrestrial vertebrate fauna and habitat assessment was carried out Gabriela Martinez (Senior Botanist), Lisa Chappell (Senior Botanist) and Greg Harewood (Senior Zoologist) on 25 October 2017.

A follow-up targeted Banksia Woodland TEC assessment was conducted by Lisa Chappell and Kellie Bauer-Simpson (Principal Ecologist) during June 2018.

A targeted *Caladenia huegelii* survey was also conducted with the proposed footprint by Kellie Bauer-Simpson and Will Bauer-Simpson (Technician) during on 4 October 2018.

The assessments for flora, vegetation, fauna and habitat (including Black-cockatoo habitat) values, were recorded and reported in accordance with:

- EPA (2016a) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment
- Threatened Species Scientific Committee (2016) Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain Ecological Community
- EPA (2016b) Technical Guidance – Terrestrial Fauna Surveys
- EPA (2016c) Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna
- Commonwealth of Australia, Department of the Environment and Energy (DEE) (2017) Revised draft referral guideline for three threatened Black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo.

3.1 DESKTOP REVIEW

Results of searches of the Department of Biodiversity, Conservation and Attractions (DBCA) Threatened and Priority Flora and Fauna; and Ecological Communities databases were compiled for the desktop assessment. Other available information was also sourced through searches of NatureMap and the Commonwealth DEE Protected Matters Search Tool, for Matters of National Environmental Significant (MNES) associated with the site.

The suite of information gathered from the desktop assessment was used to generate potential species lists tailored to the project area, with a focus on Threatened and Priority flora, fauna and ecological communities, as well as fauna species recognised under international treaties (JAMBA, CAMBA, ROKAMBA and the Bonn Convention); and assisted in determining species and areas of the study site to particularly focus on during the field assessment.

A review of the following publicly available information was included:

- DBCA NatureMap Species Report (**Appendix A**); providing:
    - flora and fauna species listed as rare (Threatened (T)) or likely to become extinct
    - flora and fauna species protected under international agreements (IA)
    - other specially protected fauna (Scheduled)
    - flora and fauna species listed as Priority 1 to 5 (P1, P2, P3, P4, P5)
    - other non-conservation taxa recorded or know to the area.

- EPBC Act Protected Matters (Matters of National Environmental Significance (MNES)) (**Appendix B**); search for the study area; providing results relevant to:
    - the following MNES:
        - World Heritage Properties
        - National Heritage Places
        - Wetlands of International Importance
        - Great Barrier Reef Marine Park
        - Commonwealth Marine Areas
        - Listed Threatened Ecological Communities
        - Listed Threatened Species (flora and fauna)
        - Listed Migratory Species
    - the following other matters protected by the EPBC Act:
        - Commonwealth Land
        - Commonwealth Heritage Places
        - Listed Marine Species
        - Whales and other Cetaceans
        - Critical Habitats
        - Commonwealth Reserves (Terrestrial)
        - Commonwealth Reserves (Marine).
- spatial data sourced from DBCA for:
    - Threatened and Priority flora, across the entire City
    - Threatened, Priority and conservation significant vertebrate fauna, across the entire City
    - Threatened and Priority Ecological Communities, across the entire City
- relevant technical reports:
    - EcoLogical (2016) *Natural Area Initial Desktop Assessment*
    - Bamford Consulting Ecologists (2012). *Lot 123 Wattleup Road, Hammond Park. Significant Fauna Assessment.* Report prepared for Bayley Environmental Services
    - Bamford Consulting Ecologists (2011). *Threatened Fauna Assessment: Lots 42-44 Frankland Road, Hammond Park.* Report prepared for Bayley Environmental Services
    - Ecoscape (2009). *Fauna Survey for Lots 13, 14 and 18 Barfield Road and Lots 48-51 Rowley Road, Hammond Park.* Unpublished report for Gold Estates and the Department of Housing
    - Emerge Associates (Emerge) (2011). *Level 1 Fauna Survey and Habitat Assessment - Various Allotments, Mandogalup.* Unpublished report prepared for Qube Mandogalup Land Development Company
    - ENV (2009). *Jandakot Airport Fauna Survey*. Unpublished report for Jandakot Airport Holdings Pty Ltd
    - GHD (2012). *Report for Hammond Park Primary School. Flora and Fauna Assessment.* Unpublished report for the Department of Education
    - Harewood, G. (2014a*). Fauna Assessment of Lot 33 Barfield Road, Hammond Park.* Unpublished report for West Coast Plan (on behalf of the Passione Family)
    - Harewood, G. (2014b*). Fauna Assessment of Lots 109 and 110 Wattleup Road, Hammond Park.* Unpublished report for Emerge Associates
    - Harewood, G. (2014c). *Fauna Assessment of Lots 1, 111 & 810 Wattleup Road, Hammond Park*. Unpublished report for Emerge Associates

- Harewood, G. (2011a). *Fauna Assessment Lot 9001 and Lot 35 Barfield Road, Hammond Park.* Unpublished report for Mainlake Holdings Pty Ltd
- Harewood, G. (2011b). *Fauna Underpass Monitoring Spring 2010 – Perth Mandurah Rail Line.* Unpublished report for the Public Transport Authority of Western Australia
- Harewood, G. (2009). *Fauna Survey (Level 2) East Rockingham WWTP Site & Pipeline Corridors.* Unpublished report for ERM
- Harewood, G. (2006). *Fauna Assessment, Lot 121 Wattleup Road, Wattleup*. Unpublished report for Cardno BSD
- Harewood, G. (2005). *Fauna Assessment, Mandogalup*. Unpublished report for Cardno BSD
- Phoenix Environmental Sciences (2011). *Vertebrate Fauna Survey for the Roe Highway Extension Project.* Unpublished report for South Metro Connect
- Strategen (2013). *Mandogalup Black Cockatoo Habitat Survey*. Unpublished Report for Satterley Property Group
- Terrestrial Ecosystems (2012). *Level 1 Fauna Assessment for Hammond Park Primary School*. Unpublished report for Taylor Robinson
- 360 Environmental (2012). *Lots 124 and 125 Frankland Avenue Hammond Park: Graceful Sun Moth Survey & Site Based (Lomandra) Habitat Assessment.* Report prepared for WorldStyle Furniture Wholesaler, Perth.

The fauna species lists produced from the database search contain observations/inferred distributions from a broader area than Frankland Park. Therefore, the list may include species that would only ever occur as vagrants due to a lack of suitable habitat or the presence of only marginal habitat within the subject site itself. Database search results also often include or are based on very old records and in some cases the species in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

The review of the above information provided guidance for field preparations and has assisted in the preparation of this report.

3.2 FIELD ASSESSMENT

3.2.1 Flora and Vegetation Assessment

A single-phase, detailed (formerly referred to as 'Level 2') field survey for flora and vegetation values was carried out on 25 October 2017, by Gabriela Martinez and Lisa Chappell (Senior Botanists). Field data was collected using electronic tablets with customised data forms and mobile spatial mapping capability, within the software program, Mappt™.

Data was collected from marked flora and vegetation assessment 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), and from detailed data collection points (relevés, where vegetation is not in 'Good' or better condition). Observations and opportunistic data collection was carried out continuously within and throughout the study site.

Where utilised, quadrats utilised a single peg (galvanised fence-dropper) at the north-west corner, to mark location. Quadrat dimensions were 10 m x 10 m in accordance with the Guidance and were used to characterise all of the intact native vegetation communities (in 'Good' or better condition).

The flora and vegetation data collected from the combination of quadrats and continuous opportunistic observations contributed to the flora inventory for the study site.

The spring 2017 field assessment also included a targeted search for Threatened and Priority flora potentially supported by the site, with a focus on the Threatened flora species, *Caladenia huegelii*. The entire site was traversed on foot.

During spring 2018, a follow-up targeted *Caladenia huegelii* survey was also conducted with the proposed footprint. The survey was carried out on 4 October 2018.

If individuals or suspected individuals of *Caladenia huegelii* or other Threatened of Priority flora were observed, the following data was to be recorded:

- GPS location of each individual plant allowing an inventory of the number of plants/population size
- vegetation type and condition at the recorded location
- condition of plants/populations recorded.

The vegetation communities of the study area were 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 communities was prepared in the field using Mappt™ and transferred to GIS for presentation in the report.

The vegetation communities present within the study area was described to National Vegetation Information System (NVIS) Level 5, in accordance with the applicable methodologies (DEH 2003) in combination with the Muir (1977) Structural Vegetation Classifications (**Appendix C**).

Banksia woodlands were expected to constitute the entirety of the intact native vegetation at the site, and as such, these areas were to be assessed in more detail, in order to collect sufficient data for a targeted Banksia Woodland TEC assessment, in accordance with the Commonwealth Conservation Advice (Threatened Species Scientific Committee 2016). This data was to enable determination of the status of the site as representing the Banksia woodlands of the Swan Coastal Plain TEC, at a later date, if required.

Vegetation condition was assessed and documented at each quadrat and relevé and at appropriate locations between using the current bushland condition scale which is an adaptation of Keighery (1994) and Trudgen (1991), as described in EPA (2016a). The spatial extent of the varying vegetation condition was prepared in the field using Mappt™ and transferred to GIS for presentation in the report.

3.2.1.1 Targeted Banksia Woodland Assessment

Banksia Woodland is known to be supported by the study area, and therefore, as a follow-up to the initial spring survey conducted during spring 2017, during June 2018, as a follow-up Banksia woodland assessment was undertaken. The targeted assessment was carried out to diagnose/characterise, map and quantify the extent of Banksia woodland TEC within and connected to the Frankland Park site. Within areas of Banksia woodland within the study area and adjacent areas (for the purposes of "patch" mapping), vegetation condition was confirmed or determined and mapped in accordance with the adaptation of the Keighery (1994) and Trudgen (1988) condition scales (as per EPA 2016).

The Banksia woodland assessment methodology requires sampling of quadrats and analysis of this data to determine FCTs based on analysis against the Gibson *et al* (1994) dataset. Areas of Banksia woodland within the study area were sampled from a total of eleven 10 m x 10 m non-permanent quadrats.

FVC's tailored diagnostic tool has been developed in direct reference to the criteria listed in the Conservation Advice Threatened Species Scientific Committee (2016), which incorporates assessment of the following:

- IBRA region
- soil and landform systems
- overstorey layer (*Banksia* species)
- emergent or other tree layer (associated non-*Banksia* tree species)
- understorey/mid-ground sclerophyllous shrub layer species
- herbaceous ground layer species
- FCT
- continuity/connectedness
- condition.

The results of the field assessment and data analysis were used to determine the type and distribution of varying FCTs within mapped areas of Banksia woodland, which were also spatially mapped in terms of their condition. Spatial mapping of patches of Banksia woodland and the buffers around these was then carried out, by grouping areas of Banksia woodland throughout the region of adequate condition separated by less than 30 m of "non-Banksia woodland ground" (i.e. another vegetation type, cleared areas or infrastructure such as roads).

3.2.2 Fauna Assessment

A day time Level 1 fauna assessment of the site was conducted by Senior Zoologist, Greg Harewood, on 25 October 2017, in accordance with EPA (2016b). The fauna assessment incorporated results of the desktop assessment, plus a field assessment addressing habitat mapping, targeted survey for relevant fauna species of conservation significance, and collection of a terrestrial vertebrate fauna species list, from opportunistic observations made on site.

Fauna species and direct evidence of fauna activity was observed and recorded continuously whilst on site. Secondary evidence of fauna species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

The fauna habitats present within the study area were described based on site observations and detailed vegetation community data, and taking into account aspects important to fauna such as soil, rocks, bare ground, leaf litter, wood (woody debris, logs, etc.), lower and ground strata density (cover), canopy height/cover/density and presence of or proximity to surface water.

3.2.2.1 Targeted Black-cockatoo Assessment

Particular attention was focused on Black-cockatoos and their suitable habitat within the study area. A targeted survey for Black-cockatoos was conducted in accordance with the *Referral guidelines for three threatened Black cockatoo species* (DSEWPaC 2012), as endorsed by the Commonwealth DEE, and as such required that the survey:

- be carried out by a suitably qualified person with experience in vegetation or cockatoo surveys

- maximise the chance of detecting the species' habitat and/or signs of use
- determine the context of the site within the broader landscape; for example, the amount and quality of habitat nearby and in the local region (for example, within 10 km)
- account for uncertainty and error (false presence and absences)
- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

The targeted survey for Black-cockatoos aimed to record any observed individuals either at the site or as an overfly observation, any evidence of their activity (e.g. chewed Marri nuts or Banksia cones), as well as habitat suitable for nesting/breeding, roosting or foraging. Such suitable habitat was mapped, with areas quantified.

The various habitats suitable for Black-cockatoos were identified in accordance with the categories outlined in **Table 4**.

Table 4 Black-cockatoo Habitats Surveyed

Habitat	Examples
Foraging habitat	Food source plants for Black-cockatoos include Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*), Proteaceous species such as *Banksia, Hakea* and *Grevillea*; *Allocasuarina*, and *Anigozanthos* and introduced species such as Pines (*Pinus* spp.) and Cape Lilac (*Melia azedarach*), but also *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 study area.

A tree habitat survey was also included to specifically observe suitable trees within the study area, to assess their status as a breeding/nesting tree, with or without hollows, or as potential future nesting trees (with a diameter at breast height (DBH) of 500 mm or greater).

Target tree species included Marri, Tuart, Jarrah and Flooded Gum of a suitable size that may have been present. Banksia, Sheoak and Melaleuca tree species were not assessed as they typically do not develop suitably large hollows that are used by Black-cockatoos.

The location of each tree identified as being over the threshold DBH was to be recorded with a GPS and details on tree species, number and size of hollows (if any) noted.

Based on this assessment, trees present within the subject site were to be placed into one of the following four categories:

- Tree <50cm DBH or an unsuitable species (not recorded)
- Tree >50cm DBH, a habitat tree, but with no hollows observed
- Tree >50cm DBH, one or more hollows observed, none of which were considered suitable for Black-cockatoos to utilise for nesting
- Tree >50cm DBH, one or more hollows observed, with at least one hollow considered suitable for Black-cockatoos to utilise for nesting.

For the purposes of this assessment a tree containing a potential cockatoo nest hollow was defined as:

Generally, any tree which is alive or dead that contains one or more visible hollows (cavities within the trunk or branches) suitable for occupation by a Black-cockatoo for the purpose of nesting/breeding. Hollows that have an entrance greater than about 10 cm in diameter and would allow the entry of a Black-cockatoo into a suitably orientated and sized branch/trunk and recorded as a "potential Black-cockatoo nest hollow".

Identified hollows were examined using binoculars for evidence of actual use by Black-cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches). Trees with possible nest hollows were also to be scratched and raked with a large stick/pole in attempt to flush any sitting birds from hollows and calls of chicks were also listened for.

Potential hollows were to be placed into one of four categories, based on the size of the apparent hollow entrance as follows:

- Small = ~<5cm diameter (i.e. entrance too small for a Black-cockatoo)
- Medium = ~5cm-10cm diameter (i.e. entrance too small for a Black-cockatoo)
- Large = ~>10cm diameter (entrance large enough for a Black-cockatoo but possible hollow appears to be unsuitable for nesting i.e. wrong orientation, too small, too low or too shallow)
- Large (cockatoo) = ~>10cm diameter (entrance appears big enough to provide access to a possible hollow that may be suitable for a Black-cockatoo to use for nesting.

The location and nature of Black-cockatoo foraging evidence (e.g. chewed fruits around base of trees) observed during the reconnaissance survey was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence, based on the broader habitat mapping.

Direct and indirect evidence of Black-cockatoos roosting within trees within the study area was noted if observed (e.g. branch clippings, droppings or moulted feathers). A visit to the site at dusk was also carried out to make relevant observations of night-roosting activity.

4 RESULTS

4.1 DESKTOP REVIEW

The results of the DBCA database search, NatureMap Species Report, the MNES Report and literature review returned results for the potential presence of conservation significant flora, fauna and ecological communities within the study area. These results are presented in the following sections.

4.1.1 Threatened and Priority Flora

The DBCA database search results, NatureMap Species Report and the MNES Report conducted for the Frankland Park Area returned results for 24 species of Threatened and Priority flora, previously recorded within close proximity to the study area (**Table 5**, **Figure 5**).

Previously recorded significant flora comprises eight Commonwealth and State listed Threatened flora, one Priority 1, one Priority 2, seven Priority 3 and seven Priority 4 species. Of these, based on known distribution, current records and preferred habitat type, one species (*Jacksonia gracillima,* P3) is considered likely to occur, eight species may occur and 15 are considered unlikely to occur (**Table 5**). Interrogation of the databases indicates that no species of conservation significance have been previously recorded within the Frankland Park site.

Table 5 Threatened and Priority Flora with the Potential to occur within the Study Area

Species	EPBC Cons. Status	WA Cons. Status	Description	Preferred Habitat	Likelihood of Occurrence	Source
Caladenia huegelii	Endangered	Critically Endangered	Tuberous, perennial, herb, 0.25-0.6 m high. Flowers green & cream & red, September to October	Closed Banksia woodland. *Banksia* sp., *Stirlingia latifolia, Hibbertia* spp., *Hypocalymma robustum, Conostephium pendulum*. Coastal plain. Grey sand.	May occur - suitable habitat occurs within the study area	EPBC DBCA
Drakaea elastica	Endangered	Critically Endangered	Tuberous, perennial, herb, 0.12-0.3 m high. Flowers red & green & yellow, October to November	White or grey sand. Low-lying situations adjoining winter-wet swamps	Unlikely to occur - Not previously recorded within the City of Cockburn	EPBC
Diuris purdiei	Endangered	Endangered	Tuberous, perennial, herb, 0.15-0.35 m high. Flowers yellow, September to October	Grey-black sand, moist. Winter-wet swamps	May occur - suitable habitat occurs within the study area	EPBC
Lepidosperma rostratum	Endangered	Endangered	Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Flowers brown	Peaty sand, clay	Unlikely to occur - Not previously recorded within the City of Cockburn	EPBC
Andersonia gracilis	Endangered	Vulnerable	Slender erect or open straggly shrub, 0.1-1 m high. Flowers white-pink-purple, September to November	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps	Unlikely to occur - Not previously recorded within the City of Cockburn	EPBC
Darwinia nubigena	Vulnerable	Endangered	Open straggly shrub to 1.5m. Flowers pink to red, October	confined to a saddle on a mountain	Unlikely to occur - Species is known to occur in the Stirling Ranges	DBCA
Drakaea micrantha	Vulnerable	Endangered	Tuberous, perennial, herb, 0.15-0.3 m high. Flowers red & yellow, September to October	White-grey sand	May occur - suitable habitat occurs within the study area	EPBC
Diuris micrantha	Vulnerable	Vulnerable	Tuberous, perennial, herb, 0.15-0.35 m high. Flowers yellow, September to October	Grey-black sand, moist. Winter-wet swamps	May occur - suitable habitat occurs within the study area	EPBC
Acacia lasiocarpa var. *bracteolata* long peduncle variant (G.J. Keighery 5026)		Priority 1	Shrub, 0.35-0.5 m high. Flowers yellow, August	Grey-yellow sand with laterite. Low open heath	Unlikely to occur. Species commonly known from the Coorow area	DBCA
Thelymitra variegata		Priority 2	Tuberous, perennial, herb, 0.1-0.35 m high. Flowers orange & red & purple & pink, June to September	Sandy clay, sand, laterite. In yellow sand. With *Banksia attenuata*, *Allocasuarina fraseri, Hibbertia hypericoides*	May occur - suitable habitat occurs within the study area. Closest record occurs along Russell Road	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description	Preferred Habitat	Likelihood of Occurrence	Source
Byblis gigantea		Priority 3	Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Flowers pink-purple/white, September to December or January	Sandy-peat swamps. Seasonally wet areas	Unlikely to occur - Suitable habitat not present within the study area	DBCA
Cyathochaeta teretifolia		Priority 3	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Flowers brown	Grey sand, sandy clay. Swamps, creek edges.	Unlikely to occur - Suitable habitat not present within the study area. Common wetland species	DBCA
Dampiera triloba		Priority 3	Erect spreading branched herb to 30 cm tall. Leaves clustered. Erect perennial, herb or shrub, to 0.5 m high. Flowers Blue, August to December	Dark brown/black peaty soils. Coastal plain. Damp peaty sand. Low woodland to open forest of E*ucalyptus rudis, Banksia attenuata* and *Melaleuca preissiana*.	Unlikely to occur - Suitable habitat not present within the study area	DBCA
Eryngium pinnatifidum subsp. *palustre* (G.J. Keighery 13459)		Priority 3	Tuberous perennial herb.	Black sand. Grey sand over clay. Winter wet depression	Unlikely to occur - Not previously recorded within the City of Cockburn	DBCA
Jacksonia gracillima		Priority 3	Low spreading semi-prostrate shrub, buds and flowers, flowers orange. Decumbent perennial to 0.3 m high x 1.4 m diam.	Grey and. Banksia woodland. Low Forest A, Associated species: *Allocasuarina fraseriana, Banksia menziesii*	Likely to occur - Suitable habitat present within the study area	DBCA
Phlebocarya pilosissima subsp. *pilosissima*		Priority 3	Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Flowers cream-white, August to October	Sand ridge. In Banksia woodland. White or grey sand, lateritic gravel.	May occur - Previously recorded from the Jandakot Area	DBCA
Stylidium paludicola		Priority 3	Reed-like perennial, herb, 0.35-1 m high, Inflorescence racemose. Flowers pink, October to December	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland. In swampy areas.	Unlikely to occur - Suitable habitat not present within the study area	DBCA
Dodonaea hackettiana		Priority 4	Erect shrub or tree, 1-5 m high. Flowers yellow-green/red, mainly July to October	Sand. Outcropping limestone. Eucalyptus marginata open forest, with grasses	May occur - Previously recorded from the Wattleup Area	DBCA
Microtis quadrata		Priority 4	Erect herb 0.4m high. Flowers Cream/white, October to November	Sandy clay loam. Flat terrain, swamp. *Melaleuca, Nuytsia, Eucalyptus calophylla* very open low woodland over heath	Unlikely to occur - Suitable habitat not present within the study area	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description	Preferred Habitat	Likelihood of Occurrence	Source
Ornduffia submersa		Priority 4	Aquatic annual 0.3m high	Ephemeral creek, Flat open depression	Unlikely to occur - Suitable habitat not present within study area. Not previously recorded within the City of Cockburn	DBCA
Stylidium longitubum		Priority 4	Erect annual (ephemeral), herb, 0.05-0.12 m high. Flowers pink, October to December	Sandy clay, clay. Seasonal wetlands.	Unlikely to occur - Suitable habitat not present within study area.	DBCA
Thysanotus glaucus		Priority 4	Caespitose, glaucose perennial, herb, 0.1-0.2 m high. Flowers purple, October to December or January to March	White, grey or yellow sand, sandy gravel.	May occur - Suitable habitat present within the study area, however not previously recorded within the City of Cockburn	DBCA
Tripterococcus sp. Brachylobus (A.S. George 14234)		Priority 4	Slender erect multi-stemmed shrub to 40 cm. Flowers orange-yellow, in full flower.	Winter wet flats, peaty sand over clay. *Hypocalymma angustifolium* low heath.	Unlikely to occur - Suitable habitat not present within study area.	DBCA
Verticordia lindleyi subsp. *lindleyi*		Priority 4	Erect shrub, 0.2-0.75 m high. Flowers pink, May or November to December or January	Sand, sandy clay. Winter-wet depressions.	Unlikely to occur - Suitable habitat not present within study area.	DBCA

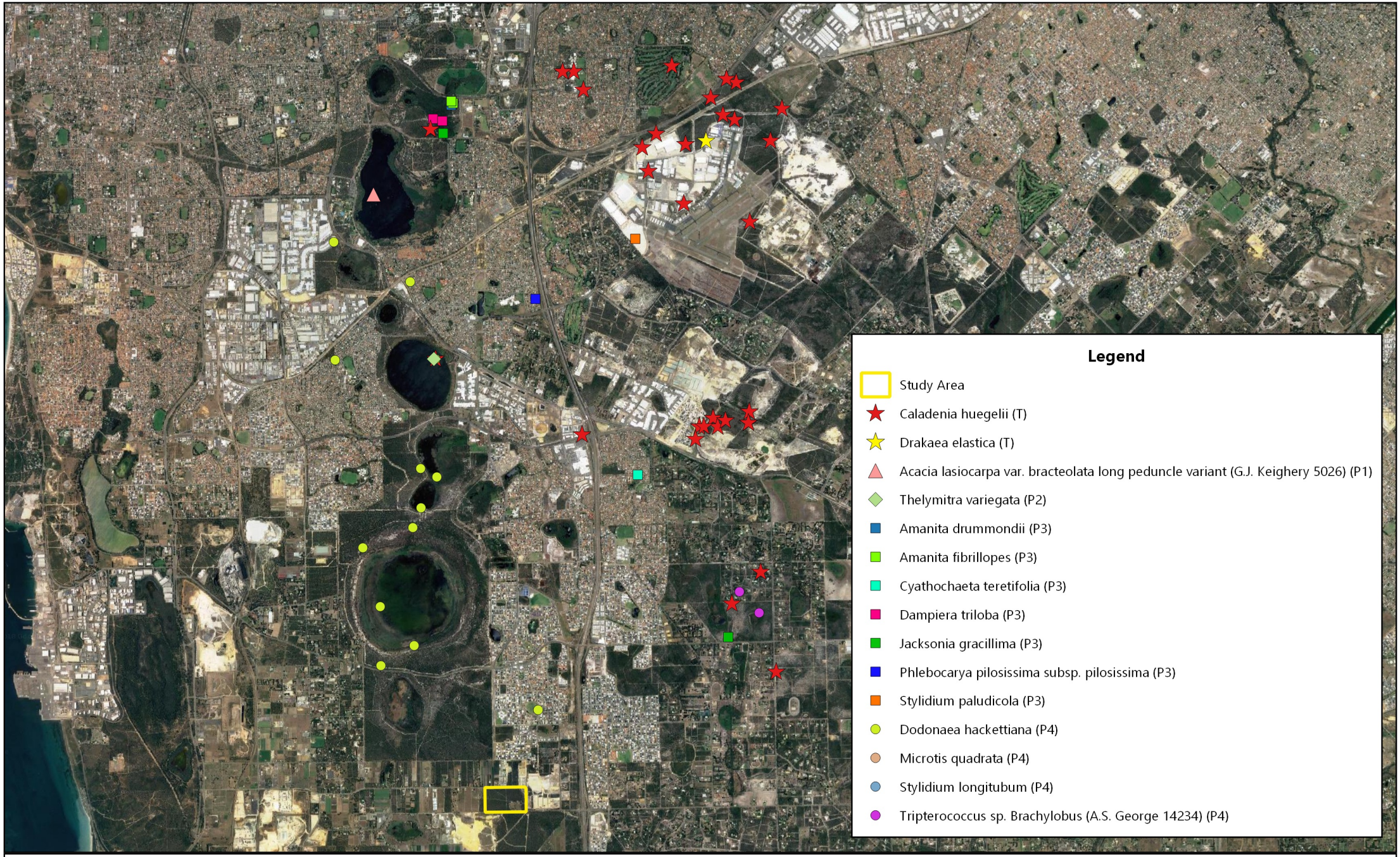

Figure 5 - Threatened and Priority Flora

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4.1.2 Threatened and Priority Ecological Communities

A review of DBCA Threatened and Priority Ecological Communities (TEC and PEC) database and the EPBC Protected Matters Search Tool identified the presence of the Endangered *Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region* Ecological Community (Banksia Woodlands TEC) (**Appendix B**, **Figure 6**) within the study area.

The Banksia Woodlands TEC is associated with some soils of the Swan Coastal Plain with a prominent tree layer of Banksia sometimes with scattered Eucalypts and other tree species among or emerging above the canopy. The understorey is comprised of a species rich mix of sclerophyllous shrubs, graminoids and forbs (Threatened Species Scientific Committee 2016).

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. This TEC mainly occurs on deep Bassendean and Spearwood sands or occasionally on Quindalup sands at the eastern edge (Threatened Species Scientific Committee 2016).

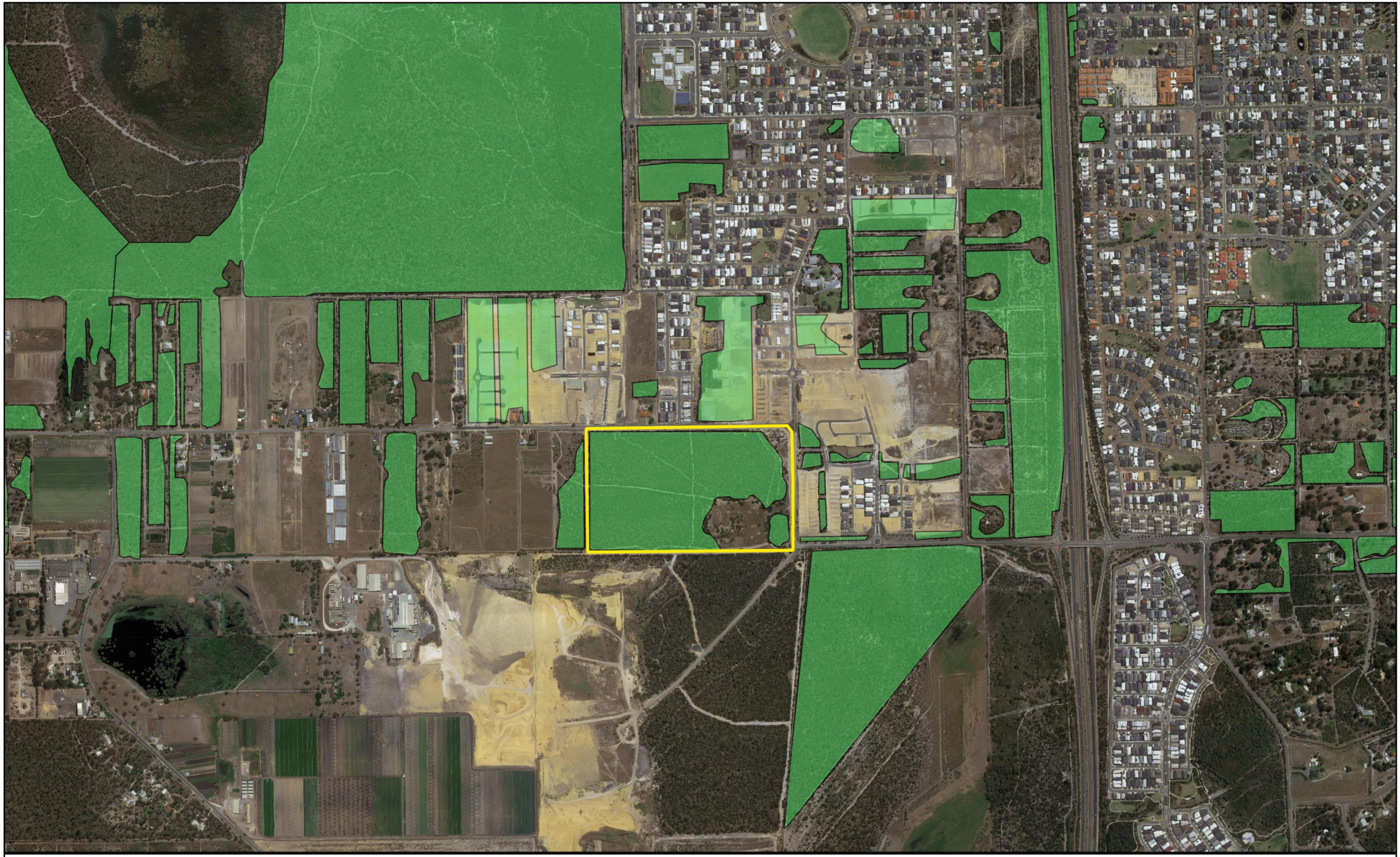

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Figure 6 - Threatened and Priority Ecological Communities

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4.1.3 Fauna Assemblage

The number of vertebrate fauna species potentially occurring within or utilising the study area identified through the literature review and field observations is summarised in **Table 6**. A complete list of vertebrate fauna with the potential to occur or frequent the Frankland Park site is presented in **Appendix E**.

Table 6 Summary of Potential Vertebrate Fauna Species

Group	Total No. Potential Species	Potential No. Specially Protected Species	Potential No. Migratory Species	Potential No. Migratory Species	No. Species Recorded in Study Area During Survey
Amphibians	3	0	0	0	0
Reptiles	25	0	0	1	0
Birds	80[6]	3	1	0	6
Non-Volant Mammals	10[6]	0	0	2	2
Volant Mammals (Bats)	8	0	0	0	0
Total	**126[12]**	**3**	**1**	**3**	**8**

NB: Detailed results presented in Appendix D Superscript = No. of introduced species included in total

4.1.4 Conservation Significant Fauna

The conservation significant fauna relevant to the site were compiled from the DBCA database search results, NatureMap Species Report and the MNES Report as well as data from the Red List produced by the SSC of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria.

The EPBC Act also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA)
- China Australia Migratory Bird Agreement 1998 (CAMBA)
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA)
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

(Note - Species listed under JAMBA are also protected under Schedule 5 of the WC Act.)

All migratory bird species listed under the aforementioned bilateral agreements are protected in Australia as MNES under the EPBC Act.

Conservation significant fauna identified from the desktop assessment with the potential to occur within the study area are presented in **Table 7**. The full fauna assessment report (Harewood 2017) is presented in **Appendix D**.

