

7.3 Fauna

7.3.1 Level 1 Fauna Survey

7.3.1.1 Fauna Inventory

Thirty-seven vertebrate fauna species were recorded within the survey area during the field survey. This comprised four reptile, one amphibian, six mammal and 26 bird species. The observed species are presented in Table 21.

7.3.1.2 Conservation Significant Fauna Species

Six of the 37 vertebrate fauna species recorded were of conservation significance, including five bird and one mammal species. These include:

- Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii* (listed as Vulnerable under the EPBC Act and the BC Act). Refer to Section 7.4 for further details.
- Carnaby's Cockatoo *Calyptorhynchus latirostris* (listed as Endangered under the EPBC Act and the BC Act). Refer to Section 7.4 for further details.
- Baudin's Cockatoo *Calyptorhynchus baudinii* (listed as Endangered under the EPBC Act and the BC Act). Refer to Section 7.4 for further details.
- Quenda *Isoodon fusciventer* (listed as Priority 4 by DBCA) recorded directly and indirectly (scat and diggings) within the survey area. Refer to Plate 3 for photographs of typical conical shaped diggings recorded within the survey area.
- Magpie Lark *Grallina cyanoleuca* and Rainbow Bee-Eater *Merops ornatus* (listed as Marine under the EPBC Act). Species listed as Marine under the EPBC Act are considered significant in Commonwealth land and as the survey area does not contain Commonwealth land these species will not be further discussed within the report.

Refer to Table 16 and Appendix A for further detail on these conservation significant species. Based on the habitat present, all ten species identified within the desktop assessment as “likely to occur” or “may occur” retain their previously determined likelihood of occurrence. Potentially suitable habitat for these species occurring within the survey area are described in Table 22.

Table 21 Fauna species recorded within the survey area

Species	Vernacular	Status	Observations
Birds			
<i>Anthochaera carunculata</i>	Red Wattlebird	Native	Commonly observed throughout survey area
<i>Ardea pacifica</i>	White-necked Heron	Native	Observed in southern wetland
<i>Platycercus zonarius</i>	Australian Ringneck	Native	Commonly observed throughout and flying over the survey area
<i>Cacatua sanguinea</i>	Little Corella	Native	Observed flying over survey area
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	Native	Direct observations and foraging evidence recorded throughout survey area
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	Native	Direct observations and foraging evidence recorded throughout survey area
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	Native	Direct observations and foraging evidence recorded throughout survey area
<i>Chenonetta jubata</i>	Australian Wood Duck	Native	Pair observed in southern wetland
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	Native	Observed in Marri trees in southern section of survey area
<i>Corvus coronoides</i>	Australian Raven	Native	Commonly observed throughout survey area
<i>Cracticus tibicen</i>	Australian Magpie	Native	Commonly observed throughout survey area
<i>Cacatua roseicapilla</i>	Galah	Native	Commonly observed throughout and flying over the survey area
<i>Gerygone fusca</i>	Western Gerygone	Native	Commonly seen and heard throughout the survey area
<i>Grallina cyanoleuca</i>	Magpie Lark	Native	Commonly observed throughout and flying over the survey area
<i>Gavicalis virescens</i>	Singing Honeyeater	Native	Commonly observed throughout survey area
<i>Merops ornatus</i>	Rainbow Bee-eater	Native	Heard in survey area
<i>Pardalotus striatus</i>	Striated Pardalote	Native	Observed and heard several times in the survey area
<i>Petrochelidon ariel</i>	Fairy Martin	Native	Observed several times flying over southern survey area and nesting in powerlines
<i>Petroica boodang</i>	Scarlet Robin	Native	Observed in Marri woodland in central survey area
<i>Phaps chalcoptera</i>	Common Bronzewing	Native	Observed in suburban planted vegetation to north of survey area
<i>Platycercus spurius</i>	Red-capped Parrot	Native	Two birds observed in Marri tree
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Native	Observed in suburban planted vegetation to north of survey area
<i>Rhipidura leucophrys</i>	Willie Wagtail	Native	Commonly observed throughout survey area
<i>Smicromnis brevirostris</i>	Weebil	Native	Observed within survey area
<i>Todiramphus sanctus</i>	Sacred Kingfisher	Native	Recorded twice in Marri trees in southern section of survey area
<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	Introduced	Commonly observed throughout survey area

Species	Vernacular	Status	Observations
Mammals			
<i>Canis familiaris</i>	Dog	Introduced	Scat observed within survey area
<i>Isoodon fusciventer</i>	Southern Brown Bandicoot	Native	Scat, diggings and individuals observed several times throughout survey area
<i>Equus caballus</i>	Horse	Introduced	Observed in paddocks
<i>Felis catus</i>	Cat	Introduced	Prints observed in several areas
<i>Oryctolagus cuniculus</i>	Rabbit	Introduced	Scat and diggings observed throughout survey area
<i>Vulpes vulpes</i>	Fox	Introduced	Fox dens and scat observed several times throughout survey area
Reptiles			
<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink	Native	Observed on fallen tree in survey area
<i>Egernia kingii</i>	King's Skink	Native	Observed in Marri woodland in central survey area
<i>Pseudonaja affinis affinis</i>	Dugite	Native	Observed in southern and central survey area
<i>Tiliqua rugosa</i>	Bobtail Lizard	Native	Observed twice in survey area
Amphibians			
<i>Crinia glauerti</i>	Clicking Froglet	Native	Heard several times in drainage lines throughout survey area



Plate 3 Typical conical shaped Southern Brown Bandicoot diggings

7.3.1.3 Introduced Species

Six introduced and naturalised exotic species were recorded during the field survey. The species and their legal status under the BAM Act are listed below:

- Cat *Felis catus* – Permitted – s11
- Dog *Canis familiaris* – the domestic dog is Permitted – s11; the feral dog is Declared Pest - s22(2) (C3 Exempt)
- Horse *Equus caballus* - Permitted - s11
- European Wild Rabbit *Oryctolagus cuniculus* – Declared Pest – s22(2) (C3 Prohibited)
- Rainbow Lorikeet *Trichoglossus haematodus* - Declared Pest - s22(2) (C3 Exempt)
- Red Fox *Vulpes vulpes* - Declared Pest – s22(2) (C3 Prohibited).

The Rabbit, Feral Dog, Fox and Rainbow Lorikeet are listed as Declared Pests under the BAM Act. Generally, these species were recorded sporadically throughout the survey area and were observed directly, or identified by tracks, scats and burrows.

Refer to Section 3.0 for explanations of BAM Act categories.

7.3.2 Fauna Habitat

The survey area is a north-south corridor approximately 11 km in length, and generally 50 – 100 m in width, though it contains several short east-west sections. The survey area follows the rail line and major arterial roads and much of the area is either cleared or hardstand. It generally contains fauna habitats surrounding and impacted by clearing and edge effects, though it does still contain several smaller areas of good quality fauna habitat.

Seven (including Cleared) broadly defined fauna habitats have been mapped within the survey area (Table 22 and Figure 4). Other than cleared areas, the most common fauna habitat is the Eucalypt Woodland. This habitat is highly variable generally contains Marri *Corymbia calophylla* over an open shrubland over an open sedge layer. It also contains smaller areas with scattered large introduced eucalypts and Sheoak. Significant habitat characteristics include; bare ground is common, trees contain small (common) and large (rare to occasional) hollows, dense understorey is occasionally present, various sizes of logs are present (generally common), as are decorticated bark and a coarse and fine leaf litter. Habitat quality is considered high to moderate depending on the levels of degradation and modification, and the levels of complexity.

The Eucalypt Woodland habitat occupies 12.07 ha (12%) of the survey area. This habitat may be utilised as breeding, roosting and foraging habitat by the Forest Red-tailed Black Cockatoo *Calyptrorhynchus banksii naso*, Carnaby's Cockatoo *Calyptrorhynchus latirostris* and Baudin's Cockatoo (*Calyptrorhynchus baudinii*) depending on tree species present, provides potential habitat for the South-western Brush-tailed Phascogale *Phascogale tapoatafa wambenger*, Quenda *Isodon fusciventer* and Peregrine Falcon *Falco peregrinus*, and provides marginal habitat for the Chuditch *Dasyurus geoffroyi* and Inornate Trapdoor Spider *Euoplos inornatus*. This habitat is also likely to be utilised by many of the common fauna species in the area.


Table 22 describes these fauna habitats, includes the area and percentage these cover within the survey area, and the conservation significant fauna species with potential to utilise these habitats.


7.3.3 Fauna Habitat Linkages


Habitat linkages are typically areas or corridors of vegetation that link (larger) areas of fauna habitat. Linkages are important as they enable fauna to move freely between remnant bushland patches, therefore increasing gene-flow between populations. A study conducted by Gilbert *et al.* (1998) found that corridors and/or linkages do maintain species richness in the fragmented landscapes.



The survey area is located on the edge of a metropolitan area with significant amounts of cleared and highly modified land. Although the survey area does not appear to contain any significant linkages, it does contain several degraded drainage lines that may enable some taxa to move through the area. It also sits adjacent Brickwood Reserve and may enable some gene flow through this area, although there are major roads between the survey area and Brickwood Reserve.



Table 22 Fauna habitats of the survey area


Description	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	% of survey area	Photograph
<p>Scattered Trees</p> <p>This habitat is varied but generally contains scattered eucalypts (often Marri and / or introduced) over a predominantly cleared and maintained understorey. Trees contain small and large hollows. Various sizes of logs are present. Decorticating bark and a coarse and fine leaf litter layer is present – mainly restricted to underneath trees. Abundant bare ground is present, often with a high weed cover.</p> <p>Although it lacks any significant understorey and the associated complexity this would add, it is considered moderate to high quality fauna habitat due to the age and maturity of the trees present.</p>	<ul style="list-style-type: none"> • Potential breeding, roosting and foraging habitat for: <ul style="list-style-type: none"> - Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> - Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i> - Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> • Potential habitat for: <ul style="list-style-type: none"> - South-western Brush-tailed Phascogale <i>Phascogale tapoatafa wambenger</i> - Quenda <i>Isoodon fusciventer</i> • Marginal habitat for: <ul style="list-style-type: none"> - Peregrine Falcon <i>Falco peregrinus</i> - Chuditch <i>Dasyurus geoffroii</i> 	11.82	12	



Description	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	% of survey area	Photograph
				

Description	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	% of survey area	Photograph
<p>Wetlands, Drainage and Riparian Vegetation</p> <p>This habitat is highly variable and contains degraded drainage lines with overstorey of Marri and Flooded Gums, riparian shrublands and small wetlands areas. The habitat is considered high to moderate quality due to its wetland and riparian nature, but often reduced in quality due to degraded nature, with high weed cover and high disturbance levels.</p>	<ul style="list-style-type: none"> • Potential breeding, roosting and foraging habitat (where areas contain appropriate flora species) for: <ul style="list-style-type: none"> - Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> - Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i> - Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> • Potential habitat for: <ul style="list-style-type: none"> - Quenda <i>Isoodon fusciventer</i> • Marginal habitat for: <ul style="list-style-type: none"> - Water-rat <i>Hydromys chrysogaster</i> - Carter's Freshwater Mussel <i>Westralunio carteri</i> 	<p>3.39</p>	<p>3</p>	

Description	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	% of survey area	Photograph
				
<p>Eucalypt Woodland</p> <p>This woodland generally contains Marri <i>Corymbia calophylla</i> over an open shrubland over an open sedge layer. Also contains smaller areas with scattered large introduced eucalypts and Sheoak.</p> <p>Bare ground is common. Trees contain small (common) and large (rare to occasional) hollows. A dense understorey is occasionally present. Various sizes of logs are present (generally common), as are decorticating bark and a coarse and fine leaf litter.</p> <p>Habitat quality is variable depending on the level of degradation with some areas highly degraded with highly modified understorey containing shrubs and</p>	<ul style="list-style-type: none"> • Potential breeding, roosting and foraging habitat for: <ul style="list-style-type: none"> - Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> - Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i> - Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> • Potential habitat for: <ul style="list-style-type: none"> - South-western Brush-tailed Phascogale <i>Phascogale tapoatafa wambenger</i> 	12.07	12	

Description	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	% of survey area	Photograph
<p>high weed cover. Habitat quality is considered high to moderate quality due to the levels of complexity.</p>	<ul style="list-style-type: none"> - Quenda <i>Isoodon fusciventer</i> - Peregrine Falcon <i>Falco peregrinus</i> • Marginal habitat for: <ul style="list-style-type: none"> - Chuditch <i>Dasyurus geoffroii</i> - Inornate Trapdoor Spider <i>Euoplos inornatus</i> 			
<p>Eucalypt Woodland / Wetland</p> <p>This is generally the transition from Eucalypt woodland to wetland or a mosaic of these habitats. Habitat quality is variable depending on the level of degradation with some areas highly degraded with highly modified understorey containing shrubs and high weed cover. Habitat quality is considered high to moderate quality due to the levels of complexity.</p>	<ul style="list-style-type: none"> • Potential breeding, roosting and foraging habitat for: <ul style="list-style-type: none"> - Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> - Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i> - Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> • Potential habitat for: <ul style="list-style-type: none"> - South-western Brush-tailed Phascogale <i>Phascogale tapoatafa wambenger</i> 	3.86	4	

Description	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	% of survey area	Photograph
	<ul style="list-style-type: none"> - Quenda <i>Isoodon fusciventer</i> - Peregrine Falcon <i>Falco peregrinus</i> • Marginal habitat for: <ul style="list-style-type: none"> - Chuditch <i>Dasyurus geoffroii</i> - Inornate Trapdoor Spider <i>Euoplos inornatus</i> - Water-rat <i>Hydromys chrysogaster</i> - Carter's Freshwater Mussel <i>Westralunio carteri</i> 			
<p>Grassland with Occasional Tree</p> <p>This habitat contains an open grassland with the occasional tree (generally eucalypt). Habitat contains abundant bare ground. The habitat is considered moderate to low quality due to limited complexity and often degraded condition.</p>	<ul style="list-style-type: none"> • Marginal habitat for: <ul style="list-style-type: none"> - Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> - Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i> - Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> - Quenda <i>Isoodon fusciventer</i> 	1.26	1	n/a

Description	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	% of survey area	Photograph
<p>Shrubland</p> <p>This habitat contains degraded roadside vegetation of limited quality with abundant bare ground, high weed cover and edge effects, and higher quality mixed native shrublands.</p>	<ul style="list-style-type: none"> • Potential habitat for: <ul style="list-style-type: none"> - Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> - Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> - Quenda <i>Isoodon fusciventer</i> 	2.51	3	
<p>Cleared</p> <p>This habitat has been predominantly cleared and it includes tracks, paddocks, roadside etc. It may contain a high vegetative cover of weeds / grasses, and the occasional tree or shrub, and is generally low quality fauna habitat.</p>		36.06	37	

Notes:

- an additional 4.72 ha (4.8) of the survey area was not accessed due to private property access issue
- 22.68 (23%) of the survey area was mapped as Hardstand (houses, roads, rail-lines etc.) which provides minimal fauna habitat.

7.4 Black Cockatoos

7.4.1 Ecology

7.4.1.1 Carnaby's Cockatoo

Carnaby's Cockatoo *Calyptorhynchus latirostris* is endemic to the southwest of Western Australia, extending from the Murchison River to Esperance, and inland to Coorow, Kellerberrin and Lake Cronin. This black cockatoo has a white patch on its cheek, white bands on its tail, and a strong curved bill. Carnaby's Cockatoo is a seasonal visitor to the Swan Coastal Plain, which provides important foraging and roosting habitat during the non-breeding season.

Carnaby's Cockatoo feeds on seeds, nuts and flowers of a variety of native and exotic plants. Feed plants include the various proteaceous species (e.g. *Banksia*, *Grevillea* and *Hakea*), Marri *Corymbia calophylla*, Jarrah *Eucalyptus marginata*, and seeds from the cones of Pine *Pinus* sp. trees. Cockatoo flocks follow vegetation corridors and actively avoid cleared and open areas when moving between roosting, water and food resources. Habitat fragmentation increases the distances cockatoos need to travel between resources. Proximity of foraging habitat and water has been demonstrated to be critical to support roosting and breeding sites (Le Roux, 2017).

Carnaby's Cockatoo displays strong pair bonds and nest in the hollows of live or dead mature eucalypts including Salmon Gum *Eucalyptus salmonophloia*, York Gum *E. loxophleba* subsp. *loxophleba*, Flooded Gum *E. rudis*, Karri *E. diversicolor*, Wandoo *E. wandoo* and Tuart *E. gomphocephala* and Marri *Corymbia calophylla*, (DSEWPaC, 2012). Nest hollows generally range from 2.5-12 m above ground, size of entrance from 23-30 cm and depth of hollows from 1-2.5 m (Johnstone and Storr, 1998).

Carnaby's Cockatoo has undergone a dramatic decline of approximately 50 percent in the past 45 years, with the main contributing factors the clearing of core breeding habitat in the Wheatbelt, the deterioration of nesting hollows, and clearing of foraging habitat.

Breeding habitat for this species occurs in the Wheatbelt, Jarrah Forest and South Coast regions, and the species is expanding its current breeding range with small patches of breeding habitat now being utilised across the SCP. After breeding, Carnaby's Cockatoo disperse to the higher rainfall coastal areas of the south-west of Western Australia to feed in late December to July. Breeding has been recorded from early July to mid-December.

Carnaby's Cockatoos were directly observed on two occasions during the survey. Six Carnaby's Cockatoo were recorded flying southeast over survey area, and a flock of approximately 40 birds were observed flying south over the survey area.

7.4.1.2 Forest Red-tailed Black Cockatoo

The Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* is endemic to the south-west humid and semi-humid zones of Western Australia, where it inhabits dense Jarrah, Karri and Marri forests which receive more than 600 mm average annual rainfall (DSEWPaC, 2012). It has a pair of black central tail feathers and a bright red, orange or yellow barring on the tail.

This species predominantly feeds in eucalypt forests, preferring Marri *Corymbia calophylla* and Jarrah *Eucalyptus marginata* seeds, but also feeding on Blackbutt *E. patens*, Albany Blackbutt *E. staeri*, Karri *E. diversicolor*, Sheoak *Allocasuarina* sp. and Snottygobble *Persoonia longifolia* (Johnstone, 2016 pers. comm.).

Forest Red-tailed Black Cockatoo are monogamous and pairs nest in tree hollows from 6.5 to 33 m above ground. Most nests are in very large and very old, mature Marri (Johnstone, Kirkby & Sarti, 2013), though they will nest in other eucalypts such as Tuart (Johnstone, 2016 pers. comm.). Breeding habitat for this species occurs in the eastern margins of the Jarrah forests of the Wheatbelt, and within the Jarrah Forest regions, and the Forest Red-tailed Black Cockatoo is expanding its current breeding range with small patches of breeding habitat now being utilised across the SCP.

Forest Red-tailed Black Cockatoo were observed on two occasions within the survey area. Two birds were observed flying south over the survey area, and a small flock was also observed flying over the survey area.

7.4.1.3 Baudin's Cockatoo

Baudin's Cockatoo *Calyptorhynchus baudinii* is distributed throughout the south-western humid and subhumid zones, from the northern Darling Range and adjacent far east of the SCP (south of the Swan River), south to Bunbury and across to Albany (Johnstone & Storr, 1998). It is a large black cockatoo with rectangular white patches in the tail. Males have a pink eye ring, the female a dark eye ring.

Baudin's Cockatoo forages primarily in eucalypt forest, where it feeds on seeds, flowers, nectar and buds from Marri *Corymbia calophylla*, and seeds of *Eucalyptus* and proteaceous species (e.g. *Banksia* and *Hakea*), as well as orchard fruits and Pines *Pinus* sp. It also takes insect larvae and insects (including beetle, wasp and moth larvae) from under bark and in wood of live and dead trees, from galls and from flower spikes of *Xanthorrhoea* and the pith of *Anigozanthos flavidus* (Johnstone & Kirkby, 2008).

This black cockatoo primarily nests in tree hollows in live or dead Karri *Eucalyptus diversicolor*, Marri *Corymbia calophylla*, Wandoo *Eucalyptus wandoo* and Tuart *Eucalyptus gomphocephala* (DSEWPaC, 2012b). Baudin's Cockatoo nests in spring in the deep southwest of Western Australia.

Flocks of Baudin's Cockatoo were observed on four separate occasions in or adjacent the survey area, comprising:

- eight Baudin's Cockatoos flying north over the survey area
- 12 Baudin's Cockatoos flying south over the survey area
- flock of several Baudin's Cockatoos heard to the southwest of the survey area
- five Baudin's Cockatoo observed in introduced eucalypts in the survey area.

Refer to Figure 5 for the locations of these observations.

7.4.2 Roosting

Carnaby's and Baudin's Cockatoos roost in or near riparian environments or near other permanent water sources, generally within any tall trees, but particularly Flat-topped Yate, Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced eucalypts and introduced pines. The Forest Red-tailed Black Cockatoo prefers the edges of forests for roosting, within any tall trees, but particularly tall Jarrah, Marri, Blackbutt, Tuart and introduced eucalypt trees (DotEE, 2017). Evidence of roosting usually involves large amounts of bird scat beneath a large, mature tree, with a significant amount of broken branches on the ground. Roosting sites were searched for throughout the survey area, but no black cockatoo roost sites were identified. BirdLife (2018) notes only one confirmed roost site directly adjacent (within 500 m) the survey area. This is site SERDARR0 and is a white-tailed and Forest Red-tailed Black Cockatoo roost site.

7.4.3 Foraging habitat

7.4.3.1 Carnaby's Cockatoo

The survey area contains a total of 34.40 ha of foraging habitat for Carnaby's Cockatoo. This includes 19.14 ha of Very High and High Quality foraging habitat. This generally consisted of eucalypt woodlands and scattered mature eucalypts on the Swan Coastal Plain containing potential breeding trees and Marri. Foraging habitat is presented in Figure 5, and total areas for each foraging quality are presented in Table 23. The foraging quality assessments are presented in Appendix E.

Carnaby's Cockatoo foraging evidence was recorded at five locations within the survey area (refer to Table 24 and Figure 5).

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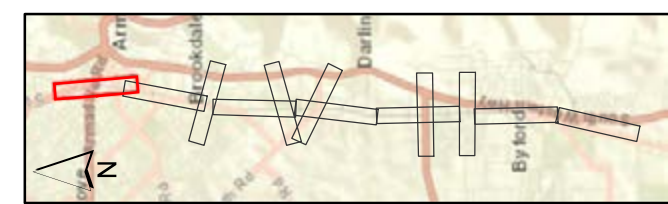
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1:4,000 (when printed at A3)
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Data sources:
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- Black Cockatoo Breeding Trees
 - Potential Black Cockatoo Breeding Trees
 - Tree could not be assessed due to visual/access issues
- Tree Species
 - Flooded Gum
 - Introduced
 - Jarrah
 - Marri
 - Stag
 - Tuart
 - Wandoo
- Black Cockatoo Foraging Habitat
 - Low Quality
 - Quality
 - High Quality
 - Very High Quality

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.1



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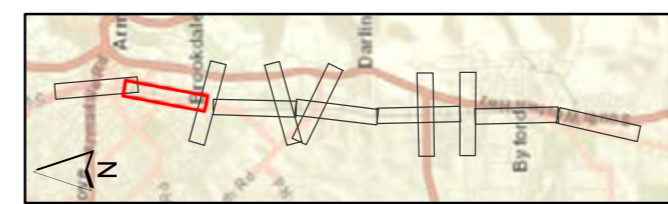
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 - Stag
 - Tuart
 - Wandoo
- Black Cockatoo Foraging Habitat
- Low Quality
 - Quality
 - High Quality
 - Very High Quality

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.2

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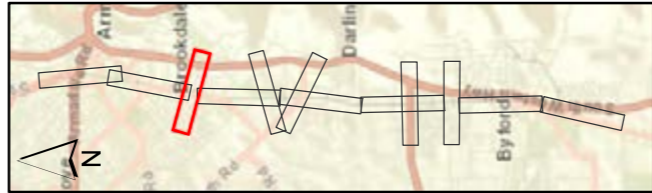
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- Black Cockatoo Foraging Habitat
 - Low Quality
 - Quality
 - High Quality
 - Very High Quality
- ☆ Opportunistic Fauna Observations

Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.3



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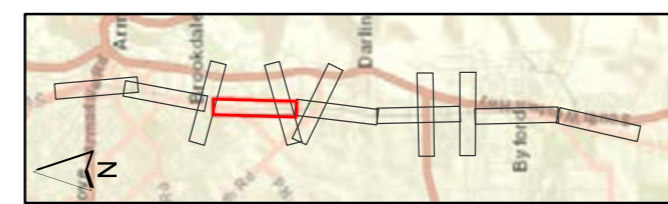
Data sources:
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● Black Cockatoo Breeding Trees
 ○ Potential Black Cockatoo Breeding Trees
 ● Tree could not be assessed due to visual/access issues

Tree Species
 ● Flooded Gum
 ● Introduced
 ● Jarrah
 ● Marri
 ● Stag
 ● Tuart
 ● Wandoo

Black Cockatoo Foraging Habitat
 ■ Low Quality
 ■ Quality
 ■ High Quality
 ■ Very High Quality

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

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Figure 5.4

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Carnaby's Cockatoo Foraging Habitat

Baudin's Cockatoo Foraging Habitat

Forest Red-tailed Black Cockatoo Foraging Habitat

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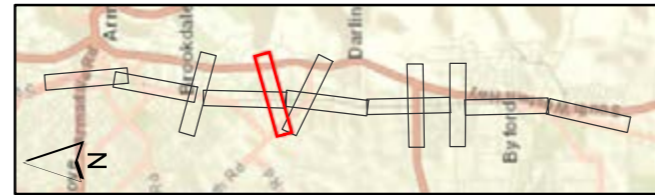
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- Black Cockatoo Breeding Trees
 - Potential Black Cockatoo Breeding Trees
 - Tree could not be assessed due to visual/access issues
- Tree Species
 - Flooded Gum
 - Introduced
 - Jarrah
 - Marri
 - Stag
 - Tuart
 - Wandoo
- Black Cockatoo Foraging Habitat
 - Low Quality
 - Quality
 - High Quality
 - Very High Quality

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.5

Carnaby's Cockatoo Foraging Habitat



Baudin's Cockatoo Foraging Habitat



Forest Red-tailed Black Cockatoo Foraging Habitat



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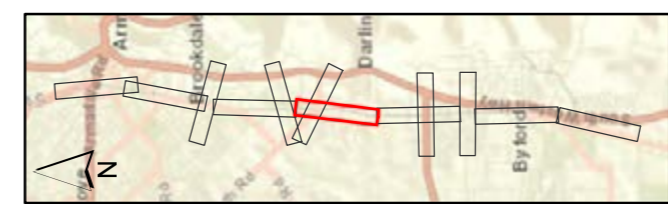
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● Black Cockatoo Breeding Trees
 ○ Potential Black Cockatoo Breeding Trees
 ● Tree could not be assessed due to visual/access issues

Tree Species
 ● Flooded Gum
 ● Introduced
 ● Jarrah
 ● Marri
 ● Stag
 ● Tuart
 ● Wandoo

Black Cockatoo Foraging Habitat
 ■ Low Quality
 ■ Quality
 ■ High Quality
 ■ Very High Quality

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.6

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Carnaby's Cockatoo Foraging Habitat

Baudin's Cockatoo Foraging Habitat

Forest Red-tailed Black Cockatoo Foraging Habitat

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 0 50 100 metres

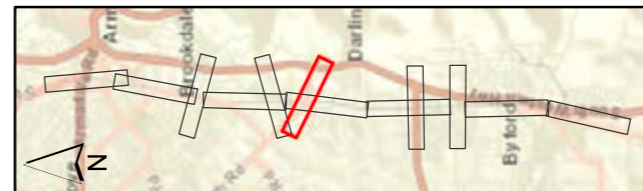
Data sources:
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- Black Cockatoo Breeding Trees
- Potential Black Cockatoo Breeding Trees
- Tree could not be assessed due to visual/access issues

- Tree Species
- Flooded Gum
 - Introduced
 - Jarrah
 - Marri
 - Stag
 - Tuart
 - Wandoo

- Black Cockatoo Foraging Habitat
- Low Quality
 - Quality
 - High Quality
 - Very High Quality

- ☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY
 BYFORD EXTENSION PART ONE –
 FLORA AND FAUNA ASSESSMENT

Figure 5.7

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Carnaby's Cockatoo Foraging Habitat

Baudin's Cockatoo Foraging Habitat

Forest Red-tailed Black Cockatoo Foraging Habitat



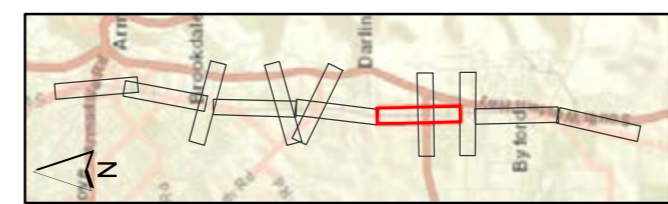
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- Black Cockatoo Breeding Trees
 - Potential Black Cockatoo Breeding Trees
 - Tree could not be assessed due to visual/access issues
- Tree Species**
- Flooded Gum
 - Introduced
 - Jarrah
 - Marri
 - Stag
 - Tuart
 - Wandoo
- Black Cockatoo Foraging Habitat**
- Low Quality
 - Quality
 - High Quality
 - Very High Quality
- ☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.8