Table 7 Conservation Significant Fauna Species with the Potential to occur within the Study Area

Species	Common Name	Conservation Status	Habitat Present	Likelihood of Occurrence	Possible Impacts
Synemon gratiosa	Graceful Sun Moth	P4	No/Very Marginal	Unlikely	None
Lerisita lineata	Perth Lined Lerista	P3	Yes	Possible	Loss/modification of an area of habitat.
Neelaps calonotos	Black-striped Snake	P3	Yes/Marginal	Unlikely-Locally extinct	None
Leipoa ocellata	Malleefowl	S3	No	Would not occur – locally/regionally extinct	None
Ardea alba	Eastern Great Egret	S5	No	Would not occur	None
Ardea ibis	Cattle Egret	S5	No	Would not occur	None
Haliaeetus leucogaster	White-bellied Sea-Eagle	Ma	No	Would not occur	None
Pandion haliaetus	Osprey	S5, Mig	No	Would not occur	None
Falco peregrinus	Peregrine Falcon	S7	Yes	Possible	Loss/modification of an area of habitat
Plegadis falcinellus	Glossy Ibis	S5, Mig	No	Would not occur	None
Oxyura australis	Blue-billed Duck	P4	No	Would not occur	None
Various	Migratory shorebirds	S5, Mig	No	Would not occur	None
Rostratula australis/ benghalensis	Australian Painted Snipe	S2, S5, Mig EN	No	Would not occur	None
Motacilla cinerea	Grey Wagtail	S5, Mig	No	Would not occur	None
Calyptorhynchus latirostris	Carnaby`s Black Cockatoo	S2, EN	Yes	Known to occur	Loss/modification of an area of habitat
Calyptorhynchus baudinii	Baudin`s Black Cockatoo	S2, VU	No/Marginal	Unlikely – outside of normal range	None
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	S3, VU	Yes	Possible	Loss/modification of an area of habitat.
Apus pacificus	Fork-tailed Swift	S5, Mig	Yes	Unlikely	None
Merops ornatus	Rainbow Bee-eater	S5	Yes	Possible	Loss/modification of an area of habitat.
Phascogale tapoatafa ssp.	Southern Brush-tailed Phascogale	S6	No/Marginal	Unlikely – possibly locally extinct	None
Dasyurus geoffroii	Chuditch	S3, VU	Yes	Would not occur – locally extinct	None
Myrmecobius fasciatus	Numbat	S3, VU	No	Would not occur – locally extinct	None

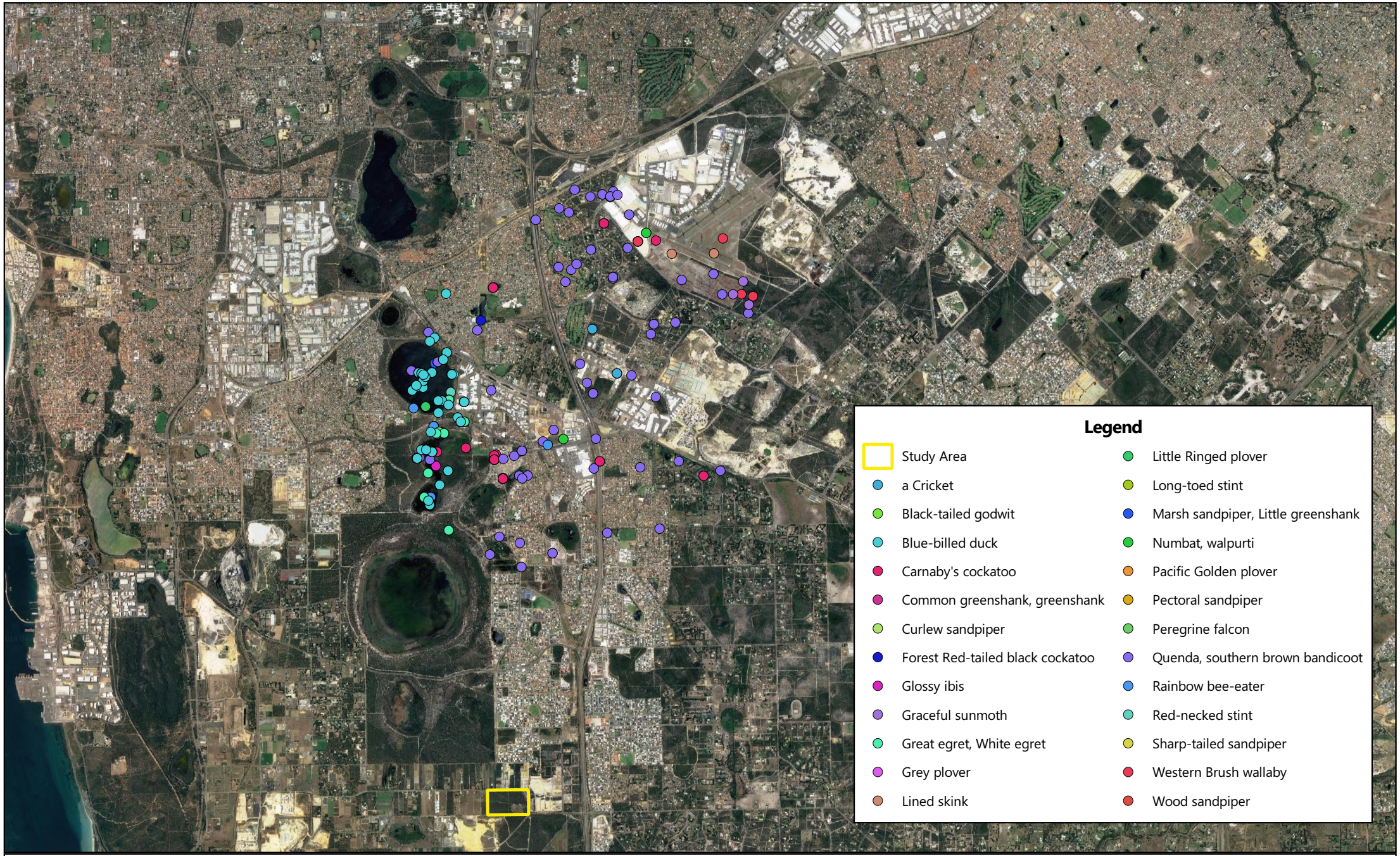
Species	Common Name	Conservation Status	Habitat Present	Likelihood of Occurrence	Possible Impacts
Isoodon obesulus fusciventer	Southern Brown Bandicoot	P4	Yes	Known to occur	Loss/modification of an area of habitat.
Pseudocheirus occidentalis	Western Ringtail Possum	S1, VU	No	Would not occur – locally extinct	None
Macropus irma	Western Brush Wallaby	P4	Yes/Marginal	Unlikely	None
Macropus eugenii derbianus	Tammar	P4	No	Would not occur – locally extinct	None
Setonix brachyurus	Quokka	S3, VU	No	Would not occur – locally extinct	None
Falsistrellus mackenziei	Western False Pipistrelle	P4	No/Marginal	Unlikely – locally extinct	None
Hydromys chrysogaster	Water Rat	P4	No	Would not occur	None

4.1.4.1 Fauna Literature Review Results

A total of 114 native fauna species have been previously recorded in the vicinity of the study area, some of which have the potential to occur within or utilise sections of Frankland Park. This includes, 12 mammals (including eight bat species), 74 birds, 25 reptiles and three frog species. An additional 12 introduced species may frequent the area. The compiled potential fauna list is presented in **Appendix E**.

Of the 114 native species that are listed to potentially occur, three are considered to be endangered/vulnerable or in need of special protection under State and/or Commonwealth legislation. In addition, one migratory and three DBCA priority species are also listed as potentially present.

The list of potential fauna takes into consideration that firstly the species in question are not known to be locally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the study site, though compiling an accurate list has limitations and therefore, the listing is likely to be an overestimation of the fauna species that actually use the site for some purpose.



0 0.5 1 1.5 2 2.5 3 km

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Figure 7 - Threatened and Priority Fauna

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4.2 FIELD ASSESSMENT

4.2.1 Flora

A total of 109 flora species, from 66 genera and 38 families was recorded during the survey. The most dominant families were found to be Poaceae (thirteen species), Fabaceae (twelve species), Myrtaceae (eight species), Proteaceae (eight species) and Asteraceae (eight species). The total includes 82 (75.2%) native species and 27 (24.8%) introduced (weed) species. The full list of vascular flora recorded (which includes opportunistic species records, additional to flora recorded within quadrats) is presented in **Appendix F**, species recorded within each quadrat is presented in **Appendix G** and individual quadrat data is presented in **Appendix H**.

None of the recorded flora species are of conservation significance, listed as either Threatened flora under the State WC Act, nor the Commonwealth EPBC Act, or as Priority Flora by DBCA.

None of the recorded flora are exhibiting an extension beyond their currently documented range, in accordance with records of the Western Australian Herbarium (DBCA 2017). Nor are any of the recorded introduced (weed) species, listed as Declared Pest plants under the *Biosecurity and Agriculture Management Act 2007* within the district of the study area.

4.2.1.1 Targeted Caladenia huegelii Search

The entire study area was traversed on foot as part of the spring 2017 assessment. Additionally, during spring 2018, a follow-up targeted *Caladenia huegelii* survey was also conducted with the proposed footprint. Despite the targeted searches of the study area during two consecutive spring seasons, no *Caladenia huegelii* individuals were recorded. The targeted search traverses are presented in **Figure 8**. The timing of the surveys (early October in both 2017 and 2018) were considered suitable to conduct a targeted flora survey for *Caladenia huegelii* as this is during the flowering period for the species. Following a particularly wet winter, the spring 2018 conditions were considered particularly optimal for flowering plants, including orchids (Andrew Brown, pers. comm.)

4.2.2 Vegetation

One intact vegetation unit was recorded across the Frankland Park study area (**Figure 9**), which was described from eleven quadrats as;

> Low Woodland A or B of *Banksia attenuata* and *Banksia menziesii* with occasional *Eucalyptus marginata* over Low Scrub B of *Xanthorrhoea preissii, Allocasuarina humilis* and *Eremaea pauciflora* var. *pauciflora* over Dwarf Scrub C of *Hibbertia hypericoides, Stirlingia latifolia and Hypocalymma robustum* over Open sedges of *Mesomelaena pseudostygia, Lyginia imberbis* and *Amphipogon turbinatus.*

The condition of the vegetation of the study area was found to range from 'Very Good – Excellent' to 'Completely Degraded'. The majority of the vegetation was observed to be in 'Very Good – Excellent' condition. The spatial extent of the varying vegetation condition is presented in **Figure 10**.

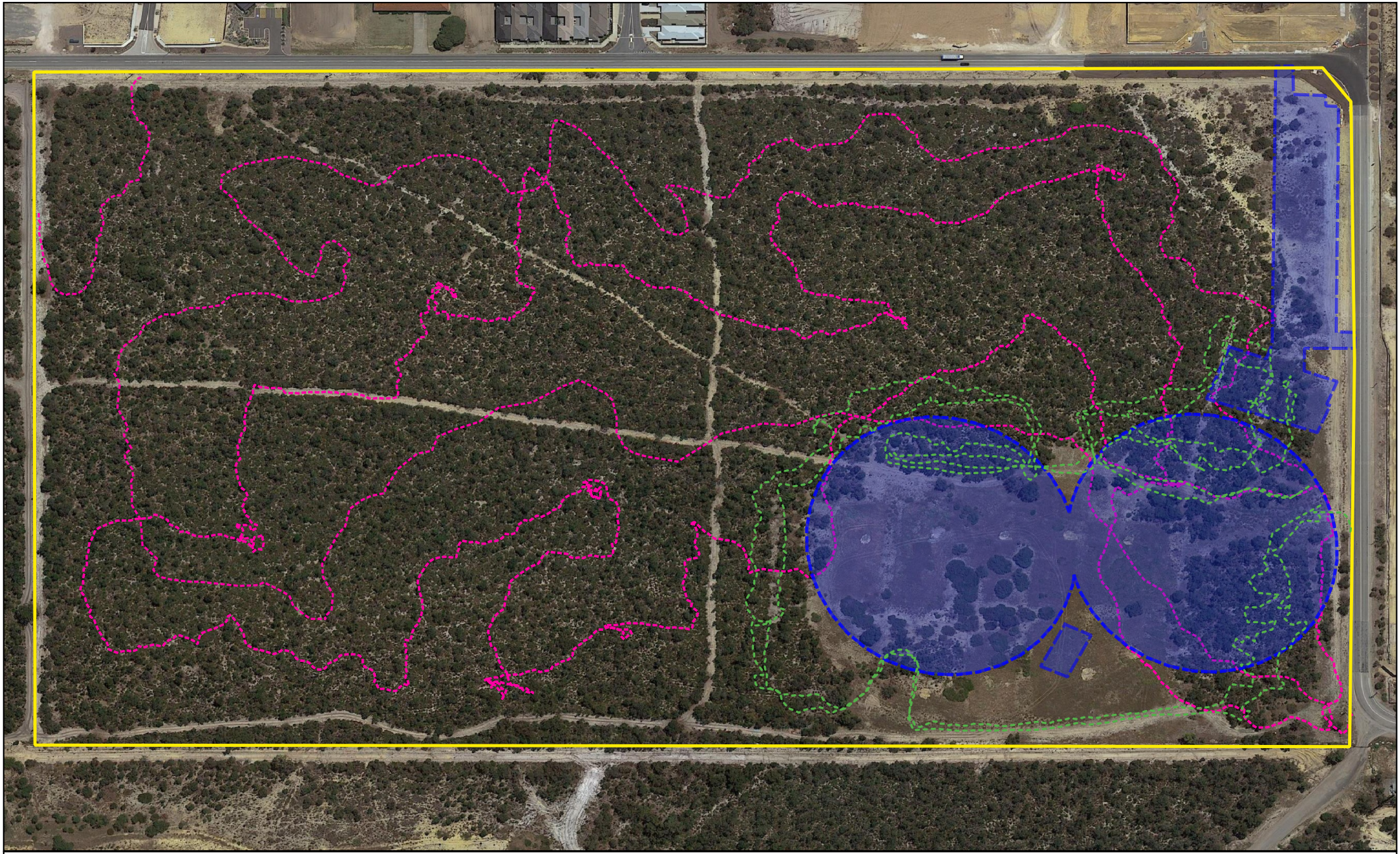

Figure 8 - Caladenia huegelii Search Traverses

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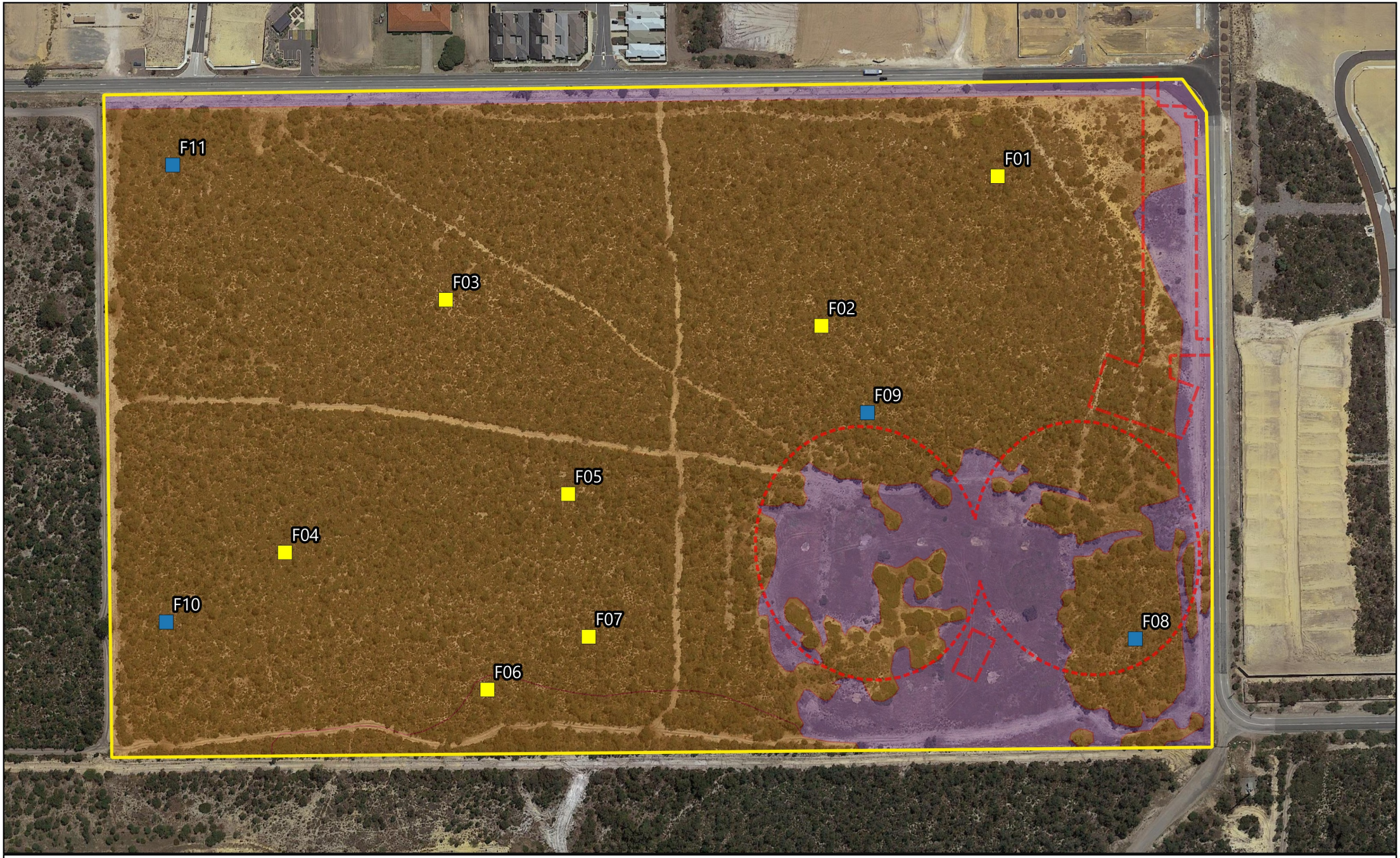

0 25 50 75 100 125 150 m

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Figure 9 - Vegetation Units

N

Legend

- Study Area
- Infrastructure_Footprint
- Spring Quadrats
- Additional Quadrats
- BaBmOW
- Cleared

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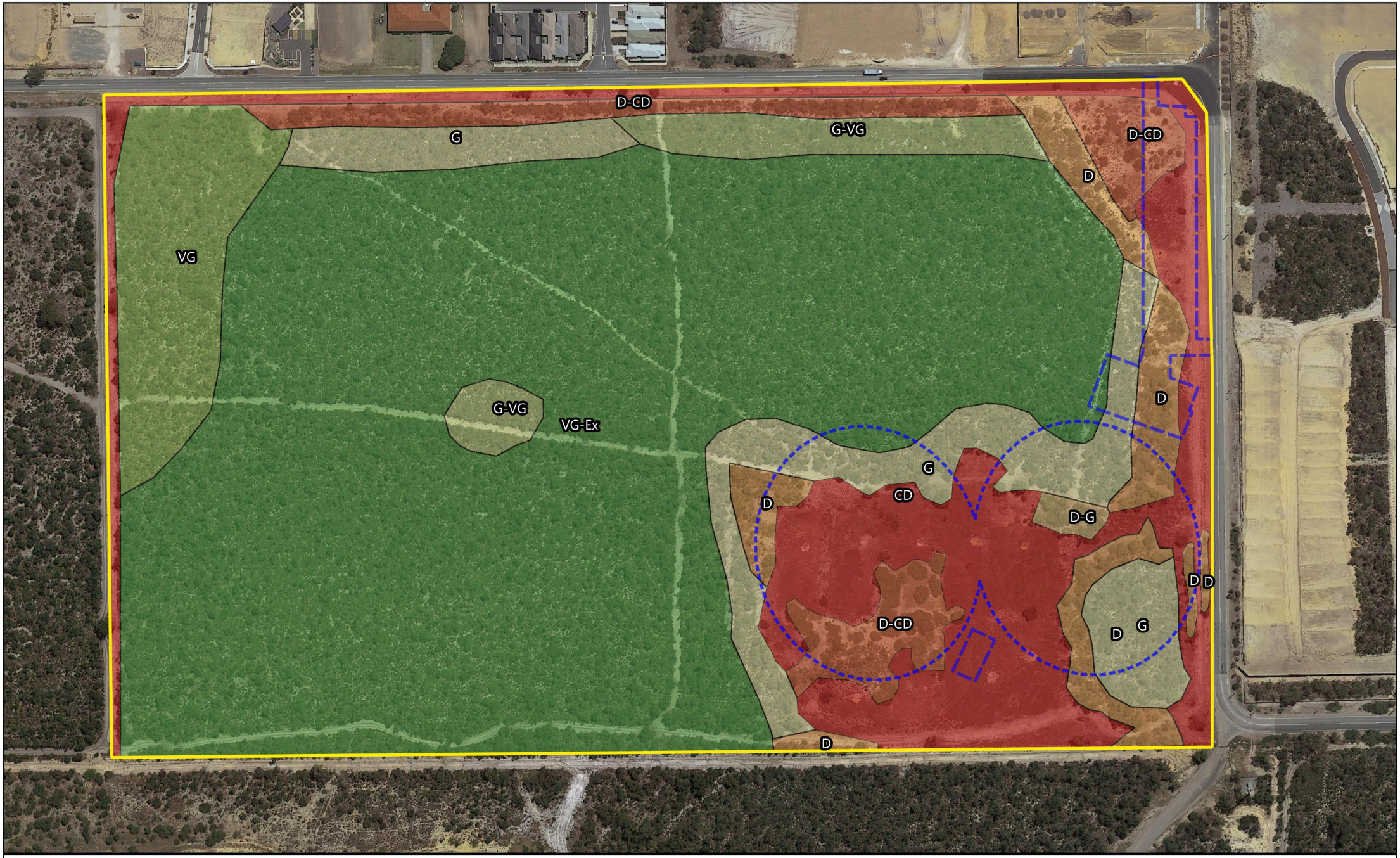

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Figure 10 - Vegetation Condition

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4.2.3 Fauna

Opportunistic fauna observations made during the October 2017 field survey are listed in **Table 8**. A total of eight native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the study area during the one-day survey period. No introduced fauna species were recorded within the study area.

Evidence of two fauna species of conservation significance were observed during the field assessment. Carnaby's Black-cockatoo, listed as Endangered under the EPBC Act and as Schedule 2 under the WC Act was observed from evidence of chewed Banksia cones. Diggings attributed to the Southern Brown Bandicoot/Quenda, a DPaW-listed Priority 4 species, were also found at several locations.

Table 8 Opportunistic Fauna Observations

Common Name	Species Name	Conservation Status	Type of Observation
Carnaby's Black Cockatoo	*Calyptorhynchus latirostris*	S3 VU Bp LC	Chewed Banksia cones
Southern Brown Bandicoot	*Isoodon obesulus fusciventer*	P4 LC	Diggings
Brown Honeyeater	*Lichmera indistincta*	LC	Observed
White-cheeked Honeyeater	*Phylidonyris nigra*	Bp LC	Observed
Singing Honeyeater	*Lichenostomus virescens*	LC	Observed
Rufous Whistler	*Pachycephala rufiventris*	LC	Observed
Australian Raven	*Corvus coronoides*	LC	Observed
Western Grey Kangaroo	*Macropus fuliginosus*	LC	Observed

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern

4.2.4 Fauna Habitats

The majority of the study area is considered to be in 'Very Good – Excellent' condition (in accordance with the vegetation assessment) and would therefore have the capacity to support a wide range of the predicted fauna assemblage. Some areas have been subject to historic clearing and as a consequence, would have a much lower capacity to support most fauna species.

The study area was found to support two habitat types, consisting of a Banksia Woodland and a degraded area. The two fauna habitats recorded are summarised in **Table 9** and spatially presented in **Figure 11**.

Table 9 Summary of Fauna Habitats

Unit No.	Habitat Type	Habitat Description	Example Image
1	Banksia Woodland	*Banksia attenuata* and *Banksia menziesii* open woodland over *Allocasuarina humilis* and *Xanthorrhoea preissii* open shrubland over *Hibbertia hypericoides* and *Gompholobium tomentosum* low open shrubland	
2	Cleared/partly cleared areas	Cleared/partly cleared (including firebreaks) – grassland/bare sand with weeds dominating. Some scattered regrowth of native species	

4.2.4.1 Banksia Woodland

The Banksia Woodland habitat consists of an overstorey of *Banksia attenuata* and Banksia *menziesii*, over *Allocasuarina humilis* and *Xanthorrhoea preissii* open shrubland over *Hibbertia hypericoides* and *Gompholobium tomentosum* low open shrubland. The overstorey layer is up to 9 m tall and sparse in some areas, but denser in areas of better condition. The native understorey is degraded in some areas, predominantly around the external boundary of the study area, where the edge effect is more pronounced. Many of the mid-strata shrubs, such as Grasstrees which dominate throughout the habitat, have foliage mostly down to the ground, providing good coverage for ground dwelling mammals and reptiles and with spacing suitable to enable easy movement. The majority of the Banksia woodland is in 'Very Good – Excellent' condition and would therefore have the capacity to support a wide range of predicted fauna assemblage.

4.2.4.2 Cleared/Partly Cleared Areas

The cleared or partly cleared areas occur over a small proportion of the south-eastern side of the study area. This habitat primarily consists of grasslands dominated by introduced weed and grass species such as *Asphodelus fistulosus, Avena barbata, Ehrharta calycina, Eragrostis curvula, Euphorbia terracina* and *Pelargonium capitatum*. Areas that have been subject to historic clearing support vegetation of lower quality and therefore have a lower capacity to support most native fauna species.

4.2.5 Black-cockatoo Habitat Assessment

4.2.5.1 Breeding Habitat

No trees meeting the criteria of a 'Black-cockatoo breeding habitat' as defined by the DEE (Commonwealth of Australia 2017) were observed within the study area.

A review of available data showed no known records of Black-cockatoos breeding near the study area, the closest documented site being near Karnup/Baldivis approximately 20 km to the south (Johnstone *et al*. 2011).

4.2.5.2 Foraging Habitat

The main foraging resource observed within the study area is represented by *Banksia attenuata* and *Banksia menziesii.* These dominant plant species are supplemented to varying degrees by smaller shrub species such as *Allocasuarina humilis* and *Xanthorrhoea preissii.* Other documented foraging species (e.g. *Eucalyptus marginata*) are represented by a relatively small number of individuals within the site, and would not contribute to the total potential food resource to any significant degree.

Evidence of Black-cockatoos foraging onsite was observed during the field assessment in the form of chewed Banksia cones. This evidence was attributed to Carnaby's Black-cockatoos, based on chew patterns. No evidence (new or old) of Jarrah or Sheoak being utilised as a food source was observed which would suggest that the Forest Red-tailed Black-cockatoo is an infrequent visitor. The Forest Red-tailed Black-cockatoo does not utilise Banksia as a food source, however excluding the preferred food source (Marri), the species often feeds on Jarrah and in some circumstances Sheoak.

In 2012, Terrestrial Ecosystems, as part of their assessment of a development project at the Hammond Park Primary School (located about 1 km north of the subject site) assessed all areas of native vegetation within an area 1.5 km to the east and west and 2 km to the north and south of the school site, to ascertain their suitability for providing foraging habitat for Black-cockatoos (Terrestrial Ecosystems 2012). This assessment identified 726 ha of foraging habitat in the surrounding areas, with 430 ha secured in Bush Forever tenure (Harry Warring Marsupial Reserve and Thompson's Lake Nature Reserve).

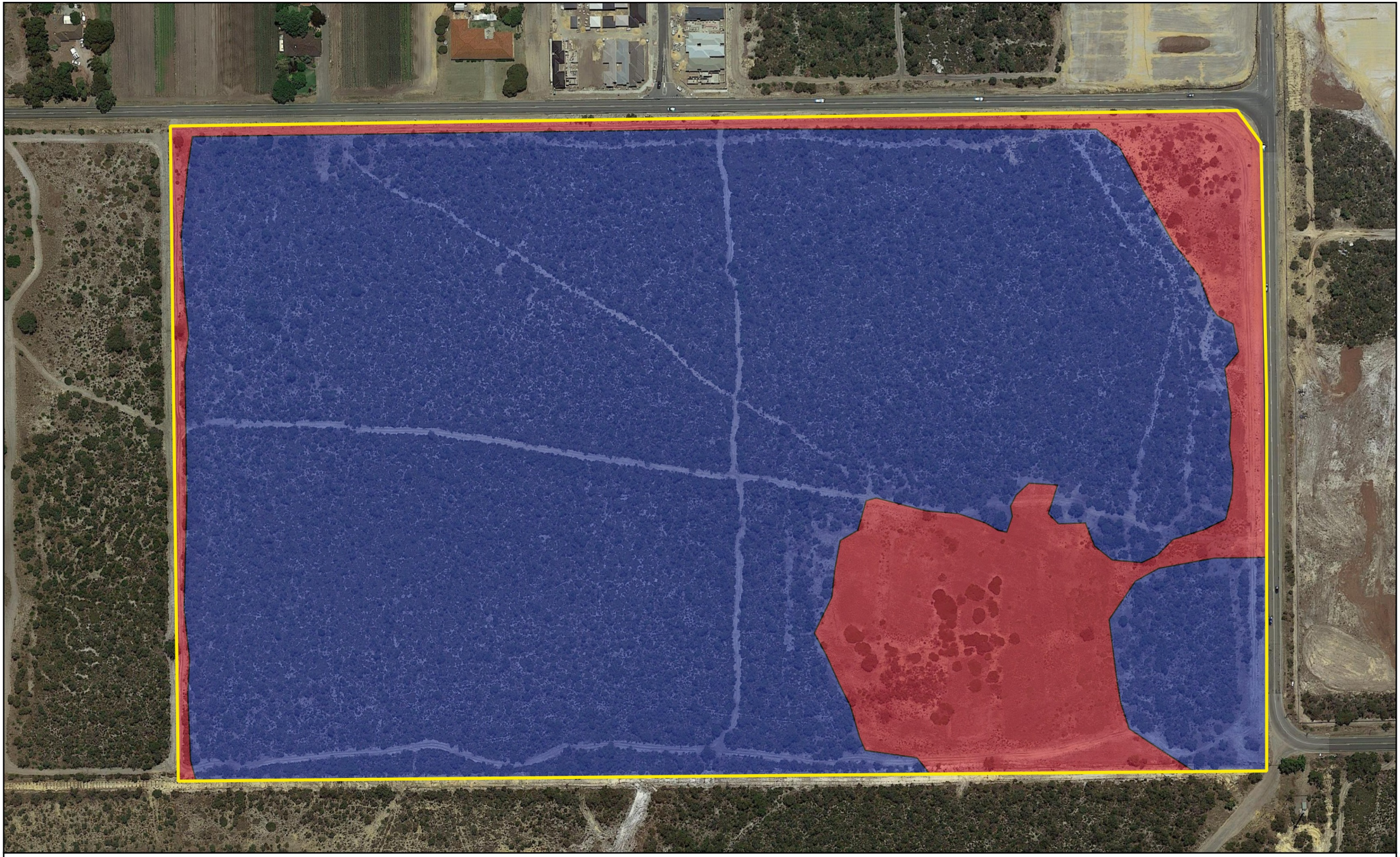

Figure 11 - Fauna Habitat

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4.2.5.3 Roosting Habitat

No existing night-roosting trees (trees used at night by Black-cockatoos to rest) were positively identified during the field survey, and given the lack of large trees present, Black-cockatoos are considered very unlikely to use the study area for this purpose.

A review of available data showed no known records of Black-cockatoos roosting in the immediate vicinity. However, roost sites have been identified within the north-east section of Thomson's Lake Nature Reserve, about 6 km to the north and a similar distance to the east in Wandi (Johnstone *et al.* 2011).

5 DISCUSSION

5.1 FLORA

A total of 109 flora species were recorded during the survey which includes 27 (24.8%) introduced (weed) species. The large proportion of weeds can be attributed to the close proximity of the study area to existing infrastructure, such as sand quarries and previous clearing disturbance within the Frankland Park study area. The area directly adjacent to Frankland Park to the north has been extensively cleared for residential development.

The native floral diversity of Frankland Park is considered relatively high (82 species), which is largely attributable to the presence of woodland types that are typically relatively diverse, and also due to the excellent quality of the bushland remnants across a large proportion of the site.

All of the flora specimens recorded and collected were able to be identified fully, due to good material being available from the optimally timed spring survey.

None of the recorded flora species are listed as Threatened under the WC Act or under the EPBC Act, nor are any listed as Priority Flora under the WC Act. However, the site is considered to potentially be suitable habitat for a number of Threatened and Priority Flora, based on habitat requirements and habitat suitability in the study area. The Threatened flora species, *Caladenia huegelii* is considered to have the potential to occur, due to the presence of suitable habitat within the study area. This species is known from several local populations and the closest known record occurs in the Banjup area. Despite targeted searches during both 2017 and 2018, *Caladenia huegelii* was not recorded within the study area. The targeted survey within the proposed project footprint was considered to have been in relatively fine detail, and during an optimal spring season following good 2018 winter rainfall. Therefore, the likelihood of *Caladenia huegelii* occurring within the footprint is considered very low.

Both surveys were considered to have been conducted during optimal spring flowering periods, with the 2017 assessment expected to have identified the majority of species occurring within the study area.

5.2 VEGETATION

5.2.1 Vegetation Units

One intact vegetation unit was recorded across the Frankland Park study area, described from eleven quadrats as:

> Low Woodland A or B of *Banksia attenuata* and *Banksia menziesii* with occasional *Eucalyptus marginata* over Low Scrub B of *Xanthorrhoea preissii, Allocasuarina humilis* and *Eremaea pauciflora* var. *pauciflora* over Dwarf Scrub C of *Hibbertia hypericoides, Stirlingia latifolia and Hypocalymma robustum* over Open sedges of *Mesomelaena pseudostygia, Lyginia imberbis* and *Amphipogon turbinatus.*

The single described and mapped vegetation unit is representative of a Banksia woodland, and specifically, as the Banksia woodland TEC, which is discussed in more detail in **Section 5.2.3**.

The intact vegetation unit was analysed in relation to species presence/absence and landform/soil types, in comparison to the Gibson *et al* (1994) dataset, in order to assign inferred Floristic Community Types (FCTs) using PATN™ analysis which has identified that the vegetation unit (BaBmOW) is representative of FCT SCP28 (**Appendix I**).

5.2.2 Vegetation Condition

The condition of the vegetation of the study area was found to range from 'Very Good – Excellent' to 'Completely Degraded', with the majority of the vegetation in 'Very Good – Excellent' condition.

Areas of the better quality vegetation are found towards the centre of the study area, which is likely attributable to the proximity of edge effects from current activities, including ongoing development in the area and maintenance of firebreaks, as well as historic land uses. Historic land uses appear to have included quarrying and tailings storage, which may represent ongoing contamination sources which could impact the ability of vegetation to grow or regenerate in localised areas.

5.2.3 Banksia Woodland TEC

The Banksia Woodlands TEC is described as woodlands associated with some soils of the Swan Coastal Plain with a prominent tree layer of Banksia with sometimes scattered Eucalypts and/or other tree species among or emerging above the canopy. The understorey is comprised of a species rich mix of sclerophyllous shrubs, graminoids and forbs (Threatened Species Scientific Committee 2016).

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. This TEC mainly occurs on deep Bassendean and Spearwood sands or occasionally on Quindalup sands at the eastern edge (Threatened Species Scientific Committee 2016).

Twenty-two FCTs described by Gibson *et. al* (1994), in Bush Forever (Government of Western Australia 2000), Keighery *et. al* (2008) and Urban Bushland Council (2011) best correspond to the Banksia Woodlands TEC (Threatened Species Scientific Committee 2016).

The DBCA TEC and PEC database search results identified the presence of the Endangered Banksia Woodlands TEC within the study area and/or proximity. The results of the targeted Banksia Woodland TEC field assessment and analysis are presented in the following sections.

The study area supports Banksia woodland, and therefore, a targeted Banksia Woodland TEC assessment was carried out in a follow-up study. The results of the assessment are discussed in further detail in the following section.

5.2.3.1 Banksia Woodland Characterisation

One of the tools used to characterise the Banksia woodland vegetation as representative of the TEC is a checklist developed from the Conservation Advice (Threatened Species Scientific Committee 2016). The checklist includes the key characters of the TEC, including botanical region, soil and landform types and required or typical species for each stratum.

Analysis of site assessment results against the checklist determined that all of the quadrats sampled represent the Banksia woodland TEC, in accordance with the key diagnostic characters, as stipulated by the Conservation Advice (Threatened Species Scientific Committee 2016) (**Table 10**).

Table 10 Banksia Woodland TEC Characterisation of the Recorded Quadrats

Key Character (see key)	Plot/Quadrat No.										
	F01	F02	F03	F04	F05	F06	F07	F08	F09	F10	F11
a).	+	+	+	+	+	+	+	+	+	+	+
b).	+	+	+		+	+	+	+	+	+	+
c).	+	+	+	+	+	+	+	+	+	+	+
d).						+			+		
e).		+							+	+	+
f).	+	+	+	+	+	+	+	+	+	+	+
g).	+	+	+	+	+	+	+	+	+	+	+
Confirmed	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**

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 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

5.2.3.2 Banksia Woodland Extent

The extent of Banksia woodland across the study area was determined to be all areas of remaining native vegetation (vegetation unit BaBmOW), as presented in **Figure 12**.

GDA 94 / MGA Zone 50

Figure 12 - Extent of Banksia Woodland

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5.2.3.3 Banksia Woodland FCT

Floristic analysis of recorded quadrat data against the Gibson *et al* (1994) dataset using multivariate cluster analysis of species presence/absence in PATN™ has identified that the vegetation unit present within the study area (BmBaOW) is representative of FCT SCP28; Spearwood *Banksia attenuata* or *Banksia attenuata - Eucalyptus woodlands*, which is considered to be representative of the Banksia Woodland TEC, as discussed in **Section 5.2.1**. The analysis clearly shows affinity to the regional (Gibson *et al* 1994) site data for FCT SCP 28, as shown by a selection of the dendrogram presented in **Figure 13**. The full cluster analysis result is presented in **Appendix I**.

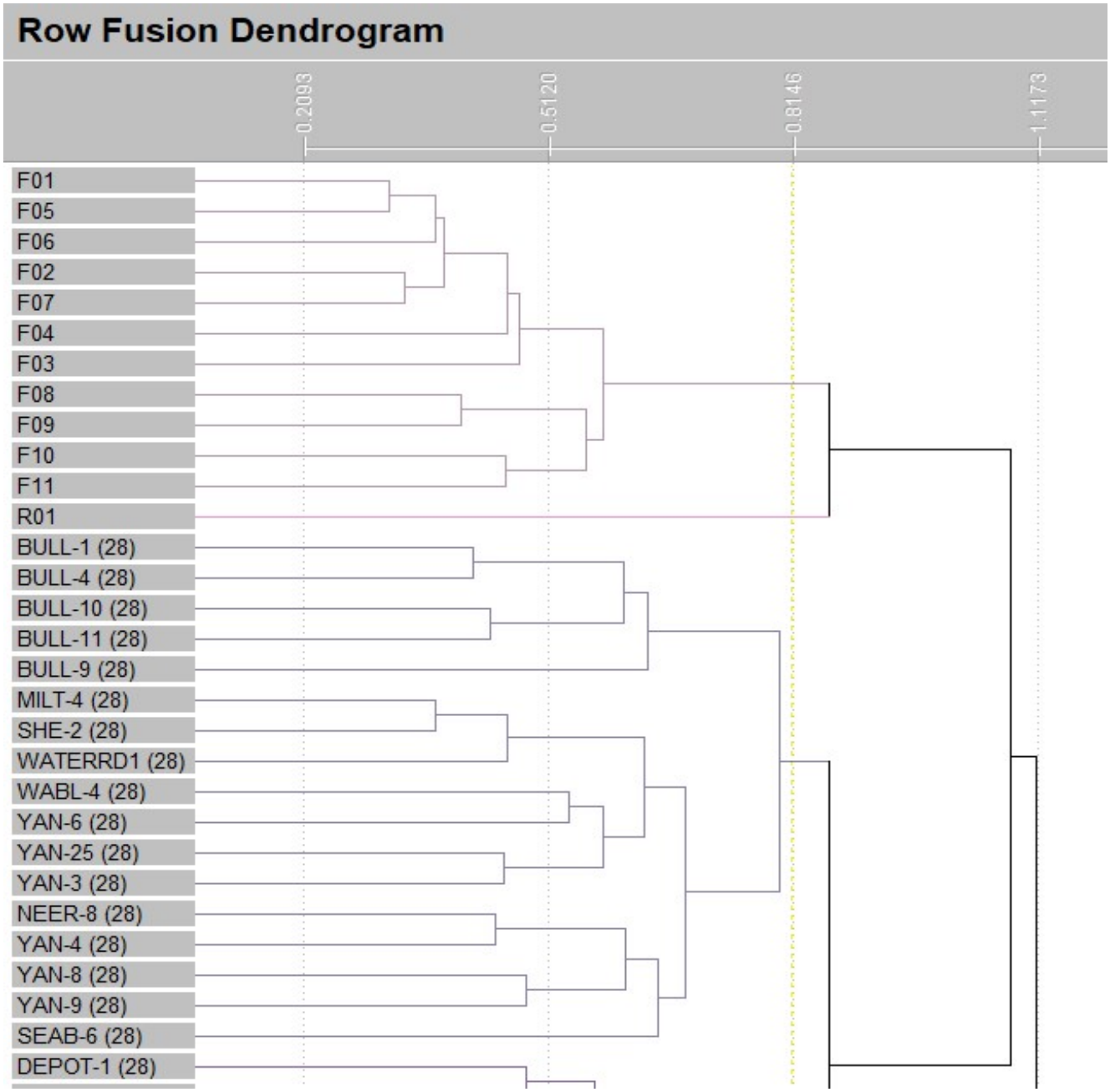


Figure 13 Selection of Quadrat Cluster Analysis Dendrogram

5.2.3.4 Banksia Woodland Patch

The area of Banksia woodland mapped within the Frankland Park study area has been grouped with adjacent areas of Banksia woodland to form a patch, in accordance with the methodologies and requirements described in the Conservation Advice (Threatened Species Scientific Committee 2016). These methodologies specify that areas of Banksia woodland may be variable in their condition within their patch but that condition thresholds provide guidance as to whether or not a patch retains sufficient conservation values to be considered a MNES as defined under the EPBC Act. Patches that do not meet the minimum condition thresholds are excluded from full national protection, so that efforts are focused on the most valuable elements of the ecological community (Threatened Species Scientific Committee 2016).

In summary, areas of Banksia woodland that are in very degraded condition are unlikely to be able to be conserved, so are excluded from patches and classification as the TEC all together. Areas of Banksia woodland in degraded or worse condition are not considered to be a matter of MNES unless they are connected to or located closely to (separated by less than a 30 m gap, with gaps being cleared areas, infrastructure, areas of another vegetation type, or any other interruption) other areas of applicable Banksia woodland. That is, isolated and degraded areas of Banksia woodland would not be classified as Banksia woodland TEC patches, given the low likelihood of sustainable conservation, and therefore would not be focused on for protection.

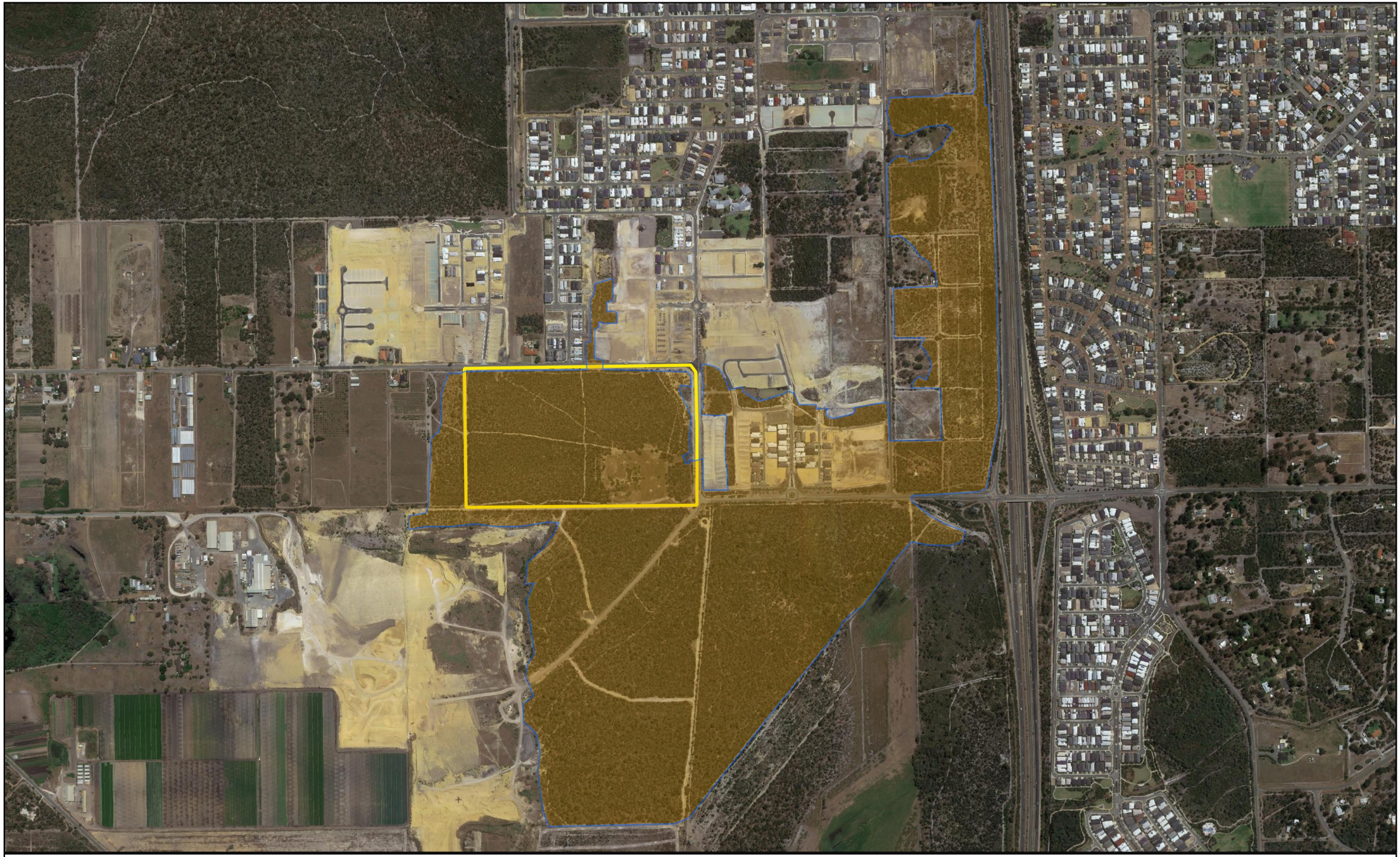
Based on the above logic, a single, medium-sized Banksia woodland patch of 140.24 ha exists around the study area, as presented in **Figure 14**.

5.2.3.5 Banksia Woodland Buffers

The Conservation Advice (Threatened Species Scientific Committee 2016) incorporates the need for buffers around areas of the TEC, in order to protect the integrity of the significant vegetation from surrounding impacts such as weed invasion. The guideline suggests that suitable buffers are a minimum of 20 m but optimally up to 50 m. A protection buffer of at least 20 m and optimally 50 m would therefore apply around the entire Banksia woodland patch as presented in **Figure 15**.

5.2.3.6 Banksia Woodland Condition

Within the Frankland Park study area, the area of Banksia woodland (the majority of the study area) ranges from 'Very Good – Excellent' to 'Degraded – Completely Degraded' condition, in accordance with an adaptation of the Keighery (1994) and Trudgen (1991) condition scales. The varying condition of the Banksia Woodland is presented in **Figure 16**.



GDA 94 / MGA Zone 50

Figure 14 - Banksia Woodland Patch

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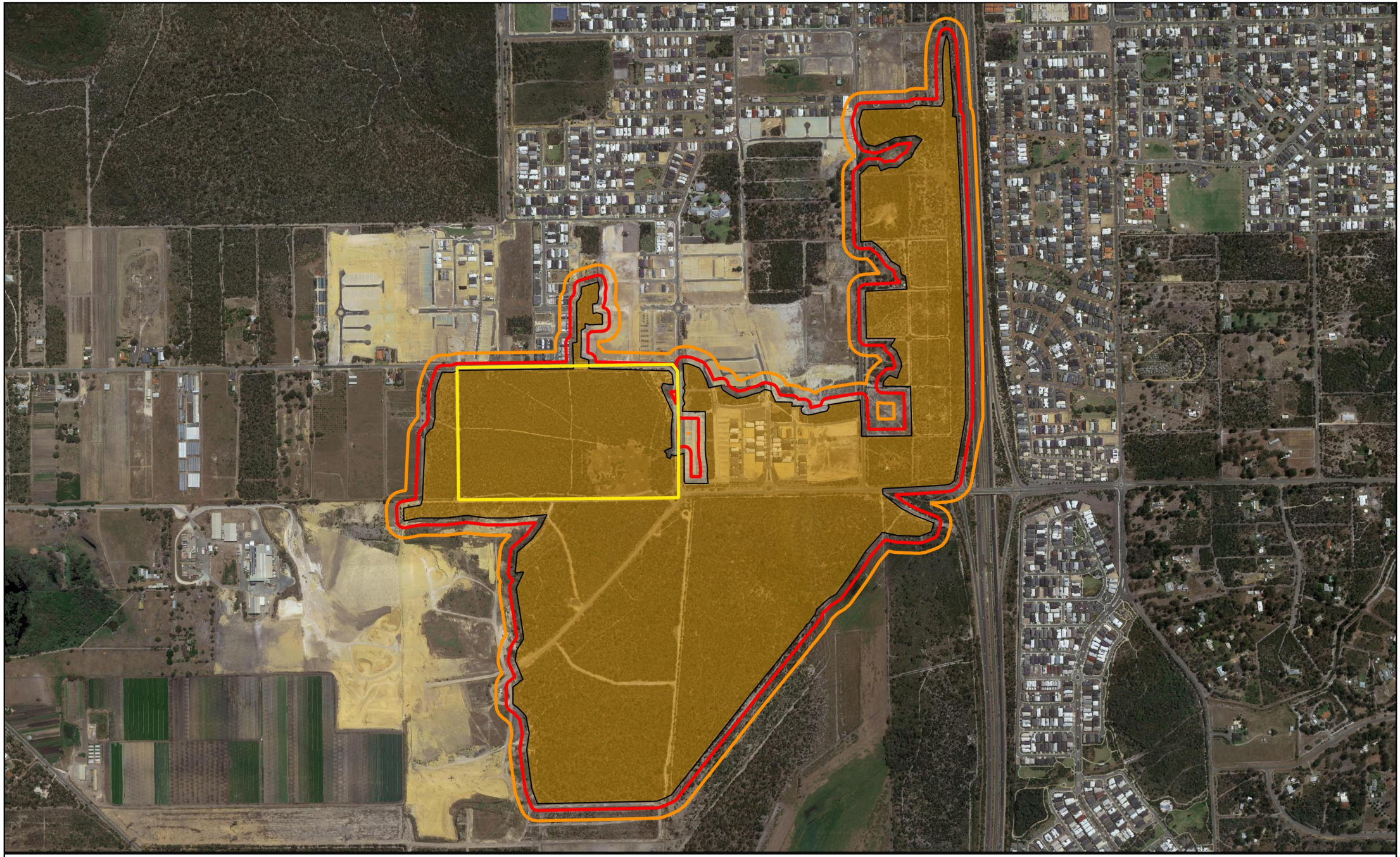

GDA 94 / MGA Zone 50

Figure 15 - Banksia Woodland Patch Buffers

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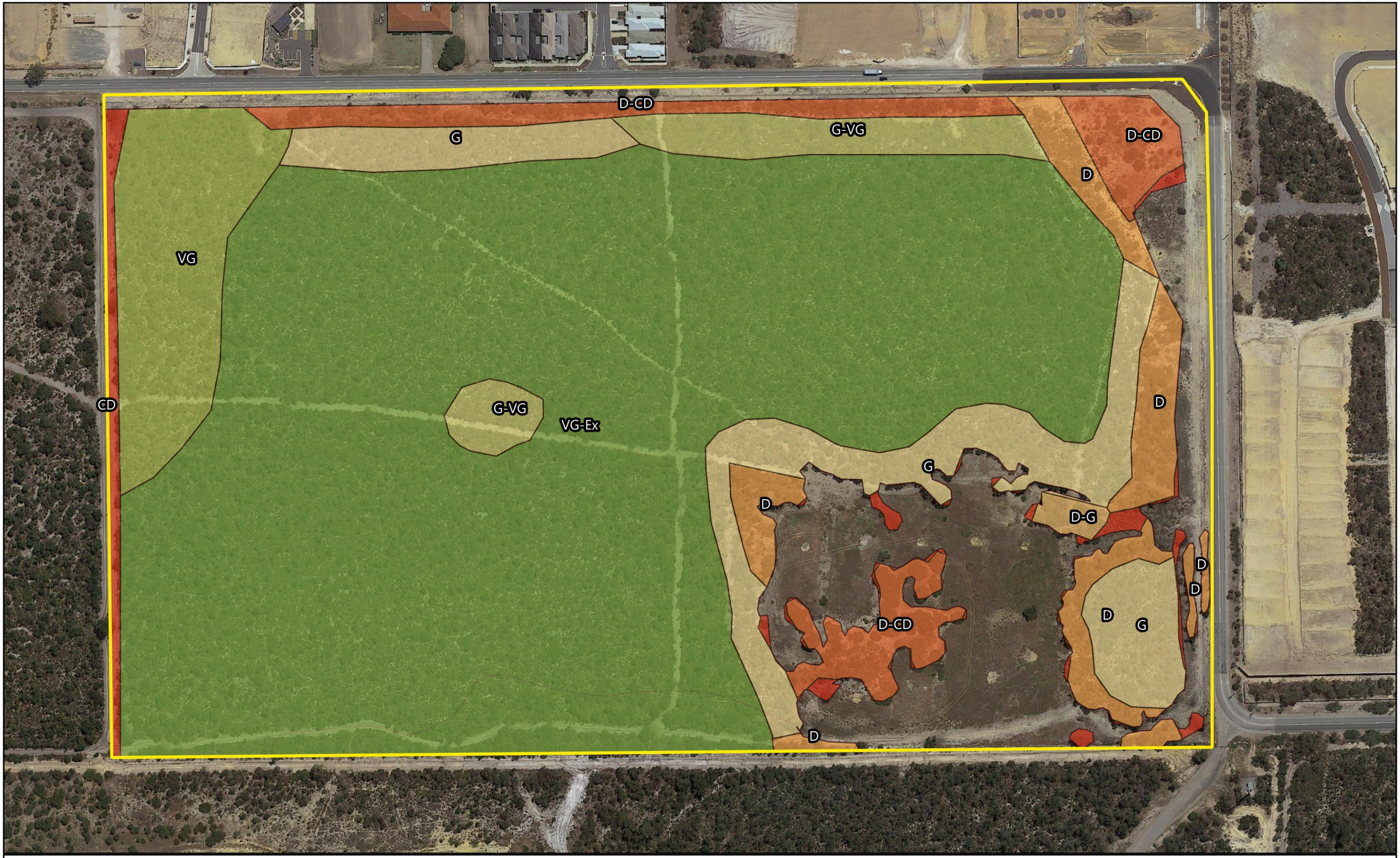

GDA 94 / MGA Zone 50

Figure 16 - Banksia Woodland Condition

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5.2.3.7 Banksia Woodland Patch and Condition Threshold

The grouping of the area of Banksia woodland at and surrounding the Frankland Park study area resulted in a single medium-sized patch of 140.24 ha. Within the Frankland Park study area, the area of Banksia woodland (the majority of the study area) ranges from 'Very Good – Excellent' to 'Degraded – Completely Degraded' condition. Therefore, a conservative average condition across the patch of 'Excellent' is considered applicable.

The Conservation Advice (Threatened Species Scientific Committee 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 a MNES protectable under the EPBC Act, a Banksia woodland patch the must meet at least the 'Good' condition category as outlined in the Conservation Advice (Threatened Species Scientific Committee 2016). Based on the condition and size of the patch mapped and grouped within the Banksia woodland present within the Frankland Park study area, the entire patch (140.24 ha) is considered eligible as the TEC.

5.2.4 Vegetation Representation

One of the EPA's objectives is to retain at least 10% of the pre-European extent of vegetation types in constrained areas in the Perth and Peel regions (EPA, 2015). The study area supports the Bassendean Complex - Central and South, which, according to the Local Biodiversity Program study (Western Australian Local Government Association 2013), is represented by 27.70% of its pre-European extent. This percentage exceeds the EPA threshold, based on a pre-European extent documented as remaining.

5.3 FAUNA

5.3.1 Fauna Assemblage

The desktop assessment determined that a total of 114 native fauna species have been previously recorded in the vicinity of the study area, and that some of these have the potential to occur within or utilise sections of the Frankland Park study area. The list of 114 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 the site.

A total of eight native fauna species were observed or positively identified from field evidence within the study area. This did not include any introduced fauna species, but included two species of conservation significance; Carnaby's Black-cockatoo (Endangered under the EPBC Act; Schedule 2 under the WC Act), observed from evidence of chewed Banksia cones; and the Southern Brown Bandicoot/Quenda (DBCA-listed Priority 4), observed from diggings in several locations. Both species of conservation significance are locally common, and they are discussed in more detail in the following section.

The low number of fauna sightings made during the field assessment can be attributed to the relatively small size of the study area and the limited survey period (half a day over a single day) invested and required, due to the small site size and low intensity nature of the assessment.

5.3.2 Conservation Significant Fauna

The desktop review determined that 29 terrestrial fauna species of conservation significance may have the potential to occur within the study area. Of these, the following two fauna species of conservation significance were recorded from evidence observed during the field assessment of the study area:

- *Calyptorhynchus latirostris* Carnaby's Black-Cockatoo – S2 (WC Act), Endangered (EPBC Act)

  Foraging evidence attributed to this species was observed during the site survey (chewed Banksia cones) and most of the remnant vegetation on site (Banksia woodland) represents foraging habitat.

- *Isoodon obesulus fusciventer* Southern Brown Bandicoot/Quenda – P4 (DBCA Priority Species)

  Evidence of this species' foraging (i.e. diggings) in some sections of the subject site was observed during site survey. Potentially present in most areas of the subject site wherever dense, shrubby groundcover exists.

Based on the habitats present and current documented distributions, it is considered possible that five additional conservation significant fauna species may use the study area for some purpose at times. No evidence of these species was found within the study area and as a result, their status within Frankland Park remains uncertain.

These species are:

- *Lerista lineata* Perth Lined Lerista – P3 (DBCA Priority Species)

  Habitat appears to be suitable for this species to persist and it has been recorded nearby (ENV 2009, Phoenix 2010). Known to inhabit gardens (Nevill 2005, Bush *et al.* 2010) so may persist in degraded areas and landscaped gardens subsequent to development.

- *Calyptorhynchus banksii naso* Forest Red-tailed Black Cockatoo – S3 (WC Act), Vulnerable (EPBC Act)

  No evidence of this species using the site for any purpose was observed. Some small areas of remnant vegetation containing Jarrah and Sheoak within the study area do however represent potential foraging habitat and it may occasionally visit the area at times to feed.

- *Falco peregrinus* Peregrine Falcon – S7 (WC Act)

  Individuals of this species potentially utilise some sections of the subject site as part of a much larger home range but would only occur rarely. This species would not breed onsite.

- *Merops ornatus* Rainbow Bee-eater – S5 (WC Act)

  This species is a common seasonal visitor to south west. Population numbers at any one location would however never be significant as the species usually breeds in pairs and only rarely in small colonies (Johnstone and Storr 1998).

- *Macropus irma* Western Brush Wallaby – P4 (DBCA)

  Listed as a potential species as it has been recorded in some nearby areas (Harewood 2005, ENV 2009). This species may therefore occur occasionally though the study area itself is too small to maintain a population.

A number of other species of conservation significance, while possibly present in the wider area (e.g. Harry Waring Marsupial Reserve, Thomson Lake Nature Reserve, Bibra Lake/Jandakot Airport bushland), are not listed as potential species due to known localised extinction (and no subsequent recruitment from adjoining areas) and/or lack of suitable habitat and/or the presence of feral predators. Details on conservation significant species and reasons for the omission of some from the potential listing are provided in **Appendix E** and **Table 7**.

5.3.2.1 Carnaby's Black-cockatoo

Carnaby's Black-cockatoo is listed as Schedule 2 under the WC 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, Hakeas 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, 2003). 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 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 & Saunders 1986).

Evidence of foraging activity was observed at the study area during the October 2017 field assessment in the form of chewed banksia cones. Most of the remnant vegetation containing Banksia and occasional and jarrah within the site represents potential foraging habitat. Overfly activity of the species is regularly observed in the Cockburn region (Kellie Bauer-Simpson, *pers. comm.*).

No existing roosting trees (trees used at night by Black-cockatoos to rest) were positively identified during the field survey, and given the lack of large trees present, Black-cockatoos are considered very unlikely to use the study area for this purpose.

The potential impact of future development at Frankland Park on Carnaby's Black-cockatoo would be loss and/or modification of some areas of habitat.

5.3.2.2 Southern Brown Bandicoot

The Southern Brown Bandicoot is listed as a Priority 4 species by DBCA. Widely distributed in the south west from near Cervantes north of Perth to east of Esperance, patchy distribution through the Jarrah and Karri forest and on the Swan Coastal Plain, and inland as far as Hyden. The species has been translocated to Julimar State Forest, Hills Forest Mundaring, Tutanning Nature Reserve, Boyagin Nature Reserve, Dongolocking Nature Reserve, Leschenault Conservation Park, and Karakamia and Paruna Sanctuaries (DBCA information pamphlet) and Nambung National Park (DBCA pers. coms.)

The Southern Brown Bandicoot habitat consists of dense scrubby, often swampy, vegetation with dense cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. The Sothern Brown Bandicoot can thrive in more open habitat subject to exotic predator control (DBCA information pamphlet).

Evidence of foraging activity such as diggings was observed at Frankland Park during the field assessment. This species is potentially present over most of the study area wherever dense shrubby groundcover occurs (Harewood 2017).

The potential impact of future development at Frankland Park on the Southern Brown Bandicoot would be loss and/or modification of some areas of habitat. There is also some possibility that individual maybe killed or injured during clearing operations (Harewood 2017).

5.4 FAUNA HABITATS

The study area was found to support two habitat types; a Banksia Woodland and a degraded area. These two habitat types vary in quality and value in terms of providing for native fauna, which includes species of conservation significance.

Of greatest significance with regards to fauna habitat, is the Banksia Woodland, which comprises the majority of the study area. This habitat type encompasses the best quality vegetation in the study area and is suitable foraging habitat for Threatened Black-cockatoos, as well as the Southern Brown Bandicoot in areas of dense ground cover. Clearing of areas greater than one hectare of this habitat would require referral to the Commonwealth DEE.

The cleared or partly cleared areas primarily consists of grasslands dominated by introduced weed and grass species such as *Asphodelus fistulosus, Avena barbata, Ehrharta calycina, Eragrostis curvula, Euphorbia terracina* and *Pelargonium capitata.* This lower quality vegetation provides very little value for native fauna and have a lower capacity to support most fauna species (Harewood 2017).

5.5 HABITAT QUALITY SCORES

An analysis of the habitat quality scores within the proposed development area footprint (**Figure 1**) was conducted utilising habitat quality scales developed internally by FVC and utilised on other projects, where input into the Commonwealth Biodiversity Offsets calculator has been required. The results of the analyses in the context of both Banksia woodland TEC and Black-cockatoo habitat are provided below.

5.5.1 Banksia Woodland TEC

In order to arrive at a habitat quality score for the Banksia woodland TEC present within the study area, an analysis was carried out based on:

- vegetation condition
- local and regional context of the Banksia woodland vegetation, relating to:
    - site size
    - patch size
    - local representation and/or isolation
    - the stocking rate, relating to:
        - density of vegetation
        - site size
        - area to boundary ratio
- the State significance of the vegetation (status as a State-listed TEC or PEC and a highly restricted FCT).

The details of the basis of the habitat quality score are presented in **Appendix J**.

Based on the results of the habitat quality score assessment for the study area, the Banksia woodland vegetation present within the study area, habitat quality score has been determined to be 7.

5.5.2 Black-cockatoo Habitat

In order to arrive at a preliminary habitat quality score for the Carnaby's Black-cockatoo habitat present within the study area, an analysis was carried out based on:

- foraging value
- local and regional context of the habitat, relating to:
    - presence of breeding birds
    - presence of roosting sites
    - proportionate representation of remaining local habitat
- stocking rate, relating to the whether or not the site supports regular foraging, breeding or roosting, or a combination of any of these.

Based on the above, the Carnaby's Black-cockatoo habitat present within the study area achieved a preliminary habitat quality score of 6. The site is not considered relevant as habitat for either Forest Red-tailed Black-cockatoo or Baudin's Cockatoo, and therefore habitat quality score for these species were not calculated.

5.6 ADJUSTED MNES IMPACT AREAS

The current proposed sporting grounds development footprint (3.77 ha) (not taking into account the completely degraded areas that could be deducted, in accordance with the precautionary principle). Input of this area into the Commonwealth Biodiversity Offsets Calculator, combined with the determined habitat quality scores, arrives at the following adjusted impact areas:

- up to 2.64 ha for Banksia woodland TEC
- up to 2.26 ha for Black-cockatoo habitat.

If the completely degraded areas are deducted from the impact area calculations, an area of approximately 2.03 ha within the proposed clearing footprint is concluded to comprise Banksia woodland TEC and Black-cockatoo foraging habitat. Input of this area into the Calculator with the habitat quality scores, provides the following adjusted impact areas:

- 1.42 ha for Banksia woodland TEC
- 1.22 ha for Black-cockatoo habitat.

These impact areas would be able to be rationalised against proposed offset areas in the calculator, once potential offset sites are selected and proposed, and once the scales for arriving at the habitat quality score discussed above have been agreed with DEE.

A proportion (approximately 0.39 ha) of the Banksia woodland within the proposed clearing footprint is significantly degraded (i.e. mapped to be in 'Degraded to Completely Degraded' condition. In this location, historic imagery reveals that the vegetation was completely cleared prior to the mid-1970s and remained cleared until at least the early 1980s, and that the vegetation currently in-situ has therefore regenerated, with species composition akin to that of vegetation unit BaBmOW, but in much poorer condition than the surrounding Banksia woodland. For this reason, clearing of this vegetation may not be considered to represent a significant impact, and referral of the wider proposed clearing may not be necessary. Although it is recommended that DEE be consulted on the matter.

6 CONCLUSION AND RECOMMENDATIONS

The key findings of the flora, vegetation, fauna and habitat assessment within the study area are as follows:

- No flora of conservation significance was recorded during any of the field assessments, despite targeted surveys for *Caladenia huegelii*.
- One intact vegetation unit, BaBmOW, was described and mapped within the study area and defined as a Banksia Woodland, and representative of FCT SCP28 (Spearwood *Banksia attenuata* or *Banksia attenuata – Eucalyptus* woodlands), which is considered to represent the Banksia woodland TEC.
- Two fauna habitats, consisting of Banksia woodland and a degraded area were described and mapped across the study area.
- Evidence of Threatened Carnaby's Black-cockatoos and the Priority 4 species, Southern Brown Bandicoot/Quenda was recorded during the field assessment.
- Based on the habitats present and current documented distributions, *Lerista lineata* (Perth Lined Lerista), *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo), *Falco peregrinus* (Peregrine Falcon), *Merops ornatus* (Rainbow Bee-eater) and *Macropus irma* (Western Brush Wallaby) are considered to possibly occur within or occasionally utilise Frankland Park
- No breeding, potential breeding (habitat) or existing roosting trees were positively identified within the study area during the field survey.
- A targeted Banksia Woodland TEC assessment has confirmed that the areas of intact remnant native vegetation present within the Frankland Park site, represented by vegetation unit BaBmOW are representative of the TEC.
- The Banksia woodland at and surrounding the Frankland Park study area is part of a medium-sized patch of 140.24 ha.
- The Banksia woodland within the study area is in mostly 'Very Good – Excellent' condition. And based on the condition and size of the patch mapped, in accordance with the conservation advice, the entire patch (140.24 ha) is considered eligible as the TEC.
- Any proposed clearing and development that directly impacts on significant biological values, including the Banksia woodland TEC and Carnaby's Black-cockatoo habitat would be considered a significant impact under the EPBC Act.
- Any closely adjacent impacts that may result in indirect impacts such as weed invasion, dieback introduction, increased fire risk, and albeit unlikely, accidental over-clearing of significant biological values, including the Banksia woodland TEC and Black-cockatoo habitat would be considered a significant impact under the EPBC Act.

The majority of the area proposed for the sporting grounds development is cleared or degraded (if not completely degraded), supporting little value in terms of flora, vegetation, fauna or habitats, however a very small proportion of the footprint is in better condition and supports more significant values (Banksia woodland TEC and Black-cockatoo foraging habitat). Impact mitigating adjustments to the placement of the proposed development footprint have resulted in a significantly reduced area of impact for both MNES.

The adjusted impact areas that result from the Commonwealth Biodiversity Offsets Calculator for the proposed development are as follows:

- 1.42 ha for Banksia woodland TEC
- 1.22 ha for Black-cockatoo habitat.

These adjusted impact areas would be able to be rationalised against proposed offset areas in the calculator, once potential offset sites are selected and proposed, and once the scales for arriving at the habitat quality score discussed above have been agreed with DEE.

Since a proportion of the Banksia woodland within the proposed clearing footprint is significantly degraded and has regenerated from historic clearing, clearing of this vegetation may not be considered to represent a significant impact, and therefore referral of the wider proposed clearing may not be necessary, although DEE should be consulted on the matter.

The following mitigation measures and other recommendations are suggested for consideration with regards to proposed impacts to biological values:

- If possible, avoid clearing and residual impacts on all areas of remnant vegetation, which represents Banksia woodland TEC and Black-cockatoo foraging habitat MNES.
- Undertake a fauna trapping and translocation program prior to clearing, particularly aimed at the Priority 4 species, Quenda.
- Maintain the presence of a suitably qualified zoologist on site during clearing, so that any fauna that may be encountered can be relocated to adjacent bushland areas.

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APPENDIX A DBCA NATUREMAP SEARCH REPORT

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 23/10/2017

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 50' 39" E,32° 10' 45" S
Buffer 1km

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
2.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
3.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
4.	1834	*Banksia menziesii (Firewood Banksia)*			
5.		*Barnardius zonarius*			
6.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
7.	244	*Briza maxima (Blowfly Grass)*	Y		
8.	1277	*Caesia occidentalis*			
9.	5458	*Calytrix flavescens (Summer Starflower)*			
10.	1280	*Chamaescilla corymbosa (Blue Squill)*			
11.	24980	*Christinus marmoratus (Marbled Gecko)*			
12.	25592	*Corvus coronoides (Australian Raven)*			
13.	25595	*Cracticus tibicen (Australian Magpie)*			
14.	25596	*Cracticus torquatus (Grey Butcherbird)*			
15.	30893	*Cryptoblepharus buchananii*			
16.	25027	*Ctenotus australis*			
17.	7454	*Dampiera linearis (Common Dampiera)*			
18.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
19.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
20.	3109	*Drosera menziesii (Pink Rainbow)*			
21.	3117	*Drosera paleacea (Dwarf Sundew)*			
22.	13188	*Drosera paleacea subsp. paleacea*			
23.		*Eolophus roseicapillus*			
24.	24041	*Felis catus (Cat)*	Y		
25.	25530	*Gerygone fusca (Western Gerygone)*			
26.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
27.	6161	*Gonocarpus pithyoides*			
28.	24443	*Grallina cyanoleuca (Magpie-lark)*			
29.	25119	*Hemiergis quadrilineata*			
30.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
31.	24491	*Hirundo neoxena (Welcome Swallow)*			
32.	12859	*Hovea trisperma var. trisperma*			
33.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
34.	1070	*Hypolaena exsulca*			
35.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P4	
36.	925	*Lepidosperma angustatum*			
37.	25005	*Lialis burtonis*			
38.	25661	*Lichmera indistincta (Brown Honeyeater)*			
39.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
40.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
41.	1228	*Lomandra hermaphrodita*			
42.	1246	*Lomandra suaveolens*			
43.	1097	*Lyginia barbata*			
44.	5980	*Melaleuca thymoides*			
45.	25184	*Menetia greyii*			
46.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
47.	24223	*Mus musculus (House Mouse)*	Y		
48.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
49.	25682	*Pardalotus striatus (Striated Pardalote)*			
50.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
51.	2299	*Petrophile linearis (Pixie Mops)*			
52.	24409	*Phaps chalcoptera (Common Bronzewing)*			
53.	1478	*Phlebocarya ciliata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
54.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
55.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
56.	25509	*Pletholax gracilis (Keeled Legless Lizard)*			
57.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
58.	25511	*Pseudonaja affinis (Dugite)*			
59.		*Purpureicephalus spurius*			
60.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
61.	1556	*Romulea rosea (Guildford Grass)*	Y		
62.	984	*Schoenus curvifolius*			
63.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
64.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
65.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
66.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
67.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
68.	7785	*Stylidium repens (Matted Triggerplant)*			
69.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
70.	25519	*Tiliqua rugosa*			
71.	6280	*Trachymene pilosa (Native Parsnip)*			
72.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
73.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			

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 the Environment and Energy

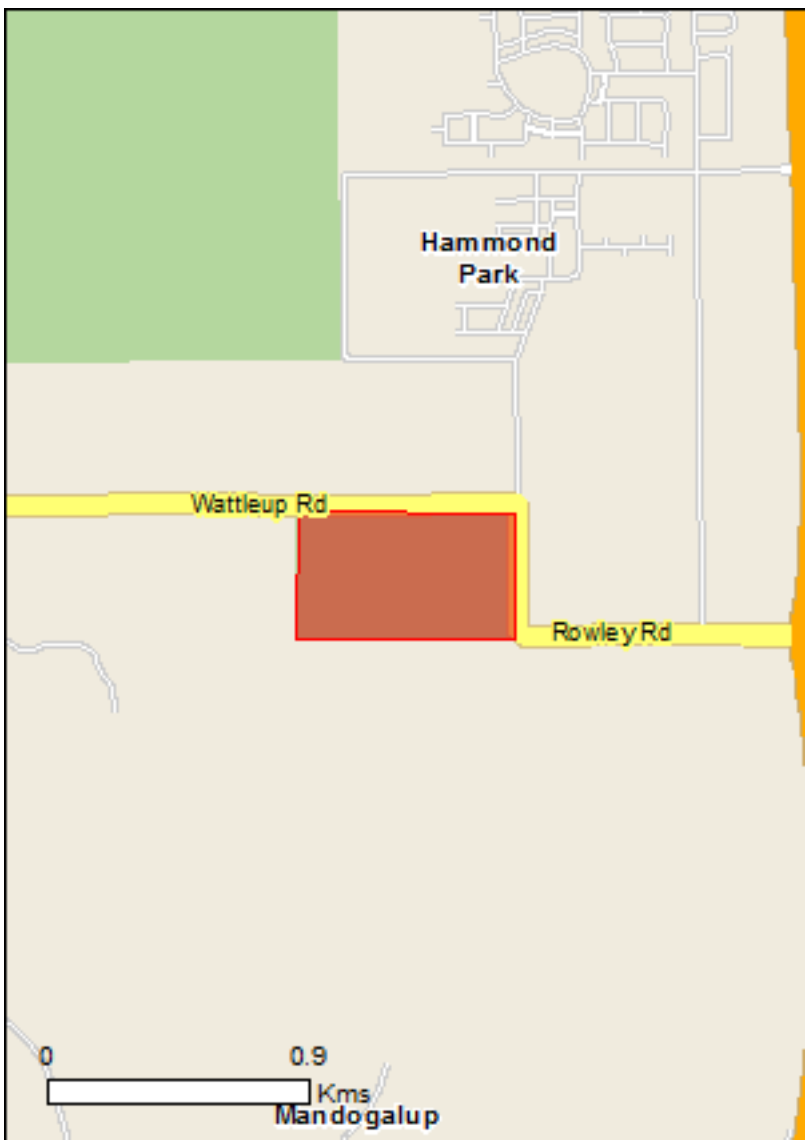
EPBC Act Protected Matters Report

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.