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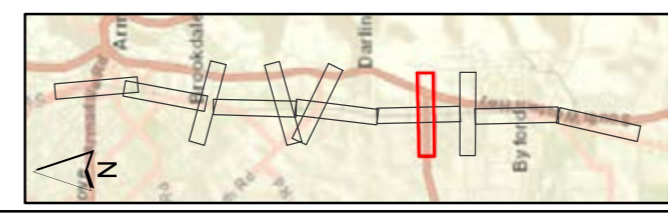
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Data sources:
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- Black Cockatoo Breeding Trees
 - Potential Black Cockatoo Breeding Trees
 - Tree could not be assessed due to visual/access issues
- Tree Species**
- Flooded Gum
 - Introduced
 - Jarrah
 - Marri
 - Stag
 - Tuart
 - Wandoo
- Black Cockatoo Foraging Habitat**
- Low Quality
 - Quality
 - High Quality
 - Very High Quality

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.9

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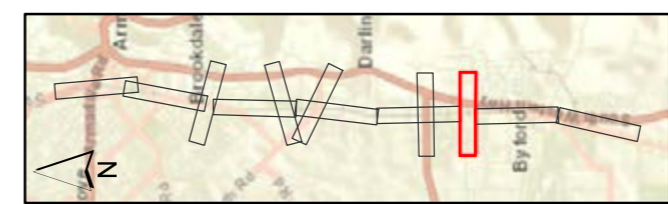
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- Black Cockatoo Breeding Trees
 - Potential Black Cockatoo Breeding Trees
 - Tree could not be assessed due to visual/access issues
- Tree Species
 - Flooded Gum
 - Introduced
 - Jarrah
 - Marri
 - Stag
 - Tuart
 - Wandoo
- Black Cockatoo Foraging Habitat
 - Low Quality
 - Quality
 - High Quality
 - Very High Quality

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.10

Carnaby's Cockatoo Foraging Habitat



Baudin's Cockatoo Foraging Habitat



Forest Red-tailed Black Cockatoo Foraging Habitat



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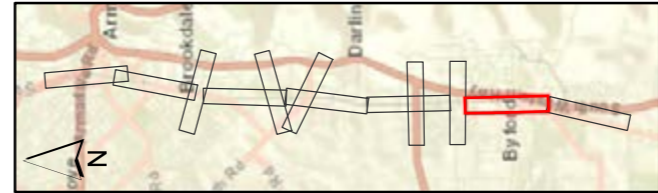
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- Black Cockatoo Breeding Trees
- Potential Black Cockatoo Breeding Trees
- Tree could not be assessed due to visual/access issues

- Tree Species
- Flooded Gum
 - Introduced
 - Jarrah
 - Marri
 - Stag
 - Tuart
 - Wandoo

- Black Cockatoo Foraging Habitat
- Low Quality
 - Quality
 - High Quality
 - Very High Quality

- ☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT

Figure 5.11



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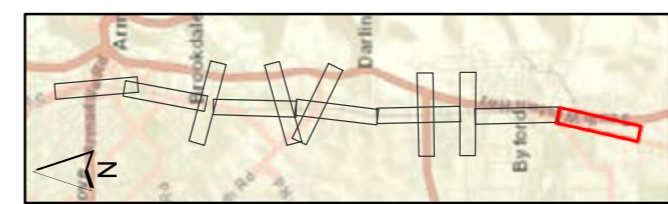
Data sources:
 Base Data: © Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010); Geoscience Australia; Streetpro

● Black Cockatoo Breeding Trees
 ○ Potential Black Cockatoo Breeding Trees
 ● Tree could not be assessed due to visual/access issues

Tree Species
 ● Flooded Gum
 ● Introduced
 ● Jarrah
 ● Marri
 ● Stag
 ● Tuart
 ● Wandoo

Black Cockatoo Foraging Habitat
 ■ Low Quality
 ■ Quality
 ■ High Quality
 ■ Very High Quality
 /// Not Accessed

☆ Opportunistic Fauna Observations



Black Cockatoo Foraging Habitat

PUBLIC TRANSPORT AUTHORITY

BYFORD EXTENSION PART ONE – FLORA AND FAUNA ASSESSMENT






Figure 5.12

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Table 23 Carnaby's Cockatoo foraging habitat areas

Foraging Quality	Area (ha)
Low Quality (1-3)	4.92
Quality (4-6)	10.35
High Quality (7-8)	1.59
Very High Quality (>8)	17.54
TOTAL	34.40

Table 24 Potential Carnaby's Cockatoo foraging evidence

ID	Comment	Plate	ID	Comment	Plate
65	Probable recent chewing on Marri nuts		77	Probable recent chewing on Marri nuts	
69	Probable recent chewing on Marri nuts		102	Probable old chewing on Marri nuts	
75	Probable chewing on Marri nuts				

7.4.3.2 Baudin's Cockatoo





The survey area contains a total of 34.40 ha of foraging habitat for the Baudin's Cockatoo. This includes 19.14 ha of High Quality and Very High Quality foraging habitat, which generally consists of This generally consisted of eucalypt woodlands and scattered mature eucalypts on the Swan Coastal Plain containing potential breeding trees and Marri. Foraging habitat is presented spatially in Figure 5, and the total areas for each foraging quality are presented in Table 25. The foraging quality assessments are presented in Appendix E.

No foraging evidence from the Baudin's Cockatoo was recorded within the survey area.

Table 25 Baudin's Cockatoo foraging habitat areas

Foraging Quality	Area (ha)
Low Quality (1-3)	4.92
Quality (4-6)	10.35
High Quality (7-8)	4.72
Very High Quality (>8)	14.42
TOTAL	34.40

Table 26 Potential Baudin's Cockatoo foraging evidence

ID	Comment	Plate	ID	Comment	Plate
67	Probable recent chewing on Marri nuts		109	Probable recent chewing on Marri nuts	
72	Probable chewing on Marri nuts		80	Probable recent chewing on Marri nuts	

7.4.3.3 Forest Red-tailed Black Cockatoo








The survey area contains a total of 29.48 ha of foraging habitat for the Forest Red-tailed Black Cockatoo. This includes 14.42 ha of High Quality foraging habitat, which generally consists of eucalypt woodlands and scattered mature eucalypts on the Swan Coastal Plain containing potential breeding trees and Marri. Foraging habitat is presented spatially in Figure 5, and the total areas for each foraging quality are presented in Table 27. The foraging quality assessments are presented in Appendix E.







Potential foraging evidence from the Forest Red-tailed Black Cockatoo were recorded commonly throughout the survey area (refer to Table 28 and Figure 5).

Table 27 Forest Red-tailed Black Cockatoo foraging habitat areas

Foraging Quality	Area (ha)
Low Quality (1-3)	10.35
Quality (4-6)	4.72
High Quality (7-8)	14.42
Very High Quality (>8)	0
TOTAL	29.48

Table 28 Potential Forest-Red-tailed Black Cockatoo foraging evidence

ID	Comment	Plate	ID	Comment	Plate
66	Probable old chewing on Marri nuts		90	Probable old chewing on Marri nuts	
73	Probable recent chewing on Marri nuts		92	Probable recent chewing on Marri nuts	
79	Probable old chewing on Marri nuts		106	Probable old chewing on Marri nuts	
108	Probable old and recent chewing on Marri nuts		111	Probable old chewing on Marri nuts	

ID	Comment	Plate	ID	Comment	Plate
112	Probable old chewing on Marri nuts		116	Probable recent chewing on Marri nuts	
121	Probable old chewing on Marri nuts		124	Probable old chewing on Marri nuts	
134	Probable recent chewing on Marri nuts		135	Probable recent chewing on Marri nuts	

7.4.3.4 Breeding

Hollow formation in Eucalypt trees is a result of a number of processes including fungal attack, termites and fire, and the propensity for hollow formation varies between species (Whitford, 2002). In order to be suitable for black cockatoos, hollow entrances need to be at least 100 mm in diameter.

A total of 277 native (hollow-forming) potential breeding habitat trees were identified within the survey area. Just over 73% (203) of these were Marri, 26% (53) were Flooded Gums, and the remaining were Jarrah, Stags, Tuart and Wandoo. An additional 37 introduced eucalypts with a DBH >500mm were recorded. On the Swan Coastal Plain most black cockatoo breeding records, particularly for Carnaby's Cockatoo are in Tuart (Johnstone & Kirkby, 2010).

Thirteen of the 277 trees contained a total of 13 potentially suitable hollows for breeding black cockatoos. All were considered to be large enough at their entrances with potentially sufficient floor and chamber space (when observed from the ground). However, hollow depth could not generally be fully inspected from the ground to determine suitability for nesting. Hollow presence in 18 of the 277 native breeding habitat trees could not be fully assessed from the ground due to access issues, trees being on private property, visibility being obscured, or safety reasons.

Refer to Appendix D and Figure 5 for the details of all 277 native and 37 introduced breeding habitat trees.

8.0 Likely Environmental Approvals Required

8.1 Assessment against the Ten Clearing Principles

In assessing whether the Project’s proposed clearing is likely to have a significant impact on the environment, the Project was assessed against the Ten Clearing Principles (EP Act, Schedule 5).

a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments	Proposed clearing likely to be at variance to this Principle
	<p>The Project Footprint incorporates the entire 98.38 ha survey area of which 20.60 ha represents native vegetation (condition mapped as Degraded or better).</p> <p>Within the Project Footprint, 77.77 ha is not considered to meet the definition of native vegetation in the <i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i> (Clearing Regulations). Under the Clearing Regulations planted trees and revegetation are not defined as native vegetation unless they are planted in accordance with a Conservation Covenant. There are no Conservation Covenants that are known to apply to this land and therefore this vegetation is not considered to meet the definition of native vegetation.</p> <p>Within the native vegetation biodiversity was considered high. Three TECs listed under the EPBC Act and BC Act were identified including:</p> <ul style="list-style-type: none"> • <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Act Endangered, BC Act Critically Endangered) – 6.68 ha. • <i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands (SCP3c) (EPBC Act Endangered, BC Act Critically Endangered) – 0.18 ha. • FCT8 Herb rich shrublands in claypans (EPBC Act Critically Endangered, BC Act Vulnerable) – 1.57 ha. <p>The survey area supported six woodlands and two shrublands including wetland/riparian vegetation that are likely to represent groundwater dependent ecosystems (6.03 ha).</p> <p>No flora species listed as Threatened under the EPBC Act or BC Act or listed as Priority by DBCA were recorded. Despite this, it is possible that additional survey effort would identify conservation significant flora in the survey area, in particular <i>Johnsonia pubescens</i> subsp. <i>cygnorum</i> (WA Priority 2) and <i>Schoenus pennisetis</i> (WA Priority 3).</p> <p>Seven fauna habitats were mapped (including cleared), with Eucalypt Woodland representing the most common habitat. The Eucalypt Woodland habitat occupies 12.07 ha (12%) of the survey area and provides suitable habitat for:</p> <ul style="list-style-type: none"> • Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i> listed as Vulnerable under the BC Act and the EPBC Act. • Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> listed as Endangered under the BC Act and the EPBC Act. • Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> listed as Endangered under the BC Act and the EPBC Act. • Quenda <i>Isodon obesulus</i> listed as a Priority 4 species by the DBCA • South-western Brush-tailed Phascogale <i>Phascogale tapoatafa wambenger</i> listed as a Conservation Dependent Species under the EPBC Act. <p>The habitat is considered marginal habitat for:</p> <ul style="list-style-type: none"> • Chuditch <i>Dasyurus geoffroii</i> listed as Vulnerable under the BC Act and the EPBC Act • Trapdoor Spider <i>Euoplos inornatus</i> listed as Priority 3 by DBCA. <p>Foraging evidence of all three black cockatoos were observed throughout the survey area and both foraging and breeding habitat was recorded.</p>

Comments	Proposed clearing likely to be at variance to this Principle
	Given the above, it is likely that native vegetation within the survey area is considered to support high biodiversity therefore the project is likely to be at variance with this principle.
Methodology	DBCA shapefiles Ecological field surveys

b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments	Proposed clearing is likely to be at variance to this Principle
	<p>Seven fauna habitats were defined and mapped including cleared. Eucalypt Woodland was the most common habitat, mapped for 12.07 ha (12%). This habitat is highly variable generally contains Marri <i>Corymbia calophylla</i> over an open shrubland over an open sedge layer. It also contains smaller areas with scattered large introduced eucalypts and Sheoak. Significant habitat characteristics include; bare ground is common, trees contain small (common) and large (rare to occasional) hollows, dense understorey is occasionally present, various sizes of logs are present (generally common), as are decorticating bark and a coarse and fine leaf litter. Habitat quality is considered high to moderate depending on the levels of degradation and modification, and the levels of complexity.</p> <p>The field survey and review of the desktop study determined that habitat in the survey area is suitable for five conservation significant fauna species including:</p> <ul style="list-style-type: none"> • Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i> listed as Vulnerable under the BC Act and the EPBC Act. • Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i> listed as Endangered under the BC Act and the EPBC Act. • Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> listed as Endangered under the BC Act and the EPBC Act. • Quenda <i>Isoodon obesulus</i> listed as a Priority 4 species by the DBCA • South-western Brush-tailed Phascogale <i>Phascogale tapoatafa wambenger</i> listed as a Conservation Dependent Species under the EPBC Act. <p>The habitat is considered marginal habitat for:</p> <ul style="list-style-type: none"> • Chuditch Dasyurus geoffroi listed as Vulnerable under the BC Act and the EPBC Act • Trapdoor Spider <i>Euoplos inornatus</i> listed as Priority 3 by DBCA. <p>Evidence of the three threatened black cockatoo species was observed in the survey area. The survey area contains foraging habitat for all three threatened black cockatoo species and development of the Project Footprint would require disturbance of:</p> <ul style="list-style-type: none"> • 34.40 ha of Carnaby's and Baudin's Cockatoo habitat, comprising <ul style="list-style-type: none"> - 4.92 ha of Low Quality habitat - 10.35 ha Quality habitat - 19.14 ha High and Very High Quality habitat • 29.48 ha of Forest Red-tailed Black Cockatoo foraging habitat comprising: <ul style="list-style-type: none"> - 7.80 ha Low Quality habitat - 4.72 ha Quality habitat - 14.42 ha High Quality habitat <p>The survey area also contains 277 native breeding habitat trees with a DBH >500 mm.</p>