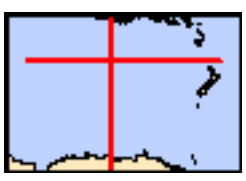
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/10/17 14:40:26



Coordinates

Buffer: 1.0Km



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:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	16
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	36
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Forrestdale and thomsons lakes	Within 10km of Ramsar

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

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

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

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

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may 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
Harry Waring Marsupial Reserve	WA

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Gibbs Road Swamp System	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

-32.177376 115.840824,-32.177485 115.847519,-32.180718 115.847562,-32.180754 115.840738,-32.177376 115.840824,-32.177376 115.840824

Acknowledgements

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

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

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

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

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APPENDIX C STRUCTURAL VEGETATION CLASSIFICATIONS (MUIR, 1977)

Life Form/Height Class	Canopy Cover			
	Dense 70-100%	**Mid-dense 30-70%**	**Sparse 10-30%**	**Very sparse 2-10%**
Trees >30m	Dense tall forest	Tall forest	Tall woodland	Open tall woodland
Trees 15-30m	Dense forest	Forest	Woodland	Open woodland
Trees 5-15m	Dense low forest A	Low forest A	Low woodland A	Open low woodland A
Trees <5m	Dense low forest B	Low forest B	Low woodland B	Open low woodland B
Mallee Tree Form	Dense tree mallee	Tree mallee	Open tree mallee	Very open tree mallee
Mallee Shrub form	Dense shrub mallee	Shrub mallee	Open shrub mallee	Very open shrub mallee
Shrubs >2m	Dense thicket	Thicket	Scrub	Open scrub
Shrubs 1.5-2m	Dense heath A	Heath A	Low scrub A	Open low scrub A
Shrubs 1-1.5m	Dense heath B	Heath B	Low scrub B	Open low scrub B
Shrubs 0.5-1m	Dense low heath C	Low heath C	Dwarf scrub C	Open dwarf scrub C
Shrubs <0.5m	Dense low heath D	Low heath D	Dwarf scrub D	Open dwarf scrub D
Mat plants	Dense mat plants	Mat plants	Open mat plants	Very open mat plants
Hummock grass	Dense hummock grass	Mid-dense hummock grass	Hummock grass	Open hummock grass
Bunch grass >0.5m	Dense tall grass	Tall grass	Open tall grass	Very open tall grass
Bunch grass <0.5m	Dense low grass	Low grass	Open low grass	Very open low grass
Herbaceous spp.	Dense herbs	Herbs	Open herbs	Very open herbs
Sedges >0.5m	Dense tall sedges	Tall sedges	Open tall sedges	Very open tall sedges
Sedges <0.5m	Dense low sedges	Low sedges	Open low sedges	Very open low sedges
Ferns	Dense ferns	Ferns	Open ferns	Very open ferns
Mosses, Liverwort	Dense mosses	Mosses	Open mosses	Very open mosses

APPENDIX D FAUNA ASSESSMENT REPORT (HAREWOOD 2017)

Fauna Assessment

of

Frankland Park

(Lot 2022/Reserve 27057)

Hammond Park

JANUARY 2018

Version 2

On behalf of:
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APPENDICES

SUMMARY

This report details the results of a fauna assessment of Frankland Park (Lot 2022/Reserve 27057**)**, Hammond Park (the subject site).

The subject site has a total area of about 24.27 hectares and is comprised mainly of remnant native vegetation in addition to some cleared and partly cleared areas.

The scope of works was to conduct a level 1 fauna survey as defined by the EPA (EPA 2016c). Because some listed threatened species (i.e. several species of black cockatoo) are known to occur in the general area, the scope of the survey work was expanded to include targeted assessment of the site's significance to these particular species. The assessment has included a literature review and single daytime reconnaissance survey.

Descriptions and examples images of the main fauna habitats present within the subject site are provided in Table 1. Almost all the subject site is covered by a *banksia* open woodland.

The majority of the vegetation appears to be in very good to excellent condition and would therefore have the capacity to support a wide range of the predicted fauna species. Some areas appear to have been subject to some historical clearing and as a consequence contains vegetation of a lower quality relative to other areas. These areas would have much lower capacity to support most species.

A total of eight native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the subject site during the one day survey period. This is a relatively low number of observations and can be attributed mainly to the relatively small size of the subject site and the limited survey period (~three hours over one day).

Evidence of one listed threatened species was observed (Carnaby's black-cockatoo - chewed banksia cones at many locations). Diggings attributed to the southern brown bandicoot, a DBCA Priority 4 species, were also found to be relatively common.

No trees meeting the criteria of a "black cockatoo breeding habitat" as defined by the DotEE (Commonwealth of Australia 2012) were observed with the subject site.

The main foraging resource observed within the subject site is represented by *Banksia attenuata* and *Banksia menziesii.* These dominant plant species are supplemented to varying degrees by smaller shrub species such as *Allocasuarina humilis and Xanthorrhoea preissii.* Other documented foraging species (e.g. *Eucalyptus marginata*) are represented by a relatively small number of individual specimens and do not contribute to the total potential food resource to any significant degree.

Evidence of black cockatoos foraging onsite was observed during the field assessment in the form of chewed *banksia* cones. This evidence was attributed to Carnaby's black-cockatoo. No evidence (new or old) of jarrah or sheoak onsite being utilised as a food source was seen which would suggest the forest red-tailed black-cockatoo is an infrequent visitor to the site at

best. The forest red-tailed black-cockatoo does not utilise *banksia* as a food source but, apart from its favoured food marri, often feeds on jarrah and in some circumstances sheoak.

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey and given the lack of large trees present black cockatoos are considered very unlikely to use the subject site for this purpose.

With respect to native vertebrate fauna, 12 mammals (includes eight bat species), 74 bird, 25 reptile and three frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the subject site at times.

Of the 114 native animals that are listed as potentially occurring in the area, three are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law, these being two species of black cockatoo (Carnaby's and the forest red-tailed black-cockatoo) and the peregrine falcon. In addition, one migratory species (the rainbow bee-eater) and three DBCA priority species (Perth lined lerista, the southern brown bandicoot and the western brush wallaby) are known to or may also utilise the area at times.

The identified presence or likely presence of these fauna species (in particular those listed as threatened under federal legislation) represents a potential constraint on development within the subject site as it is considered very likely that habitat removal at any scale will need to be referred to the DotEE to ensure compliance with the *EPBC Act*.

The potential impacts on fauna species of conservation significance and/or their habitat will therefore need to be taken into consideration during the course of ongoing planning so as to minimise the potential for onerous conditions being imposed on any proposed development. Future planning should aim to reduce potential impacts so as to simplify any statutory approval processes that maybe required.

1. INTRODUCTION

This report details the results of a fauna assessment of Frankland Park (Lot 2022/Reserve 27057**)**, Hammond Park (the subject site).

The subject site has a total area of about 24.27 hectares and is comprised mainly of remnant native vegetation in addition to some cleared and partly cleared areas.

2. SCOPE OF WORKS

The scope of works was to conduct a level 1 fauna survey as defined by the EPA (EPA 2016c). Because some listed threatened species (i.e. several species of black cockatoo) are known to occur in the general area, the scope of the survey work was expanded to include a targeted assessment of the site's significance to these species.

The fauna assessment has therefore included:

1. Level 1 Fauna Survey (to EPA standard);

2. Black Cockatoo Habitat Assessment ("habitat trees" = DBH ≥50cm, existing and potential nest hollows, foraging and roosting habitat); and

3. Brief report summarising methods and results.

Note: For the purposes of this report the term black cockatoo is in reference to Carnaby's black-cockatoo *Calyptorhynchus latirostris* and the forest red-tailed black-cockatoo *Calyptorhynchus banksii naso*.

3. METHODS

3.1 POTENTIAL FAUNA INVENTORY – LITERATURE REVIEW

3.1.1 Database Searches

Searches of the following databases were undertaken to aid in the compilation of a list of conservation significant fauna potentially occurring within the subject site:

- DBCA's NatureMap Database Search (combined data from DBCA, ALA, WAM, BA and consultant's reports) (DBCA 2017); and

- Protected Matters Search Tool (DotEE 2017).

It should be noted that lists produced during the abovementioned database searches contain observations/inferred distributions from a broader area than the subject site and therefore may include species that would only ever occur as vagrants due to a lack of suitable habitat or the presence of only marginal habitat within the subject site itself. The databases also often included or are based on very old records and in some cases the species in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

3.1.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publicly available and could not be referenced. The most significant of those available have been used as the primary reference material for compiling the potential fauna assemblage for the general area.

Those reports referred to included, but were not limited to:

- 360 Environmental (2012). Lots 124 and 125 Frankland Avenue Hammond Park: Graceful Sun Moth Survey & Site Based (*Lomandra*) Habitat Assessment. Report prepared for WorldStyle Furniture Wholesaler, Perth.
- Bamford Consulting Ecologists (2011). Threatened Fauna Assessment: Lots 42-44 Frankland Road, Hammond Park. Report prepared for Bayley Environmental Services.
- Bamford Consulting Ecologists (2012). Lot 123 Wattleup Road, Hammond Park. Significant Fauna Assessment. Report prepared for Bayley Environmental Services.
- Ecoscape (2009). Fauna Survey for Lots 13, 14 and 18 Barfield Road and Lots 48-51 Rowley Road, Hammond Park. Unpublished report for Gold Estates and the Department of Housing.
- Emerge Associates (Emerge) (2011). Level 1 Fauna Survey and Habitat Assessment - Various Allotments, Mandogalup. Unpublished report prepared for Qube Mandogalup Land Development Company.
- ENV (2009). Jandakot Airport Fauna Survey. Unpublished report for Jandakot Airport Holdings Pty Ltd.
- GHD (2012). Report for Hammond Park Primary School. Flora and Fauna Assessment. Unpublished report for the Department of Education.
- Harewood, G. (2005). Fauna Assessment, Mandogalup. Unpublished report for Cardno BSD.

- Harewood, G. (2006). Fauna Assessment, Lot 121 Wattleup Road, Wattleup. Unpublished report for Cardno BSD.
- Harewood, G. (2009). Fauna Survey (Level 2) East Rockingham WWTP Site & Pipeline Corridors. Unpublished report for ERM.
- Harewood, G. (2011a). Fauna Assessment Lot 9001 and Lot 35 Barfield Road, Hammond Park. Unpublished report for Mainlake Holdings Pty Ltd.
- Harewood, G. (2011b). Fauna Underpass Monitoring Spring 2010 – Perth Mandurah Rail Line. Unpublished report for the Public Transport Authority of Western Australia.
- Harewood, G. (2014a). Fauna Assessment of Lot 33 Barfield Road, Hammond Park. Unpublished report for West Coast Plan (on behalf of the Passione Family).
- Harewood, G. (2014b). Fauna Assessment of Lots 109 and 110 Wattleup Road, Hammond Park. Unpublished report for Emerge Associates.
- Harewood, G. (2014c). Fauna Assessment of Lots 1, 111 & 810 Wattleup Road, Hammond Park. Unpublished report for Emerge Associates.
- Phoenix Environmental Sciences (2011). Vertebrate Fauna Survey for the Roe Highway Extension Project. Unpublished report for South Metro Connect.
- Strategen (2013). Mandogalup Black Cockatoo Habitat Survey. Unpublished Report for Satterley Property Group.
- Terrestrial Ecosystems (2012). Level 1 Fauna Assessment for Hammond Park Primary School. Unpublished report for Taylor Robinson.

As with the databases searches some reports refer to species that would not occur in the subject site due to a lack of suitable habitat (extent and/or quality) and this fact was taken into consideration when compiling the potential fauna species list for the subject site. It should also be noted that the NatureMap database is likely to include some records from previous fauna surveys in the area including some of those listed above.

3.1.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the subject site:

- Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.
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3.1.4 Fauna of Conservation Significance

The conservation significance of fauna species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*). Administered by the Australian Government DotEE;
- *Wildlife Conservation Act 1950* (*WC Act*). Administered by the Western Australian DBCA (Govt. of WA 2017);
- Red List produced by the SSC of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- DBCA Priority Fauna list. A non-statutory list maintained by the DBCA for management purposes (DPaW 2017).

The *EPBC Act* also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA);
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

(Note - Species listed under JAMBA are also protected under Schedule 5 of the *WC Act*.)

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as matters of national environmental significance (MNES) under the *EPBC Act*.

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the subject site has been assessed using the most recent lists published in accordance with the above mentioned instruments and is indicated as such in the fauna listings of this report. A full listing of conservation codes is provided in Appendix A.

A number of other species not listed in official lists can also be considered of local or regional conservation significance. These include species that have a restricted range, those that occur in breeding colonies and those at the limit of their range.

While not classified as rare, threatened or vulnerable under any State or Commonwealth legislation, a number of bird species have been listed as of significance on the Swan Coastal portion of the Perth Metropolitan Region (Bush Forever - Government of Western Australia 1998 and 2000). The bird species are often referred to as Bush Forever Decreaser Species. The three categories used for birds within the Bush Forever documents are:

- Habitat specialists with reduced distribution on the Swan Coastal Plain (code Bh)
- Wide ranging Species with reduced population's on the Swan Coastal Plain. (code Bp)
- Extinct in the Perth region (code Be)

The presence of Bush Forever species should be taken into some consideration when determining the fauna values of an area. Bush Forever decreaser species are indicated as such within the species list held in Appendix B.

3.1.5 Likelihood of Occurrence – Vertebrate Fauna of Conservation Significance

Fauna of conservation significance identified during the literature review as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the subject site itself. The rankings and criteria used were:

- Would Not Occur: There is no suitable habitat for the species in the subject site and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
    - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20 km of the subject site. Populations do however persist outside of this area.
    - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the central swan coastal plain region/Perth metropolitan area. Populations do however persist outside of this area.
- Unlikely to Occur: The subject site is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable

habitat is located nearby but the subject site itself would not support individuals or a population the species.

- Possibly Occurs: The subject site is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field assessment, supported in some cases by recent records being documented in literature from within or near the subject site. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

- Known to Occur: The species in question was positively identified as being present (for sedentary species) or as using the subject site as habitat for some other purpose (for non-sedentary/mobile species) during the field survey. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. foraging debris, tracks and scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

3.1.6 Taxonomy and Nomenclature

Taxonomy and nomenclature for vertebrate fauna species used in this report is generally taken from the DBCA's WA Fauna Census Database which is assumed to follow Aplin and Smith (2001) for amphibians and reptiles and Johnstone (2001) for birds. Jackson and Groves (2015) has been used for mammals.

Common names are taken from the Western Australia Museum (WAM) recognised primary common name listings when specified, though where common names are not provided they have been acquired from other publications. Sources include Cogger (2014), Wilson and Swan (2017), Van Dyck & Strahan (2013), Christidis and Boles (2008), Bush *et al.* (2010), Bush *et al.* (2007), Tyler & Doughty (2009), and Glauret (1961). Not all common names are generally accepted.

3.1.7 Invertebrates of Conservation Significance

For this project, the assessment for conservation significant invertebrates has been limited to those listed by the DPaW and *EPBC Act* database searches (which rely on distribution records and known habitat preferences).

No assessment of the potential for SREs to be present has been made as it can be difficult to identify significant invertebrate species due to uncertainties in determining the range-restrictions of many species due to lack of surveys, lack of taxonomic resolutions within target taxa and problems in identifying certain life stages.

Where invertebrates are collected during surveys, a high percentage are likely to be unknown, or for known species there can be limited knowledge or information on their distribution (Harvey 2002).

3.2 SITE SURVEYS

The daytime reconnaissance survey of the site was carried out on the 25 October 2017 by Greg Harewood (Zoologist).

3.2.1 Fauna Habitat Assessment

The vegetation communities identified during a botanical survey of the site carried out by Focused Vision Consulting (2017) have been used as the basis for a classification of broad fauna habitats types. This information has been supplemented with observations made during the fauna assessment.

The main aim of the habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted on as a consequence of development at the site. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the desktop literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey the habitats within the subject site were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

3.2.2 Opportunistic Fauna Observations

Opportunistic observations of fauna species were made during all field survey work which involved a series of close spaced transects across the site during the day while searching microhabitats such as logs, rocks, leaf litter and observations of bird species with binoculars. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

3.2.3 Black Cockatoo Habitat Assessment

The following methods were employed to comply with the defined scope of works and are based on guidelines published by the federal DotEE (Commonwealth of Australia 2012) which states that surveys for Carnaby's, Baudin's and forest red-tailed black cockatoo habitat should:

- be done by a suitably qualified person with experience in vegetation or cockatoo surveys, depending on the type of survey being undertaken;
- maximise the chance of detecting the species' habitat and/or signs of use;

- determine the context of the site within the broader landscape—for example, the amount and quality of habitat nearby and in the local region (for example, within 10 km);
- account for uncertainty and error (false presence and absences); and
- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

Habitat used by black cockatoos have been placed into three categories by the DotEE (Commonwealth of Australia 2012) these being:

- Breeding Habitat;
- Foraging Habitat; and
- Night Roosting Habitat.

To comply with the requested scope of works and in line with the published guidelines the following was carried out.

3.2.3.1 Black Cockatoo Breeding Habitat

The black cockatoo breeding habitat assessment involved the identification of all suitable breeding trees species (native, endemic species only) within the subject site that had a DBH of equal to or over 50cm. The DBH of each tree was estimated using a pre-made 50 cm “caliper”.

Target tree species included marri and jarrah or any other *Corymbia/Eucalyptus* species of a suitable size that may have been present. Peppermints, *banksia*, sheoak and *melaleuca* tree species (for example) were not assessed as they typically do not develop hollows that are used by black cockatoos.

The location of each tree identified as being over the threshold DBH was recorded with a GPS and details on tree species, number and size of hollows (if any) noted. Trees observed to contain hollows (of any size/type) were marked with “H” using spray paint for easy future reference.

Potential hollows were placed into one of four categories, based on the size of the apparent hollow entrance, these being:

- Small = ~<5cm diametre (i.e. entrance too small for a black cockatoo);
- Medium = ~5cm-10cm diametre (i.e. entrance too small for a black cockatoo);

- Large = ~>10cm diametre (entrance large enough for a black cockatoo but possible hollow appears to be unsuitable for nesting i.e. wrong orientation, too small, too low or too shallow); or

- Large (cockatoo) = ~>10cm diametre (entrance appears big enough to provide access to a possible hollow that may be suitable for a black cockatoo to use for nesting).

Based on this assessment trees present within the subject site have been place into one of four categories:

- Tree < 50cm DBH or an unsuitable species (not recorded);

- Tree ≥50cm DBH, no hollows seen;

- Tree ≥50cm DBH, one or more hollows seen, none of which were considered suitable for black cockatoos to use for nesting; or

- Tree ≥50cm DBH, one or more hollows seen, with at least one considered suitable for black cockatoos to use for nesting.

For the purposes of this assessment a tree containing a potential cockatoo nest hollow was defined as:

Generally, any tree which is alive or dead that contains one or more visible hollows (cavities within the trunk or branches) suitable for occupation by a black cockatoo for the purpose of nesting/breeding. Hollows that had an entrance greater than about 10cm in diameter and would allow the entry of a black cockatoo into a suitably orientated and sized branch/trunk were recorded as a "potential black cockatoo nest hollow".

Identified hollows were examined using binoculars for evidence of actual use by black cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches). Trees with possible nest hollows were also scratched and raked with a large stick/pole in attempt to flush any sitting birds from hollows and calls of chicks were also listened for. It should be noted that the survey may have been conducted outside of the main breeding season of one or more of the three species of black cockatoo.

3.2.3.2 Black Cockatoo Foraging Habitat

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around base of trees) observed during the reconnaissance survey was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence.

3.2.3.3 Black Cockatoo Roosting Habitat

Direct and indirect evidence of black cockatoos roosting within trees was with the subject site was noted if observed (e.g. branch clippings, droppings or moulted feathers).

4. SURVEY CONSTRAINTS

No seasonal sampling has been carried out as part of this fauna assessment. The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. It should also be recognised that site conditions can change with time.

Some fauna species are reported as potentially occurring within the subject site based on there being suitable habitat (quality and extent) within the subject site or immediately adjacent. With respect to opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to:

- seasonal inactivity during the field survey;
- species present within micro habitats not surveyed;
- cryptic species able to avoid detection; and
- transient wide-ranging species not present during the survey period.

Lack of observational data on some species should therefore not necessarily be taken as an indication that a species is absent from the site.

The habitat requirements and ecology of many of the species known to occur in the wider area are often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitat or microhabitat within the subject site. As a consequence of this limitation the potential fauna list produced is most likely an overestimation of those species that actually utilise the subject site for some purpose. Some species may be present in the general area but may only use the subject site itself on rare occasions or as vagrants/transients.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any fauna species that would possibly occur within the subject site (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the Author, has been listed as a potential species.

During the black cockatoo habitat survey trees with hollows were searched for. It should be noted that identifying hollows suitable for fauna species from ground level has limitations.

Generally the full characteristics of any hollow seen are not fully evident (e.g. internal dimensions). It is also difficult to locate all hollows within all trees as some are not observable from ground level.

The location of observations was recorded using a handheld GPS. The accuracy of the GPS cannot be guaranteed above a level of about 5 to 10 metres, though it should be noted that in some circumstance the accuracy can increase or decrease beyond this range.

5. RESULTS

5.1 POTENTIAL FAUNA INVENTORY - LITERATURE REVIEW

A list of fauna species considered most likely to occur in the subject site has been compiled from information obtained during the desktop study and is presented in Appendix B. This listing was refined after information gathered during the site reconnaissance survey was assessed.

The results of some previous fauna surveys carried out in the general area are summarised in this species listing as are the DBCA NatureMap database search results. The raw database search results from NatureMap (DBCA 2017) and the Protected Matters Search Tool (DotEE 2017) are contained within Appendix C.

The list of potential fauna takes into consideration that firstly the species in question is not known to be locally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the subject site, though compiling an accurate list has limitations (see Section 4 above) and therefore as discussed the listing is likely to be an overestimation of the fauna species that actually use the site for some purpose.

With respect to native vertebrate fauna, 12 mammals (including eight bat species), 74 bird, 25 reptile and three frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the subject site at times. Twelve species of introduced animals could also frequent the area.

Of the 114 native animals that are listed as potentially occurring in the area, three are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law. In addition, one migratory and three DBCA priority species are also listed as potentially present.

5.2 SITE SURVEYS

5.2.1 Fauna Habitat Assessment

Descriptions and examples images of the main fauna habitats (based on plant communities mapped by Focus Vision 2017) present within the subject site are provided in Table 1.

Table 1: Main Fauna Habitats within the Subject site

Unit No.	Fauna Habitat Description	Example Image
1	*Banksia attenuata* and *Banksia menziesii* open woodland over *Allocasuarina humilis* and *Xanthorrhoea preissii* open shrubland over *Hibbertia hypericoides* and *Gompholobium tomentosum* low open shrubland	
2	Cleared/partly cleared (including firebreaks) – grassland/bare sand with weeds dominating. Some scattered regrowth of native species	

Almost all the subject site is covered by a banksia open woodland. The majority of the vegetation appears to be in very good to excellent condition and would therefore have the capacity to support a wide range of the predicted fauna species. Some areas appear to have been subject to some historical clearing and as a consequence contains vegetation of a lower quality relative to other areas. These areas would have much lower capacity to support most species.

5.2.2 Opportunistic Fauna Observations

A total of eight native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the subject site during the one day survey period. This is a relatively low number of observations and can be attributed mainly to the relatively small size of the subject site and the limited survey period (~three hours over one day).

Evidence of one listed threatened species was observed (Carnaby's black-cockatoo - chewed *banksia* cones at many locations). Diggings attributed to the southern brown bandicoot, a DBCA Priority 4 species, were also found to be relatively common.

The other species recorded were:

- Brown Honeyeater
- White-cheeked Honeyeater
- Singing Honeyeater
- Rufous Whistler
- Australian Raven
- Western Grey Kangaroo

5.2.3 Black Cockatoo Habitat Assessment

5.2.3.1 Black Cockatoo Breeding Habitat Assessment

No trees meeting the criteria of a "black cockatoo breeding habitat" as defined by the DotEE (Commonwealth of Australia 2012) were observed with the subject site.

A review of available data showed no known records of black cockatoo's breeding near the subject site, the closest documented site being near Karnup/Baldivis approximately 20 km to the south (Johnstone *et al*. 2011).

5.2.3.2 Black Cockatoo Foraging Habitat

The main foraging resource observed within the subject site is represented by *Banksia attenuata* and *Banksia menziesii.* These dominant plant species are supplemented to varying degrees by smaller shrub species such as *Allocasuarina humilis and Xanthorrhoea preissii.* Other documented foraging species (e.g. *Eucalyptus marginata*) are represented by a relatively small number of individual specimens and do not contribute to the total potential food resource to any significant degree.

Evidence of black cockatoos foraging onsite was observed during the field assessment in the form of chewed *banksia* cones. This evidence was attributed to Carnaby's black-cockatoo. No evidence (new or old) of jarrah or sheoak onsite being utilised as a food source was seen which would suggest the forest red-tailed black-cockatoo is an infrequent visitor to the site at best. The forest red-tailed black-cockatoo does not utilise *banksia* as a food source but, apart from its favoured food marri, often feeds on jarrah and in some circumstances sheoak.

In 2012 Terrestrial Ecosystems, as part of their assessment of a development project at the Hammond Park Primary School (located about 1km north of the subject site) assessed all areas of native vegetation within an area 1.5km to the east and west and 2km to the north and south of the school site to ascertain their suitability for providing foraging habitat for black-cockatoos (Terrestrial Ecosystems 2012). This assessment identified 726 ha of

foraging habitat in the surrounding areas, with 430 ha secured in Bush Forever tenure (e.g. Harry Warring Marsupial Reserve and Thompson's Lake Nature Reserve).

5.2.3.3 Black Cockatoo Roosting Habitat

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey and given the lack of large trees present black cockatoos are considered very unlikely to use the subject site for this purpose.

A review of available data showed no known records of black cockatoo's roosting in the immediate vicinity however roost sites have been identified within the north east section of the Thomson's Lake Nature Reserve, about 6km to the north and a similar distance to the east in Wandi (Johnstone *et al.* 2011).

5.3 FAUNA INVENTORY – SUMMARY

5.3.1 Vertebrate Fauna

Table 2 summarises the number of vertebrate fauna species potentially occurring within or utilising at times the subject site, based on results from the literature review and observations made during the field assessment. A complete list of vertebrate fauna possibly inhabiting or frequenting the subject site is located in Appendix B.

Not all species listed as potentially occurring within the subject site in existing databases and publications (i.e. *EPBC Act* Threatened Fauna and Migratory species lists, DBCA's NatureMap database, various reports and publications) are shown in the expected listing in Appendix B. Some species have been excluded from this list based largely on the lack of suitable habitat at the study site and in the general area or known local extinction even if suitable habitat is present.

Table 2: Summary of Potential Vertebrate Fauna Species (as listed in Appendix B)

Group	Total number of potential species	Potential number of specially protected species	Potential number of migratory species	Potential number of priority species	Number of species recorded during field survey
Amphibians	3	0	0	0	0
Reptiles	25	0	0	1	0
Birds	80[6]	3	1	0	6
Non-Volant Mammals	10[6]	0	0	2	2

Volant Mammals (Bats)	8	0	0	0	0
Total	**126[12]**	**3**	**1**	**3**	**8**

Superscript = number of introduced species included in total.

Despite the omission of some species it should be noted that the list provided is still very likely an over estimation of the fauna species utilising the site (either on a regular or infrequent basis) because of the precautionary approach adopted for the assessment. At any one time, only a small proportion of the listed potential species are likely to be present.

5.3.2 Vertebrate Fauna of Conservation Significance

A review of the *EPBC Act* threatened fauna list, DBCA's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, priority or migratory vertebrate fauna species as potentially occurring in the general vicinity of the subject site. Of these species, most that have no potential whatsoever to utilise the subject site for any purpose have been omitted from the potential list for the site (Appendix B), principally due to lack of suitable habitat on-site (including extent and/or quality) or known local extinction.

In summary, two vertebrate fauna species of conservation significance were positively identified as utilising the subject site for some purpose during the survey period, these being:

- *Calyptorhynchus latirostris* Carnaby`s Black-Cockatoo – S2 (*WC Act*), Endangered (*EPBC Act*)
  Foraging evidence attributed to this species was observed during the site survey (chewed *banksia* cones) and most of the remnant vegetation on site (*Banksia* woodland) represents foraging habitat.

- *Isoodon obesulus fusciventer* Southern Brown Bandicoot – P4 (DBCA Priority Species)
  Evidence of this species foraging (i.e. diggings) in some sections of the subject site was observed during site survey. Potentially present in most areas of the subject site wherever dense, shrubby groundcover occurs.

Based on the habitats present and current documented distributions it is considered possible that five additional species may use the subject site for some purpose at times. As no evidence of any was found their status within the subject site remains uncertain.

These species are:

- *Lerista lineata* Perth Lined Lerista – P3 (DBCA Priority Species)
  Habitat appears to be suitable for this species to persist and it has been recorded nearby (ENV 2009, Phoenix 2011). Known to inhabit gardens (Nevill 2005, Bush *et al.* 2010) so may persist in degraded areas and landscaped gardens subsequent to development.

- *Calyptorhynchus banksii naso* Forest Red-tailed Black Cockatoo – S3 (*WC Act*), Vulnerable (*EPBC Act*)
  No evidence of this species using the site for any purpose was observed. Some small areas of remnant vegetation containing jarrah and sheoak within the subject site do however represent potential foraging habitat and it may occasionally visit the area at times to feed.

- *Falco peregrinus* Peregrine Falcon – S7 (*WC Act*),
  Individuals of this species potentially utilise some sections of the subject site as part of a much larger home range but would only occur rarely. This species would not breed onsite.

- *Merops ornatus* Rainbow Bee-eater – S5 (*WC Act*)
  This species is a common seasonal visitor to south west. Population numbers at any one location would however never be significant as the species usually breeds in pairs and only rarely in small colonies (Johnstone and Storr 1998).

- *Macropus irma* Western Brush Wallaby – P4 (DBCA Priority Species)
  Listed as a potential species as it has been recorded in some nearby areas (Harewood 2005, ENV 2009). This species may therefore occur occasionally though the subject site itself is too small to maintain a population.

Note: Habitat for some of these species on-site, while considered possibly suitable, may be marginal in extent/quality and species listed may only visit the area for short periods, or as rare/uncommon vagrants/transients.

A number of other species of conservation significance, while possibly present in the wider area (e.g. Harry Waring Marsupial Reserve, Thomson Lake Nature Reserve, Bibra Lake/Jandakot Airport bushland), are not listed as potential species due to known localised extinction (and no subsequent recruitment from adjoining areas) and/or lack of suitable habitat and/or the presence of feral predators. Details on conservation significant species and reasons for the omission of some from the potential listing are provided in Appendix D and Table 3.

Twenty seven bird species that potentially frequent or occur in the subject site are noted as Bush Forever Decreaser Species in the Perth Metropolitan Region (only one species was recorded during the field survey). Decreaser species are a significant issue in biodiversity conservation in the Perth section of the coastal plain as there have been marked reductions in range and population levels of many sedentary bird species as a consequence of disturbance and land clearing (Dell & Hyder-Griffiths *2002).*

5.3.3 Invertebrate Fauna of Conservation Significance

One invertebrate species of conservation significance appeared in the DBCA database search (DBCA 2017), this being the graceful sun moth (*Synemon gratiosa* – Priority 4).

The subject site apparently contains none of the plant species normally associated with the presence of the GSM (i.e. *Lomandra hermaphrodita* and *L. maritima*). It is therefore considered very unlikely that GSM would persist onsite. Previous surveys in nearby areas have found no evidence of the GSM and its absence was also attributed to the lack of favourable habitat (i.e. *Lomandra hermaphrodita and L. maritima)* (Bamford 2011, 2012 and 360 Environmental 2012).

6. POTENTIAL IMPACTS

The exact location and extent of any proposed development within the subject site is not yet defined and therefore it is not possible to quantify impacts. The potential direct and indirect impact on fauna that may occur as a consequence of clearing, construction and then ongoing use of the area will be dependent on each fauna species habits, population density and the quantity and quality of potential habitat that will be affected.

In general the most significant potential impacts to fauna of any development include:

- Loss of vegetation/fauna habitat that may be used for foraging, breeding, roosting, or dispersal (includes loss of hollow bearing trees);
- Fragmentation of vegetation/fauna habitat which may restrict the movement of some fauna species;
- Modifications to surface hydrology, siltation of creek lines;
- Changes to fire regimes;
- Pollution (e.g. oil spills);
- Noise/Light/Dust;
- Spread of plant pathogens (e.g. dieback) and weeds;
- Potential increase in the number of predatory introduced species (e.g. cats);
- Death or injury of fauna during clearing and construction; and
- An increase in fauna road kills subsequent to development.

In this instance impacts are most likely to be related to the loss of habitat and the potential for some species to be killed or injured during clearing. Based on available information the likely impacts on species of conservation significance previously recorded in the general area has been assessed, a summary of which is provided in Table 3 below.

Table 3: Likelihood of Occurrence and Possible Impacts – Fauna Species of Conservation Significance (continues on following pages).

Common Name	Genus & Species	Conservation Status (See Appendix A for codes)	Habitat Present	Likelihood of Occurrence	Possible Impacts
Graceful Sun Moth	*Synemon gratiosa*	P4	No/Very Marginal	Unlikely	None
Perth Lined Lerista	*Lerisita lineata*	P3	Yes	Possible	Loss/modification of an area of habitat.
Black-striped Snake	*Neelaps calonotos*	P3	Yes/Marginal	Unlikely-Locally extinct	None
Malleefowl	*Leipoa ocellata*	S3	No	Would Not Occur – locally/regionally extinct	None
Eastern Great Egret	*Ardea alba*	S5	No	Would Not Occur	None
Cattle Egret	*Ardea ibis*	S5	No	Would Not Occur	None
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Ma	No	Would Not Occur	None
Osprey	*Pandion haliaetus*	S5, Mig	No	Would Not Occur	None
Peregrine Falcon	*Falco peregrinus*	S7	Yes	Possible	Loss/modification of an area of habitat.
Glossy Ibis	*Plegadis falcinellus*	S5, Mig	No	Would Not Occur	None
Blue-billed Duck	*Oxyura australis*	P4	No	Would Not Occur	None
Migratory shorebirds	*Various*	S5, Mig	No	Would Not Occur	None
Australian Painted Snipe	*Rostratula australis/benghalensis*	S2, S5, Mig EN	No	Would Not Occur	None
Grey Wagtail	*Motacilla cinerea*	S5, Mig	No	Would Not Occur	None
Carnaby`s Black Cockatoo	*Calyptorhynchus latirostris*	S2, EN	Yes	Known to occur	Loss/modification of an area of habitat.
Baudin`s Black Cockatoo	*Calyptorhynchus baudinii*	S2, VU	No/Marginal	Unlikely – outside of normal range	None

Common Name	Genus & Species	Conservation Status (See Appendix A for codes)	Habitat Present	Likelihood of Occurrence	Possible Impacts
Forest Red-tailed Black Cockatoo	*Calyptorhynchus banksii naso*	S3, VU	Yes	Possible	Loss/modification of an area of habitat.
Fork-tailed Swift	*Apus pacificus*	S5, Mig	Yes	Unlikely	None
Rainbow Bee-eater	*Merops ornatus*	S5	Yes	Possible	Loss/modification of an area of habitat.
Southern Brush-tailed Phascogale	*Phascogale tapoatafa ssp*	S6	No/Marginal	Unlikely – possibly locally extinct	None
Chuditch	*Dasyurus geoffroii*	S3, VU	Yes	Would Not Occur – locally extinct	None
Numbat	*Myrmecobius fasciatus*	S3, VU	No	Would Not Occur – locally extinct	None
Southern Brown Bandicoot	*Isoodon obesulus fusciventer*	P4	Yes	Known to occur	Loss/modification of an area of habitat.
Western Ringtail Possum	*Pseudocheirus occidentalis*	S1, VU	No	Would Not Occur – locally extinct	None
Western Brush Wallaby	*Macropus irma*	P4	Yes/Marginal	Unlikely	None
Tammar	*Macropus eugenii derbianus*	P4	No	Would Not Occur – locally extinct	None
Quokka	*Setonix brachyurus*	S3, VU	No	Would Not Occur – locally extinct	None
Western False Pipistrelle	*Falsistrellus mackenziei*	P4	No/Marginal	Unlikely – locally extinct	None
Water Rat	*Hydromys chrysogaster*	P4	No	Would Not Occur	None

7. CONCLUSION

The fauna assessment within the subject site was undertaken for the purposes of categorising the fauna assemblages and identifying fauna habitats present. A targeted assessment of black cockatoo habitat within the area was also carried out.

With respect to native vertebrate fauna, 12 mammals (includes eight bat species), 74 bird, 25 reptile and three frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the subject site at times.

Of the 114 native animals that are listed as potentially occurring in the area, three are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law, these being two species of black cockatoo (Carnaby's and the forest red-tailed black-cockatoo) and the peregrine falcon. In addition, one migratory species (the rainbow bee-eater) and three DBCA priority species (Perth lined lerista, the southern brown bandicoot and the western brush wallaby) are known to or may also utilise the area at times.

The identified presence or likely presence of these fauna species (in particular those listed as threatened under federal legislation) represents a potential constraint on development within the subject site as it is considered very likely that habitat removal at any scale will need to be referred to the DotEE to ensure compliance with the *EPBC Act*.

The potential impacts on fauna species of conservation significance and/or their habitat will therefore need to be taken into consideration during the course of ongoing planning so as to minimise the potential for onerous conditions being imposed on any proposed development. Future planning should aim to reduce potential impacts so as to simplify any statutory approval processes that maybe required.