Comments	Proposed clearing is likely to be at variance to this Principle
Methodology	DBCA Shapefiles Ecological field surveys

c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments	Proposal is not likely to be at variance to this Principle
	The desktop assessment identified 83 Threatened and Priority Flora species that could potentially occur within the survey area. Of these, six were considered likely to occur. No flora species listed under the BC Act or EPBC Act were recorded during the field survey. It is possible that with additional survey effort, conservation significant flora species may be recorded. Clearing required to develop the Project Footprint is therefore not likely to be at variance to this principle.
Methodology	DBCA shapefiles Ecological field surveys

d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments	Proposed clearing is likely to be at variance with this Principle
	Three TECs listed under the EPBC Act and BC Act were identified including: <ul style="list-style-type: none"> • <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Act Endangered, BC Act Critically Endangered) – 6.68 ha, high confidence. • <i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands (SCP3c) (EPBC Act Endangered, BC Act Critically Endangered) – 0.18 ha, low confidence. • FCT8 Herb rich shrublands in claypans (EPBC Act Critically Endangered, BC Act Vulnerable) – 1.57 ha, low confidence. The location of SCP3c means that direct impacts could potentially be avoided through appropriate avoidance and mitigation strategies. The other two TECs are unlikely to be avoidable. As such, the Project is likely to be at variance to this principle.
Methodology	DBCA shapefiles

e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments	Proposed clearing may be at variance to this Principle
	<p>The National Objectives and Targets for Biodiversity Conservation 2001-2005 (Commonwealth of Australia, 2001) recognises that the retention of 30% or more of the pre-clearing extent in constrained areas of each ecological community is necessary if Australia's biodiversity is to be protected.</p> <p>Two vegetation associations (968 and 3) occur in the survey area. Both of these are above the 30% threshold in the state, but below the threshold on the Swan Coastal Plain (see Table 1). Association 968 has only 6.6% remaining on the Swan Coastal Plain and is below the 10% threshold for the Perth Metropolitan Area.</p> <p>As the extent of this vegetation association is already below the 30% threshold, further clearing required for the project is likely to be at variance within this principle. It is recommended that the Project avoids clearing native vegetation where possible.</p>
Methodology	Government of Western Australia (2018)

f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments	Proposed clearing is likely to be at variance to this Principle
	<p>Four wetland communities representing GDEs were recorded including:</p> <ul style="list-style-type: none"> • Woodland: Marri CcHtCa - Represents wetland vegetation and/or ecotone of wetland and modified drainage and Marri Woodlands on uplands. Mapped for 3.22 ha and is Completely Degraded to Very Good • Woodland: Marri CcWmEc –riparian vegetation associated with a waterway. Mapped for 0.22 ha and is Degraded. • Shrubland: Mixed HtNa – riparian vegetation situated on gradual slopes adjacent to basin of wetlands. Mapped for 1.47 ha and is Good to Very Good. • Shrubland: Mixed PeCaBs – riparian vegetation that represents Claypans of the Swan Coastal Plain TEC. Mapped in low-lying areas and basins mapped for 1.12 ha in Good to Very Good condition. <p>These communities are considered GDEs that are regionally and locally significant due to their role in maintaining wetland functions and values.</p> <p>DBCA recommends protection of a minimum 50 m buffer from Conservation Category wetlands (CCWs). The project intersects with seven CCWs and two waterways including Wungong Brook and Cardup Brook.</p> <p>Without management, clearing the Project Footprint could also impact wetlands adjacent to the Footprint. As such, it is likely that the Project is at variance with this principle.</p>
Methodology	<p>DWER and DBCA shapefiles</p> <p>Ecological field surveys</p>

g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments	Proposed clearing is not likely to be at variance to this Principle
	<p>The Project Footprint is 98.38 ha of which 20.60 ha comprises native vegetation. The Project includes construction of the rail line adjacent to the current Armadale line. Based on the nature and scale of clearing required, development of the Project Footprint is not likely to result in significant changes to salinity, waterlogging, nutrient export or erosion, and is therefore not likely to be at variance with this principle. However, there is potential for some erosion to occur.</p> <p>As a precaution, it is recommended that clearing is minimised where possible, to reduce the potential for land degradation. The project should also be managed in accordance with a Construction Environmental Management Plan (CEMP) that mitigates and/or minimises potential for environmental impacts that can cause land degradation (e.g. erosion, changes to drainage etc). Suitable management measures could include drainage design and controls to prevent scouring and erosion, and dust suppression to minimise wind erosion.</p>
Methodology	

h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments	Proposed clearing may be at variance to this Principle
	<p>The survey area intersects with numerous wetlands, Bush Forever sites and is adjacent to Brickwood Reserve and Cardup Reserve.</p> <p>Clearing the survey area may have an impact on adjacent environmental values, in particular associated with two waterways and Bush Forever sites. As a precaution it is recommended that any potential impact to adjacent vegetation and water is to be managed through the implementation of appropriate management strategies within a CEMP.</p>
Methodology	DBCA shapefiles

i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Comments	Proposed clearing may be at variance to this Principle
	<p>The survey area intersects with two waterways and several CCWs.</p> <p>No significant surface water features occur within the survey area. Clearing may also impact water supply to the lake if it results in changes to runoff patterns. The proposal therefore may be at variance with this principle.</p> <p>It is recommended that clearing is implemented in accordance with a CEMP that includes controls that mitigate impacts to wetland vegetation. This should include dust control and measures to prevent changes to the hydrological regime (e.g. sediment control).</p>
Methodology	DWER and DBCA shapefiles

j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments	Proposed clearing is not likely to be at variance to this Principle
	<p>Clearing would involve removal of 20.60 ha of native vegetation including 6.03 ha of riparian (GDE) vegetation. Due to the role vegetation plays in reducing surface water runoff, there is potential for clearing to cause changes in the incidence of flooding.</p> <p>The Project intersects with two waterways, already intersected by the current rail corridor. It is likely that with appropriate engineering design and mitigation measures outlined in a CEMP, the potential impact of vegetation clearing on flooding can be adequately managed. It is therefore unlikely to be at variance with this principle.</p> <p>As a precaution, it is recommended that the project avoids clearing native vegetation where possible. Flood risk can be managed by using drainage structures and stormwater management measures included as part of the project design.</p>
Methodology	

8.2 Impact of the Project on Threatened Ecological Communities

Three TECs listed under the EPBC Act and BC Act were identified including:

- *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Act Endangered, BC Act Critically Endangered) – 6.68 ha, high confidence.
- *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (SCP3c) (EPBC Act Endangered, BC Act Critically Endangered) – 0.18 ha, low confidence.
- FCT8 Herb rich shrublands in claypans (EPBC Act Critically Endangered, BC Act Vulnerable) – 1.57 ha, low confidence.

Verification of their presence is recommended through discussions with EPA and potentially additional survey effort.

An action will also require approval if the action has, will have, or is likely to have a significant impact on an ecological community listed as Critically Endangered or Endangered. The Project includes clearing a minimum, 6.68 ha of SCP3a listed as Critically Endangered. At most, the Project will include clearing 8.43 ha of three TECs listed as Critically Endangered or Endangered.

A significant impact on a TEC is presented in Table 29. This assessment is preliminary and addresses the three TECs simultaneously.

Table 29 Significant impact assessment for Threatened Ecological Communities

Significant impact criteria	Assessment
Reduce the extent of an ecological community	<p>Likely</p> <p>Removal of between 6.68 ha to 8.43 ha of TEC is considered to reduce the extent of the TECs.</p>
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	<p>Unlikely</p> <p>The occurrence of TECs are adjacent to the existing rail corridor which has already led to some fragmentation. Clearing is unlikely to cause further fragmentation that may lead to a decline in the ecological attributes of the community.</p>

Significant impact criteria	Assessment
Adversely affect habitat critical to the survival of an ecological community	Likely All habitat where the TECs occur are considered critical habitat. As such, any clearing represents an impact to habitat critical to the survival of the TEC.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Possible One of the TECs is associated with wetlands and occurs inside and outside the survey area. Changes in wetland hydrology as a result of the Project may impact on the TEC adjacent to the survey area.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Unlikely Indirect impacts from train line construction would be mitigated and managed in accordance with the Project CEMP.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: – assisting invasive species, that are harmful to the listed ecological community, to become established, or – causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	Unlikely The occurrences of the TEC are within an existing rail corridor where common weeds and the invasive <i>Watsonia</i> are already present. It is anticipated that indirect impacts associated with weed invasion would be adequately managed through implementation of the CEMP.
Interfere with the recovery of an ecological community.	Possible None of the three TECs have recovery plans. The four key approaches to achieve the conservation objectives include protect, restore and research and monitoring. The direct impact of clearing the TECs will lead to further loss of extent and potentially condition.

8.3 Impact of the Project on Black Cockatoo Species

Two threatened black cockatoo species were recorded during the biological survey, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*). Foraging evidence of the Forest Red-tailed Black Cockatoo was observed within the survey area and Carnaby's Cockatoo was observed flying over the survey area a number of times.

An evaluation of the proposed action against *EPBC Act 1999: Referral Guidelines for three threatened Black Cockatoo species* (DSEWPaC, 2012) is provided below.

Clearing of any known nesting tree

The survey area contains 277 native breeding habitat trees with a DBH >500 mm, of which 13 contained hollows suitable for the use of breeding black cockatoos. Hollows were identified and observed from the ground using binoculars. Hollow presence in 18 of the 277 breeding habitat trees could not be assessed from the ground due to access issues, trees being on private property, visibility being obscured, or safety reasons.

There was no current breeding evidence observed during the survey. It is recommended that the project avoids clearing of any potential black cockatoo breeding tree. If this is unavoidable, the project is likely to require a referral under the EPBC Act.

Clearing or degradation of any part of a vegetation community known to contain breeding habitat

The survey area includes 12.07 ha of Eucalypt Woodland which may be utilised as breeding, or foraging habitat by the three black cockatoo species. Clearing of this vegetation is likely to require referral under the EPBC Act.

Clearing or degradation of more than 1 ha of quality foraging habitat

Note that Quality in regards to DSEWPaC (2012) Referral Guidelines relates to High Quality and Very High Quality foraging habitat based on our assessment tool. The survey area contains foraging habitat for all three threatened black cockatoo species and development of the Project Footprint would require disturbance of:

- 34.40 ha of Carnaby's and Baudin's Cockatoo habitat, comprising
 - 4.92 ha of Low Quality habitat
 - 10.35 ha Quality habitat
 - 19.14 ha High and Very High Quality habitat
- 29.48 ha of Forest Red-tailed Black Cockatoo foraging habitat comprising:
 - 7.80 ha Low Quality habitat
 - 4.72 ha Quality habitat
 - 14.42 ha High Quality habitat

It is recommended that the Project avoids clearing of black cockatoo foraging habitat. If the Project clears or causes the degradation of more than 1 ha of Quality (or above) foraging habitat it is likely it will require referral under the EPBC Act.

Clearing or degradation of a known night roosting tree:

No night roosting trees were identified within the survey area. The project will not result in the clearing or degradation of a known roosting tree. The Birdlife data notes only one confirmed roost site directly adjacent (within 500 m) the survey area (DBCA, 2019b). This is site SERDARR0 and is a white-tailed and Forest Red-tailed Black Cockatoo roost site.

Creating a gap of more than 4 km between patches of Black Cockatoo habitat:

It is recommended that the project does not clear any black cockatoo foraging habitat or potential black cockatoo breeding trees. However, if this is unavoidable the Project will not create a gap of more than 4 km between patches of black cockatoo habitat.

The survey area is adjacent to, or in close proximity to a number of wetlands, Reserves and Bush Forever sites that contain black cockatoo habitat in similar, if not better quality, to that within the survey area. As such, the Project will not create a gap of more than 4 km between patches of habitat.

8.4 Environmental Approvals

Environmental approvals required for the project will depend on project design and construction requirements, and the potential for significant impacts to the environment. Potential environmental approvals required are summarised in Table 30.

Table 30 Environmental approvals that may be required

Environmental Approval	Government Agency	Description
EPBC Act referral	DAWE	Required if there is potential to have a significant impact on MNES. This would include impacts to flora, vegetation and fauna listed under the EPBC Act. Referral may be required for impacts on foraging and breeding habitat of black cockatoo species and the Threatened Ecological Communities recorded.
EP Act assessment – Section 48A of EP Act	DWER	Required if there is potential for significant impact on Environmental Factors defined in EPA (now DWER Environmental Services) Guidance. When the EPA receives a referral of a Scheme it must decide whether or not to assess it under section 48A of the EP Act. The EPA must also inform the responsible authority in writing of its decision. Assessment under Section 48A of the EP Act may be required for several factors including Flora and Vegetation, Fauna, Terrestrial Environmental Quality, Inland Waters and potentially Social Surrounds.
EP Act Part V - Clearing Permit	DWER	All clearing in Western Australia must be completed under an approved native vegetation clearing permit, unless an exemption is applied under the <i>Environmental Protection (Clearing of native Vegetation) Regulations 2004</i> or the Project is assessed under Part IV. The site is within an ESA so no exemptions would apply.
Bed and Banks Permit	DWER	Required if you plan to obstruct or interfere with a watercourse or its banks and surrounds. This will be required for crossing Wungong Brook and Cardup Brook.
Licence to take groundwater	DWER	Required if abstraction of groundwater is proposed. In conjunction with this approval a permit to install a groundwater bore may also be required.
Licence to take surface water	DWER	Required if surface water needs to be taken.
Section 18 of <i>Aboriginal Heritage Act</i>	Aboriginal Cultural Material Committee	Section 18 Notice will be required if there is any disturbance to registered Aboriginal heritage sites.