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APPENDIX A

CONSERVATION CATEGORIES

***EPBC Act (1999)* Threatened Fauna Categories**

Threatened fauna may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) in any one of the following categories:

Category	Code	Description
Extinct	E	There is no reasonable doubt that the last member of the species has died.
*Extinct in the wild	EW	A species (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
*Critically Endangered	CE	A species is facing an extremely high risk of extinction in the wild in the immediate future.
*Endangered	EN	A species: (a) is not critically endangered; and (b) is facing a very high risk of extinction in the wild in the near future.
*Vulnerable	VU	A species (a) is not critically endangered or endangered; and (b) is facing a high risk of extinction in the wild in the medium-term future.
Conservation Dependent	CD	A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered
*Migratory	Migratory	(a) all migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and (c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Marine	Ma	Species in the list established under s248 of the *EPBC Act*

Note: Only species in those categories marked with an asterix are matters of national environmental significance (NES) under the *EPBC Act*.

Wildlife Conservation (Specially Protected Fauna) Notice 2015 Categories

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Schedule 1 Critically Endangered species	CR	Threatened species considered to be facing an extremely high risk of extinction in the wild.
Schedule 2 Endangered species	EN	Threatened species considered to be facing a very high risk of extinction in the wild.
Schedule 3 Vulnerable species	VU	Threatened species considered to be facing a high risk of extinction in the wild.
Schedule 4 Presumed extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
Schedule 5 Migratory birds protected under an international agreement	IA	Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds.
Schedule 6 Fauna that is of special conservation need as conservation dependent fauna	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Schedule 7 Other specially protected fauna.	OS	Fauna otherwise in need of special protection to ensure their conservation.

Western Australian DBCA Priority Fauna Categories

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Description
Priority 1 Poorly Known Species.	P1	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.
Priority 2 Poorly Known Species.	P2	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.
Priority 3 Poorly Known Species.	P3	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.
Priority 4 Rare, Near Threatened and other species in need of monitoring.	P4	(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 do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

***IUCN Red List* Threatened Species Categories**

The *IUCN Red List of Threatened Species*™ is a checklist of taxa that have undergone an extinction risk assessment using the *IUCN Red List Categories and Criteria*.

Categories are summarized below.

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing a high risk of extinction in the wild.
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.
Not Evaluated	NE	Taxa which has not been evaluated.

A full list of categories and their meanings are available at:

http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria

APPENDIX B

POTENTIAL VERTEBRATE FAUNA LIST

Potential Vertebrate Fauna List

Frankland Park

Compiled by Greg Harewood - December 2017
Approximate centroid = 32.1789°S and 115.84425°E
Recorded (Sighted/Heard/Signs/Captured) = X

A = Harewood, G. (2017). Combined Observations - Wattleup/Hammond Park Area 2014 to 2017. Unpublished data.

B = ENV (2009). Jandakot Airport Fauna Survey. Unpublished report for Jandakot Airport Holdings Pty Ltd.

C = Phoenix Environmental Sciences (2011). Vertebrate Fauna Survey for the Roe Highway Extension Project. . Unpublished report for South Metro Connect.

D = Harewood, G. (2009) Fauna Survey (Level 2) East Rockingham WWTP Site and Pipeline Corridors. Unpublished report for ERM.

E = DBCA (2017). NatureMap Database search. “By Circle” 115° 50' 39'' E, 32° 10' 44'' S – Study area (plus 20km buffer), 18/11/2017.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Amphibia							
Myobatrachidae Ground or Burrowing Frogs							
Heleioporus eyrei	Moaning Frog	LC			X		X
Limnodynastes dorsalis	Western Banjo Frog	LC	X	X	X		X
Myobatrachus gouldii	Turtle Frog	LC			X		X
Reptilia							
Diplodactylidae Geckoes							
Strophurus spinigerus	Soft Spiny-tailed Gecko					X	X
Gekkonidae Geckoes							
Christinus marmoratus	Marbled Gecko				X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Pygopodidae Legless Lizards							
Aprasia repens	Sandplain Worm Lizard				X		X
Delma fraseri	Fraser's Legless Lizard		X	X		X	X
Lialis burtonis	Burton's Legless Lizard		X		X	X	X
Pygopus lepidopodus	Common Scaly Foot			X	X		X
Agamidae Dragon Lizards							
Pogona minor	Western Bearded Dragon		X	X	X	X	X
Varanidae Monitor's or Goanna's							
Varanus gouldii	Gould's Sand Monitor						X
Varanus tristis	Racehorse Monitor					X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Scincidae Skinks							
Acritoscincus trilineatum	Southwestern Cool Skink			X	X		
Cryptoblepharus buchananii	Fence Skink		X	X	X	X	X
Ctenotus australis	Western Ctenotus		X		X	X	X
Ctenotus fallens	West Coast Ctenotus				X	X	X
Egernia kingii	King's Skink						X
Egernia napoleonis	Salmon-bellied Skink		X		X		X
Hemiergis quadrilineata	Two-toed Mulch Skink		X	X	X	X	X
Lerista elegans	West Coast Four-toed Lerista			X	X	X	X
Lerista lineata	Perth Lined Lerista	P3			X		X
Menetia greyii	Dwarf Skink		X	X	X	X	X
Morethia lineoocellata	West Coast Pale-flecked Morethia				X	X	X
Morethia obscura	Shrubland Pale-flecked Morethia				X	X	X
Tiliqua rugosa	Bobtail		X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Elapidae Elapid Snakes							
Notechis scutatus	Tiger Snake				X		X
Pseudonaja affinis	Dugite		X	X	X	X	X
Simoselaps bertholdi	Jan's Banded Snake						X
Aves							
Phasianidae Quails, Pheasants							
Coturnix pectoralis	Stubble Quail	LC	X				X
Coturnix ypsilophora	Brown Quail	LC		X			X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Accipitridae Kites, Goshawks, Eagles, Harriers							
Accipiter cirrocephalus	Collared Sparrowhawk	Bp LC		X		X	X
Accipiter fasciatus	Brown Goshawk	Bp LC	X		X	X	X
Aquila audax	Wedge-tailed Eagle	Bp LC	X		X		X
Aquila morphnoides	Little Eagle	Bp LC	X	X		X	
Circus assimilis	Spotted Harrier	LC					X
Elanus caeruleus	Black-shouldered Kite	LC	X	X	X	X	X
Haliastur sphenurus	Whistling Kite	Bp LC	X		X	X	X
Hamirostra isura	Square-tailed Kite	Bp LC					X
Falconidae Falcons							
Falco berigora	Brown Falcon	Bp LC					X
Falco cenchroides	Australian Kestrel	LC	X	X	X	X	X
Falco longipennis	Australian Hobby	LC	X	X	X	X	X
Falco peregrinus	Peregrine Falcon	S7 Bp LC				X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Columbidae Pigeons, Doves							
Columba livia	Domestic Pigeon	Introduced			X		X
Ocyphaps lophotes	Crested Pigeon	LC	X	X	X		X
Phaps chalcoptera	Common Bronzewing	Bh LC	X	X		X	X
Streptopelia chinensis	Spotted Turtle-Dove	Introduced		X	X		X
Streptopelia senegalensis	Laughing Turtle-Dove	Introduced	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Psittacidae Parrots							
Cacatua roseicapilla	Galah	LC	X	X	X	X	X
Cacatua sanguinea	Little Corella	LC	X	X	X		X
Cacatua tenuirostris	Eastern Long-billed Corella	Introduced					X
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	S3 VU Bp LC	X	X	X		X
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	S2 EN Bp EN A2bcde	X	X	X	X	X
Neophema elegans	Elegant Parrot	LC	X		X		X
Platycercus icterotis icterotis	Western Rosella (western ssp)	Bp LC					X
Platycercus spurius	Red-capped Parrot	LC	X	X	X	X	X
Platycercus zonarius	Australian Ringneck Parrot	LC	X	X	X	X	X
Polytelis anthopeplus	Regent Parrot	LC	X				X
Trichoglossus haematodus	Rainbow Lorikeet	Introduced	X	X	X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Cuculidae Parasitic Cuckoos							
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC		X			X
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC		X		X	X
Chrysococcyx lucidus	Shining Bronze Cuckoo	LC		X	X		X
Cuculus pallidus	Pallid Cuckoo	LC					
Strigidae Hawk Owls							
Ninox novaeseelandiae	Boobook Owl	LC			X		
Tytonidae Barn Owls							
Tyto alba	Barn Owl	LC				X	X
Podargidae Frogmouths							
Podargus strigoides	Tawny Frogmouth	LC					X
Caprimulgidae Nightjars							
Eurostopodus argus	Spotted Nightjar	LC					X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Aegothelidae Owlet-nightjars							
Aegotheles cristatus	Australian Owlet-nightjar	LC			X		X
Halcyonidae Tree Kingfishers							
Dacelo novaeguineae	Laughing Kookaburra	Introduced	X		X	X	X
Todiramphus sanctus	Sacred Kingfisher	LC			X		X
Meropidae Bee-eaters							
Merops ornatus	Rainbow Bee-eater	S5 JA LC	X		X	X	X
Maluridae Fairy Wrens, GrassWrens							
Malurus splendens	Splendid Fairy-wren	Bh LC	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces							
Acanthiza apicalis	Broad-tailed Thornbill	Bh LC	X		X	X	X
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Bh LC	X	X	X		X
Acanthiza inornata	Western Thornbill	Bh LC	X		X	X	X
Gerygone fusca	Western Gerygone	LC	X	X	X	X	X
Sericornis frontalis	White-browed Scrubwren	Bh LC			X	X	X
Smicrornis brevirostris	Weebill	Bh LC	X		X	X	X
Pardalotidae Pardalotes							
Pardalotus punctatus	Spotted Pardalote	LC			X		X
Pardalotus striatus	Striated Pardalote	LC	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Meliphagidae Honeyeaters, Chats							
Acanthorhynchus superciliosus	Western Spinebill	LC	X	X	X		X
Anthochaera carunculata	Red Wattlebird	LC	X	X	X	X	X
Anthochaera lunulata	Western Little Wattlebird	Bp LC		X	X		X
Lichenostomus virescens	Singing Honeyeater	LC	X	X	X	X	
Lichmera indistincta	Brown Honeyeater	LC	X	X	X	X	X
Phylidonyris nigra	White-cheeked Honeyeater	Bp LC	X	X	X		
Phylidonyris novaehollandiae	New Holland Honeyeater	Bp LC	X	X	X	X	X
Petroicidae Australian Robins							
Petroica multicolor	Scarlet Robin	Bh LC	X			X	
Neosittidae Sitellas							
Daphoenositta chrysoptera	Varied Sittella	Bh LC			X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers							
Colluricincla harmonica	Grey Shrike-thrush	Bh LC	X	X	X	X	X
Pachycephala pectoralis	Golden Whistler	Bh LC	X	X			
Pachycephala rufiventris	Rufous Whistler	LC	X	X	X	X	X
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo							
Grallina cyanoleuca	Magpie-lark	LC	X	X	X	X	X
Rhipidura fuliginosa	Grey Fantail	LC	X		X	X	
Rhipidura leucophrys	Willie Wagtail	LC	X	X	X	X	X
Campephagidae Cuckoo-shrikes, Trillers							
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	X	X	X	X	X
Lalage tricolor	White-winged Triller	LC					

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Artamidae Woodswallows, Butcherbirds, Currawongs							
Artamus cinereus	Black-faced Woodswallow	Bp LC					X
Artamus cyanopterus	Dusky Woodswallow	Bp LC			X		X
Cracticidae Currawongs, Magpies & Butcherbirds							
Cracticus tibicen	Australian Magpie	LC	X	X	X	X	X
Cracticus torquatus	Grey Butcherbird	LC	X	X	X	X	X
Corvidae Ravens, Crows							
Corvus coronoides	Australian Raven	LC	X	X	X	X	X
Motacillidae Old World Pipits, Wagtails							
Anthus australis	Australian Pipit	LC				X	X
Dicaeidae Flowerpeckers							
Dicaeum hirundinaceum	Mistletoebird	LC					X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Hirundinidae Swallows, Martins							
Hirundo neoxena	Welcome Swallow	LC			X	X	X
Hirundo nigricans	Tree Martin	LC	X	X	X	X	
Sylviidae Old World Warblers							
Cincloramphus cruralis	Brown Songlark	LC					
Cincloramphus mathewsi	Rufous Songlark	LC					
Zosteropidae White-eyes							
Zosterops lateralis	Silvereye	LC	X	X	X	X	X
Mammalia							
Peramelidae Bandicoots							
Isoodon obesulus fusciventer	Southern Brown Bandicoot	P4 LC	X	X	X	X	X
Phalangeridae Brushtail Possums, Cuscuses							
Trichosurus vulpecula	Common Brushtail Possum	LC	X		X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Macropodidae Kangaroos, Wallabies							
Macropus fuliginosus	Western Grey Kangaroo	LC	X	X	X	X	X
Macropus irma	Western Brush Wallaby	P4 NT	X	X			X
Molossidae Freetail Bats							
Austronomus australis	White-striped Freetail-bat	LC		X	X		
Ozimops kitcheneri	South-western Freetail-bat	LC			X	X	
Vespertilionidae Ordinary Bats							
Chalinolobus gouldii	Gould's Wattled Bat	LC		X	X	X	X
Chalinolobus morio	Chocolate Wattled Bat	LC					X
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC			X		X
Nyctophilus gouldi	Gould's Long-eared Bat	LC					X
Nyctophilus major	Western Long-eared Bat	LC				X	X
Vespadelus regulus	Southern Forest Bat	LC		X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Muridae Rats, Mice							
Mus musculus	House Mouse	Introduced	X	X	X	X	X
Rattus rattus	Black Rat	Introduced		X	X	X	X
Canidae Dogs, Foxes							
Canis lupus familiaris	Dog	Introduced				X	
Vulpes vulpes	Red Fox	Introduced		X	X	X	X
Felidae Cats							
Felis catus	Cat	Introduced	X	X	X	X	X
Leporidae Rabbits, Hares							
Oryctolagus cuniculus	Rabbit	Introduced	X	X	X	X	X

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APPENDIX C

DBCA & EPBC DATABASE SEARCH RESULTS

NatureMap
Mapping Western Australia's biodiversity

NatureMap - Frankland Park

Created By Greg Harewood on 18/11/2017

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 50' 39" E,32° 10' 44" S
Buffer 20km
Group By Species Group

Species Group	Species	Records
Amphibian	13	1735
Bird	365	120372
Fish	365	1860
Invertebrate	237	2422
Mammal	65	3729
Reptile	102	4567
TOTAL	**1147**	**134685**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25398	*Crinia georgiana (Quacking Frog)*			
2.	25399	*Crinia glauerti (Clicking Frog)*			
3.	25400	*Crinia insignifera (Squelching Froglet)*			
4.	25401	*Crinia pseudinsignifera (Bleating Froglet)*			
5.	25404	*Geocrinia leai (Ticking Frog)*			
6.	25410	*Heleioporus eyrei (Moaning Frog)*			
7.	25412	*Heleioporus psammophilus (Sand Frog)*			
8.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
9.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
10.	25388	*Litoria moorei (Motorbike Frog)*			
11.	25420	*Myobatrachus gouldii (Turtle Frog)*			
12.	25426	*Neobatrachus pelobatoides (Humming Frog)*			
13.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Bird					
14.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
15.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
16.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
17.	24262	*Acanthiza inornata (Western Thornbill)*			
18.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
19.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
20.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
21.	24281	*Accipiter cirrocephalus subsp. cirrocephalus (Collared Sparrowhawk)*			
22.	25536	*Accipiter fasciatus (Brown Goshawk)*			
23.	24283	*Accipiter fasciatus subsp. didimus (Brown Goshawk)*			
24.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
25.		*Acridotheres fuscus*			Y
26.		*Acridotheres tristis subsp. tristis*			
27.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
28.	24831	*Acrocephalus australis subsp. gouldi (Australian Reed Warbler)*			
29.		*Acrocephalus scripaceus*			Y
30.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
31.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
32.	24301	*Aegotheles cristatus subsp. cristatus (Australian Owlet-nightjar)*			
33.		*Amandava subflava*			Y
34.	24310	*Anas castanea (Chestnut Teal)*			
35.	24312	*Anas gracilis (Grey Teal)*			
36.	24313	*Anas platyrhynchos (Mallard)*			
37.	24315	*Anas rhynchotis (Australasian Shoveler)*			
38.	24316	*Anas superciliosa (Pacific Black Duck)*			
39.	47414	*Anhinga novaehollandiae (Australasian Darter)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
40.	25634	*Anous stolidus (Common Noddy)*		IA	
41.	24505	*Anous stolidus subsp. pileatus (Common Noddy)*		IA	
42.	24506	*Anous tenuirostris subsp. melanops (Australian Lesser Noddy)*		T	
43.		*Anser anser*			
44.	24561	*Anthochaera carunculata (Red Wattlebird)*			
45.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
46.	24599	*Anthus australis subsp. australis (Australian Pipit)*			
47.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
48.	24285	*Aquila audax (Wedge-tailed Eagle)*			
49.	25557	*Ardea garzetta (Little Egret)*			
50.	24337	*Ardea garzetta subsp. nigripes (Little Egret)*			
51.	25558	*Ardea ibis (Cattle Egret)*		IA	
52.	25559	*Ardea intermedia (Intermediate Egret)*			
53.	41324	*Ardea modesta (great egret, white egret)*		IA	
54.	24340	*Ardea novaehollandiae (White-faced Heron)*			
55.	24341	*Ardea pacifica (White-necked Heron)*			
56.	25560	*Ardea sacra (Eastern Reef Egret, Eastern Reef Heron)*			
57.		*Ardenna pacifica*			
58.	24610	*Ardeotis australis (Australian Bustard)*			
59.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
60.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
61.	24352	*Artamus cinereus subsp. melanops (Black-faced Woodswallow)*			
62.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
63.		*Artamus sordidus*			
64.	24318	*Aythya australis (Hardhead)*			
65.		*Barnardius zonarius*			
66.	24319	*Biziura lobata (Musk Duck)*			
67.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
68.	24359	*Burhinus grallarius (Bush Stone-curlew)*			
69.	25713	*Cacatua galerita (Sulphur-crested Cockatoo)*			
70.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
71.	24724	*Cacatua pastinator subsp. pastinator (Muir's Corella, Muir's Corella (Western Corella SW WA))*		S	
72.	25715	*Cacatua roseicapilla (Galah)*			
73.	25716	*Cacatua sanguinea (Little Corella)*			
74.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*	Y		
75.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
76.	24427	*Cacomantis flabelliformis subsp. flabelliformis (Fan-tailed Cuckoo)*			
77.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
78.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
79.	24780	*Calidris alba (Sanderling)*		IA	
80.	25738	*Calidris canutus (Red Knot, knot)*		IA	
81.	24783	*Calidris canutus subsp. rogersi (Red Knot (north-eastern Siberia))*		T	
82.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
83.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
84.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
85.		*Calidris sp.*			
86.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
87.	24790	*Calidris tenuirostris (Great Knot)*		T	
88.	24686	*Calonectris leucomelas (Streaked Shearwater)*		IA	
89.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
90.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)*		T	
91.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)*		T	
92.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
93.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
94.	25625	*Carduelis carduelis (Goldfinch, European Goldfinch)*	Y		
95.		*Carduelis chloris*			Y
96.		*Catharacta skua*			Y
97.	25574	*Charadrius dubius (Little Ringed Plover)*		IA	
98.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		IA	
99.	25576	*Charadrius mongolus (Lesser Sand Plover)*		T	
100.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
101.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
102.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
103.	41332	*Chlidonias leucopterus (White-winged Black Tern)*		IA	
104.		*Chroicocephalus novaehollandiae*			
105.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
106.	25601	*Chrysococcyx lucidus (Shining Bronze Cuckoo)*			

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107.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
108.	24288	*Circus approximans (Swamp Harrier)*			
109.	24289	*Circus assimilis (Spotted Harrier)*			
110.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
111.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
112.	24613	*Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)*			
113.	24399	*Columba livia (Domestic Pigeon)*	Y		
114.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
115.	24362	*Coracina novaehollandiae subsp. novaehollandiae (Black-faced Cuckoo-shrike)*			
116.	24363	*Coracina novaehollandiae subsp. subpallida (Black-faced Cuckoo-shrike)*			
117.	24416	*Corvus bennetti (Little Crow)*			
118.	25592	*Corvus coronoides (Australian Raven)*			
119.	24417	*Corvus coronoides subsp. perplexus (Australian Raven)*			
120.	25593	*Corvus orru (Torresian Crow)*			
121.	24419	*Corvus splendens (House Crow)*			
122.		*Corvus splendens subsp. protegatus*			
123.	24671	*Coturnix pectoralis (Stubble Quail)*			
124.	25701	*Coturnix ypsilophora (Brown Quail)*			
125.	24673	*Coturnix ypsilophora subsp. australis (Brown Quail)*			
126.	24672	*Coturnix ypsilophora subsp. cervina (Brown Quail)*			
127.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
128.	25595	*Cracticus tibicen (Australian Magpie)*			
129.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
130.	24423	*Cracticus tibicen subsp. tibicen (Black-backed Magpie)*			
131.	25596	*Cracticus torquatus (Grey Butcherbird)*			
132.	24424	*Cracticus torquatus subsp. torquatus (Grey Butcherbird)*			
133.	24322	*Cygnus atratus (Black Swan)*			
134.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
135.	30902	*Dacelo novaeguineae subsp. novaeguineae (Laughing Kookaburra)*	Y		
136.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
137.	24606	*Daphoenositta chrysoptera subsp. pileata (Varied Sittella, Black-capped Sitella)*			
138.	24687	*Daption capense (Cape Petrel)*			
139.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
140.	25618	*Diomedea exulans (Wandering Albatross)*		T	
141.	30836	*Diomedea exulans subsp. exulans (Snowy Albatross)*		T	
142.		*Diomedia sp.*			Y
143.		*Egretta garzetta*			
144.		*Egretta novaehollandiae*			
145.		*Elanus axillaris*			
146.	25540	*Elanus caeruleus (Black-shouldered Kite)*			
147.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
148.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
149.		*Eolophus roseicapillus*			
150.	25692	*Eopsaltria australis (Yellow Robin)*			
151.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
152.	24567	*Epthianura albifrons (White-fronted Chat)*			
153.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
154.	25745	*Eudyptes chrysolophus (Macaroni Penguin)*			Y
155.	25746	*Eudyptula minor (Little Penguin)*			
156.	24818	*Eudyptula minor subsp. novaehollandiae (Little Penguin)*			
157.	24368	*Eurostopodus argus (Spotted Nightjar)*			
158.	25591	*Eurystomus orientalis (Dollarbird)*			
159.	25621	*Falco berigora (Brown Falcon)*			
160.	24471	*Falco berigora subsp. berigora (Brown Falcon)*			
161.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
162.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)*			
163.	25623	*Falco longipennis (Australian Hobby)*			
164.	24474	*Falco longipennis subsp. longipennis (Australian Hobby)*			
165.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
166.	24475	*Falco peregrinus subsp. macropus (Australian Peregrine Falcon)*		S	
167.	24476	*Falco subniger (Black Falcon)*			
168.	25727	*Fulica atra (Eurasian Coot)*			
169.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
170.	24688	*Fulmarus glacialoides (Southern Fulmar)*			
171.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
172.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
173.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
174.	24765	*Gallirallus philippensis subsp. mellori (Buff-banded Rail)*			
175.		*Gallus gallus*			
176.	42314	*Gavicalis virescens (Singing Honeyeater)*			

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177.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
178.	25530	*Gerygone fusca (Western Gerygone)*			
179.	24271	*Gerygone fusca subsp. fusca (Western Gerygone)*			
180.	24274	*Gerygone magnirostris subsp. magnirostris (Large-billed Gerygone)*			
181.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
182.	24443	*Grallina cyanoleuca (Magpie-lark)*			
183.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
184.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
185.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
186.	25541	*Haliastur indus (Brahminy Kite)*			
187.	24295	*Haliastur sphenurus (Whistling Kite)*			
188.	24689	*Halobaena caerulea (Blue Petrel)*			
189.	24296	*Hamirostra isura (Square-tailed Kite)*			
190.	47965	*Hieraaetus morphnoides (Little Eagle)*			
191.	25734	*Himantopus himantopus (Black-winged Stilt)*			
192.	24775	*Himantopus himantopus subsp. leucocephalus (Black-winged Stilt)*			
193.	24491	*Hirundo neoxena (Welcome Swallow)*			
194.		*Hydroprogne caspia*			
195.	47975	*Ixobrychus dubius (Australian Little Bittern)*		P4	
196.	42319	*Lanius tigrinus (Tiger Shrike)*			Y
197.	25637	*Larus novaehollandiae (Silver Gull)*			
198.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
199.	25638	*Larus pacificus (Pacific Gull)*			
200.		*Leucosarcia melanoleuca*			
201.	25661	*Lichmera indistincta (Brown Honeyeater)*			
202.	24582	*Lichmera indistincta subsp. indistincta (Brown Honeyeater)*			
203.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
204.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
205.	24797	*Limosa limosa subsp. melanuroides (Black-tailed Godwit)*		IA	
206.	25683	*Lonchura castaneothorax (Chestnut-breasted Mannikin)*			
207.		*Lophoictinia isura*			
208.	24690	*Macronectes giganteus (Southern Giant Petrel)*		IA	
209.	24691	*Macronectes halli (Northern Giant Petrel)*		IA	
210.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
211.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
212.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
213.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
214.	25654	*Malurus splendens (Splendid Fairy-wren)*			
215.	24552	*Malurus splendens subsp. splendens (Splendid Fairy-wren)*			
216.	24583	*Manorina flavigula (Yellow-throated Miner)*			
217.	25758	*Megalurus gramineus (Little Grassbird)*			
218.	47997	*Melanodryas cucullata (Hooded Robin)*			
219.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
220.	24586	*Melithreptus brevirostris subsp. leucogenys (Brown-headed Honeyeater)*			
221.	24587	*Melithreptus chloropsis (Western White-naped Honeyeater)*			
222.	24736	*Melopsittacus undulatus (Budgerigar)*			
223.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
224.		*Microcarbo melanoleucos*			
225.	25693	*Microeca fascinans (Jacky Winter)*			
226.	25542	*Milvus migrans (Black Kite)*			
227.	48008	*Morus serrator (Australasian Gannet)*			
228.	25610	*Myiagra inquieta (Restless Flycatcher)*			
229.	25686	*Neochmia temporalis (Red-browed Finch)*	Y		
230.	24738	*Neophema elegans (Elegant Parrot)*			
231.	24739	*Neophema petrophila (Rock Parrot)*			
232.	25747	*Ninox connivens (Barking Owl)*			
233.	24798	*Numenius madagascariensis (Eastern Curlew)*		T	
234.	25742	*Numenius phaeopus (Whimbrel)*		IA	
235.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
236.	24742	*Nymphicus hollandicus (Cockatiel)*			
237.	24497	*Oceanites oceanicus (Wilson's Storm Petrel)*		IA	
238.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
239.	48040	*Otus sunia (Oriental Scops Owl)*			Y
240.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
241.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
242.	24624	*Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)*			
243.	24692	*Pachyptila belcheri (Slender-billed Prion)*			
244.	24693	*Pachyptila desolata (Antarctic Prion)*			
245.	25707	*Pachyptila salvini (Salvin's Prion)*			
246.		*Pachyptila sp.*			

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247.	24696	*Pachyptila turtur (Fairy Prion)*			
248.	24697	*Pachyptila vittata (Broad-billed Prion)*			
249.		*Pandion cristatus*			
250.	25543	*Pandion haliaetus (Osprey)*		IA	
251.	24299	*Pandion haliaetus subsp. cristatus (Osprey)*		IA	
252.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
253.	24625	*Pardalotus punctatus subsp. punctatus (Spotted Pardalote)*			
254.	24626	*Pardalotus punctatus subsp. xanthopyge (Yellow-rumped Pardalote)*			
255.	25682	*Pardalotus striatus (Striated Pardalote)*			
256.	24628	*Pardalotus striatus subsp. murchisoni (Striated Pardalote)*			
257.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
258.	25687	*Passer domesticus (House Sparrow)*	Y		
259.	24642	*Passer montanus (Eurasian Tree Sparrow)*	Y		
260.	24674	*Pavo cristatus (Common Peafowl, Indian Peafowl)*	Y		
261.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
262.	48060	*Petrochelidon ariel (Fairy Martin)*			
263.	48061	*Petrochelidon nigricans (Tree Martin)*			
264.	48066	*Petroica boodang (Scarlet Robin)*			
265.	24659	*Petroica goodenovii (Red-capped Robin)*			
266.	24663	*Phaethon rubricauda (Red-tailed Tropicbird)*		P4	
267.	25697	*Phalacrocorax carbo (Great Cormorant)*			
268.	24664	*Phalacrocorax carbo subsp. novaehollandiae (Great Cormorant)*			
269.	24665	*Phalacrocorax fuscescens (Black-faced Cormorant)*			
270.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
271.	24666	*Phalacrocorax melanoleucos subsp. melanoleucos (Little Pied Cormorant)*			
272.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
273.	25699	*Phalacrocorax varius (Pied Cormorant)*			
274.	24668	*Phalacrocorax varius subsp. hypoleucos (Pied Cormorant)*			
275.	24409	*Phaps chalcoptera (Common Bronzewing)*			
276.	25587	*Phaps elegans (Brush Bronzewing)*			
277.	24462	*Phoebetria fusca (Sooty Albatross)*		T	
278.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
279.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
280.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
281.	24842	*Platalea regia (Royal Spoonbill)*			
282.	25720	*Platycercus icterotis (Western Rosella)*			
283.	24745	*Platycercus icterotis subsp. icterotis (Western Rosella)*			
284.	24747	*Platycercus spurius (Red-capped Parrot)*			
285.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
286.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
287.	24751	*Platycercus zonarius subsp. zonarius (Port Lincoln Parrot)*			
288.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
289.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
290.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
291.	25703	*Podargus strigoides (Tawny Frogmouth)*			
292.	24679	*Podargus strigoides subsp. brachypterus (Tawny Frogmouth)*			
293.	25704	*Podiceps cristatus (Great Crested Grebe)*			
294.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
295.	25722	*Polytelis anthopeplus (Regent Parrot)*			
296.	30854	*Polytelis anthopeplus subsp. westralis (Regent Parrot)*			
297.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
298.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
299.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
300.	24769	*Porzana fluminea (Australian Spotted Crake)*			
301.	25732	*Porzana pusilla (Baillon's Crake)*			
302.	24770	*Porzana pusilla subsp. palustris (Baillon's Crake)*			
303.	24771	*Porzana tabuensis (Spotless Crake)*			
304.	48085	*Psittacula krameri (Indian Ringnecked Parrot, Rose-ringed Parakeet)*	Y		
305.	24702	*Pterodroma brevirostris (Kerguelen Petrel)*			
306.	24703	*Pterodroma lessonii (White-headed Petrel)*			
307.	25710	*Pterodroma macroptera (Great-winged Petrel)*			
308.	25711	*Pterodroma mollis (Soft-plumaged Petrel)*			
309.	25712	*Puffinus assimilis (Little Shearwater)*			
310.	24711	*Puffinus assimilis subsp. assimilis (Little Shearwater)*			
311.	24712	*Puffinus carneipes (flesh-footed shearwater, fleshy-footed shearwater)*		T	
312.	24715	*Puffinus huttoni (Hutton's Shearwater)*		T	
313.	24716	*Puffinus pacificus (Wedge-tailed Shearwater)*		IA	
314.	42344	*Purnella albifrons (White-fronted Honeyeater)*			
315.		*Purpureicephalus spurius*			
316.	30867	*Pycnonotus jocosus subsp. jocosus (Red-whiskered Bulbul)*	Y		Y

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317.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
318.	48096	*Rhipidura albiscapa (Grey Fantail)*			
319.	24455	*Rhipidura dryas subsp. dryas (Wood Fantail)*			
320.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
321.	24454	*Rhipidura leucophrys subsp. leucophrys (Willie Wagtail)*			
322.	48237	*Rostratula australis (Australian Painted Snipe)*		T	
323.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
324.	24279	*Sericornis frontalis subsp. maculatus (White-browed Scrubwren)*			
325.	30948	*Smicrornis brevirostris (Weebill)*			
326.	24645	*Stagonopleura oculata (Red-eared Firetail)*			
327.	48116	*Stercorarius antarcticus (Brown Skua)*			
328.	24516	*Stercorarius longicaudus (long-tailed jaeger, long-tailed skua)*		IA	
329.	24517	*Stercorarius parasiticus (Arctic jaeger, Arctic Skua)*		IA	
330.	24518	*Stercorarius pomarinus (Pomarine Jaeger, Pomarine Skua)*		IA	
331.	25639	*Sterna anaethetus (Bridled Tern)*		IA	
332.	24520	*Sterna anaethetus subsp. anaethetus (Bridled Tern)*		IA	
333.	24522	*Sterna bergii (Crested Tern)*			
334.	24523	*Sterna caspia (Caspian Tern)*		IA	
335.	25640	*Sterna dougallii (Roseate Tern)*		IA	
336.	24524	*Sterna dougallii subsp. gracilis (Roseate Tern)*		IA	
337.	24525	*Sterna fuscata subsp. nubilosa (Sooty Tern)*			
338.	25642	*Sterna hirundo (Common Tern)*		IA	
339.	24526	*Sterna hirundo subsp. hirundo (Common Tern)*		IA	Y
340.	25643	*Sterna hybrida (Whiskered Tern)*			
341.	24528	*Sterna hybrida subsp. javanica (Whiskered Tern)*			
342.	24530	*Sterna nereis subsp. nereis (Fairy Tern)*		T	
343.	24533	*Sterna paradisaea (Arctic Tern)*			
344.	24329	*Stictonetta naevosa (Freckled Duck)*			
345.	25597	*Strepera versicolor (Grey Currawong)*			
346.	24426	*Strepera versicolor subsp. plumbea (Grey Currawong)*			
347.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
348.	30951	*Streptopelia chinensis subsp. tigrina (Spotted Turtle-Dove)*	Y		
349.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
350.	30950	*Streptopelia senegalensis subsp. senegalensis (Laughing Turtle-Dove)*	Y		
351.	25752	*Sturnus vulgaris (Common Starling)*	Y		
352.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
353.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
354.	25552	*Tadorna radjah (Radjah Shelduck)*			
355.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
356.	30870	*Taeniopygia guttata (Zebra Finch)*			
357.	34007	*Thalassarche chlororhynchos (Atlantic Yellow-nosed Albatross)*		T	
358.	44607	*Thalassarche melanophris (Black-browed Albatross)*		T	
359.		*Thalasseus bergii*			
360.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
361.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
362.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
363.	24309	*Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)*			
364.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
365.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
366.	24755	*Trichoglossus haematodus subsp. moluccanus (Rainbow Lorikeet)*	Y		
367.	24754	*Trichoglossus haematodus subsp. rubritorquis (Red-collared Lorikeet)*			
368.	24803	*Tringa brevipes (Grey-tailed Tattler)*		IA	
369.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
370.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
371.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
372.	48147	*Turnix varius (Painted Button-quail)*			
373.	24851	*Turnix velox (Little Button-quail)*			
374.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
375.	24855	*Tyto novaehollandiae subsp. novaehollandiae (Masked Owl (southwest))*		P3	
376.	25577	*Vanellus miles (Masked Lapwing)*			
377.	24386	*Vanellus tricolor (Banded Lapwing)*			
378.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