9.0 Conclusions

Ecological assessments including a detailed flora and vegetation, level 1 fauna survey and targeted black cockatoo survey were undertaken for the BRE on behalf of the PTA. The assessment included a desktop assessment, field surveys and data analysis. A summary of the ecological assessments, with a focus on significant findings, is presented below:

- Three TECs were identified and mapped including
 - *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered) extending for 6.68 ha.
 - *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (SCP3c) (EPBC Endangered, WA Critically Endangered) extending for 0.18 ha. Low confidence from FCT assessment).
 - FCT8 Herb rich shrublands in claypans (EPBC Critically Endangered, WA Vulnerable) potentially occurs near Brickwood Reserve extending for 1.57 ha. Low confidence in this assessment, however TECs are known to occur adjacent and FCT analysis, hydrology and soil characteristics suggest it is present.
- Eight vegetation communities were defined and mapped including six woodlands and two shrublands. Another four significantly modified vegetation types included trees, planted, cleared and hardstand. Of these, four represent wetland communities.
- Vegetation condition was mostly cleared, Completely Degraded (55.07 ha) and Degraded (5.83 ha), with only a small portion mapped as Excellent (2.38 ha), Very Good (4.60 ha) and Good (6.27 ha). Native vegetation represents
- No Threatened or Priority flora was recorded. Justification for this includes the narrow corridor of vegetation remaining after clearing, altered hydrology from the rail embankment, weed invasion, and historical disturbance associated with railway construction.
- Four conservation significant fauna species were recorded including; Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii* (EPBC Act & WA Vulnerable), Carnaby's Cockatoo *Calyptorhynchus latirostris* (EPBC Act & WA Endangered), Baudin's Cockatoo *Calyptorhynchus baudinii* (EPBC Act & WA Endangered) and Quenda *Isodon fusciventer* (WA Priority 4).
- Seven (including Cleared) broadly defined fauna habitats were mapped. Other than cleared areas, the most common fauna habitat is the Eucalypt Woodland. This habitat is highly variable generally contains Marri *Corymbia calophylla* over an open shrubland over an open sedge layer. Habitat quality is considered high to moderate depending on the levels of degradation and modification, and the levels of complexity.
- Breeding and foraging and habitat is present for all three Western Australian threatened black cockatoo species. A total of 277 native (hollow-forming) breeding habitat trees were identified within the survey area. Just over 73% (203) of these were Marri, 26% (53) were Flooded Gums, and the remaining were Jarrah, Stags, Tuart and Wandoo. Thirteen of the 277 trees contained a total of 13 potentially suitable hollows for breeding black cockatoos. Foraging habitat included:
 - 19.14 ha of High Quality and Very High Quality foraging habitat for Carnaby's Cockatoo *Calyptorhynchus latirostris* and Baudin's Cockatoo *Calyptorhynchus baudinii*
 - 14.42 ha of High Quality foraging habitat for Forest Red-tailed Black Cockatoo *Calyptorhynchus banksia*.

The ecological assessments were successfully completed with no significant limitations identified.

9.1 Recommendations

The following recommendations are based on the results of this ecological assessment. The high diversity of some sections of the survey area including the presence of conservation significant flora (nearby), and TECs within and adjacent to the survey area warrant targeted survey effort. This will ensure that all ecological values are adequately and accurately captured in a technical report that will inform the environmental assessment process. Recommendations include:

- Flora and vegetation surveys including permanent quadrats in areas of high ecological diversity are recommended with particular emphasis on the three TECs that were defined and mapped. Establishing permanent quadrats in early spring will facilitate a second scoring event in late spring, as recommended in the EPA Technical Guide. Another FCT assessment should be included to verify the inferred FCTs from this study.
- Targeted flora searches for Threatened and Priority species are recommended. These were included as part of this scope however the absence of a species is difficult to ascertain from one survey.
- Further black cockatoo breeding habitat tree hollow assessments could be conducted if any trees with potentially suitable hollows fall within the project footprint (once defined). Additionally, this scope should assess any of the potential breeding trees that could not be assessed completely due to visual or access issues.
- Targeted fauna surveys may be required depending on the level of impact to certain habitats. A targeted survey for Carter's Freshwater Mussel *Westralunio carteri* is recommended depending on potential impacts to suitable wetland areas, and a targeted Chuditch *Dasyurus geoffroii* survey is recommended depending on the potential impacts to the Eucalypt Woodland and Eucalypt Woodland / Wetland fauna habitats. Other conservation significant fauna species that have potential to utilise the habitats of the survey area may be able to be managed through appropriate preclearance surveys and a translocation program prior to clearing, and appropriate protocols during clearing and construction. However, we would recommend early consultation with the regulators over these conservation significant fauna species, once a project footprint has been defined.
- Consultation with regulators to determine the appropriate environmental assessment pathway once the scope of the Project is defined and studies have been undertaken to make informed decisions.

10.0 References

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Appendix A

Desktop Results

Appendix A Desktop Results

Appendix A - Desktop Flora Results

Species	EPBC	WA	Habitat ¹	Count Date	Likelihood of Occurrence (pre-survey)	Likelihood of Occurrence (post-survey)
<i>Acacia benthamii</i>		P2	Typically found on limestone breakaways, and sand. Recorded along the SCP from Dandaragan to Rockingham.	2004	Unlikely. One known record 8km away. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Acacia horridula</i>		P3	Found in gravelly soils over granite, rocky hillsides. Recorded in the Northern Jarrah Forest and Perth IBRA subregions, from Gingin to Serpentine-Jarrahdale.	1996	Unlikely. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (G.J. Keighery 5026)		P1	Grows in swampy areas and winter wet low lands	1982	Unlikely. No recent records, wetlands in survey area historically disturbed (rail/road).	Unlikely to occur.No change from previous assessment.
<i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>		P3	Distributed throughout the south-west, grows on granitic soils	1976	Unlikely. No suitable habitat. One record +10km south of survey area near Serpentine.	Unlikely to occur.No change from previous assessment.
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>		P4	Species recorded on granitic soils, occasionally on laterite. Located from Gosnells to Wandering.	2008	Unlikely. No suitable habitat. Known records associated with scarp.	Unlikely to occur.No change from previous assessment.
<i>Allocasuarina grevilleoides</i>		P3	Species grows in sand over laterite and gravel	2008	Unlikely. No suitable habitat. Known records associated with scarp.	Unlikely to occur.No change from previous assessment.
<i>Andersonia gracilis</i>	E	VU	Known from Badgingarra, Dandaragan and Kenwick areas where it is found on seasonally damp, black sandy clay flats near margins of swamps in low open vegetation with species such as <i>Calothamnus hirsutus</i> , <i>Verticordia densiflora</i> and <i>Kunzea recurva</i>	-	Unlikely. No known records in vicinity. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Andersonia</i> sp. <i>Blepharifolia</i> (F. & J. Hort 1919)		P2	Recorded on hilltops on red sandy clays or gravel in heathland to woodland.	2017	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Angianthus drummondii</i>		P3	Species grows in grey or brown clay soils and ironstone. Associated with seasonally wet flats.	2012	Unlikely. One known record +10km south. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Anthocercis gracilis</i>	V	VU	Found on sandy or loamy soils, typically on granite outcrops.	-	Unlikely. Identified in Protected Matters Search, no suitable habitat, no known records.	Unlikely to occur.No change from previous assessment.
<i>Aponogeton hexatepalus</i>		P4	Aquatic plant. Species inhabits mud, freshwater areas (ponds, rivers and claypans)	2007	Unlikely. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Asteridea gracilis</i>		P3	Grows in sand, clay and gravelly soils	2015	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Austrostipa jacobiana</i>	CE	CR	Species recorded in Bunbury and Gosnells, in low lying seasonally wet areas	2015	Unlikely. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Babingtonia urbana</i>		P3	Known from remnant bushland under <i>Corymbia calophylla</i> and <i>Xanthorrhoea preissii</i> on grey sandy clay sands and damplands.	2015	May. Suitable habitat may be present, several records nearby (5km northwest).	May occur, suitable habitat confirmed as present.
<i>Banksia kippistiana</i> var. <i>paenepeccata</i>		P3	Species found in lateritic gravelly soils associated with the Scarp in Jarrah/Marri open woodland.	2005	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Banksia mimica</i>	E	VU	Grows in white or grey sand over laterite, and sandy loam. One population nearby (10km north) associated with <i>Kingia</i> and <i>Byblis</i> .	1972	May. Old records 10km away from northern tip of survey area.	Unlikely to occur.No change from previous assessment.
<i>Beaufortia purpurea</i>		P3	Species occurs in lateritic or granitic soils and rocky slopes	2015	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Boronia tenuis</i>		P4	Plant grows amongst laterite, stony soils and granite	1966	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Byblis gigantea</i>		P3	Species occurs in sandy-peat swamps and seasonally wet areas.	1992	Unlikely. No peat swamps in survey area.	Unlikely to occur.No change from previous assessment.
<i>Caladenia huegelii</i>	E	CR	Found between Perth and Capel growing in deep sandy soil in <i>Banksia-Eucalyptus marginata</i> woodland.	1996	Unlikely. No suitable habitat (deep sandy soils).	Unlikely to occur.No change from previous assessment.
<i>Calectasia cyanea</i>	CE	CR	Species found on white, grey or yellow sand or gravel.	-	Unlikely. No known records.	Unlikely to occur.No change from previous assessment.

Species	EPBC	WA	Habitat ¹	Count Date	Likelihood of Occurrence (pre-survey)	Likelihood of Occurrence (post-survey)
<i>Calothamnus accedens</i>		P4	Found on road verges and grows in sandy soils over laterite. All records nearby associated with Ellis Brook Valley Reserve.	2008	May. Suitable habitat may be present.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>		P4	Inhabits clay over granite or lateritic soils, often on hillsides	2005	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	E	CR	Species occurs on sandy clay and swampy flats.	1915	Unlikely. One very old record in vicinity.	Unlikely to occur.No change from previous assessment.
<i>Calytrix simplex</i> subsp. <i>simplex</i>		P1	Florabase (WAH, 1998) records are in heath and Jarrah woodland on Scarp / Jarrah Forest.	1901	Unlikely. Associated with Scarp. No suitable habitat. No known records.	Unlikely to occur.No change from previous assessment.
<i>Carex tereticaulis</i>		P3	Species grows in black peaty sand. Closest record is along Serpentine River.	2009	Unlikely. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Conospermum undulatum</i>	V	VU	Inhabits grey or yellow-orange clayey sand	1908	Unlikely. Known from populations further north. One old record in vicinity.	Unlikely to occur.No change from previous assessment.
<i>Darwinia apiculata</i>	E	EN	Grows amongst Jarrah-Marri woodland on shallow, gravelly soil over laterite, or open heathland over sandy loams with granite boulders	2011	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Dillwynia dillwynioides</i>		P3	Grows in sandy soils and winter wet depressions. Known from Lowlands Bushland 12km southwest.	1993	May. Old records +10km southwest. Habitat may be present.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Diplolaena andrewsii</i>	E	EN	Found in loam or clay, along granite outcrops and hillsides.	-	Unlikely. No suitable habitat, no known records.	Unlikely to occur.No change from previous assessment.
<i>Diuris micrantha</i>	V	VU	Recorded between Perth and Boyup Brook growing in seasonally-wet flats amongst sedges and scattered shrubs.	-	May. No known records, suitable habitat may be present.	Unlikely to occur, no suitable habitat.
<i>Diuris purdiei</i>	E	EN	Recorded between Perth and Yarloop, growing under dense shrubs in seasonally-wet swamps and drainage lines. All records except 1 are from pre: 1990s.	2005	May. Suitable habitat may be present, only old records in vicinity.	Unlikely to occur, no suitable habitat.
<i>Drakaea elastica</i>	E	CR	Found on coastal plain between Ruabon and Cataby growing in sandy soil in <i>Banksia</i> woodlands and tall shrubs.		Unlikely. No suitable habitat, no known records.	Unlikely to occur.No change from previous assessment.
<i>Drakaea micrantha</i>	V	EN	Species occurs in open sandy patches that have been disturbed where competition from other plants have been removed. It grows in infertile grey sands, in <i>Banksia</i> , Jarrah and Common Sheoak woodland or forest. Is found under thickets of Spearwood with Flying Duck orchid and other <i>Drakaea</i> species.	1977	Unlikely. No suitable habitat, no recent records.	Unlikely to occur.No change from previous assessment.
<i>Drosera occidentalis</i>		P4	Recorded in vicinity on damp flats of grey sandy clays.	1990	Likely. Known record from Brickwood Reserve, suitable habitat present.	May occur, suitable habitat present, not recorded.
<i>Eleocharis keigheryi</i>	V	VU	Species occurs in clay, sandy loam and freshwater creeks and claypans.	1982	Unlikely. One record +8km north, no suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Eriochilus</i> sp. Roleystone (G. Brockman 1140)		P1	Associated with gravelly soils on scarp.	38150	Unlikely. Associated with the Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Eryngium pinnatifidum</i> subsp. <i>Palustre</i> (G.J. Keighery 13459)		P3	Recorded on dry flat brown sand.	1995	Unlikely. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>		P4	Grows in loam soils, and inhabits flats and hillsides.	1995	Unlikely. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Eucalyptus x balanites</i>	E	CR	Associated with sandy soils with lateric gravel. Population known from Fletcher Park.	2013	May. Survey area very narrow near known population and does not incorporate native vegetation.	Unlikely to occur, no suitable habitat.
<i>Goodenia arthrotricha</i>	E	EN	Species occurs in gravel, granite rocks and slopes.	2005	Unlikely. Associated with the Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Grevillea crowleyae</i>		P2	Species occurs on gravel.	1965	Unlikely. Associated with the Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	E	EN	Species grows in sand to sandy loam, in winter-wet heaths	-	Unlikely. No known records. Known from areas northeast of Perth.	Unlikely to occur.No change from previous assessment.
<i>Grevillea pimeleoides</i>		P4	Species grows in gravelly soils over granite and amongst rocky hillsides.	1965	Unlikely. Associated with the Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.

Species	EPBC	WA	Habitat ¹	Count Date	Likelihood of Occurrence (pre-survey)	Likelihood of Occurrence (post-survey)
<i>Halgania corymbosa</i>		P3	Inhabits gravelly soils and soils over granite	1999	Unlikely. Associated with the Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Isopogon drummondii</i>		P3	Occurs on white, grey or yellow sand, often over laterite. Known record 14km south of survey area.	2003	May. Suitable habitat may be present.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Jacksonia gracillima</i>		P3	Grey-black sand, sand dunes, winter wet flats.	2011	May. Suitable habitat may be present.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Jacksonia sericea</i>		P4	Species is found on calcareous and sandy soils. DBCA population 11 along Anstey road in vicinity.	1990	May. Suitable habitat may be present.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Johnsonia pubescens</i> subsp. <i>cygnorum</i>		P2	Species occurs on grey, white and yellow sands, typically on flat terrain and seasonally wet sites.	1992	Likely. Known records in close proximity, suitable habitat present.	Likely to occur. Additional survey effort may identify this species.
<i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i>		P3	Grows on slopes associated with granite outcrops. Also found on brown clay sands and swampy soils.	2017	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Lasiopetalum pterocarpum</i>	E	CR	Species grows on dark red-brown loam to clayey sand, over granite. Associated with sloping banks near creeklines.	2016	Unlikely. No suitable habitat present.	Unlikely to occur.No change from previous assessment.
<i>Lepidosperma rostratum</i>	E	EN	Grows on peaty sand and clay amongst low heath in winter-wet swamps.	2013	Unlikely. No peaty soils in survey area.	Unlikely to occur.No change from previous assessment.
<i>Meionectes tenuifolia</i>		P3	Semi-aquatic species recorded in seasonally wet areas. One record nearby in Forestdale Nature Reserve.	2013	Unlikely. No suitable habitat present.	Unlikely to occur.No change from previous assessment.
<i>Millotia tenuifolia</i> var. <i>laevis</i>		P2	Association with granite or laterite soils.	2005	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Ornduffia submersa</i>		P4	Aquatic herb associated with damp claypans. Two records from Scarp nearby.	2004	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Parsonia diaphanophleba</i>		P4	Species is found on alluvial soils along rivers.	1997	Unlikely. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Pimelea rara</i>		P4	Species grows in the Northern Jarrah Forest, on lateritic soils	1997	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Pithocarpa corymbulosa</i>		P3	Species grows in gravelly or sandy loam, amongst granite outcrops.	2005	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Ptilotus sericostachyus</i> subsp. <i>roseus</i>		P1	There is no information on Florabase or from vouchered specimens. Two known locations in vicinity are in cleared areas.	1902	May. No information to make accurate assessment.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Schoenus benthamii</i>		P3	Found on white or grey sand and sandy clay, amongst winter-wet flats and swamps	1994	May. Suitable habitat present, no recent records, no records within 5km.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Schoenus capillifolius</i>		P3	Semi-aquatic species, found in brown mud, claypans.	2013	Unlikely. No suitable habitat.	Unlikely to occur.
<i>Schoenus pennisetis</i>		P3	Species grows on grey or peaty sand to sandy clays, associated with swamps and winter-wet depressions. Known from Brickwood Reserve.	2007	Likely. Known from close proximity, suitable habitat may be present.	Likely to occur. Additional survey effort may identify this species.
<i>Schoenus</i> sp. Waroona (G.J. Keighery 12235)		P3	Grows in sandy clay to clay, in seasonal wetlands.	2012	May. Suitable habitat may be present, one known record in vicinity.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Senecio leucoglossus</i>		P4	Grows on gravelly lateritic or granitic soils, found on granite outcrops and slopes	24/09/1899	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Stackhousia</i> sp. Red-blotched corolla (A. Markey 911)		P3	Recorded on scarp associated with damplands in heath vegetation.	1997	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Stenanthemum sublineare</i>		P2	Grows in littered white sand. One record nearby is from Banksia woodlands.	2003	May. Suitable habitat may be present.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Stylidium aceratum</i>		P3	Grows in sandy soils, in swamps.	2013	May occur. Suitable habitat present, not known from wetlands adjacent to survey area.	May occur, suitable habitat present but modified. Several records in vicinity.