Fish

379.		*? ?*			
380.		*Ablennes hians*			
381.		*Acanthaluteres brownii*			
382.		*Acanthaluteres sp.*			Y
383.		*Acanthaluteres spilomelanurus*			
384.		*Acanthaluteres vittiger*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
385.		*Acanthistius serratus*			
386.		*Acanthopagrus butcheri*			
387.		*Acanthosphex sp.*			Y
388.		*Acentrogobius bifrenatus*			
389.		*Acentrogobius pflaumi*			Y
390.		*Acentrogobius pflaumii*			Y
391.		*Aetapcus maculatus*			
392.		*Afurcagobius suppositus*			
393.		*Alabes gibbosa*			
394.		*Alabes occidentalis*			
395.		*Alabes sp.*			Y
396.		*Aldrichetta forsteri*			
397.		*Allenichthys glauerti*			
398.		*Allomycterus pilatus*			
399.		*Aluterus monoceros*			
400.		*Amblygobius albimaculatus*			
401.		*Ammotretis elongatus*			
402.		*Amniataba caudavittata*			
403.		*Anguilla australis*			
404.		*Anoplocapros amygdaloides?*			
405.		*Anoplocapros lenticularis*			
406.		*Anoplocapros robustus*			
407.		*Anoplocapros sp.*			
408.		*Antennarius sp.*			
409.		*Aploactisoma milesii*			
410.		*Aploactisoma milesii subsp. milesii*			Y
411.		*Aplodactylus westralis*			
412.		*Apogon rueppellii*			
413.		*Apogon sp.*			
414.		*Apogon victoriae*			
415.		*Aptychotrema sp.*			
416.		*Aptychotrema vincentiana*			
417.		*Aracana aurita*			
418.		*Aracana ornata*			
419.		*Arenigobius bifrenatus*			
420.		*Argyrosomus japonicus*			
421.		*Arius thalassinus*			
422.		*Arothron hispidus*			
423.		*Arripis georgiana*			
424.		*Arripis truttacea*			
425.		*Assurger anzac*			Y
426.		*Asterorhombus cf. osculus*			Y
427.		*Asymbolus sp.*			Y
428.		*Atherina sp.*			
429.		*Atherinomorus lacunosus*			
430.		*Atherinomorus vaigiensis*			
431.		*Atherinosoma presbyteroides*			
432.		*Atherinosoma wallacei*			
433.		*Aulohalaelurus labiosus*			
434.		*Balistoides viridescens*			
435.		*Batrachomoeus rubricephalus*			
436.		*Bodianus vulpinus*			
437.		*Bostockia porosa*			
438.		*Brachaluteres jacksonianus*			
439.		*Caesioscorpis theagenes*			
440.		*Callogobius mucosus*			
441.		*Campichthys galei*			
442.		*Cantherhines sp.*			
443.		*Carangoides orthogrammus*			
444.		*Carassius auratus*			
445.		*Carcharhinus brachyurus*			
446.		*Carcharhinus leucas*			
447.		*Carcharhinus obscurus*			
448.		*Carcharhinus sp.*			
449.	34031	*Carcharodon carcharias (Great White Shark)*		T	
450.		*Centroberyx gerrardi*			
451.		*Chaetodermis penicilligera*			
452.		*Chaetodon assarius*			
453.		*Cheilodactylus gibbosus*			
454.		*Cheilodactylus rubrolabiatus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
455.		*Cheilopogon olgae?*			Y
456.		*Cheilopogon sp.*			
457.		*Chelidonichthys kumu*			
458.		*Chelmonops curiosus*			
459.		*Choerodon rubescens*			
460.		*Cirrhimuraena calamus*			
461.		*Cleidopus gloriamaris*			
462.		*Cnidoglanis macrocephalus*			
463.		*Cochleoceps spatula*			
464.		*Cochleoceps viridis*			
465.		*Colurodontis paxmani*			
466.		*Conger wilsoni*			
467.		*Contusus brevicaudus*			
468.		*Coris auricularis*			
469.		*Coryphaena hippurus*			
470.		*Crapatalus arenarius*			
471.		*Craterocephalus mugiloides*			
472.		*Cristiceps aurantiacus*			
473.		*Cristiceps australis*			
474.		*Cristiceps sp.*			
475.		*Cynoglossus broadhursti*			
476.		*Cypselurus sp.*			
477.		*Dactylophora nigricans*			
478.		*Dactylopus dactylopus*			
479.		*Decapterus muroadsi*			Y
480.		*Dermatopsis multiradiatus*			
481.		*Dermatopsis sp.*			
482.		*Diodon nicthemerus*			
483.		*Dipulus caecus*			
484.		*Dotalabrus alleni*			
485.		*Dotalabrus aurantiacus*			
486.		*Echeneis naucrates*			
487.		*Eeyorius hutchinsi*			
488.		*Elops hawaiensis*			
489.		*Engraulis australis*			
490.		*Enoplosus armatus*			
491.		*Epinephelides armatus*			
492.		*Epinephelus rivulatus*			
493.		*Epinephelus sp.*			
494.		*Etrumeus teres*			
495.		*Eubalichthys caeruleoguttatus*			
496.		*Eubalichthys cyanoura*			
497.		*Eubalichthys mosaicus*			
498.		*Euleptorhamphus viridis*			
499.		*Eupetrichthys angustipes*			
500.		*Eurypegasus draconis*			
501.		*Eviota bimaculata*			
502.		*Exocoetus sp.*			Y
503.		*Favonigobius lateralis*			
504.		*Filicampus tigris*			
505.		*Fistularia petimba*			
506.		*Fistularia sp.*			
507.		*Furgaleus macki*			
508.		*Galaxias maculatus*			
509.	34028	*Galaxias occidentalis (Western Minnow)*			
510.		*Galeorhinus galeus*			
511.		*Gambusia affinis*			
512.		*Genypterus tigerinus*			
513.		*Gerres sp.*			
514.		*Gerres subfasciatus*			
515.		*Girella tephraeops*			
516.		*Girella zebra*			
517.		*Gnathanacanthus goetzeei*			
518.		*Gnathanodon speciosus*			
519.		*Gnathophis longicaudatus*			
520.		*Gnathophis sp.*			
521.		*Gonorynchus greyi*			
522.		*Graviceps (invalid) alexanderi (invalid)*			Y
523.		*Gymnapistes marmoratus*			
524.		*Gymnothorax richardsoni*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
525.		*Gymnothorax sp.*			
526.		*Gymnothorax woodwardi*			
527.		*Haletta semifasciata*			
528.		*Halichoeres brownfieldi*			
529.		*Helcogramma decurrens*			
530.		*Hemiramphus robustus*			
531.		*Heteroclinus adelaidae*			
532.		*Heteroclinus roseus*			
533.		*Heteroclinus sp.*			
534.		*Heterodontus portusjacksoni*			
535.		*Hexanchus nakamurai*			Y
536.		*Hippocampus elongatus*			
537.		*Hippocampus sp.*			
538.		*Hippocampus tuberculatus*			
539.		*Histiogamphelus cristatus*			
540.		*Histrio histrio*			
541.		*Hyperlophus vittatus*			
542.		*Hypnos monopterygium*			
543.		*Hypoplectrodes nigroruber*			
544.		*Hyporhamphus melanochir*			
545.		*Hyporhamphus regularis*			
546.		*Ichthyscopus barbatus*			
547.		*Idiotropiscis australe?*			Y
548.		*Inegocia japonica*			
549.		*Kanekonia queenslandica*			
550.		*Kanekonica queenslandica*			
551.		*Kyphosus sydneyanus*			
552.		*Lactoria cornuta*			
553.		*Lagocephalus sceleratus*			
554.		*Lepidoblennius marmoratus*			
555.		*Lepidotrigla papilio*			
556.		*Leptocephalus sp.*			
557.		*Leviprora inops*			
558.		*Limnichthys fasciatus subsp. major*			
559.		*Lissocampus fatiloquus*			
560.		*Lissocampus sp.*			
561.		*Lotella rhacinus*			
562.		*Maxillicosta scabriceps*			
563.		*Megalaspis cordyla*			
564.		*Metavelifer multiradiatus*			
565.		*Meuschenia flavolineata*			
566.		*Meuschenia freycineti*			
567.		*Meuschenia galii*			
568.		*Meuschenia hippocrepis*			
569.		*Microcanthus strigatus*			
570.		*Mitotichthys meraculus*			
571.		*Monacanthus chinensis*			
572.		*Mugil cephalus*			
573.		*Muraenichthys tasmaniensis*			
574.		*Mustelus antarcticus*			
575.		*Myliobatis australis*			
576.		*Myliobatis sp.*			
577.		*Nannoperca vittata*			
578.		*Neatypus obliquus*			
579.		*Nelusetta ayraudi*			
580.		*Nematalosa erebi*			
581.		*Nematalosa sp.*			
582.		*Nematalosa vlaminghi*			
583.		*Neoodax balteatus*			
584.		*Neoodax sp.*			
585.		*Neopataecus waterhousii*			
586.		*Neosebastes pandus*			
587.		*Nomeus gronovii*			
588.		*Norfolkia brachylepis*			
589.		*Notolabrus parilus*			
590.		*Odax acroptilus*			
591.		*Odax cyanomelas*			
592.		*Omegophora armilla*			
593.		*Omegophora cyanopunctata*			
594.		*Omobranchus sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
595.		*Onigocia pedimacula?*			
596.		*Ophichthus melanochir*			
597.		*Ophisurus serpens*			
598.		*Oplegnathus woodwardi*			
599.		*Orectolobus hutchinsi*			
600.		*Orectolobus ornatus*			
601.		*Pagrus auratus*			
602.		*Papillogobius punctatus*			
603.		*Parablennius postoculomaculatus*			
604.		*Parablennius tasmanianus*			
605.		*Parapercis haackei*			
606.		*Paraplagusia acuminata*			Y
607.		*Paraplesiops meleagris*			
608.		*Paraploactis intonsa*			
609.		*Paraplotosus albilabris*			
610.		*Parapriacanthus elongatus*			
611.		*Parascyllium variolatum*			
612.		*Parequula melbournensis*			
613.		*Paristiopterus gallipavo*			
614.		*Parma mccullochi*			
615.		*Parma occidentalis*			
616.		*Pataecus sp.*			
617.		*Pegasus sp.*			Y
618.		*Pegasus volitans*			
619.		*Pelates sexlineatus*			
620.		*Pelsartia humeralis*			
621.		*Pempheris klunzingeri*			
622.		*Pempheris multiradiata*			
623.		*Pempheris sp.*			
624.		*Pentaceropsis recurvirostris*			
625.		*Pentapodus vitta*			
626.		*Perryena leucometopon*			
627.		*Petroscirtes breviceps*			
628.		*Petroscirtes sp.*			
629.		*Phalloceros harpagos*			Y
630.	34039	*Phycodurus eques (Leafy Sea Dragon)*		P2	
631.		*Phyllophryne scortea*			
632.		*Phyllophryne sp.*			
633.		*Phyllopteryx taeniolatus*			
634.		*Pictilabrus laticlavius*			
635.		*Platax teira*			
636.		*Platycephalus chauliodous*			
637.		*Platycephalus endrachtensis*			
638.		*Platycephalus laevigata*			
639.		*Platycephalus longispinis*			
640.		*Platycephalus orbitalis*			
641.		*Platycephalus sp.*			
642.		*Platycephalus speculator*			
643.		*Plotosus lineatus*			
644.		*Plotosus sp.*			
645.		*Polyspina piosae*			
646.		*Pomatomus saltatrix*			
647.		*Posidonichthys hutchinsi*			
648.		*Priolepis nuchifasciata*			
649.		*Psammoperca waigiensis*			
650.		*Pseudocalliurichthys goodladi*			
651.		*Pseudocaranx dentex*			
652.		*Pseudocaranx wrighti*			
653.		*Pseudogobius olorum*			
654.		*Pseudolabrus biserialis*			
655.		*Pseudolabrus guentheri*			
656.		*Pseudorhombus arsius*			
657.		*Pseudorhombus dupliciocellatus*			
658.		*Pseudorhombus jenynsii*			
659.		*Pseudorhombus sp.*			
660.		*Pterois antennata*			
661.		*Pterygotrigla polyommata*			
662.		*Rachycentron canadum*			
663.		*Rhabdosargus sarba*			
664.		*Rhycherus gloveri*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
665.		*Rhynchobatus djiddensis*			
666.		*Sardinella lemuru*			
667.		*Sardinella lemuru?*			
668.		*Sardinops neopilchardus*			
669.		*Saurida grandisquamis*			
670.		*Saurida tumbil*			
671.		*Saurida undosquamis*			
672.		*Scaevius milii*			
673.		*Scobinichthys granulatus*			
674.		*Scobinichthys sp.*			Y
675.		*Scomber australasicus*			
676.		*Scomber japonicus*			
677.		*Scomberoides lysan*			
678.		*Scorpaena papillosa*			
679.		*Scorpaena sumptuosa*			
680.		*Scorpis aequipinnis*			
681.		*Scorpis georgianus*			
682.		*Seriola dumerili*			
683.		*Seriola hippos*			
684.		*Siganus fuscescens*			
685.		*Sillago bassensis*			
686.		*Sillago burrus*			
687.		*Sillago maculata*			
688.		*Sillago schomburgkii*			
689.		*Sillago sp.*			
690.		*Sillago vittata*			
691.		*Siphamia cephalotes*			
692.		*Siphamia cuneiceps*			
693.		*Siphonognathus argyrophanes*			
694.		*Siphonognathus beddomei*			
695.		*Siphonognathus caninus*			
696.		*Siphonognathus radiatus*			
697.		*Solegnathus lettiensis*			
698.		*Sorosichthys ananassa*			
699.		*Sphyraena novaehollandiae*			
700.		*Sphyraena obtusata*			
701.		*Sphyrna zygaena*			
702.		*Spratelloides robustus*			
703.		*Squatina australis*			
704.		*Stigmatopora argus*			
705.		*Stigmatopora nigra*			
706.		*Stigmatopora sp.*			
707.		*Strabozebrias cancellatus*			
708.		*Strongylura leiura*			
709.		*Sutorectus tentaculatus*			
710.		*Synchiropus papilio*			
711.		*Synodus sageneus*			
712.		*Tandanus bostocki*			
713.		*Terapon sp.*			
714.		*Tetrapturus angustirostris*			
715.		*Thyrsites atun*			
716.		*Thysanophrys cirronasus*			
717.		*Tilodon sexfasciatum*			
718.		*Torquigener pleurogramma*			
719.		*Torquigener tuberculiferus*			
720.		*Torquigener vicinus*			
721.		*Trachichthys australis*			
722.		*Trachinocephalus myops*			
723.		*Trachinops noarlungae*			
724.		*Trachinotus baillonii*			
725.		*Trachinotus coppingeri*			
726.		*Trachurus declivis*			
727.		*Trachurus novaezelandiae*			
728.		*Tridentiger trigonocephalus*			
729.		*Trygonoptera mucosa*			
730.		*Trygonoptera personata*			
731.		*Trygonoptera personata?*			
732.		*Trygonorrhina fasciata*			
733.		*Upeneichthys lineatus*			
734.		*Upeneichthys stotti*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
735.		*Upeneus tragula*			
736.		*Urocampus carinirostris*			
737.		*Urolophus circularis*			
738.		*Vanacampus cf. margaritifer*			Y
739.		*Vanacampus cf. margaritifier*			Y
740.		*Vanacampus poecilolaemus*			
741.		*Vincentia badia*			
742.		*Zanclistius elevatus*			
743.		*Zebrias cancellatus*			

Invertebrate

744.		*Acariformes sp.*			
745.		*Acercella falcipes*			
746.		*Achelia shepherdi*			
747.		*Aeshnidae sp.*			
748.		*Afraflacilla huntorum*			Y
749.		*Aganippe rhaphiduca*			
750.		*Akamptogonus novarae*			
751.		*Allothereua maculata*			
752.		*Allotrochosina karri*			
753.		*Amblyomma albolimbatum*			
754.		*Amblyomma triguttatum*			
755.		*Ammothea australiensis*			
756.		*Ammothella biunguiculata subsp. australiensis*			
757.		*Aname mainae*			
758.		*Aname tepperi*			
759.		*Ancylidae sp.*			
760.		*Anoplodactylus pycnosoma*			Y
761.		*Arachnura higginsi*			
762.		*Araneus cyphoxis*			
763.		*Araneus eburneiventris*			
764.		*Araneus senicaudatus*			
765.	33903	*Arbanitis inornatus (trapdoor spider (Darling Scarp))*		P1	
766.		*Argiope protensa*			
767.		*Argiope trifasciata*			
768.		*Arkys walckenaeri*			
769.		*Artema atlanta*			
770.		*Arthrorhabdus mjobergi*			
771.		*Artoria flavimana*			
772.		*Artoria linnaei*			
773.		*Artoria taeniifera*			
774.		*Artoriopsis eccentrica*			
775.		*Artoriopsis expolita*			
776.		*Artoriopsis joergi*			
777.		*Asadipus kunderang*			
778.		*Aurecocrypta lugubris*			
779.		*Austracantha minax*			
780.	33971	*Austroconops mcmillani (biting midge (southwest))*		P2	
781.		*Backobourkia brounii*			
782.		*Backobourkia heroine*			
783.		*Badumna insignis*			
784.		*Baetidae sp.*			
785.		*Ballarra longipalpus*			
786.		*Bianor maculatus*			
787.		*Breda jovialis*			
788.		*Caenidae sp.*			
789.		*Callevophthalmus lividus*			Y
790.		*Celaenia excavata*			
791.		*Ceratopogonidae sp.*			
792.		*Cercophonius sulcatus*			
793.		*Ceryerda cursitans*			
794.		*Cethegus fugax*			
795.		*Cheiracanthium nervosum*			Y
796.	33939	*Cherax cainii (Marron)*			
797.		*Cherax destructor*			
798.		*Cherax preissii*			
799.		*Cherax quinquecarinatus*			
800.		*Cherax sp.*			
801.		*Chironominae sp.*			
802.		*Clynotis albobarbatus*			
803.		*Clynotis severus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
804.		*Coenagrionidae sp.*			
805.		*Corixidae sp.*			
806.		*Cormocephalus aurantiipes*			
807.		*Cormocephalus hartmeyeri*			
808.		*Cormocephalus novaehollandiae*			
809.		*Cormocephalus rubriceps*			
810.		*Crustulina bicruciata*			
811.		*Cryptoerithus quobba*			
812.		*Culicidae sp.*			
813.		*Cyclosa trilobata*			
814.		*Cyrtophora parnasia*			
815.		*Delena cancerides*			
816.		*Demadiana cerula*			
817.		*Dingosa murata*			
818.		*Dingosa serrata*			
819.		*Dinocambala ingens*			
820.		*Dolichopodidae sp.*			
821.		*Dytiscidae sp.*			
822.		*Ecnomidae sp.*			
823.		*Enoplognatha bidens*			Y
824.		*Eodelena convexa*			
825.		*Eodelena lapidicola*			
826.		*Eriophora biapicata*			
827.		*Ero aphana*			
828.		*Erythracarus decoris*			
829.		*Ethmostigmus rubripes*			
830.		*Eucyrtops latior*			
831.		*Euoplos inornatus*			
832.		*Gea theridioides*			
833.		*Geogarypus taylori*			
834.		*Glossiphoniidae sp.*			
835.		*Gomphidae sp.*			
836.		*Gripopterygidae sp.*			
837.		*Gyrinidae sp.*			
838.		*Hasarius adansoni*			
839.		*Hemicloea insidiosa*			Y
840.		*Hemicorduliidae sp.*			
841.		*Henicops dentatus*			
842.		*Heurodes turritus*			
843.		*Hogna crispipes*			
844.		*Holasteron aspinosum*			
845.		*Holasteron perth*			
846.		*Holconia westralia*			
847.		*Holoplatys dejongi*			
848.		*Hydrobiosidae sp.*			
849.		*Hydrometridae sp.*			
850.		*Hydrophilidae sp.*			
851.		*Hydropsychidae sp.*			
852.		*Hydroptilidae sp.*			
853.	33977	*Hylaeus globuliferus (woolybush bee)*		P3	
854.		*Hyriidae sp.*			
855.		*Idiommata blackwalli*			
856.		*Idiosoma hirsutum*			
857.		*Isometroides vescus*			
858.		*Isopeda leishmanni*			
859.		*Ixodes australiensis*			
860.		*Kangarosa ludwigi*			
861.		*Kangarosa properipes*			
862.		*Karaops ellenae*			
863.		*Lampona brevipes*			
864.		*Lampona cylindrata*			
865.		*Lamponusa gleneagle*			
866.		*Latrodectus hasseltii*			
867.	33982	*Leioproctus contrarius (short-tongued bee)*		P3	
868.	33983	*Leioproctus douglasiellus (short-tongued bee)*		T	
869.		*Leptoceridae sp.*			
870.		*Leptophlebiidae sp.*			
871.		*Leucauge dromedaria*			Y
872.		*Libellulidae sp.*			
873.		*Longepi woodman*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
874.		*Longrita insidiosa*			
875.		*Lycidas michaelseni*			
876.		*Lycosa ariadnae*			
877.		*Lycosa australicola*			
878.		*Lycosa gilberta*			
879.		*Lycosa godeffroyi*			
880.		*Lycosa lacertosa*			
881.		*Maratus pavonis*			
882.		*Marsupiopus antechinus*			
883.		*Megapodagrionidae sp.*			
884.		*Missulena granulosa*			
885.		*Missulena hoggi*			
886.		*Missulena occatoria*			
887.		*Mituliodon tarantulinus*			
888.		*Mitzoruga insularis*			
889.		*Molycria vokes*			
890.		*Myandra bicincta*			
891.		*Nanometa gentilis*			
892.	33984	*Neopasiphae simplicior (short-tongued bee)*		T	
893.		*Nephila edulis*			
894.		*Nicodamus mainae*			
895.		*Notiasemus glauerti*			
896.		*Notonectidae sp.*			
897.		*Novakiella trituberculosa*			
898.		*Nunciella aspera*			
899.		*Nymphopsis acinacispinatus subsp. bathursti*			
900.		*Ocrisiona leucocomis*			
901.		*Ocrisiona parmeliae*			
902.		*Oecobius navus*			
903.		*Oligochaeta sp.*			
904.		*Ommatoiulus moreleti*			
905.		*Ommatoiulus moreletii*			
906.		*Oniscidae sp.*			
907.		*Ornithonyssus bursa*			Y
908.		*Orthocladiinae sp.*			
909.		*Oxidus gracilis*			
910.		*Oxyopes gracilipes*			
911.		*Oxyopes punctatus*			
912.		*Oxyopes rubicundus*			
913.		*Ozarchaea westraliensis*			
914.		*Palaemonidae sp.*			
915.		*Paralampona marangaroo*			
916.		*Paralamyctes cammooensis*			Y
917.		*Parastacidae sp.*			
918.		*Pediana occidentalis*			
919.		*Perthiidae sp.*			
920.		*Phenasteron longiconductor*			
921.		*Pholcus phalangioides*			
922.		*Phryganoporus candidus*			
923.		*Physidae sp.*			
924.		*Pinkfloydia harveii*			
925.		*Piona cumberlandensis*			
926.		*Podykipus collinus*			
927.		*Poltys laciniosus*			
928.		*Polygonarea repanda*			Y
929.		*Prionosternum nitidiceps*			
930.		*Prionosternum scutatum*			
931.		*Pseudolampona woodman*			
932.		*Pycnothea flynni*			
933.		*Raveniella arenacea*			
934.		*Raveniella cirrata*			
935.		*Raveniella peckorum*			
936.		*Raveniella subcirrata*			
937.		*Richardsonianidae sp.*			
938.		*Scirtidae sp.*			
939.		*Scolopendra laeta*			
940.		*Scolopendra morsitans*			
941.		*Servaea melaina*			
942.		*Servaea spinibarbis*			
943.		*Simaetha tenuior*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
944.		*Simuliidae sp.*			
945.		*Smeringopus natalensis*			
946.		*Solaenodolichopus pruvoti*			
947.		*Steatoda capensis*			
948.		*Steatoda grossa*			
949.		*Storosa tetrica*			
950.		*Supunna funerea*			
951.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
952.		*Synothele durokoppin*			
953.		*Synothele michaelseni*			
954.		*Synothele rastelloides*			
955.		*Synsphyronus callus*			
956.		*Tabanidae sp.*			
957.		*Tamopsis darlingtoniana*			
958.		*Tamopsis distinguenda*			
959.		*Tamopsis perthensis*			
960.		*Tanypodinae sp.*			
961.		*Tasmanicosa leuckartii*			
962.		*Tetragnatha demissa*			
963.		*Tetragnatha nitens*			
964.		*Tetragnatha valida*			
965.		*Tetralycosa oraria*			
966.	33994	*Throscodectes xiphos (cricket)*		P1	Y
967.		*Tinytrema yarra*			
968.		*Tipulidae sp.*			
969.		*Tuoba pallida*			
970.		*Urodacus novaehollandiae*			
971.		*Urodacus planimanus*			
972.		*Urodacus woodwardii*			
973.		*Veliidae sp.*			
974.		*Venator immansueta*			
975.		*Venatrix pullastra*			
976.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
977.		*Westrarchaea sinuosa*			
978.		*Withius piger*			
979.		*Zachria flavicoma*			
980.		*Zebraplatys fractivittata*			

Mammal

981.	25449	*Antechinus flavipes (Yellow-footed Antechinus)*			
982.	24088	*Antechinus flavipes subsp. leucogaster (Yellow-footed Antechinus, Mardo)*			
983.	24208	*Arctocephalus forsteri (New Zealand fur-seal, long-nosed fur-seal)*		S	
984.	24044	*Balaenoptera acutorostrata (Dwarf Minke Whale)*			
985.	25450	*Balaenoptera musculus (Blue Whale)*		T	
986.	24048	*Balaenoptera musculus subsp. brevicauda (Pygmy Blue Whale)*		T	
987.	24162	*Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)*		T	
988.	25454	*Canis lupus (Dog, Dingo)*	Y		
989.	30883	*Canis lupus subsp. familiaris (Dog)*	Y		
990.	24072	*Caperea marginata (Pygmy Right Whale)*			
991.	24086	*Cercartetus concinnus (Western Pygmy-possum, Mundarda)*			
992.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
993.	24187	*Chalinolobus morio (Chocolate Wattled Bat)*			
994.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
995.	24043	*Eubalaena australis (Southern Right Whale)*		T	
996.	24189	*Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)*		P4	
997.	24041	*Felis catus (Cat)*	Y		
998.	30916	*Funambulus pennanti (Indian Palm Squirrel)*	Y		
999.	24054	*Globicephala macrorhynchus (Short-finned Pilot Whale)*			
1000.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
1001.	24211	*Hydrurga leptonyx (Leopard Seal)*			
1002.	25478	*Isoodon obesulus (Southern Brown Bandicoot)*		P4	
1003.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P4	
1004.	24070	*Kogia breviceps (Pygmy Sperm Whale)*			
1005.	25488	*Macropus eugenii (Tammar Wallaby)*		P4	
1006.	24131	*Macropus eugenii subsp. derbianus (Tammar Wallaby (WA subsp))*		P4	
1007.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
1008.	24133	*Macropus irma (Western Brush Wallaby)*		P4	
1009.	24051	*Megaptera novaeangliae (Humpback Whale)*		S	
1010.	24079	*Mesoplodon hectori (Hector's Beaked Whale)*			
1011.	24080	*Mesoplodon layardii (Strap-toothed Beaked Whale)*			
1012.	24213	*Mirounga leonina (Southern Elephant Seal)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1013.	24223	*Mus musculus (House Mouse)*	Y		
1014.	24042	*Mustela putorius (European Polecat, Ferret)*	Y		
1015.	24146	*Myrmecobius fasciatus (Numbat, Walpurti)*		T	
1016.	24210	*Neophoca cinerea (Australian Sea-lion)*		T	
1017.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
1018.	24195	*Nyctophilus gouldi (Gould's Long-eared Bat)*			
1019.	41424	*Nyctophilus major (Greater Long-eared Bat)*			
1020.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
1021.	24155	*Perameles eremiana (Desert Bandicoot, walilya)*		X	
1022.	24165	*Petropseudes dahli (Rock Ringtail Possum, Wogoit)*		P3	
1023.	25508	*Phascogale tapoatafa (Brush-tailed Phascogale)*			
1024.	48070	*Phascogale tapoatafa subsp. wambenger (South-western Brush-tailed Phascogale, Wambenger)*		T	
1025.	24164	*Potorous platyops (Broad-faced Potoroo)*		X	
1026.	24166	*Pseudocheirus occidentalis (Western Ringtail Possum, ngwayir)*		T	
1027.	24063	*Pseudorca crassidens (False Killer Whale)*			
1028.	24173	*Pteropus scapulatus (Little Red Flying-fox)*			
1029.	24243	*Rattus fuscipes (Western Bush Rat)*			
1030.	24244	*Rattus norvegicus (Brown Rat)*	Y		
1031.	24245	*Rattus rattus (Black Rat)*	Y		
1032.	24145	*Setonix brachyurus (Quokka)*		T	
1033.	24111	*Sminthopsis gilberti (Gilbert's Dunnart)*			
1034.		*Sminthopsis murina*			
1035.	24259	*Sus scrofa (Pig)*	Y		
1036.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
1037.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
1038.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
1039.	24157	*Trichosurus vulpecula subsp. arnhemensis (northern brushtail possum (Kimberley))*		T	
1040.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
1041.	30954	*Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)*			
1042.	24069	*Tursiops truncatus (Bottlenose Dolphin)*			
1043.	24206	*Vespadelus regulus (Southern Forest Bat)*			
1044.	24040	*Vulpes vulpes (Red Fox)*	Y		
1045.	24083	*Ziphius cavirostris (Cuvier's Beaked Whale)*			
Reptile					
1046.	25242	*Acanthophis antarcticus (Southern Death Adder)*		P3	
1047.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
1048.	44629	*Anilios australis*			
1049.	24990	*Aprasia pulchella (Granite Worm-lizard)*			
1050.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
1051.	42380	*Brachyurophis fasciolatus subsp. fasciolatus (Narrow-banded Shovel-nosed Snake)*			
1052.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
1053.		*Calotes versicolor subsp. versicolor*			Y
1054.	25335	*Caretta caretta (Loggerhead Turtle)*		T	
1055.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
1056.	25336	*Chelonia mydas (Green Turtle)*		T	
1057.	24980	*Christinus marmoratus (Marbled Gecko)*			
1058.	30893	*Cryptoblepharus buchananii*			
1059.	25020	*Cryptoblepharus plagiocephalus*			
1060.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
1061.	24883	*Ctenophorus ornatus (Ornate Crevice-Dragon)*			
1062.	25027	*Ctenotus australis*			
1063.	25035	*Ctenotus delli (Dell's skink, Dell's Ctenotus)*		P4	
1064.	25039	*Ctenotus fallens*			
1065.	25040	*Ctenotus gemmula (Jewelled South-west Ctenotus (Swan Coastal Plain pop P3), skink)*			
1066.	25047	*Ctenotus impar*			
1067.	25049	*Ctenotus labillardieri*			
1068.	41641	*Ctenotus ora (Coastal Plains Skink)*		P3	
1069.	25087	*Cyclodomorphus celatus (Western Slender Blue-tongue)*			
1070.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
1071.	24999	*Delma grayii*			
1072.	25468	*Demansia psammophis (Yellow-faced Whipsnake)*			
1073.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
1074.	25346	*Dermochelys coriacea (Leatherback Turtle)*		T	
1075.	24929	*Diplodactylus granariensis subsp. granariensis*			
1076.	24939	*Diplodactylus polyophthalmus*			
1077.	25251	*Echiopsis curta (Bardick)*			
1078.	25096	*Egernia kingii (King's Skink)*			
1079.	25100	*Egernia napoleonis*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1080.	25250	*Elapognathus coronatus (Crowned Snake)*			
1081.	24959	*Gehyra variegata*			
1082.	25232	*Hemidactylus frenatus (Asian House Gecko)*	Y		
1083.	25115	*Hemiergis initialis subsp. initialis*			
1084.	25119	*Hemiergis quadrilineata*			
1085.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
1086.	25366	*Hydrophis elegans (Elegant Seasnake, Bar-bellied Seasnake)*			
1087.	42410	*Hydrophis ornatus (Ornate Reef Seasnake, Sea Snake)*			
1088.	43384	*Hydrophis platurus (Yellow-bellied Seasnake)*			
1089.	25128	*Lerista christinae*			
1090.	25131	*Lerista distinguenda*			
1091.	25133	*Lerista elegans*			
1092.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
1093.	25148	*Lerista lineopunctulata*			
1094.	25165	*Lerista praepedita*			
1095.	25005	*Lialis burtonis*			
1096.	25184	*Menetia greyii*			
1097.	25185	*Menetia maini*			
1098.	25186	*Menetia surda subsp. cresswelli*			
1099.	25187	*Menetia surda subsp. surda*			
1100.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
1101.	25188	*Morethia adelaidensis*			
1102.	25189	*Morethia boulengeri*			
1103.	25191	*Morethia lineoocellata*			
1104.	25192	*Morethia obscura*			
1105.	25193	*Morethia ruficauda subsp. exquisita*			
1106.	25194	*Morethia ruficauda subsp. ruficauda*			
1107.	25195	*Morethia storri*			
1108.	25344	*Natator depressus (Flatback Turtle)*		T	
1109.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
1110.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	
1111.	25252	*Notechis scutatus (Tiger Snake)*			
1112.	25196	*Notoscincus butleri (lined soil-crevice skink (Dampier))*		P4	
1113.	25197	*Notoscincus ornatus subsp. ornatus*			
1114.	25253	*Parasuta gouldii*			
1115.	25255	*Parasuta nigriceps*			
1116.	25509	*Pletholax gracilis (Keeled Legless Lizard)*			
1117.	25006	*Pletholax gracilis subsp. edelensis (Keeled Legless Lizard (Shark Bay))*		P3	
1118.	25007	*Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)*			
1119.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
1120.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
1121.	24908	*Pogona minor subsp. mitchelli (Dwarf Bearded Dragon)*			
1122.	24909	*Pogona nullarbor (Nullabor Bearded Dragon)*			
1123.	25199	*Proablepharus reginae*			
1124.	25200	*Proablepharus tenuis*			
1125.	25261	*Pseudechis australis (Mulga Snake)*			
1126.	25201	*Pseudemoia baudini*			
1127.	25511	*Pseudonaja affinis (Dugite)*			
1128.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
1129.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
1130.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
1131.	25264	*Pseudonaja nuchalis (Gwardar, Northern Brown Snake)*			
1132.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
1133.	25009	*Pygopus nigriceps*			
1134.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
1135.	25267	*Simoselaps littoralis (West Coast Banded Snake)*			
1136.	25518	*Strophurus spinigerus*			
1137.	24942	*Strophurus spinigerus subsp. spinigerus*			
1138.	25202	*Tiliqua multifasciata (Central Blue-tongue)*			
1139.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
1140.	25519	*Tiliqua rugosa*			
1141.	25204	*Tiliqua rugosa subsp. aspera*			
1142.	25207	*Tiliqua rugosa subsp. rugosa*			
1143.	24983	*Underwoodisaurus milii (Barking Gecko)*			
1144.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
1145.	25225	*Varanus rosenbergi (Heath Monitor)*			
1146.	25526	*Varanus tristis (Racehorse Monitor)*			
1147.	25227	*Varanus tristis subsp. tristis (Racehorse Monitor)*			

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

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

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

Australian Government

Department of the Environment and Energy

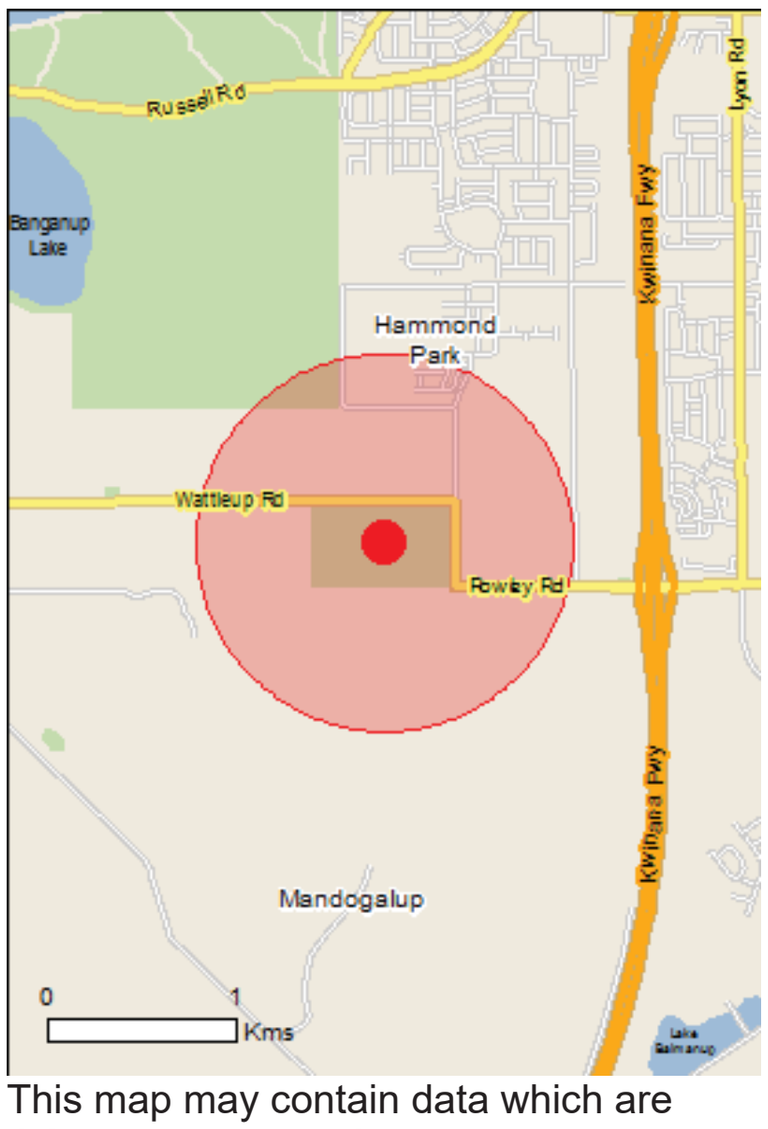
EPBC Act Protected Matters Report

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: 18/11/17 11:50:27



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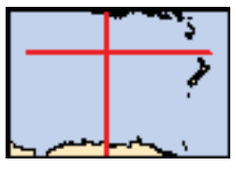
Coordinates

Buffer: 1.0Km



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:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	16
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	36
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Forrestdale and thomsons lakes	Within 10km of Ramsar

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

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

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

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

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may 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
Harry Waring Marsupial Reserve	WA

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Gibbs Road Swamp System	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

-32.1789 115.84425

Acknowledgements

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

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

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

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

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APPENDIX D

SIGNIFICANT SPECIES PROFILES

Graceful Sun Moth *Synemon gratiosa*

Status and Distribution: Listed as Priority 4 by the DBCA.

The GSM was up until a few years ago thought to be confined to a small number of bush reserves in the northern suburbs of Perth. Targeted survey work since that time by several consultants and DBCA have extended the known range of the species north to Leeman and south as far as Binningup (Bishop *et al.* 2010b).

Survey work carried out in 2010 expanded the previously document area of occupancy of the GSM from 18km^2 to 43 km^2 and the extent of occurrence from 230km^2 to 2,015km^2. The area of occupancy is potentially a conservative estimate at this stage and if habitat anticipated to be occupied by GSM is included, the area of occupancy may be as high as 119 km^2 (Bishop *et al.* 2010b). Additional surveys have been carried out in 2011 north and south of the known range and these may also expand the species range (results not as yet publically available).

The conservation status of the graceful sun-moth was change at a state level in 2012 from Schedule 1 to Priority 4 and it has also been delisted from the *EPBC Act* threatened species list altogether as a consequence of the additional information illustrating the species much greater range and abundance.

Habitat: The graceful sun-moth is currently only known from two general vegetation types:

- Banksia woodland/woolly bush on deep sands, in the northern suburbs of Perth on the Swan Coastal Plain. In these sites the GSM breeds on *Lomandra hermaphrodita*, which often occurs in low numbers.

- Open areas of herbland, heathland and shrubland on Quindalup soils (sand and limestone) close to the coast where it breeds on *Lomandra maritima*, which is often present in reasonable numbers and may even be a dominant understorey herb. Sites on limestone may have both *Lomandra* species present.

The presence of these two *Lomandra* species therefore provides a good indication of prospective habitat, however, sufficient numbers and densities of these plants are thought to be necessary to sustain a viable breeding colony of Graceful Sun-Moths.

Likely presence in subject site: The subject site apparently contains none of the plant species normally associated with the presence of the GSM (i.e. *Lomandra hermaphrodita* and *L. maritima*). It is therefore considered very unlikely that GSM would persist onsite. Previous surveys in nearby areas have found no evidence of the GSM and its absence was also attributed to the lack of favourable habitat (i.e. *Lomandra hermaphrodita and L. maritima)* (Bamford 2011, 2012 and 360 Environmental 2012)).

Potential impact of development: No impact on this species or its preferred habitat is considered likely to occur as a consequence of development at the site occurring.

Perth Lined Lerista *Lerista lineata*

Status and Distribution: Listed as Priority 3 by DBCA. Found in the lower west coast from north of Perth south to Leschenault Peninsula/Kemerton. It has also been found at Rottnest Island and Garden Island (Storr *et al.* 1999). Found in the southern suburbs of Perth (Bush *et al.* 2002).

Habitat: This small species of skink inhabits white sands (Storr *et al*. 1999) under areas of shrubs and heath where it inhabits loose soil and leaf litter (Nevill 2005) particularly in association with banksias (Bush *et al.* 2002).

Likely presence in subject site: Habitat appears to be suitable for this species to persist and it has been recorded nearby (ENV 2009, Phoenix 2010). Known to inhabit gardens (Nevill 2005, Bush *et al.* 2010) so may persist in degraded areas and subsequent to development.

Potential impact of development: Loss/modification of an area of habitat.

Black-striped Snake *Neelaps calonotos*

Status and Distribution: Listed as Priority 3 by DBCA. Found in the lower west coast from Lancelin to Mandurah. It is locally abundant but is under threat due to land clearing (Storr *et al.* 1999).

Habitat: This species of snake favours sandy soils supporting heath and banksia/eucalypt woodland (Nevill 2005).

Likely presence in subject site: Status in area difficult to determine, however the lack of recent records in the general area despite several detailed surveys (e.g. Rockingham, East Rockingham, Bibra Lake, Jandakot) suggests that it no longer persists in the southern Perth suburbs. Not listed as a potential species.

Potential impact of development: No impact anticipated as this species is considered unlikely to be present.

Malleefowl *Leipoa ocellata*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Originally common, but now generally rare to uncommon and patchily distributed.

Current distribution mainly southern arid and semi-arid zones, north to Shark Bay, Jingemarra, Colga Downs and Yeelirrie, east to Earnest Giles Range, Yeo Lake, lower Ponton Creek and to Eucla and west and south to Cockleshell Gully, the Wongan Hills, Stirling Range, Beaufort Inlet, Hatters Hill, Mt Ragged and Point Malcolm (Johnstone and Storr 1998).

Habitat: Mainly scrubs and thickets of mallee *Eucalyptus* spp., boree *Melaleuca lanceolata* and bowgada *Acacia linophylla*, also dense litter forming shrublands.

Likely presence in subject site: This species is regionally extinct and would never, under normal circumstances occur anywhere on the Swan Coastal Plain.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Eastern Great Egret *Ardea alba*

Status and Distribution: This species of egret is listed under Schedule 5 of the *WC Act*, and as migratory under international agreements to which Australia is a signatory. The eastern great egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2004).

Habitat: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2004).

Likely presence in subject site: No suitable habitat.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Cattle Egret *Ardea ibis*

Status and Distribution: This species of egret is listed under Schedule 5 of the WC Act, and as migratory under international agreements to which Australia is a signatory. The cattle egret is common in the north sections of its range but is an irregular visitor to the better watered parts of the state (Johnstone and Storr 1998). The population is expanding (Morcombe 2004).

Habitat: Moist pastures with tall grasses, shallow open wetlands and margins, mudflats (Morcombe 2004).

Likely presence in subject site: No suitable habitat.

Potential impact of development: No impact on this species or its preferred habitat will occur.

White-bellied Sea Eagle *Haliaeetus leucogaster*

Status and Distribution: This species is listed as Marine under the *EPBC Act*. White-bellied sea eagles are moderately common to common on Kimberley and Pilbara islands, coasts and estuaries, on Bernier, Dorre and Dirk Hartog Is., in Houtman Abrolhos and in the Archipelago of the Recherche; rare to uncommon elsewhere (Johnstone and Storr 1998). Also found in New Guinea, Indonesia, China, southeast Asia and India. Scarce near major coastal cities (Morcombe 2004).

Habitat: They nest and forage usually near the coast over islands, reefs, headlands, beaches, bays, estuaries, mangroves, but will also live near seasonally flooded inland swamps, lagoons and floodplains, often far inland on large pools of major rivers. Established pairs usually sedentary, immatures dispersive (Morcombe 2004). White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession.

Likely presence in subject site: May fly over on rare occasions given presence of nearby lake systems and ocean but there is no suitable habitat for this species inside the subject site.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Osprey *Pandion haliaetus*

Status and Distribution: This species of egret is listed under Schedule 5 of the *WC Act*, as Migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. Moderately common to very common in sheltered seas around the north and west coast islands south to 31°S; uncommon to common on mainland coasts, estuaries and large rivers north of tropic, rare to uncommon elsewhere (Johnstone and Storr 1998).

Habitat: Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers (Pizzey & Knight 2012). Constructs nests on prominent headland, large trees, communication towers (Simpson & Day 2010).

Likely presence in subject site: May fly over on rare occasions given presence of nearby lake systems and ocean but there is no suitable habitat for this species inside the subject site.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Peregrine Falcon *Falco peregrinus*

Status and Distribution: This species is listed as Schedule 7 under the *WC Act*. Individuals of this species are uncommon/rare but wide ranging across Australia. Moderately common at higher levels of the Stirling Range, uncommon in hilly, north west Kimberley, Hamersley and Darling Ranges; rare or scarce elsewhere (Johnstone and Storr 1998).

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2004). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone and Storr 1998). The species utilises the

ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey.

Likely presence in subject site: Individuals of this species potentially utilise some sections of the subject site as part of a much larger home range but would only occur rarely. Very unlikely to breed onsite.

Potential impact of development: Loss/modification of some areas of foraging habitat.

Glossy Ibis *Plegadis falcinellus*

Status and Distribution: This species is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The glossy ibis frequents swamps and lakes throughout much of the Australian mainland, but is most numerous in the north. It is a non-breeding visitor to Tasmania and the south-west of Western Australia. The Glossy Ibis is both migratory and nomadic. Its range expands inland after good rains, but its main breeding areas seem to be in the Murray-Darling Basin of New South Wales and Victoria, the Macquarie Marshes in New South Wales, and in southern Queensland. Glossy ibis often move north in autumn, then return south to their main breeding areas in spring and summer (Pizzey & Knight 2012).

Habitat: Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats, occasionally dry grasslands (Pizzey & Knight 2012).

Likely presence in subject site: No suitable habitat.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Blue-billed Duck *Oxyura australis*

Status and Distribution: Recently listed as Priority 4 by DBCA (DPaW 2017). Rare to moderately common (most plentiful on the Swan Coastal Plain and in the Great Southern). South-western: north to Lake Pinjarrega and east to Esperance; vagrant further north and east (as far as Thundelarra and Kalgoorlie). Also south-eastern Australian and Tasmania (Johnstone and Storr 1998).

Habitat: Well vegetated freshwater swamps, large dams and lakes, winters on more open water (Morcombe 2004). Occasionally salt lakes and estuaries freshened by floodwaters (Johnstone and Storr 1998).

Likely presence in subject site: No suitable habitat.

Potential impact of development: No impact on these species or their preferred habitat will occur.

Migratory Shorebirds

A number of migratory shorebirds are listed as potentially occurring in the general area. Not all specific species are discussed in detail.

Status and Distribution: Most migratory shorebirds are listed under Schedule 5 of the *WC Act* and/or the *EPBC Act.* Some are also listed under international agreements to which Australia is a signatory. All species are either widespread summer migrants to Australia or residents. State and Federal conservation status varies between species.

Habitat: Varies between species but includes beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.

Likely presence in subject site: No suitable habitat.

Potential impact of development: No impact on these species or their preferred habitat will occur.

Australian Painted Snipe *Rostratula australis/benghalensis*

Status and Distribution: This species is listed as Schedule 2 and 5 under the *WC Act* and as Endangered and Migratory under the *EPBC Act*. Sparsely distributed in better watered regions: Kimberley, North West and South Western divisions. Also, eastern Australia and Tasmanian (Johnstone and Storr 1998).

Habitat: Well vegetated shallows and margins of wetlands, dams, sewerage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea tree scrub, open timber. Requires dense low cover (Morcombe 2004).

Likely presence in subject site: There is no suitable habitat for this species within the study site.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Grey Wagtail *Motacilla cinerea*

Status and Distribution: The grey wagtail is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. A rarely recorded, accidental vagrant that has on a few occasions been recorded on widely separated parts of the Australian coastline (Pizzey & Knight 2012).

Habitat: In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Pizzey & Knight 2012).

Likely presence in subject site: Cleared paddocks theoretically represent suitable habitat for this species but as it is an "accidental vagrant" (Pizzey & Knight 2012) the likelihood of occurrence is extremely low. Not listed as potential species as it would only occur very rarely, if ever and then only for brief periods.

Potential impact of development: No significant impact on this species or its preferred habitat will occur.

Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*

Status and Distribution: Listed as Scheduled 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Found in the humid and subhumid south west, mainly hilly interior, north to Gingin and east to Mt Helena, Christmas Tree Well, North Bannister, Mt Saddleback, Rock Gully and the upper King River (Johnstone and Storr 1998).

Habitat: Eucalypt forests, feeds on Marri, Jarrah, Blackbutt, Karri, Sheoak and Snottygobble. The forest red-tailed black-cockatoo nests in the large hollows of Marri, Jarrah and Karri (Johnstone and Kirkby 1999). In Marri, the nest hollows of the Forest Red-tailed Black Cockatoo range from 8-14m above ground, the entrance is 12 – 41cm in diameter and the depth is one to five metres (Johnstone and Storr 1998).

Breeding commences in winter/spring. There are few records of breeding in the Forest Red-tailed Black Cockatoo (Johnstone and Storr 1998), but eggs are laid in October and November (Johnstone 1997; Johnstone and Storr 1998). Recent data however indicates that breeding in all months of the year occurs with peaks in spring and autumn–winter (Ron Johnstone pers. comm.). Incubation period 29 – 31 days. Young fledge at 8 to 9 weeks (Simpson and Day 2010).

J	F	M	A	M	J	J	A	S	O	N	D

Period in which breeding is most likely to commence
Period in which fledging/weening could extend through

Likely presence in subject site: No evidence of this species using the subject site for any purpose was observed. Some small areas of remnant vegetation containing jarrah and sheoak within the site do however represent potential foraging habitat and it may occasionally visit the area at times to feed.

Potential impact of development: Loss/modification of an area of habitat.

Baudin's Black- Cockatoo *Calyptorhynchus baudinii*

Status and Distribution: Listed as Scheduled 2 under the *WC Act* and as Vulnerable under the *EPBC Act*. Confined to the south-west of Western Australia, north to Gidgegannup, east to Mt Helena, Wandering, Quindanning, Kojonup, Frankland and King River and west to the eastern strip of the Swan Coastal Plain including West Midland, Byford, Nth Dandalup, Yarloop, Wokalup and Bunbury (Johnstone and Storr 1998). On the southern Swan Coastal Plain this cockatoo is in some areas resident but

mainly a migrant moving from the deep south-west to the central and northern Darling Range. Between March and September most flocks move north and are concentrated in the northern parts of the Darling Range. During this period birds forage well out onto the southern Swan Coastal Plain to areas such as Harvey, Myalup, Bunbury, Capel, Dunsborough and Meelup. While generally more common in the Darling Range this species can also be common on parts of the southern Swan Coastal Plain especially in mid-August – September when flocks begin to return to their breeding quarters (Johnstone 2008).

Habitat: Mainly eucalypt forests where it feeds primarily on the Marri seeds, (Morcombe 2004), Banksia, Hakeas and *Erodium* sp. Also strips bark from trees in search of beetle larvae (Johnstone and Storr 1998). This species of cockatoo nests in large tree hollows, 30–40 cm in diameter and more than 30 cm deep (Saunders 1974).

Baudin's Black-Cockatoo breeds in late winter and spring, from August to November or December (Gould 1972; Johnstone 1997; Saunders 1974; Saunders *et al*. 1985). Eggs laid in October (Johnstone and Storr 1998). Based on observations at currently known nest sites breeding mainly occurs within the October-December period (Ron Johnstone pers. comms.). Incubation is 28 – 30 days. Young fledge at 8 to 9 weeks (Simpson and Day 2010).

J	F	M	A	M	J	J	A	S	O	N	D

Period in which breeding is most likely to commence
Period in which fledging/weening could extend through

Likely presence in subject site: No evidence of this species using the subject site was observed. This species is only rarely recorded in this section of the coastal pain so it is considered unlikely to frequent the site except on rare occasions.

Potential impact of development: No impact on this species or its preferred habitat is anticipated.

Carnaby's Black- Cockatoo *Calyptorhynchus latirostris*

Status and Distribution: Carnaby's black-cockatoo is listed as Scheduled 2 under the *WC Act* and as Endangered under the *EPBC Act*. 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 ESE of Condingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Habitat: Forests, woodlands, heathlands, farms; feeds on Banksia, Hakeas and Marri. Carnaby's black-cockatoo has specific nesting site requirements. Nests are mostly in smoothed-barked eucalypts with the nest hollows ranging from 2.5 to 12m above the ground, an entrance from 23-30cm diameter and a depth of 0.1-2.5m (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 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 28-29 days. The young depart the nest 10–12 weeks after hatching (Saunders 1977; Smith & Saunders 1986).

J	F	M	A	M	J	J	A	S	O	N	D

Period in which breeding is most likely to commence
Period in which fledging/weening could extend through

Likely presence in subject site: Foraging evidence attributed to this species was observed during the site survey (chewed banksia cones) and most of the remnant vegetation present within the site represents foraging habitat.

Potential impact of development: Loss/modification of an area of habitat.

Fork-tailed Swift *Apus pacificus*

Status and Distribution: The fork-tailed swift is listed as Schedule 5 under the *WC Act,* as Migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. It is a summer migrant (Oct-Apr) to Australia (Morcombe 2004).

Habitat: Low to very high airspace over varied habitat from rainforest to semi desert (Morcombe 2004).

Likely presence in subject site: It is potentially an occasional summer visitor to the subject site but is entirely aerial and largely independent of terrestrial habitats. Not listed as a potential species.

Potential impact of development: No impact on this species will occur.

Rainbow Bee-eater *Merops ornatus*

Status and Distribution: This species is listed as Schedule 5 under the *WC Act,* as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The rainbow bee-eater is a common summer migrant to southern Australia but in the north they are resident (Morcombe 2004).

Habitat: Open Country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2004). Breeds underground in areas of suitable soft soil firm enough to support tunnel building.

Likely presence in subject site: Likely to utilise the subject site in small numbers during the summer migratory period. This species is a common seasonal visitor to south west. Population numbers at any one location would however never be significant as the species usually breeds in pairs and only rarely in small colonies (Johnstone and Storr 1998).

Potential impact of development: Modification and/or loss of an area of habitat.

Southern Brush-tailed Phascogale *Phascogale tapoatafa ssp*

Status and Distribution: Listed as Scheduled 6 under the *WC Act*. Present distribution is believed to have been reduced to approximately 50 per cent of its former range. Now known from Perth and south to Albany, west of Albany Highway. Occurs at low densities in the northern Jarrah forest. Highest densities occur in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton (DEC information pamphlet). Records are less common from wetter forests.

Habitat: This subspecies has been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover. A nocturnal carnivore relying on tree hollows as nest sites. The home range for a female Brush-tailed Phascogale is estimated at between 20 and 70 ha, whilst that for males is given as twice that of females. In addition, they tend to utilise a large number (approximately 20) of different nest sites throughout their range (Soderquist 1995).

Likely presence in subject site: Status in this area is difficult to determine. Individuals of this species have been captured further south in Paganoni Swamp reserve and east of the Kwinana Freeway at Keralup though foxes and drying weather conditions appear to be affecting population levels (Chambers 2010, 2011). While transient individuals may occasionally occur it has not be listed as a potential species.

Potential impact of development: No impact on this species is anticipated.

Chuditch *Dasyurus geoffroii*

Status and Distribution: Listed as Scheduled 3 under the *WC Act* and as Vulnerable under the *EPBC Act.* Formerly occurred over nearly 70 per cent of Australia. Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah

forest of southwest Western Australia. Also occurs in very low numbers in the Midwest, Wheatbelt and South Coast Regions with records from Moora to the north, Yellowdine to the east and south to Hopetoun.

Habitat: Chuditch are known to have occupied a wide range of habitats from woodlands, dry sclerophyll (leafy) forests, riparian vegetation, beaches and deserts. Riparian vegetation appears to support higher densities of chuditch, possibly because food supply is better or more reliable and better cover is offered by dense vegetation. Chuditch appear to utilise native vegetation along road sides in the wheatbelt (CALM 1994). The estimated home range of a male chuditch is over 15 km^2 whilst that for females is 3-4 km^2 (Sorena and Soderquist 1995).

Likely presence in subject site: Generally regarded as locally extinct in this section of the Swan Coastal Plain. Very occasional transient individuals recorded further south (Anketell/Karnup) (DBCA 2017).

Potential impact of development: No impact on this species or its preferred habitat will occur.

Numbat *Myrmecobius fasciatus*

Status and Distribution: Listed as Scheduled 3 under the *WC Act* (1950) and as Vulnerable under the *EPBC Act* (1999). Once occurred across much of arid and semi arid southern Australia, now restricted to a few remnant forests of wandoo, powderbark wandoo or jarrah in South west WA (Menkhorst & Knight 2011). Rare, scattered. Found only at Dryandra, Perup and six other translocation sites (Van Dyck & Strahan 2008).

Habitat: Generally dominated by eucalypts that provide hollow logs and branches for shelter and termites for food (Van Dyck & Strahan 2008).

Likely presence in subject site: This species is locally and regionally extinct.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Southern Brown Bandicoot *Isoodon obesulus fusciventer*

Status and Distribution: Listed as Priority 4 by DBCA. Widely distributed in the south west from near Cervantes north of Perth to east of Esperance, patchy distribution through the Jarrah and Karri forest and on the Swan Coastal Plain, and inland as far as Hyden. Has been translocated to Julimar State Forest, Hills Forest Mundaring, Tutanning Nature Reserve, Boyagin Nature Reserve, Dongolocking Nature Reserve, Leschenault Conservation Park, and Karakamia and Paruna Sanctuaries (DBCA information pamphlet) and Nambung National Park (DBCA pers. coms.)

Habitat: Dense scrubby, often swampy, vegetation with dense cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah

and Wandoo forests are usually associated with watercourses. Quendas can thrive in more open habitat subject to exotic predator control (DBCA information pamphlet).

Likely presence in subject site: Evidence of this species foraging (i.e. diggings) in some sections of the subject site was observed during site survey. Potentially present over most of the subject site wherever dense shrubby groundcover occurs.

Potential impact of development: Modification and/or loss of an area of habitat. Some possibility that individuals maybe killed or injured during clearing operations.

Western Ringtail Possum *Pseudocheirus occidentalis*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act.* Common in suitable habitat (de Tores 2008). The highest densities of this species are recorded in Peppermint habitat near Busselton area; relatively high densities are found in Jarrah/Marri forest at Perup (de Tores 2008).

The western ringtail possum (WRP) has a restricted distribution in south-western Western Australia. Most known populations (natural and translocated) are now restricted to near coastal areas of the south west from the Dawesville area to the Waychinicup National Park. Inland, it is also known to be relatively common in a small part of the lower Collie River valley, the Perup Nature Reserve and surrounding forest blocks near Manjimup.

Habitat: The western ringtail possum was once located in a variety of habitats including Coastal Peppermint, Coastal Peppermint-Tuart, Jarrah-Marri associations, Sheoak woodland, and eucalypt woodland and mallee. Coastal populations mostly inhabit Peppermint-Tuart associations with highest densities in habitats with dense, relatively lush vegetation. Inland, the largest known populations occur in the Upper Warren area east of Manjimup (Wayne *et al* 2005). In this area the peppermint tree is naturally absent and jarrah-marri associations constitute the species refuge and foraging habitat. In areas where Peppermint is absent or rare WRPs have been observed feeding predominately on young Jarrah, *Nuytsia floribunda* and *Allocasuarina fraseriana* (G Harewood pers. obs.*).*

Likely presence in subject site: This species is locally extinct.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Western Brush Wallaby *Macropus irma*

Status and Distribution: Listed as Priority 4 by DBCA. The western brush wallaby is distributed across the south-west of Western Australia from north of Kalbarri to Cape Arid (DBCA information pamphlet nd).

Habitat: The species optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found

in some areas of mallee and heathland, and is uncommon in karri forest (DBCA information pamphlet nd).

Likely presence in subject site: Listed as a potential species as it has been recorded in some nearby areas (Harewood 2005, ENV 2009). This species may therefore occur occasionally though the subject site itself is too small to maintain a population.

Potential impact of development: Modification and/or loss of an area of habitat..

Tammar *Macropus eugenii derbianus*

Status and Distribution: Listed as Priority 4 by DBCA. Formerly widespread in SW WA and Eyre Peninsula SA, now reduced to tiny populations on the mainland and some offshore islands. Re-introduce in recent times to several national parks and sanctuaries along the Avon Valley including Walyunga National Park

Habitat: Inhabits dense coastal heath and scrub and some dry sclerophyll forest with dense patches of cover.

Likely presence in subject site: Locally extinct.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Western False Pipistrelle *Falsistrellus mackenziei*

Status and Distribution: Listed as Priority 4 by DBCA. Confined to south west W.A. south of Perth and east to the wheat belt. Most records from Karri forests but also recorded in wetter stands of jarrah and tuart and woodlands on the Swan Coastal Plain (Menkhorst and Knight 2011). Range appears to be contracting southwards, presumably due to drying climate. Not recorded north of Collie in recent times (Bob Bullen 2010, pers. comm.)

Habitat: This species of bat occurs in high forest and coastal woodlands. It roosts in small colonies in tree hollows and forages at canopy level and in the cathedral-like spaces between trees.

Likely presence in subject site: Rarely recorded in this area in recent times. Not listed as a potential species.

Potential impact of development: No impact on this species is anticipated.

Water Rat *Hydromys chrysogaster*

Status and Distribution: Listed as Priority 4 by DBCA. The water rat is widely distributed around Australia and its offshore islands, New Guinea and some adjacent islands. It occurs in fresh brackish water habitats in the south-west of Western Australia, but occurs in marine environments along the Pilbara coastline and offshore islands.

Previous survey work in the south west suggested this species was relatively common and widespread though difficult to capture (Christensen *et al.* 1985, How *et al.*1987).

Habitat: The water rat occupies habitat near permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south west (Christensen *et al.* 1985).

Likely presence in subject site: No suitable habitat.

Potential impact of development: No impact on this species will occur.

DISCLAIMER

This fauna assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Greg Harewood ("the Author"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints. In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, the Author has not verified the accuracy of completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

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The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

APPENDIX E COMPILED POTENTIAL FAUNA LIST (HAREWOOD 2017)

Potential Vertebrate Fauna List

Frankland Park

Compiled by Greg Harewood - December 2017
Approximate centroid = 32.1789°S and 115.84425°E
Recorded (Sighted/Heard/Signs/Captured) = X

A = Harewood, G. (2017). Combined Observations - Wattleup/Hammond Park Area 2014 to 2017. Unpublished data.

B = ENV (2009). Jandakot Airport Fauna Survey. Unpublished report for Jandakot Airport Holdings Pty Ltd.

C = Phoenix Environmental Sciences (2011). Vertebrate Fauna Survey for the Roe Highway Extension Project. . Unpublished report for South Metro Connect.

D = Harewood, G. (2009) Fauna Survey (Level 2) East Rockingham WWTP Site and Pipeline Corridors. Unpublished report for ERM.

E = DBCA (2017). NatureMap Database search. “By Circle” 115° 50' 39" E, 32° 10' 44" S – Study area (plus 20km buffer), 18/11/2017.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Amphibia							
Myobatrachidae Ground or Burrowing Frogs							
Heleioporus eyrei	Moaning Frog	LC			X		X
Limnodynastes dorsalis	Western Banjo Frog	LC	X	X	X		X
Myobatrachus gouldii	Turtle Frog	LC			X		X
Reptilia							
Diplodactylidae Geckoes							
Strophurus spinigerus	Soft Spiny-tailed Gecko					X	X
Gekkonidae Geckoes							
Christinus marmoratus	Marbled Gecko				X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Pygopodidae Legless Lizards							
Aprasia repens	Sandplain Worm Lizard				X		X
Delma fraseri	Fraser's Legless Lizard		X	X		X	X
Lialis burtonis	Burton's Legless Lizard		X		X	X	X
Pygopus lepidopodus	Common Scaly Foot			X	X		X
Agamidae Dragon Lizards							
Pogona minor	Western Bearded Dragon		X	X	X	X	X
Varanidae Monitor's or Goanna's							
Varanus gouldii	Gould's Sand Monitor						X
Varanus tristis	Racehorse Monitor					X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Scincidae Skinks							
Acritoscincus trilineatum	Southwestern Cool Skink			X	X		
Cryptoblepharus buchananii	Fence Skink		X	X	X	X	X
Ctenotus australis	Western Ctenotus		X		X	X	X
Ctenotus fallens	West Coast Ctenotus				X	X	X
Egernia kingii	King's Skink						X
Egernia napoleonis	Salmon-bellied Skink		X		X		X
Hemiergis quadrilineata	Two-toed Mulch Skink		X	X	X	X	X
Lerista elegans	West Coast Four-toed Lerista			X	X	X	X
Lerista lineata	Perth Lined Lerista	P3			X		X
Menetia greyii	Dwarf Skink		X	X	X	X	X
Morethia lineoocellata	West Coast Pale-flecked Morethia				X	X	X
Morethia obscura	Shrubland Pale-flecked Morethia				X	X	X
Tiliqua rugosa	Bobtail		X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Elapidae Elapid Snakes							
Notechis scutatus	Tiger Snake				X		X
Pseudonaja affinis	Dugite		X	X	X	X	X
Simoselaps bertholdi	Jan's Banded Snake						X
Aves							
Phasianidae Quails, Pheasants							
Coturnix pectoralis	Stubble Quail	LC	X				X
Coturnix ypsilophora	Brown Quail	LC		X			X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Accipitridae Kites, Goshawks, Eagles, Harriers							
Accipiter cirrocephalus	Collared Sparrowhawk	Bp LC		X		X	X
Accipiter fasciatus	Brown Goshawk	Bp LC	X		X	X	X
Aquila audax	Wedge-tailed Eagle	Bp LC	X		X		X
Aquila morphnoides	Little Eagle	Bp LC	X	X		X	
Circus assimilis	Spotted Harrier	LC					X
Elanus caeruleus	Black-shouldered Kite	LC	X	X	X	X	X
Haliastur sphenurus	Whistling Kite	Bp LC	X		X	X	X
Hamirostra isura	Square-tailed Kite	Bp LC					X
Falconidae Falcons							
Falco berigora	Brown Falcon	Bp LC					X
Falco cenchroides	Australian Kestrel	LC	X	X	X	X	X
Falco longipennis	Australian Hobby	LC	X	X	X	X	X
Falco peregrinus	Peregrine Falcon	S7 Bp LC				X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Columbidae Pigeons, Doves							
Columba livia	Domestic Pigeon	Introduced			X		X
Ocyphaps lophotes	Crested Pigeon	LC	X	X	X		X
Phaps chalcoptera	Common Bronzewing	Bh LC	X	X		X	X
Streptopelia chinensis	Spotted Turtle-Dove	Introduced		X	X		X
Streptopelia senegalensis	Laughing Turtle-Dove	Introduced	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Psittacidae Parrots							
Cacatua roseicapilla	Galah	LC	X	X	X	X	X
Cacatua sanguinea	Little Corella	LC	X	X	X		X
Cacatua tenuirostris	Eastern Long-billed Corella	Introduced					X
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	S3 VU Bp LC	X	X	X		X
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	S2 EN Bp EN A2bcde	X	X	X	X	X
Neophema elegans	Elegant Parrot	LC	X		X		X
Platycercus icterotis icterotis	Western Rosella (western ssp)	Bp LC					X
Platycercus spurius	Red-capped Parrot	LC	X	X	X	X	X
Platycercus zonarius	Australian Ringneck Parrot	LC	X	X	X	X	X
Polytelis anthopeplus	Regent Parrot	LC	X				X
Trichoglossus haematodus	Rainbow Lorikeet	Introduced	X	X	X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Cuculidae Parasitic Cuckoos							
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC		X			X
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC		X		X	X
Chrysococcyx lucidus	Shining Bronze Cuckoo	LC		X	X		X
Cuculus pallidus	Pallid Cuckoo	LC					
Strigidae Hawk Owls							
Ninox novaeseelandiae	Boobook Owl	LC			X		
Tytonidae Barn Owls							
Tyto alba	Barn Owl	LC				X	X
Podargidae Frogmouths							
Podargus strigoides	Tawny Frogmouth	LC					X
Caprimulgidae Nightjars							
Eurostopodus argus	Spotted Nightjar	LC					X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Aegothelidae Owlet-nightjars							
Aegotheles cristatus	Australian Owlet-nightjar	LC			X		X
Halcyonidae Tree Kingfishers							
Dacelo novaeguineae	Laughing Kookaburra	Introduced	X		X	X	X
Todiramphus sanctus	Sacred Kingfisher	LC			X		X
Meropidae Bee-eaters							
Merops ornatus	Rainbow Bee-eater	S5 JA LC	X		X	X	X
Maluridae Fairy Wrens, GrassWrens							
Malurus splendens	Splendid Fairy-wren	Bh LC	X	X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces							
Acanthiza apicalis	Broad-tailed Thornbill	Bh LC	X		X	X	X
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Bh LC	X	X	X		X
Acanthiza inornata	Western Thornbill	Bh LC	X		X	X	X
Gerygone fusca	Western Gerygone	LC	X	X	X	X	X
Sericornis frontalis	White-browed Scrubwren	Bh LC			X	X	X
Smicrornis brevirostris	Weebill	Bh LC	X		X	X	X
Pardalotidae Pardalotes							
Pardalotus punctatus	Spotted Pardalote	LC			X		X
Pardalotus striatus	Striated Pardalote	LC	X	X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Meliphagidae Honeyeaters, Chats							
Acanthorhynchus superciliosus	Western Spinebill	LC	X	X	X		X
Anthochaera carunculata	Red Wattlebird	LC	X	X	X	X	X
Anthochaera lunulata	Western Little Wattlebird	Bp LC		X	X		X
Lichenostomus virescens	Singing Honeyeater	LC	X	X	X	X	
Lichmera indistincta	Brown Honeyeater	LC	X	X	X	X	X
Phylidonyris nigra	White-cheeked Honeyeater	Bp LC	X	X	X		
Phylidonyris novaehollandiae	New Holland Honeyeater	Bp LC	X	X	X	X	X
Petroicidae Australian Robins							
Petroica multicolor	Scarlet Robin	Bh LC	X			X	
Neosittidae Sitellas							
Daphoenositta chrysoptera	Varied Sittella	Bh LC			X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers							
Colluricincla harmonica	Grey Shrike-thrush	Bh LC	X	X	X	X	X
Pachycephala pectoralis	Golden Whistler	Bh LC	X	X			
Pachycephala rufiventris	Rufous Whistler	LC	X	X	X	X	X
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo							
Grallina cyanoleuca	Magpie-lark	LC	X	X	X	X	X
Rhipidura fuliginosa	Grey Fantail	LC	X		X	X	
Rhipidura leucophrys	Willie Wagtail	LC	X	X	X	X	X
Campephagidae Cuckoo-shrikes, Trillers							
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	X	X	X	X	X
Lalage tricolor	White-winged Triller	LC					

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Artamidae Woodswallows, Butcherbirds, Currawongs							
Artamus cinereus	Black-faced Woodswallow	Bp LC					X
Artamus cyanopterus	Dusky Woodswallow	Bp LC			X		X
Cracticidae Currawongs, Magpies & Butcherbirds							
Cracticus tibicen	Australian Magpie	LC	X	X	X	X	X
Cracticus torquatus	Grey Butcherbird	LC	X	X	X	X	X
Corvidae Ravens, Crows							
Corvus coronoides	Australian Raven	LC	X	X	X	X	X
Motacillidae Old World Pipits, Wagtails							
Anthus australis	Australian Pipit	LC				X	X
Dicaeidae Flowerpeckers							
Dicaeum hirundinaceum	Mistletoebird	LC					X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Hirundinidae Swallows, Martins							
Hirundo neoxena	Welcome Swallow	LC			X	X	X
Hirundo nigricans	Tree Martin	LC	X	X	X	X	
Sylviidae Old World Warblers							
Cincloramphus cruralis	Brown Songlark	LC					
Cincloramphus mathewsi	Rufous Songlark	LC					
Zosteropidae White-eyes							
Zosterops lateralis	Silvereye	LC	X	X	X	X	X
Mammalia							
Peramelidae Bandicoots							
Isoodon obesulus fusciventer	Southern Brown Bandicoot	P4 LC	X	X	X	X	X
Phalangeridae Brushtail Possums, Cuscuses							
Trichosurus vulpecula	Common Brushtail Possum	LC	X		X		X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Macropodidae Kangaroos, Wallabies							
Macropus fuliginosus	Western Grey Kangaroo	LC	X	X	X	X	X
Macropus irma	Western Brush Wallaby	P4 NT	X	X			X
Molossidae Freetail Bats							
Austronomus australis	White-striped Freetail-bat	LC		X	X		
Ozimops kitcheneri	South-western Freetail-bat	LC			X	X	
Vespertilionidae Ordinary Bats							
Chalinolobus gouldii	Gould's Wattled Bat	LC		X	X	X	X
Chalinolobus morio	Chocolate Wattled Bat	LC					X
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC			X		X
Nyctophilus gouldi	Gould's Long-eared Bat	LC					X
Nyctophilus major	Western Long-eared Bat	LC				X	X
Vespadelus regulus	Southern Forest Bat	LC		X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E
Muridae Rats, Mice							
Mus musculus	House Mouse	Introduced	X	X	X	X	X
Rattus rattus	Black Rat	Introduced		X	X	X	X
Canidae Dogs, Foxes							
Canis lupus familiaris	Dog	Introduced				X	
Vulpes vulpes	Red Fox	Introduced		X	X	X	X
Felidae Cats							
Felis catus	Cat	Introduced	X	X	X	X	X
Leporidae Rabbits, Hares							
Oryctolagus cuniculus	Rabbit	Introduced	X	X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