Species	EPBC	WA	Habitat ¹	Count Date	Likelihood of Occurrence (pre-survey)	Likelihood of Occurrence (post-survey)
<i>Stylidium longitubum</i>		P4	Species found on sandy clay and clay in seasonal wetlands	2013	May occur. Suitable habitat present, not known from wetlands adjacent to survey area.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Styphelia filifolia</i>		P3	Grows on sandy soils of the coastal, usually in Banksia or Jarrah woodland and in low-lying situations.	2003	May. Suitable habitat may be present.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Synaphea odocoileops</i>		P1	Inhabits brown-orange loam and sandy clay, granite amongst swamps and winter-wet areas. Known record from Serpentine.	1998	Unlikely. No suitable habitat present.	Unlikely to occur.No change from previous assessment.
<i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696)	CE	CR	Endemic to Pinjarra Plain of WA, known from five subpopulations south of Perth from Serpentine to Dardanup. Occurs on grey, clayey sand with lateritic pebbles in low woodland near winter-wet flats.	2003	Unlikely. No suitable habitat present.	Unlikely to occur.No change from previous assessment.
<i>Synaphea</i> sp. Pinjarra Plain (A.S. George 17182)	E	EN	Species recorded throughout the Swan Coastal Plain, in Serpentine-Jarrahdale, Capel and Murray. Grows on grey sandy lam to clay or grey-brown clayey sand or loam. Typically associated with flat terrains and seasonally wet areas.	2012	May. Suitable habitat may be present. Numerous known records nearby.	May occur, suitable habitat present but modified. Several records in vicinity.
<i>Synaphea</i> sp. Serpentine (G.R. Brand 103)	CE	CR	Flat terrain on grey-brown sandy loams to clay in seasonally wet areas.	2003	Likely. Suitable habitat present.	Likely to occur. Additional survey effort may identify this species.
<i>Tetralia australiensis</i>	V	VU	Records in vicinity are from low plains, slopes and low dunes with white/grey sand, yellow/grey sand and brown/yellow sands in Eucalypt woodlands.	2010	Likely. Suitable habitat present.	Unlikely to occur, no suitable habitat.
<i>Thelymitra dedmaniarum</i>	E	CR	Granite, restricted to Jarrah Forest.	-	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Thelymitra magnifica</i>		P1	Grows on stony ridges.	2003	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Thelymitra stellata</i>	E	EN	Sand, gravel, lateritic loam. Grows in <i>Eucalyptus marginata</i> forests or in low heath on rocky tops of small hills	1991	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Thysanotus anceps</i>		P3	Occurs on white or grey sand, lateritic gravel and laterite	1997	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Thysanotus glaucus</i>		P4	One known record in vicinity associated with disturbed sandy soils.	1960	May. Suitable habitat may be present. Records old.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Thysanotus</i> sp. Badgingarra (E.A. Griffin 2511)		P2	Grows in grey sand with lateritic gravel.	1996	Unlikely. Associated with Scarp. No suitable habitat.	Unlikely to occur.No change from previous assessment.
<i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234)		P4	One record nearby from moist sandy flats on edge of disturbed area.	1990	May. Suitable habitat may be present. Record old.	Unlikely to occur, suitable habitat present but modified, no records nearby.
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	Grows in white to grey and yellow sand, often with or over clay and gravel, usually low-lying and winter-wet. Frequently in heath, shrubland and open woodland	1990	Likely. Suitable habitat present.	Unlikely to occur, no suitable habitat.
<i>Verticordia plumosa</i> var. <i>ananeotes</i>	E	CR	Species grows in sandy loam and seasonally inundated plains. Populations are restricted to areas of remnant vegetation surrounded by land cleared for agriculture	1900	Unlikely. Two old records, known from Serpentine and Cockburn Sound.	Unlikely to occur.No change from previous assessment.

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Appendix A2 - Fauna Desktop Assessment

Scientific Name	Common Name	State	EPBC Act	Last Record	Total Records	PMST	Ecology	Likelihood
<i>Acanthophis antarcticus</i>	Southern Death Adder	P3	-	1963	9		The Southern Death Adder is associated with forests, woodlands, grasslands or heath. Populations in WA and are scattered in the south-west (ALA, 2019)	Unlikely to occur
<i>Actitis hypoleucos</i>	Common Sandpiper	IA	Marine / Migratory			+	The Common Sandpiper is widespread throughout Australia, with few important sites on the continent. They visit Australia during the non-breeding season. Preferred habitat is coastal wetlands with muddy margins or rocky shores but has also been recorded in inland wetlands and dams (DotE, 2015).	Unlikely to occur
<i>Apus pacificus</i>	Fork-tailed Swift	IA	Marine / Migratory			+	The Fork-tailed Swift is almost exclusively aerial, and a non-breeding visitor to Australia (DotE, 2015). They are rarely seen roosting on land.	Unlikely to occur
<i>Ardea alba</i>	Great Egret, White Egret	IA	Marine / Migratory				The Great Egret occupies a wide variety of wet habitats including freshwater wetlands, dams, flooded pastures, estuarine mudflats, mangroves and reefs (Morcombe, 2003). The species is also known to visit shallows of rivers, sewage ponds and irrigation areas (Pizzey & Knight, 2007).	Unlikely to occur
<i>Ardea ibis</i>	Cattle Egret	IA	Marine / Migratory				The Cattle Egret is a small egret weighing only 390g and standing 70cm tall. The heaviest distribution of this species in WA is in the north east, and into the Northern Territory. In the non-breeding season, it can be found throughout most of Australia (DotE, 2015).	Unlikely to occur
<i>Arenaria interpres</i>	Ruddy Turnstone	IA	Marine / Migratory				The Ruddy Turnstone is a stocky, medium build wader with a short wedge shaped bill, orange-red legs and black or dark-brown chest. It is widespread throughout Australia during its non-breeding season. It prefers rocky shores or beaches with rotting seaweed. It breeds in the Northern Hemisphere, but there are several Australian site of international importance in the north of Western Australia and is widespread across the continent during the non-breeding season (DotE, 2015).	Unlikely to occur
<i>Austroconops mcmillani</i>	McMillan's biting midge	P2	-	1934	1		No habitat description available	Unlikely to occur
<i>Bettongia penicillata ogilbyi</i>	Woylie	CR	E			+	The Woylie is a small marsupial with grey to greyish brown fur on the back and flanks, and pale greyish on the undersides. The tail is dark and has a distinctive black brush at the end. The Woylie previously occurred over large areas of western, central and eastern Australia, however naturally occurring extant populations are now restricted to three small reserves in the Western Australian wheatbelt (Van Dyck & Strahan, 2008). They inhabit woodlands and adjacent heaths with a dense understorey of shrubs, particularly <i>Gastrolobium</i> sp. (poison pea).	Unlikely to occur
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	E			+	The Australasian Bittern is a large thick-necked bird, growing to a length of 66 to 76 cm. Upper parts are brown and black and mottled to aid in camouflage. It grows to a length of 66–76 cm and has a wingspan of 1050–1180 cm. The Australasian Bittern has a straw yellow bill and the legs and feet are pale green to olive (Marchant & Higgins, 1990; Pizzey & Knight, 1997). In Western Australia the species was formerly widespread in the south-west however is now thought to only occur on the western coastal plain, southern coastal region and inland to some wetlands in the Jarrah forests (DSEWPac, 2011). The Australasian Bittern's preferred habitat is comprised of wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water (Marchant & Higgins, 1990).	Unlikely to occur
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	IA	Marine / Migratory			+	The Sharp-tailed Sandpiper is a small to medium sized wader with a length of 17 to 22 cm and weighing 65g. They are widespread in Western Australia from the Pilbara region to the south-west.	Unlikely to occur

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Scientific Name	Common Name	State	EPBC Act	Last Record	Total Records	PMST	Ecology	Likelihood
<i>Calidris alba</i>	Sanderling	IA	Marine / Migratory				A small pale wader, reaching 20cm long that breeds in the Northern Hemisphere. This species is almost always found on the coast where they forage in the wave-wash zone and in rotting seaweed (DotE, 2015). This species occurs from the coast near Eyre to Derby, however is more common on the southern and south-west coasts (DotE, 2015).	Unlikely to occur
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	CE			+	The Curlew Sandpiper is a small, slim weighing 57 g. In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. In Western Australia, they are widespread around coastal and sub coastal plains from Cape Arid to the south-west Kimberley.	Unlikely to occur
<i>Calidris melanotos</i>	Pectoral Sandpiper	IA	Marine / Migratory			+	The Pectoral Sandpiper occupies shallow, fresh waters often containing low grass or other small herbs. It is also observed in swamp margins, flooded pastures and saltmarshes. This species breeds in the northern hemisphere and is a regular though uncommon summer visitor to Australia (Pizzey & Knight, 2007). Rarely recorded in Western Australia (DotE, 2015).	Unlikely to occur
<i>Calidris ruficollis</i>	Red-necked Stint	IA	Marine / Migratory			+	The Red-necked Stint is the smallest wader in Australia and is distributed along most of the Australian coastline, with the greatest densities in Victoria and Tasmania. The nearest internationally important site for the species is the Alfred Cove Nature Reserve on the Swan River (DotE, 2015).	Unlikely to occur
<i>Calidris subminuta</i>	Long-toed Stint	IA	Marine / Migratory			+	The Long-toed Stint breeds in the northern hemisphere, before migrating to northern and coastal Australia where it occupies weedy margins of shallow wetlands, sewage ponds and tidal mudflats (Pizzey & Knight, 2007). In Western Australia records of this species are generally found along the coast (DotE, 2015).	Unlikely to occur
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	VU	V	2018	28	+	The Forest Red-tailed Black Cockatoo is 55-60 cm in length, and are mostly glossy black with a pair of black central tail feathers, a crest, robust bill and bright red, orange or yellow barring in the tail (Higgins, 1999). Males are distinguished by broad red tail panels that are only visible when taking off or alighting (Higgins 1999). Requires tree hollows to nest and breed, occurs in forests of Karri (<i>Eucalyptus diversicolor</i>), Jarrah (<i>E. marginata</i>) and Marri (<i>Corymbia calophylla</i>), with flocks moving out onto the Swan Coastal Plain in search of food from exotic trees such as White Cedar (Johnstone <i>et al.</i> , 2010). Foraging habitat for the species consists of Jarrah and Marri woodlands and forest throughout its range. Has become more common in the Metropolitan area in the past few years.	Likely to occur based on recent records and suitable habitat
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	EN	E	2015	68	+	Baudin's Cockatoo is a large cockatoo that measures 50–57 cm in length, with a wingspan of approximately 110 cm. Mostly dull black in colour, with pale whitish margins on the feathers (Higgins, 1999). Habitat critical to the survival of this species includes forests of Karri (<i>Eucalyptus diversicolor</i>), Jarrah (<i>E. marginata</i>) and Marri (<i>Corymbia calophylla</i>), in areas of 600 mm average rainfall per year. Individuals typically move north through the Perth region from March to May and south through the Perth region from August to October. This species ranges north to Gidgegannup and Hoddly Well and west to the Eastern Strip of the Swan Coastal Plain including West Midland in the north, heading south through Armadale, Byford and south and towards the coast until Lake Clifton where it continues to hug the coastline to east of Albany (Johnstone <i>et al.</i> , 2010). Breeding has been recorded to the south-west of the area bounded by Leschenault, Collie and Albany (DSEWPac, 2012), with the most northerly record at Lowden, near Donnybrook (Johnstone & Storr, 1998). Breeding has also been recorded at Serpentine (hills area), and east to Kojonup and near Albany (Johnstone & Kirkby, 2008).	Likely to occur based on recent records and suitable habitat

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Scientific Name	Common Name	State	EPBC Act	Last Record	Total Records	PMST	Ecology	Likelihood
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	EN	E	2013	407	+	Carnaby's Cockatoo is a white-tailed black cockatoo endemic to the south-west of Western Australia. It is a postnuptial nomad and typically moves west soon after breeding. Breeding occurs mainly from early July to mid-December. There has been an apparent shift in its breeding range further west and south since the middle of last century (Johnstone <i>et al.</i> , 2010). The species nests in hollows in eucalypts, particularly Salmon Gum (<i>Eucalyptus salmonophloia</i>) and Wandoo (<i>E. Wandoo</i>), but nests have been found in other eucalypts including York Gum (<i>E. loxophleba</i>), Flooded Gum (<i>E. rudis</i>), Tuart (<i>E. gomphocephala</i>) and Marri (<i>Corymbia calophylla</i>) (Johnstone <i>et al.</i> , 2010). Breeding success is largely dependent on suitable feeding habitat adjacent to the nest site to provide the necessary food for the survival of the chick (Johnstone <i>et al.</i> , 2010). Diet consists of an array of Proteaceous and <i>Eucalyptus</i> species. Foraging habitat, including <i>Banksia</i> woodlands, is considered to be habitat critical to the survival of the species (Johnstone <i>et al.</i> , 2010).	Likely to occur based on recent records and suitable habitat
<i>Charadrius dubius</i>	Little Ringed Plover	IA	Marine / Migratory			+	The Little Ringed Plover is a non-breeding visitor to Australia. There are no current known sites of international importance to the species on mainland Australia or offshore islands (Wetlands International, 2008).	Unlikely to occur
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU	V				The Greater Sand Plover is a medium sized plover, weighing up to 100 g. This species has been recorded at beaches, tidal mudflats, reefs, dunes and is seldom observed far inland (Pizzey & Knight, 2007).	Unlikely to occur
<i>Ctenotus delli</i>	Dell's skink, Darling Range Southwest Ctenotus	P4	-	1969	1		The Darling Range Heath Ctenotus, a small skink that occurs in the Darling Range, inhabiting shrubby understorey on lateritic, sandy and clay soils in Jarrah and Marri woodlands.	Unlikely to occur
<i>Ctenotus ora</i>	Coastal Plains Skink	P3	-				Newly defined species since 2012, previously grouped with <i>Ctenotus labillardieri</i> . Records have located species in open eucalypt woodland over banksia and low vegetation along the Swan Coastal Plain (Kay & Keogh, 2012).	Unlikely to occur
<i>Dasyurus geoffroi</i>	Chuditch	VU	V	2010	4	+	At maturity the Chuditch is the size of a small domestic cat with white spotted brown pelage,, large rounded ears, pointed muzzle, large dark eyes and non-hopping gait. Following European settlement the range of this species contracted dramatically, from much of the continent to a small area in the south west. It currently only occurs in areas dominated by sclerophyll forest or drier woodland, heath and mallee shrubland (Van Dyck & Strahan, 2008). The Chuditch requires adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive.	May occur
<i>Euoplos inornatus</i>	Inornate Trapdoor Spider	P3					<i>Euoplos</i> is a spider genus in the family Idiopidae which is found in various geographical locations in Australia. The trapdoor spider species <i>Euoplos inornatus</i> occurs on the eastern edge of the SCP, although most records are from the Darling Scarp and the Jarrah forest to the east (Invertebrate Solutions, 2018).	May occur
<i>Falco peregrinus</i>	Peregrine Falcon	OS (7)	-	2004	4		The Peregrine Falcon is a medium-sized raptor (length 35-55cm; wingspan 80-105cm) with slate-grey back, a striking charcoal black head and face which contrast with a pale cream bib on the neck and breast (Birdlife Australia, 2018). A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2007). This species lays its eggs in recesses of cliff faces, tree hollows or large abandoned nests (Bamford, 2009)	May occur
<i>Falsistrellus mackenziei</i>	Western Falsistrelle	P4	-				Recent records of the Western Falsistrelle have been recorded near Stratham and Australind. Species habitat includes high rainfall areas dominated by Jarrah, Karri, Marri and Tuart. Species typically found in mature forest, but has also been recorded from Banksia woodland on the Swan Coastal Plain (Armstrong et al. 2017)	Unlikely to occur
<i>Gallinago megala</i>	Swinhoe's Snipe	IA	Marine / Migratory			+	This species is distributed throughout Western Australia, particularly in the Kimberley region (Johnstone & Storr, 1998).	Unlikely to occur

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<i>Gallinago stenura</i>	Pin-tailed Snipe	IA	Marine / Migratory			+	This species occupies shallow freshwaters and is distributed on the north-west coastal plains but is a casual visitor further south to Perth (Johnstone & Storr, 1998).	Unlikely to occur
<i>Gelochelidon nilotica</i>	Gull-billed Tern	IA	Marine / Migratory				The Gull-billed Tern are found on all continents except Antarctica, typically near freshwater swamps, brackish and salt lakes, beaches and other water bodies. The species is distributed throughout inland Australia (Birds in Backyards, 2020).	Unlikely to occur
<i>Glacidorbis occidentalis</i>	Jarrah forest freshwater snail	P3	-				Found in the Swan Coastal Plain and South-west regions of Western Australia, Jarrah forest freshwater snails typically inhabit inland waters, and are found on macrophytes, moss, roots, pieces of wood, or under stones (Centre for Freshwater Ecosystems, 2020).	Unlikely to occur
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	IA	Marine / Migratory				The White-bellied Sea-Eagle is a large raptor that is widespread throughout coastal Australia. The White Bellied Sea-Eagle occupies a wide range of habitats, usually in close proximity to a large body of water (including the ocean). Breeding usually occurs in tall open woodlands overlooking bodies of water (DotE, 2015).	Unlikely to occur
<i>Hydromys chrysogaster</i>	Water-rat	P4	-	2004	3		The Water Rat is one of the few Australian mammals adapted to the aquatic environment. It has a streamlined body and broad, partially webbed hind feet. The species occurs in the vicinity of permanent bodies of fresh or brackish water. Dens are made at the end of tunnels in banks and occasionally in logs (Van Dyck & Strahan, 2008).	May occur
<i>Hydroprogne caspia</i>	Caspian Tern	IA	Marine / Migratory	1994	1		The Caspian Tern has been recorded on both coastal and inland locations throughout Australia. In WA the species is widespread in coastal regions, from the Great Australian Bight to the Dampier Peninsula. There are sparse records on the coasts east of King Sound and in eastern regions (Higgins & Davies 1996).	Unlikely to occur
<i>Idiosoma sigillatum</i>	Shield-backed Trapdoor Spider	P3	-				This species can be found in burrows of heavy clay soils in areas of open York Gum (<i>Eucalyptus loxophleba</i>), Salmon Gum (<i>E. salmonophloia</i>) and Wandoo <i>E. wandoo</i> woodland, where <i>Acacia acuminata</i> forms a sparse understorey (Avon Catchment Council, 2007).	Unlikely to occur
<i>Isoodon fusciventer</i>	Quenda	P4	-	2016	73		The Quenda or Southern Brown Bandicoot exists only in a fragmented distribution to its former range in southern south western and eastern Australia. It is found in forest, woodland, heath and shrub communities in these regions. Preferred habitat usually consists of a combination of sandy soils and dense heathy vegetation (Van Dyck & Strahan, 2008).	Likely to occur based on recent records and suitable habitat
<i>Ixobrychus dubius</i>	Australian Little Bittern	P4	-				A small, secretive bittern, standing at between 25 cm to 35 cm, the Little Bittern forages among dense low swamp vegetation and on floating water plants. This species occurs in the south-west of Western Australia however it is very uncommon (Pizzey & Knight, 2007).	Unlikely to occur
<i>Kawaniphila pachomai</i>	Grey Vernal Katydid	P1	-				The Grey Vernal Katydid have been recorded within the southern Perth metropolitan area and south-west near Vasse. The species inhabits tree and shrubs and can be found mostly heath or mixed woodland (Rentz, 1993).	Unlikely to occur
<i>Leioproctus douglasiellus</i>	Short-tongued Bee	EN	CE			+	This small black native bee species is known from the SCP (Kenwick wetlands, Cannington and Forestdale Lake) and near Lithgow in the Blue Mountains of NSW (ALA, 2019) and has an association with <i>Goodenia filiformis</i> and <i>Anthotium junciforme</i> (South Metro Connect, 2011).	Unlikely to occur - neither flora species was recorded in the survey area
<i>Leipoa ocellata</i>	Malleefowl	VU	V			+	The Malleefowl is a large, ground-dwelling bird with strong feet and a short bill. It is found principally in the semi-arid to arid zone in shrublands and low woodlands dominated by mallee and associated habitats such as such as Broombush (<i>Melaleuca uncinata</i>) and Scrub Pine (<i>Callitris verrucosa</i>). In WA Malleefowl distribution was associated with landscapes that had lower rainfall, greater amounts of mallee and shrubland that occur as large remnants, and lighter soil surface textures (Benshemesh, 2007).	Unlikely to occur

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<i>Lerista lineata</i>	Perth Slider	P3	-				The Perth Lined Lerista is an underground dwelling skink, sheltering in leaf litter and upper layers of loose soil. It is typically found at the bases of shrubs, spoil heaps and stick ant nests (Bush <i>et al</i> , 2010). The species inhabits sandy soils supporting Eucalypt/ <i>Banksia</i> woodland, coastal heath and low shrubland (Bush <i>et al.</i> , 2010; Wilson and Swan, 2010). There are no records of this species north of the Swan River on the Swan Coastal Plain (South Metro Connect, 2011).	Unlikely to occur
<i>Limosa limosa</i>	Black-tailed Godwit	IA	Marine / Migratory			+	The Black-tailed Godwit is found in all states and territories of Australia however it typically inhabits coastal regions and is concentrated in the north of the country. It can be found elsewhere although is usually present in lower numbers (DotE, 2015).	Unlikely to occur
<i>Macronectes giganteus</i>	Southern Giant-Petrel	P4	E				The Southern Giant Petrel is the largest petrel, and has been described as looking like a small, ungainly brown albatross with a massive greenish-tipped straw coloured bill, surmounted by a large single nostril-tube (Pizzey & Knight, 1999). The species is known to occur in Antarctic to subtropical waters. It typically nests in areas of exposed vegetation (DotEE, 2019). It is a marine species and is only known to nest on the Antarctic Continent, surrounding islands and South America, it may however overfly the area.	Unlikely to occur
<i>Merops ornatus</i>	Rainbow Bee-eater	IA	Marine / Migratory				The Rainbow Bee-eater is a common species which occupies numerous habitats including open woodlands with sandy loamy soil, sand ridges, sandpits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves and rainforests. It is possible that this species will occupy open woodland areas within the survey area. The Rainbow Bee-eater avoids heavy forest that would hinder the pursuit of its insect prey (Morcombe, 2003).	Unlikely to occur
<i>Motacilla cinerea</i>	Grey Wagtail	IA	Marine / Migratory			+	The Grey Wagtail is a scarce but regular visitor to northern Australia, typically arriving in October and leaving in March. The species is most commonly associated with water and are found across a wide variety of wetlands, watercourses and on the banks of lakes and marshes (DotE, 2015)	Unlikely to occur
<i>Myrmecobius fasciatus</i>	Numbat	EN		1974	3		Originally widespread, the Numbat now only persists in two remnant populations at Dryandra and Perup in Western Australia with several reintroduced populations in the Western Australian wheatbelt (DotEE, 2019).	Unlikely to occur
<i>Neelaps calonotos</i>	Black-striped Snake	P3					The Black-striped Snake is mostly confined to the Swan Coastal Plain between Mandurah and Lancelin. It takes shelter in upper layers of loose soil beneath leaf litter in Eucalyptus/ <i>Banksia</i> woodlands, typically at the base of trees and shrubs (Bush <i>et al.</i> , 2010).	Unlikely to occur
<i>Neopasiphae simplicior</i>	Native Bee	EN	CE			+	Species is highly restricted, and only recorded from a single location within the bushland of Forrestdale Lake Nature Reserve (adjacent to the Forrestdale Lake and Armadale Golf Course). No other extant populations are known (Houston, 1994).	Unlikely to occur
<i>Notamacropus eugenii</i> subsp. <i>derbianus</i>	Tammar Wallaby	P4	-				<i>Notamacropus eugenii</i> <i>derbianus</i> is a small nocturnal Tammar Wallaby subspecies that is native to south-western Western Australia and five offshore islands. The mainland population has substantially declined since the 1890s due to habitat clearing, hunting, fire, predation by foxes and cats, and competition with rabbits. Tammar Wallabies shelter in dense low vegetation during daylight and move to open grassy areas to feed after dark. They inhabit coastal scrub, heath, dry sclerophyll forest, and thickets in mallee and woodland (DotEE, 2019).	Unlikely to occur
<i>Notamacropus irma</i>	Western Brush Wallaby	P4	-	1959	2		The Western Brush Wallaby is endemic to the south-west region of Western Australia, and has been recorded from north of Kalbarri and towards Cape Arid. The species inhabits open forest/woodland, mallee, heathland, low open grasslands and thickets. (Woinarksi and Burbidge 2016).	Unlikely to occur

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<i>Numenius madagascariensis</i>	Eastern Curlew	CR	CE			+	The Eastern Curlew is Australia's largest shorebird and a long-haul flyer. It is easily recognisable, with its long, down-curved bill. The Eastern Curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats. It is extremely shy and will take flight at the first sign of danger (DotEE, 2019). The southern most important international site in Western Australia is Eighty Mile Beach (Bamford et al., 2008).	Unlikely to occur
<i>Numenius minutus</i>	Little Curlew	IA	Marine / Migratory			+	The Little Curlew breeds in Arctic Siberia and migrates south to Australia in September, returning by April. When in Australia this species occupies dry grassplains, floodplains, margins of drying swamps, tidal mudflats, crops and sewage ponds (Pizzey & Knight, 2007).	Unlikely to occur
<i>Oxyura australis</i>	Blue-billed duck	P4	-				The Blue-billed Duck is a compact diving duck with males having a large scooped bright, light blue bill. The tail is dark with stiff pointed feather tips and is usually held flat on the surface of the water except when in display (Birdlife Australia, 2019). The Blue-billed Duck is endemic to south eastern and south western Australia. It prefers deep water in large permanent wetlands and swamps with aquatic vegetation. This species of duck is fully aquatic and rarely comes onto land.	Unlikely to occur
<i>Pandion cristatus</i>	Eastern Osprey	IA	Marine / Migratory				The breeding range of the Eastern Osprey includes the northern coast of Australia from Albany in WA to Lake Macquarie in NSW. The total range (breeding plus non-breeding) around the northern coast is more widespread, extending from Esperance in Western Australia to NSW, where records become scarcer towards the south (DotEE, 2019).	Unlikely to occur
<i>Pandion haliaetus</i>	Osprey	IA	Marine / Migratory			+	The Eastern Osprey is a medium-sized raptor with dark-brown to blackish-brown above and white below with a white head and neck; a dark-brown to blackish-brown crest; a black stripe across the eye and ear; a band of reddish-brown, brown or dark-brown streaking across the breast. The breeding range of the Osprey includes the northern coast of Australia from Albany in WA to Lake Macquarie in NSW (DotEE, 2019). The Osprey occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Found mostly in coastal areas but can travel inland along major rivers. Areas of open fresh, brackish or saline water for foraging is essential for their habitat, visiting various wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps and broad rivers, reservoirs and large lakes. They can also occur over atypical habitats such as heath, woodland or forest when travelling between foraging sites.	Unlikely to occur
<i>Phascogale tapoatafa wambenger</i>	Brush-tailed Phascogale	CD	-	No date	2		The Brush-tailed Phascogale is one of the most arboreal dasyurids and rarely feeds on the ground. The species is distinguished by a large black tail. The species formerly occupied all the dry sclerophyll forests and woodlands of temperate and tropical Australia. The species suffered a drastic reduction in habitat due to clearing of prime habitat for agriculture and now prefers open forest with sparse groundcover. It has been observed in habitats ranging from mallee to rainforest.	May occur
<i>Philomachus pugnax</i>	Ruff (Reeve)	IA	Marine / Migratory			+	The Ruff, or Reeve for females, breeds in Eurasia and is a regular, uncommon migrant to coastal Australia where it frequents fresh, brackish and saline wetlands, tidal mudflats and saltfields (Pizzey & Knight, 2007).	Unlikely to occur
<i>Plegadis falcinellus</i>	Glossy Ibis	IA	Marine / Migratory				The Glossy Ibis is slightly smaller than other ibises, reaching 49-55 cm. It occupies well vegetated wetlands, wet pastures, floodwaters, brackish wetlands and mudflats. This species is a non-breeding visitor to south-west Western Australia (Pizzey & Knight, 2007).	Unlikely to occur
<i>Pluvialis fulva</i>	Pacific Golden Plover	IA	Marine / Migratory				The Pacific Golden Plover is a medium sized bird with long legs and seldom recorded in the south west of Western Australia (DSWEPaC, 2012).	Unlikely to occur