APPENDIX F SYSTEMATIC LIST OF FLORA SPECIES

*denotes introduced (weed) species

Family		Species
Aizoaceae	*	*Carpobrotus edulis*
Apiaceae		*Daucus glochidiatus*
Asparagaceae		*Chamaescilla corymbosa*
Asparagaceae		*Laxmannia squarrosa*
Asparagaceae		*Lomandra hermaphrodita*
Asparagaceae		*Lomandra sonderi*
Asparagaceae		*Lomandra* sp.
Asparagaceae		*Sowerbaea laxiflora*
Asparagaceae		*Thysanotus manglesianus*
Asteraceae	*	*Hypochaeris glabra*
Asteraceae		*Lagenifera huegelii*
Asteraceae		*Podolepis gracilis*
Asteraceae		*Podotheca gnaphalioides*
Asteraceae		*Siloxerus humifusus*
Asteraceae	*	*Sonchus asper*
Asteraceae	*	*Sonchus oleraceus*
Asteraceae	*	*Ursinia anthemoides*
Brassicaceae	*	*Raphanus raphanistrum*
Campanulaceae	*	*Wahlenbergia capensis*
Casuarinaceae		*Allocasuarina fraseriana*
Casuarinaceae		*Allocasuarina humilis*
Colchicaceae		*Burchardia congesta*
Cyperaceae		*Lepidosperma squamatum*
Cyperaceae		*Lepidosperma tenue*
Cyperaceae		*Mesomelaena pseudostygia*
Cyperaceae		*Schoenus clandestinus*
Cyperaceae		*Schoenus curvifolius*
Cyperaceae		*Tetraria octandra*
Dasypogonaceae		*Dasypogon bromeliifolius*
Dilleniaceae		*Hibbertia hypericoides*
Dilleniaceae		*Hibbertia subvaginata*
Droseraceae		*Drosera erythrorhiza*
Droseraceae		*Drosera menziesii*
Ericaceae		*Astroloma pallidum*
Ericaceae		*Conostephium minus*
Ericaceae		*Conostephium pendulum*
Ericaceae		*Leucopogon conostephioides*
Ericaceae		*Leucopogon propinquus*
Euphorbiaceae	*	*Euphorbia terracina*
Fabaceae		*Acacia huegelii*
Fabaceae		*Acacia pulchella*

Family		Species
Fabaceae		*Acacia stenoptera*
Fabaceae		*Acacia willdenowiana*
Fabaceae		*Bossiaea eriocarpa*
Fabaceae		*Daviesia nudiflora* subsp. *nudiflora*
Fabaceae		*Daviesia triflora*
Fabaceae		*Gompholobium tomentosum*
Fabaceae		*Hovea pungens*
Fabaceae		*Hovea trisperma*
Fabaceae		*Jacksonia furcellata*
Fabaceae		*Jacksonia sternbergiana*
Fabaceae	*	*Lupinus cosentinii*
Fabaceae	*	*Trifolium dubium*
Geraniaceae	*	*Pelargonium capitatum*
Goodeniaceae		*Dampiera linearis*
Goodeniaceae		*Scaevola canescens*
Haemodoraceae		*Anigozanthos humilis*
Haemodoraceae		*Conostylis aculeata*
Haemodoraceae		*Conostylis setosa*
Haemodoraceae		*Haemodorum laxum*
Hemerocallidaceae		*Corynotheca micrantha*
Hemerocallidaceae		*Tricoryne elatior*
Iridaceae	*	*Freesia alba x leichtlinii*
Iridaceae	*	*Gladiolus caryophyllaceus*
Iridaceae		*Patersonia occidentalis*
Lauraceae		*Cassytha racemosa*
Lecotheciaceae		*Babingtonia camphorosmae*
Loranthaceae		*Nuytsia floribunda*
Myrtaceae		*Calytrix depressa*
Myrtaceae		*Calytrix flavescens*
Myrtaceae		*Calytrix* sp.
Myrtaceae		*Chamelaucium uncinatum*
Myrtaceae		*Eremaea pauciflora* var. *pauciflora*
Myrtaceae		*Eucalyptus marginata*
Myrtaceae		*Hypocalymma robustum*
Myrtaceae		*Kunzea ericifolia*
Myrtaceae		*Kunzea glabrescens*
Myrtaceae		*Scholtzia involucrata*
Orchidaceae		*Caladenia* sp.
Orchidaceae	*	*Disa bracteata*
Orchidaceae		*Pterostylis sp.*
Orobanchaceae	*	*Orobanche minor*
Orobanchaceae		*Orobanche* sp.
Oxalidaceae	*	*Oxalis pes-caprae*
Papaveraceae	*	*Fumaria capreolata*

Family		Species
Poaceae		*Amphipogon turbinatus*
Poaceae		*Austrostipa elegantissima*
Poaceae	*	*Avena barbata*
Poaceae	*	*Briza maxima*
Poaceae	*	*Briza minor*
Poaceae	*	*Cynodon dactylon*
Poaceae	*	*Ehrharta calycina*
Poaceae	*	*Eragrostis curvula*
Poaceae	*	*Hordeum leporinum*
Poaceae	*	*Lagurus ovatus*
Poaceae		*Neurachne alopecuroidea*
Poaceae	*	*Pentameris airoides*
Poaceae		*Poa drummondiana*
Poaceae	*	*Vulpia myuros*
Primulaceae		*Lysimachia arvensis*
Proteaceae		*Adenanthos cygnorum*
Proteaceae		*Banksia attenuata*
Proteaceae		*Banksia dallanneyi*
Proteaceae		*Banksia ilicifolia*
Proteaceae		*Banksia menziesii*
Proteaceae		*Persoonia saccata*
Proteaceae		*Petrophile linearis*
Proteaceae		*Stirlingia latifolia*
Proteaceae		*Synaphea spinulosa*
Restionaceae		*Desmocladus fasciculatus*
Restionaceae		*Hypolaena exsulca*
Restionaceae		*Lyginia imberbis*
Restionaceae		*Meeboldina scariosa*
Rubiaceae		*Opercularia echinocephala*
Rutaceae		*Asterolasia pallida*
Santalaceae		*Leptomeria empetriformis*
Stylidiaceae		*Levenhookia stipitata*
Stylidiaceae		*Stylidium amoenum*
Stylidiaceae		*Stylidium repens*
Xanthorrhoeaceae		*Xanthorrhoea preissii*
Zamiaceae		*Macrozamia riedlei*

APPENDIX G FLORA SPECIES BY QUADRAT

*denotes introduced (weed) species

Family		Species	Quadrat/Relevé											
			F01	F02	F03	F04	F05	F06	F07	F08	F09	F10	F11	R01
Apiaceae		*Daucus glochidiatus*	+	+	+		+	+	+					
Asparagaceae		*Chamaescilla corymbosa*	+	+			+	+	+					
Asparagaceae		*Laxmannia squarrosa*	+	+	+			+						
Asparagaceae		*Lomandra hermaphrodita*	+	+	+	+	+	+	+					
Asparagaceae		*Lomandra sonderi*			+	+	+	+						
Asparagaceae		*Sowerbaea laxiflora*	+											
Asparagaceae		*Thysanotus manglesianus*		+				+	+					
Asteraceae	*	*Hypochaeris glabra*		+	+	+	+	+	+					
Asteraceae		*Lagenifera huegelii*				+								
Asteraceae		*Podolepis gracilis*			+			+						
Asteraceae		*Podotheca gnaphalioides*		+	+	+								
Asteraceae		*Siloxerus humifusus*			+	+	+	+	+					
Asteraceae	*	*Sonchus asper*				+								
Asteraceae	*	*Ursinia anthemoides*	+	+	+	+	+	+	+					
Campanulaceae	*	*Wahlenbergia capensis*		+	+	+								
Casuarinaceae		*Allocasuarina humilis*		4	12		3							
Colchicaceae		*Burchardia congesta*				+	+	+	+					
Cyperaceae		*Mesomelaena pseudostygia*	+	13	14		5	8	25					
Cyperaceae		*Schoenus clandestinus*		+	+	2			+					
Cyperaceae		*Schoenus curvifolius*	+			+	+		+					
Cyperaceae		*Tetraria octandra*						2						
Dasypogonaceae		*Dasypogon bromeliifolius*	+			+			+					
Dilleniaceae		*Hibbertia hypericoides*	15	15	18		10	10	20					
Droseraceae		*Drosera menziesii*	+				+							
Ericaceae		*Conostephium pendulum*	+			+	+	+	+					
Ericaceae		*Leucopogon conostephioides*	+	+		+	+	+						
Ericaceae		*Leucopogon propinquus*						+						
Fabaceae		*Acacia huegelii*	+		+									
Fabaceae		*Acacia stenoptera*				+								
Fabaceae		*Bossiaea eriocarpa*	+				+	+						
Fabaceae		*Daviesia triflora*	+	+										
Fabaceae		*Gompholobium tomentosum*	+	+	+		+	+						
Fabaceae		*Hovea pungens*		+										
Fabaceae		*Hovea trisperma*				+	+							
Fabaceae		*Jacksonia furcellata*	+						+					
Fabaceae	*	*Trifolium dubium*					+							
Goodeniaceae		*Dampiera lindleyi*				+								
Goodeniaceae		*Dampiera linearis*			+		+							
Goodeniaceae		*Scaevola canescens*			+									
Haemodoraceae		*Conostylis aculeata*		+	+	+	+							

Family		Species	Quadrat/Relevé											
			F01	F02	F03	F04	F05	F06	F07	F08	F09	F10	F11	R01
Haemodoraceae		*Conostylis setosa*	+	+	+	+	+	+	+					
Hemerocallidaceae		*Corynotheca micrantha*	3											
Hemerocallidaceae		*Tricoryne elatior*	+			+	+	+						
Iridaceae	*	*Gladiolus caryophyllaceus*	+	+	+	+	+	+	+					
Iridaceae		*Patersonia occidentalis*	+		+			+						
Lauraceae		*Cassytha racemosa*					+							
Lecotheciaceae		*Babingtonia camphorosmae*				+								
Loranthaceae		*Nuytsia floribunda*		+										
Myrtaceae		*Calytrix flavescens*	+	+			+	+	+					
Myrtaceae		*Eremaea pauciflora* var. *pauciflora*	10	12	15	20	20							
Myrtaceae		*Eucalyptus marginata*						30						
Myrtaceae		*Hypocalymma robustum*	2	+	+	+	+	+	+					
Myrtaceae		*Scholtzia involucrata*		+										
Orchidaceae		*Caladenia* sp.							+					
Orchidaceae	*	*Disa bracteata*	+											
Orchidaceae		*Pterostylis* sp.							+					
Orobanchaceae	*	*Orobanche minor*	+											
Poaceae		*Amphipogon turbinatus*	7	10	5	+		2	5					
Poaceae		*Austrostipa elegantissima*	+	+	+									
Poaceae	*	*Avena barbata*				+	+							
Poaceae	*	*Briza maxima*	+	+	+	+	+	+	+					
Poaceae	*	*Briza minor*	+						+					
Poaceae	*	*Cynodon dactylon*	+											
Poaceae	*	*Ehrharta calycina*	+	+		+	+	+	+					
Poaceae	*	*Pentameris airoides*		+	+	+		+	+					
Poaceae		*Poa drummondiana*				+			+					
Poaceae	*	*Vulpia myuros*				+	+							
Primulaceae		*Lysimachia arvensis*			+	+	+							
Proteaceae		*Banksia attenuata*	7	3	1	1	8	5	10					
Proteaceae		*Banksia dallanneyi*				4		+						
Proteaceae		*Banksia ilicifolia*					+							
Proteaceae		*Banksia menziesii*	25	10	5	10	5		20					
Proteaceae		*Petrophile linearis*	+	+			+	+	+					
Proteaceae		*Stirlingia latifolia*	3		+	+	+		+					
Restionaceae		*Desmocladus fasciculatus*	+			3	+							
Restionaceae		*Lyginia imberbis*	5	2		2	1	1						
Santalaceae		*Leptomeria empetriformis*		+					+					
Stylidiaceae		*Levenhookia stipitata*	+	+	+			+	+					
Stylidiaceae		*Stylidium amoenum*	+	+	+	+	+	+	+					
Stylidiaceae		*Stylidium repens*	+	+	+		+		+					
Xanthorrhoeaceae		*Xanthorrhoea preissii*	4	2		10	8	15	8					
Zamiaceae		*Macrozamia riedlei*						5						

APPENDIX H VEGETATION QUADRAT DATA

Site F01

Date	25/10/2017
Botanist	Gabriela Martinez and Lisa Chappell
Quadrat Size	10 x 10 m
NW Corner Coordinates	391232mE 6439278mN
Slope	Gentle
Landform	Mid slope
Soil Colour	Pale Grey
Soil Type	sand
Litter	30%
Bare Ground	2%
Fire Age	>10yrs
Vegetation Condition	Good-Very Good
Disturbances/Impacts	weeds, possible dieback

	Species	Cover (%)	Height (m)
	Banksia menziesii	25	8
	Banksia attenuata	7	4
	Eremaea pauciflora var. *pauciflora*	10	1.1
	Xanthorrhoea preissii	4	1.3
	Hibbertia hypericoides	15	0.8
	Hypocalymma robustum	2	0.6
	Stirlingia latifolia	3	0.7
	Amphipogon turbinatus	7	0.3
	Corynotheca micrantha	3	0.3
	Lyginia imberbis	5	0.3
	Acacia huegelii	+	
	Austrostipa elegantissima	+	
	Bossiaea eriocarpa	+	
*	*Briza maxima*	+	
*	*Briza minor*	+	
	Calytrix flavescens	+	
	Chamaescilla corymbosa	+	
	Conostephium pendulum	+	
	Conostylis setosa	+	
*	*Cynodon dactylon*	+	
	Dasypogon bromeliifolius	+	
	Daucus glochidiatus	+	
	Daviesia triflora	+	
	Desmocladus fasciculatus	+	
*	*Disa bracteata*	+	
	Drosera menziesii	+	
*	*Ehrharta calycina*	+	
	Gompholobium tomentosum	+	
	Jacksonia furcellata	+	
	Laxmannia squarrosa	+	
	Leucopogon conostephioides	+	
	Levenhookia stipitata	+	
	Lomandra hermaphrodita	+	
	Mesomelaena pseudostygia	+	
*	*Orobanche minor*	+	
	Patersonia occidentalis	+	
	Petrophile linearis	+	
	Schoenus curvifolius	+	
	Sowerbaea laxiflora	+	
	Stylidium amoenum	+	
	Stylidium repens	+	
	Tricoryne elatior	+	
*	*Ursinia anthemoides*	+	

Site F02

Date	25/10/2017
Botanist	Gabriela Martinez and Lisa Chappell
Quadrat Size	10 x 10 m
NW Corner Coordinates	391129mE 6439191mN
Slope	Gentle
Landform	Mid slope
Soil Colour	Pale Grey
Soil Type	sand
Litter	15%
Bare Ground	15%
Fire Age	5-10yrs
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	weeds, possible dieback

	Species	Cover (%)	Height (m)
	Banksia menziesii	10	6
	Banksia attenuata	3	4
	Allocasuarina humilis	4	1.1
	Eremaea pauciflora var. *pauciflora*	12	1.1
	Xanthorrhoea preissii	2	1.4
	Hibbertia hypericoides	15	0.6
	Mesomelaena pseudostygia	13	0.8
	Amphipogon turbinatus	10	0.3
	Lyginia imberbis	2	0.3
	Austrostipa elegantissima	+	
*	*Briza maxima*	+	
	Calytrix flavescens	+	
	Chamaescilla corymbosa	+	
	Conostylis aculeata	+	
	Conostylis setosa	+	
	Daucus glochidiatus	+	
	Daviesia triflora	+	
*	*Ehrharta calycina*	+	
*	*Gladiolus caryophyllaceus*	+	
	Gompholobium tomentosum	+	
	Hovea pungens	+	
	Hypocalymma robustum	+	
*	*Hypochaeris glabra*	+	
	Laxmannia squarrosa	+	
	Leptomeria empetriformis	+	
	Leucopogon conostephioides	+	
	Levenhookia stipitata	+	
	Lomandra hermaphrodita	+	
	Nuytsia floribunda	+	
*	*Pentameris airoides*	+	
	Petrophile linearis	+	
	Podotheca gnaphalioides	+	
	Schoenus clandestinus	+	
	Scholtzia involucrata	+	
	Stylidium amoenum	+	
	Stylidium repens	+	
	Thysanotus manglesianus	+	
*	*Ursinia anthemoides*	+	
*	*Wahlenbergia capensis*	+	

Site F03

Date	25/10/2017
Botanist	Gabriela Martinez and Lisa Chappell
Quadrat Size	10 x 10 m
NW Corner Coordinates	390910mE 6439206mN
Slope	Gentle
Landform	Mid slope
Soil Colour	Pale Grey
Soil Type	sand
Litter	2%
Bare Ground	15%
Fire Age	>10yrs
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	weeds, possible dieback

	Species	Cover (%)	Height (m)
	Banksia attenuata	1	3
	Banksia menziesii	5	2.5
	Allocasuarina humilis	12	1.7
	Eremaea pauciflora var. *pauciflora*	15	0.8
	Hibbertia hypericoides	18	0.8
	Mesomelaena pseudostygia	14	0.8
	Amphipogon turbinatus	5	0.3
	Acacia huegelii	+	
	Austrostipa elegantissima	+	
*	*Briza maxima*	+	
	Calandrinia tholiformis	+	
	Conostylis aculeata	+	
	Conostylis setosa	+	
	Dampiera linearis	+	
	Daucus glochidiatus	+	
	Eremaea pauciflora	+	
*	*Gladiolus caryophyllaceus*	+	
	Gompholobium tomentosum	+	
	Hypocalymma robustum	+	
*	*Hypochaeris glabra*	+	
	Laxmannia squarrosa	+	
	Levenhookia stipitata	+	
	Lomandra hermaphrodita	+	
	Lomandra sonderi	+	
	Lysimachia arvensis	+	
	Patersonia occidentalis	+	
*	*Pentameris airoides*	+	
	Podolepis gracilis	+	
	Podotheca gnaphalioides	+	
	Scaevola canescens	+	
	Schoenus clandestinus	+	
	Siloxerus humifusus	+	
	Stirlingia latifolia	+	
	Stylidium amoenum	+	
	Stylidium repens	+	
*	*Ursinia anthemoides*	+	
*	*Wahlenbergia capensis*	+	

Site F04

Date	25/10/2017
Botanist	Gabriela Martinez and Lisa Chappell
Quadrat Size	10 x 10 m
NW Corner Coordinates	390816mE 6439059mN
Slope	Flat
Landform	Lower slope
Soil Colour	Pale Grey
Soil Type	sand
Litter	4%
Bare Ground	6%
Fire Age	5-10yrs
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	weeds, possible dieback

	Species	Cover (%)	Height (m)
	Banksia menziesii	10	9
	Banksia attenuata	1	1.2
	Xanthorrhoea preissii	10	1.5
	Eremaea pauciflora var. *pauciflora*	20	0.8
	Banksia dallanneyi	4	0.2
	Desmocladus fasciculatus	3	0.3
	Lyginia imberbis	2	0.4
	Schoenus clandestinus	2	0.05
	Acacia stenoptera	+	
	Amphipogon turbinatus	+	
*	*Avena barbata*	+	
	Babingtonia camphorosmae	+	
*	*Briza maxima*	+	
	Burchardia congesta	+	
	Conostephium pendulum	+	
	Conostylis aculeata	+	
	Conostylis setosa	+	
	Dampiera lindleyi	+	
	Dasypogon bromeliifolius	+	
*	*Ehrharta calycina*	+	
*	*Gladiolus caryophyllaceus*	+	
	Hovea trisperma	+	
	Hypocalymma robustum	+	
*	*Hypochaeris glabra*	+	
	Lagenifera huegelii	+	
	Leucopogon conostephioides	+	
	Lomandra hermaphrodita	+	
	Lomandra sonderi	+	
	Lysimachia arvensis	+	
*	*Pentameris airoides*	+	
	Poa drummondiana	+	
	Podotheca gnaphalioides	+	
	Schoenus curvifolius	+	
	Siloxerus humifusus	+	
*	*Sonchus asper*	+	
	Stirlingia latifolia	+	
	Stylidium amoenum	+	
	Tricoryne elatior	+	
*	*Ursinia anthemoides*	+	
*	*Vulpia myuros*	+	
*	*Wahlenbergia capensis*	+	

Site F05

Date	25/10/2017
Botanist	Gabriela Martinez and Lisa Chappell
Quadrat Size	10 x 10 m
NW Corner Coordinates	390981mE 6439093mN
Slope	Gentle
Landform	Mid slope
Soil Colour	Pale Grey
Soil Type	sand
Litter	10%
Bare Ground	15%
Fire Age	5-10yrs
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	weeds, senescence

	Species	Cover (%)	Height (m)
	Banksia menziesii	5	6
	Banksia attenuata	8	5
	Allocasuarina humilis	3	2
	Xanthorrhoea preissii	8	1.5
	Eremaea pauciflora var. pauciflora	20	1
	Hibbertia hypericoides	10	0.8
	Mesomelaena pseudostygia	5	0.5
	Lyginia imberbis	1	0.4
*	*Avena barbata*	+	
	Banksia ilicifolia	+	
	Bossiaea eriocarpa	+	
*	*Briza maxima*	+	
	Burchardia congesta	+	
	Calytrix flavescens	+	
	Cassytha racemosa	+	
	Chamaescilla corymbosa	+	
	Conostephium pendulum	+	
	Conostylis aculeata	+	
	Conostylis setosa	+	
	Dampiera linearis	+	
	Daucus glochidiatus	+	
	Desmocladus fasciculatus	+	
	Drosera menziesii	+	
*	*Ehrharta calycina*	+	
*	*Gladiolus caryophyllaceus*	+	
	Gompholobium tomentosum	+	
	Hovea trisperma	+	
	Hypocalymma robustum	+	
*	*Hypochaeris glabra*	+	
	Leucopogon conostephioides	+	
	Lomandra hermaphrodita	+	
	Lomandra sonderi	+	
	Lysimachia arvensis	+	
	Petrophile linearis	+	
	Schoenus curvifolius	+	
	Siloxerus humifusus	+	
	Stirlingia latifolia	+	
	Stylidium amoenum	+	
	Stylidium repens	+	
	Tricoryne elatior	+	
*	*Trifolium dubium*	+	
*	*Ursinia anthemoides*	+	
*	*Vulpia myuros*	+	

Site F06

Date	25/10/2017
Botanist	Gabriela Martinez and Lisa Chappell
Quadrat Size	10 x 10 m
NW Corner Coordinates	390934mE 6438979mN
Slope	Gentle
Landform	Mid slope
Soil Colour	Pale Grey
Soil Type	sand
Litter	25%
Bare Ground	5%
Fire Age	5-10yrs
Vegetation Condition	Good
Disturbances/Impacts	weeds, senescence, tracks

	Species	Cover (%)	Height (m)
	Banksia attenuata	5	4
	Eucalyptus marginata	30	6
	Macrozamia riedlei	5	2
	Xanthorrhoea preissii	15	3
	Hibbertia hypericoides	10	0.7
	Lyginia imberbis	1	0.6
	Mesomelaena pseudostygia	8	0.8
	Amphipogon turbinatus	2	0.4
	Tetraria octandra	2	0.4
	Banksia dallanneyi	+	
	Bossiaea eriocarpa	+	
*	*Briza maxima*	+	
	Burchardia congesta	+	
	Calytrix flavescens	+	
	Chamaescilla corymbosa	+	
	Conostephium pendulum	+	
	Conostylis setosa	+	
	Daucus glochidiatus	+	
*	*Ehrharta calycina*	+	
*	*Gladiolus caryophyllaceus*	+	
	Gompholobium tomentosum	+	
	Hypocalymma robustum	+	
*	*Hypochaeris glabra*	+	
	Laxmannia squarrosa	+	
	Leucopogon conostephioides	+	
	Leucopogon propinquus	+	
	Levenhookia stipitata	+	
	Lomandra hermaphrodita	+	
	Lomandra sonderi	+	
	Patersonia occidentalis	+	
*	*Pentameris airoides*	+	
	Petrophile linearis	+	
	Podolepis gracilis	+	
	Siloxerus humifusus	+	
	Stylidium amoenum	+	
	Thysanotus manglesianus	+	
	Tricoryne elatior	+	
*	*Ursinia anthemoides*	+	

Site F07

Date	25/10/2017
Botanist	Gabriela Martinez and Lisa Chappell
Quadrat Size	10 x 10 m
NW Corner Coordinates	390993mE 6439010mN
Slope	Flat
Landform	Mid slope
Soil Colour	Pale Grey
Soil Type	sand
Litter	25%
Bare Ground	5%
Fire Age	5-10yrs
Vegetation Condition	Very Good-Excellent
Disturbances/Impacts	weeds, senescence

	Species	Cover (%)	Height (m)
	Banksia menziesii	20	6
	Banksia attenuata	10	4
	Xanthorrhoea preissii	8	1.8
	Hibbertia hypericoides	20	0.6
	Mesomelaena pseudostygia	25	0.7
	Amphipogon turbinatus	5	0.3
*	*Briza maxima*	+	
*	*Briza minor*	+	
	Burchardia congesta	+	
	Caladenia sp.	+	
	Calytrix flavescens	+	
	Chamaescilla corymbosa	+	
	Conostephium pendulum	+	
	Conostylis setosa	+	
	Dasypogon bromeliifolius	+	
	Daucus glochidiatus	+	
*	*Ehrharta calycina*	+	
*	*Gladiolus caryophyllaceus*	+	
	Hypocalymma robustum	+	
*	*Hypochaeris glabra*	+	
	Jacksonia furcellata	+	
	Leptomeria empetriformis	+	
	Levenhookia stipitata	+	
	Lomandra hermaphrodita	+	
*	*Pentameris airoides*	+	
	Petrophile linearis	+	
	Poa drummondiana	+	
	Pterostylis sp.	+	
	Schoenus clandestinus	+	
	Schoenus curvifolius	+	
	Siloxerus humifusus	+	
	Stirlingia latifolia	+	
	Stylidium amoenum	+	
	Stylidium repens	+	
	Thysanotus manglesianus	+	
*	*Ursinia anthemoides*	+	

Site F08

Date	6/13/2018
Botanist	Lisa Chappell and Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	391311mE 6439008mN
Slope	Flat
Landform	Mid slope
Soil Colour	Pale Brown
Soil Type	Sand
Litter	6%
Bare Ground	2%
Fire Age	>10yrs
Vegetation Condition	Very Good
Weed Cover	1%
Disturbances/Impacts	Na

	Species	Cover (%)	Height (m)
	Banksia attenuata	9	6
	Jacksonia furcellata	1	5
	Banksia menziesii	2	4
	Kunzea glabrescens	3.5	3
	Xanthorrhoea preissii	5	1.5
	Hypocalymma robustum	2	1
	Hibbertia hypericoides	15	0.8
	Mesomelaena pseudostygia	12	0.8
	Gompholobium tomentosum	2	0.7
	Amphipogon turbinatus	10	0.3
	Banksia dallanneyi	5	0.3
	Desmocladus fasciculatus	2	0.3
	Acacia willdenowiana	+	
*	*Briza minor*	+	
	Conostylis setosa	+	
	Corynotheca micrantha	+	
	Daucus glochidiatus	+	
	Daviesia nudiflora subsp. *nudiflora*	+	
	Drosera erythrorhiza	+	
	Drosera menziesii	+	
	Lepidosperma squamatum	+	
	Petrophile linearis	+	
	Poa drummondiana	+	
	Scaevola canescens	+	
	Stirlingia latifolia	+	
	Stylidium amoenum	+	
	Stylidium repens	+	
	Tetraria octandra	+	
	Hovea trisperma	ass	

Site F09

Date	6/13/2018
Botanist	Lisa Chappell and Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	391155mE 6439141mN
Slope	Flat
Landform	Mid slope
Soil Colour	Pale Brown
Soil Type	Sand
Litter	6%
Bare Ground	4%
Fire Age	>10yrs
Vegetation Condition	Very Good-Excellent
Weed Cover	1%
Disturbances/Impacts	Na

	Species	Cover (%)	Height (m)
	Banksia menziesii	20	5
	Nuytsia floribunda	6	5
	Banksia attenuata	3	4
	Allocasuarina humilis	3	1.2
	Xanthorrhoea preissii	5	1
	Hibbertia hypericoides	15	0.8
	Mesomelaena pseudostygia	8	0.8
	Amphipogon turbinatus	10	0.2
	Poa drummondiana	8	0.05
	Acacia pulchella	+	
	Daucus glochidiatus	+	
	Daviesia nudiflora subsp. *nudiflora*	+	
	Drosera erythrorhiza	+	
	Eremaea pauciflora var. *pauciflora*	+	
*	*Gladiolus caryophyllaceus*	+	
	Hypocalymma robustum	+	
	Lomandra hermaphrodita	+	
	Meeboldina scariosa	+	
	Stirlingia latifolia	+	
	Stylidium amoenum	+	
	Stylidium repens	+	
	Tetraria octandra	+	
*	*Briza minor*	ass	
*	*Carpobrotus edulis*	ass	
	Conostephium pendulum	ass	
	Dasypogon bromeliifolius	ass	
	Desmocladus fasciculatus	ass	
	Drosera menziesii	ass	
*	*Ehrharta calycina*	ass	
	Eucalyptus marginata	ass	
	Jacksonia furcellata	ass	
	Petrophile linearis	ass	

Site F10

Date	6/13/2018
Botanist	Lisa Chappell and Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	390747mE 6439284mN
Slope	Gentle
Landform	Mid slope
Soil Colour	White
Soil Type	Sand
Litter	5%
Bare Ground	2%
Fire Age	>10yrs
Vegetation Condition	Very Good-Excellent
Weed Cover	1%
Disturbances/Impacts	Rubbish Rabbits

	Species	Cover (%)	Height (m)
	Allocasuarina fraseriana	2	6
	Banksia attenuata	5	5
	Banksia menziesii	8	5
	Eremaea pauciflora var. *pauciflora*	20	1.5
	Xanthorrhoea preissii	6	1.5
	Allocasuarina humilis	8	1.2
	Lyginia imberbis	20	0.8
	Hibbertia hypericoides	5	0.5
	Mesomelaena pseudostygia	2	0.4
	Acacia willdenowiana	+	
*	*Briza maxima*	+	
	Burchardia congesta	+	
	Conostephium minus	+	
	Conostephium pendulum	+	
	Conostylis setosa	+	
	Daucus glochidiatus	+	
	Drosera erythrorhiza	+	
*	*Gladiolus caryophyllaceus*	+	
	Hovea trisperma	+	
	Lomandra hermaphrodita	+	
	Lomandra sonderi	+	
	Lomandra sp.	+	
	Patersonia occidentalis	+	
	Schoenus curvifolius	+	
	Tetraria octandra	+	
	Acacia huegelii	ass	
	Acacia pulchella	ass	
	Amphipogon turbinatus	ass	
	Banksia dallanneyi	ass	
	Calytrix sp.	ass	
*	*Carpobrotus edulis*	ass	
	Dasypogon bromeliifolius	ass	
	Daviesia triflora	ass	
	Gompholobium tomentosum	ass	
	Hypocalymma robustum	ass	
	Petrophile linearis	ass	
	Stirlingia latifolia	ass	
*	*Ursinia anthemoides*	ass	

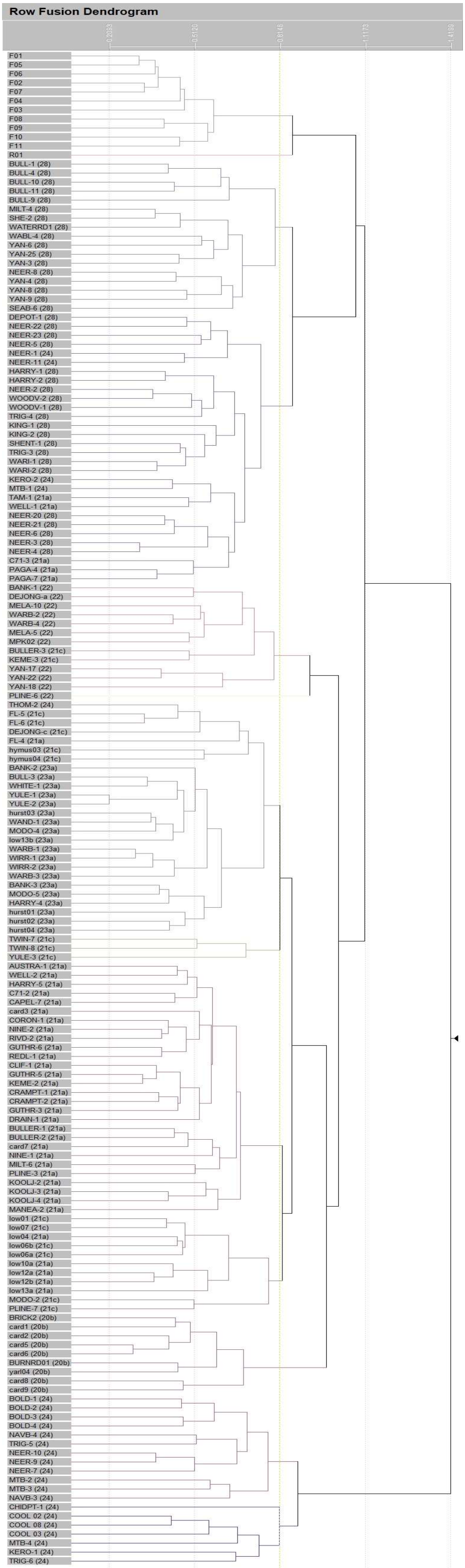
Site F11

Date	6/13/2018
Botanist	Lisa Chappell and Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	390751mE 6439284mN
Slope	Gentle
Landform	Mid slope
Soil Colour	White
Soil Type	Sand
Litter	3%
Bare Ground	5%
Fire Age	>10yrs
Vegetation Condition	Very Good
Weed Cover	3%
Disturbances/Impacts	Weed,Road,possible dieback

	Species	Cover (%)	Height (m)
	Banksia attenuata	10	5
	Banksia menziesii	5	4
	Xanthorrhoea preissii	5	1.5
	Eremaea pauciflora var. pauciflora	15	1
	Hibbertia hypericoides	12	1
	Lyginia imberbis	18	0.8
	Desmocladus fasciculatus	5	0.4
	Allocasuarina fraseriana	+	
	Amphipogon turbinatus	+	
	Astroloma pallidum	+	
	Banksia dallanneyi	+	
*	*Briza maxima*	+	
	Calytrix sp.	+	
*	*Carpobrotus edulis*	+	
	Conostephium pendulum	+	
	Conostylis aculeata	+	
	Conostylis setosa	+	
	Daucus glochidiatus	+	
	Daviesia triflora	+	
*	*Gladiolus caryophyllaceus*	+	
	Gompholobium tomentosum	+	
	Hypocalymma robustum	+	
	Lepidosperma tenue	+	
	Lomandra hermaphrodita	+	
	Lomandra sp.	+	
	Mesomelaena pseudostygia	+	
	Neurachne alopecuroidea	+	
*	*Orobanche* sp.	+	
	Persoonia saccata	+	
	Petrophile linearis	+	
	Tetraria octandra	+	
	Burchardia congesta	ass	
	Dampiera linearis	ass	
	Drosera menziesii	ass	
	Scaevola canescens	ass	
	Stirlingia latifolia	ass	

APPENDIX I FCT DENDROGRAM

Row Fusion Dendrogram



APPENDIX J BANKSIA WOODLAND HABITAT QUALITY SCORE SCALE

Aspect	Description	Potential Scores
Condition	Keighery (1994) average condition rating: • Pristine (4) • Excellent (3) • Very Good (2) • Good (1) • Degraded or poorer (0)	4, 3, 2, 1, or 0, respectively
Context	• Banksia woodland within the site is part of a large patch equal to or greater than 100 ha and is therefore of regional importance (1) • Banksia woodland within the site is not part of patch that is greater than 100 ha (0)	1 or 0, respectively
	• Banksia woodland within the site represents or is part of an isolated patch that is significant in the local region due to being the only representation within a 15 km radius (1) • Banksia woodland within the site does not represent, nor is it part of an isolated patch as there are other representations of Banksia woodland within a 15 km radius (0)	1 or 0, respectively
Stocking rate	Site (or Banksia woodland patch) size: • large (>100 ha) (3) • medium (20-100 ha) (2) • small (1-19 ha) (1) • very small (<1 ha) (0) *OR* Area to boundary ratio: • large (>100:1) (3) • medium (20-100:1) (2) • small (5-100:1) (1) • very small (<5:1) (0)	3, 2, 1, 0, respectively
	Site (or Banksia woodland patch) supports: • one or more floristic community types that are highly restricted, under threat and listed in Western Australia as a TEC or PEC (1) • floristic community types (or one floristic community type) that are not listed in Western Australia as a TEC or PEC (0)	1 or 0, respectively
Total possible score		**10**