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<i>Pluvialis squatarola</i>	Grey Plover	IA	Marine / Migratory				The Grey Plover is a medium sized plover, with the Australian population breeding in Siberia between May and August, with individuals reaching the south coast of Australia in October and November (DotEE, 2019).	Unlikely to occur
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	CR	CE			+	This species is restricted to the south-west corner of Western Australia. Closer to the coast it is closely associated with Peppermint (<i>Agonis flexuosa</i>) forest and woodland and Tuart (<i>Eucalyptus gomphocephala</i>) with a peppermint mid-story. Further from the coast the species is found in Jarrah (<i>Eucalyptus marginata</i>), Wandoo (<i>Eucalyptus wandoo</i>) and Marri (<i>Corymbia calophylla</i>) forest (Van Dyck & Strahan, 2008).	Unlikely to occur
<i>Rostratula australis</i>	Australian Painted Snipe	EN	E			+	The Australian Painted Snipe is a stocky wading bird around 220–250 mm in length with a long pinkish bill. This species is a very rare summer visitor to the south-west of Western Australia. Breeding habitat in Western Australia is not quite known however a nest located near Moora was located in a tussock beside a swamp (Johnstone & Storr, 1998). The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DotEE, 2019).	Unlikely to occur
<i>Setonix brachyurus</i>	Quokka	VU	V	1958	6	+	The Quokka is distributed from Jarrah forest south-east of Perth, extending south through southern Jarrah, Marri and Karri forests onward to the south coast. It is now thought to be absent from the Swan Coastal Plain. Habitat use varies and includes thickets of Acacia, Melaleuca and is sometimes found in conjunction with tea-tree (Van Dyck & Strahan, 2008).	Unlikely to occur
<i>Stercorarius longicaudus</i>	Long-tailed Jaeger	IA	Marine / Migratory				The long-tailed jaeger occurs across the Arctic, Atlantic and Pacific Waters. The species is mostly pelagic, with the distribution in Australia not described (Birdlife, 2019).	Unlikely to occur
<i>Sternula nereis nereis</i>	Fairy Tern	VU	V			+	The Fairy Tern is a small bird weighing approximately 70 g, and is described as bulky and round bodied (Simpson & Day 2004). The breeding plumage of both sexes is pale grey-white, with a black crown, nape, ear coverts and patch in front of the eyes (square to round in shape) (Higgins & Davies 1996). The species is found along coasts of Victoria, Tasmania, South Australia and Western Australia, occurring as far north as the Dampier Archipelago. The Fairy Tern nests on sheltered sandy beaches, spits and banks (DotE, 2015).	Unlikely to occur
<i>Synemon gratiosa</i>	Graceful Sunmoth	P4	-				The Graceful Sun Moth occurs throughout the Swan Coastal Plain and extends north into the Geraldton Sandplain (DEC, 2011). It is associated with two habitat types: 1. Coastal heathland on Quindalup dunes where it is restricted to secondary sand dunes due to the abundance of the preferred host plant <i>Lomandra maritima</i> . The Graceful Sun Moth is recorded at substantially higher rates on the <i>L. maritima</i> habitat and is therefore more numerous/dense in this coastal habitat (DEC 2011). 2. Banksia woodland on Spearwood and Bassendean dunes, where the second known host plant <i>L. hermaphrodita</i> is widespread. The relative contribution of the Banksia woodland (<i>L. hermaphrodita</i>) habitat to the total population and area of occupied habitat of the Graceful Sun Moth is small (DEC 2011). Dispersal is thought to be limited by fragmentation of habitat (DEC, 2011).	Unlikely to occur
<i>Thinornis rubricollis</i>	Hooded Plover	P4					The Hooded Plover is a medium-sized sandy-brown plover. It has a black head and a white nape, and the black hindneck collar extends around and forks onto the breast. West of the Nullarbor Plain, Hooded Plovers are also often recorded on ocean beaches, but they are just as likely to be seen foraging at salt lakes, sometimes hundreds of kilometres from the coast (Birdlife, 2019).	Unlikely to occur
<i>Trichosurus vulpecula</i> subsp. <i>arnhemensis</i>	Northern Brushtail Possum	VU	-				The Northern Brushtail Possum is distributed throughout Australia mainland and offshore islands. The Brushtail Possum is known to occupy a variety of habitats from forest and woodlands that provide sufficient trees with hollows, to ground refuges such as hollow logs. The <i>arnhemensis</i> sub-species has been recorded from the tropical northern Australia, including the Pilbara and Kimberley of Western Australia (DEC, 2012).	Unlikely to occur

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<i>Tringa glareola</i>	Wood Sandpiper	IA	Marine / Migratory			+	The Wood Sandpiper is a summer migrant to Australia where it is more common in the north although a casual visitor to southern parts. It occupies wetland margins, saltmarshes and sewage ponds (Pizzey & Knight, 2007).	Unlikely to occur
<i>Tringa nebularia</i>	Common Greenshank	IA	Marine / Migratory			+	The Common Greenshank is a largely built wader, weighing up to 190 g for both sexes. The species is found in inland wetlands and sheltered coastal habitats (DotE, 2015).	Unlikely to occur
<i>Tringa stagnatilis</i>	Marsh Sandpiper	IA	Marine / Migratory			+	This species breeds from Austria to Mongolia and moves to Australia for summer and is found in mostly coastal areas (Pizzey & Knight, 2007). Scattered records exist in Western Australia and are found mainly near the coast (DotE, 2015). This species occupies wetlands of varying salinity including fresh, sewage ponds and estuaries (Pizzey & Knight, 2007).	Unlikely to occur
<i>Westralunio carteri</i>	Carter's Freshwater Mussel	VU	V	2009	1	+	The only reasonably large bivalve in freshwaters of south-west Western Australia. Occurs in greatest abundance in slower flowing waters with stable sediments that are soft enough for burrowing. Salinity tolerance is quite low (>3 g/L is lethal) (Klunzinger <i>et al.</i> , 2012).	May occur

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Appendix B

Flora Species By
Community Matrix

Appendix B Flora Species by Community Matrix

Appendix B - Flora Species by Community Matrix

Family	Species	AfVaLm	AfXpEc	CcAhMt	CcHtCa	CcWmEc	CcXpTo	HtNa	PeCaBs
Amaranthaceae	<i>Ptilotus manglesii</i>							x	
Apiaceae	<i>Xanthosia candida</i>	x							
Araceae	<i>Zantedeschia aethiopica</i>				x				
Araliaceae	<i>Trachymene pilosa</i>			x					
Asparagaceae	<i>Laxmannia squarrosa</i>						x	x	
	<i>Lomandra ?caespitosa</i>						x		
	<i>Lomandra caespitosa</i>			x					
	<i>Lomandra drummondii</i>	x		x			x	x	
	<i>Lomandra hermaphrodita</i>						x		
	<i>Lomandra micrantha</i>	x					x	x	x
	<i>Lomandra preissii</i>						x		
	<i>Lomandra sonderi</i>							x	
	<i>Thysanotus manglesianus /</i> <i>patersonia complex</i>						x		
	<i>Thysanotus multiflorus</i>	x					x	x	x
	<i>Thysanotus triandrus</i>			x					
Asteraceae	<i>Hypochaeris glabra</i>	x					x		x
	<i>Hypochaeris radicata</i>						x	x	
	<i>Pterochaeta paniculata</i>			x					
	<i>Siloxerus filifolius</i>								x
	<i>Ursinia anthemoides</i>			x			x	x	x
Boryaceae	<i>Borya ?scirpoidea</i>	x		x			x	x	x
Campanulaceae	<i>?Lobelia anceps</i>						x		
Casuarinaceae	<i>Allocasuarina fraseriana</i>	x	x				x		
	<i>Allocasuarina humilis</i>			x			x		
Centrolepidaceae	<i>Aphelia cyperoides</i>							x	
	<i>Centrolepis aristata</i>						x		
Colchicaceae	<i>Burchardia congesta</i>			x			x		
Cyperaceae	<i>Cyathochaeta avenacea</i>	x		x	x		x		x
	<i>Isolepis cernua</i>	x						x	x
	<i>Lepidobolus preissianus</i>						x		
	<i>Lepidosperma leptostachyum</i>		x	x	x				
	<i>Lepidosperma pubisquamum</i>						x		
	<i>Lepidosperma sp.</i>			x					
	<i>Lepidosperma tenue</i>						x		
	<i>Mesomelaena stygia</i> subsp. <i>stygia</i>			x				x	
	<i>Mesomelaena tetragona</i>	x		x	x		x		x
	<i>Schoenus clandestinus</i>			x					x
	<i>Schoenus efoliatus</i>								x
	<i>Schoenus grandiflorus</i>						x		
	<i>Schoenus pedicellatus</i>						x		
	<i>Schoenus sp.</i>						x		
	<i>Tetragonia octandra</i>			x			x		
	<i>Tricostularia neesii</i>								x
Dasypogonaceae	<i>Calectasia grandiflora</i>						x		
	<i>Dasypogon bromeliifolius</i>	x					x		x
	<i>Kingia australis</i>			x			x	x	
Dilleniaceae	<i>Hibbertia hypericoides</i>			x			x		
Droseraceae	<i>Drosera erythrorhiza</i>							x	
	<i>Drosera gigantea</i>								x
	<i>Drosera glanduligera</i>						x		x
	<i>Drosera macrantha</i>						x		
	<i>Drosera marchantii</i>	x		x				x	x
	<i>Drosera micrantha</i>								x
	<i>Drosera porrecta</i>			x			x		
	<i>Drosera sp.</i>							x	
Elaeocarpaceae	<i>Tetratheca hirsuta</i> subsp. <i>hirsuta</i>						x		
Ericaceae	<i>Astroloma pallidum</i>	x							

Family	Species	AfVaLm	AfXpEc	CcAhMt	CcHtCa	CcWmEc	CcXpTo	HtNa	PeCaBs	
Fabaceae	<i>Acacia alata</i>						x			
	<i>Acacia browniana</i>						x		x	
	<i>Acacia lateritcola</i>	x					x	x		
	<i>Acacia pulchella</i> var. <i>glaberrima</i>	x			x		x			
	<i>Acacia saligna</i>						x			
	<i>Acacia</i> sp.			x						
	<i>Acacia</i> sp. (planted)		x		x					
	<i>Daviesia decurrens</i>			x			x			
	<i>Daviesia preissii</i>						x			
	<i>Daviesia triflora</i>	x					x			
	<i>Gastrolobium dilatatum</i>						x			
	<i>Gastrolobium spathulatum</i>			x						
	<i>Gompholobium marginatum</i>	x		x			x			
	<i>Hovea trisperma</i>			x			x			
	<i>Kennedia prostrata</i>					x				
	<i>Labichea punctata</i>						x			
	<i>Lotus angustissimus</i>		x				x			
	<i>Sphaerolobium medium</i>			x						
	<i>Viminaria juncea</i>					x		x	x	
Gentianaceae	<i>Cicendia filiformis</i>								x	
Goodeniaceae	<i>Dampiera alata</i>						x			
	<i>Dampiera linearis</i>	x					x	x	x	
	<i>Dampiera</i> sp.								x	
	<i>Lechenaultia biloba</i>	x	x	x			x			
Haemodoraceae	<i>Lechenaultia floribunda</i>								x	
	<i>Anigozanthos manglesii</i>						x			
	<i>Anigozanthos viridis</i>								x	
	<i>Conostylis aculeata</i> subsp. <i>preissii</i>	x			x				x	
	<i>Conostylis serrulata</i>							x		
	<i>Conostylis setigera</i> subsp. <i>setigera</i>			x			x			
	<i>Haemodorum laxum</i>	x		x			x	x		
	<i>Haemodorum simplex</i>							x	x	
	<i>Haemodorum</i> sp.						x		x	
	<i>Hemerocallidaceae</i>	x		x			9	x	x	
	<i>Agrostocrinum scabrum</i>			x			x		x	
	<i>Caesia micrantha</i>			x			x			
	<i>Dianella revoluta</i>	x								
	<i>Johnsonia pubescens</i>						x			
	<i>Johnsonia pubescens</i> subsp. <i>?cygnorum</i>								x	
	<i>Tricoryne elatior</i>							x	x	
	Iridaceae	<i>Freesia alba</i> x <i>leightlinii</i>		x	x					
		<i>Gladiolus caryophyllaceus</i>						x		x
		<i>Patersonia occidentalis</i>			x			x		x
<i>Patersonia pygmaea</i>		x		x				x		
<i>Watsonia meriana</i>				x	x	x	x	x	x	
Juncaceae	<i>Juncus kraussii</i>				x					
Lamiaceae	<i>Hemigenia incana</i>	x								
Lauraceae	<i>Cassytha racemosa</i>	x		x			x			
Loranthaceae	<i>?Nuytsia floribunda</i>			x						
	<i>Nuytsia floribunda</i>	x		x		x	x	x		
Malvaceae	<i>Lasiopetalum floribundum</i>	x								
Myrtaceae	<i>Calytrix depressa</i>	x								
	<i>Corymbia calophylla</i>	x		x	x	x	x			
	<i>Darwinia thymoides</i>						x			
	<i>Eremaea pauciflora</i>	x								
	<i>Eucalyptus lane-poolei</i>			x						
	<i>Eucalyptus marginata</i>			x			x			
	<i>Eucalyptus</i> sp. (planted)		x							
	<i>Eucalyptus wandoo</i>						x			
	<i>Hypocalymma angustifolium</i>			x			x			
	<i>Kunzea micrantha</i>	x			x			x	x	
	<i>Leptospermum laevigatum</i>	x								
	<i>Melaleuca preissiana</i>								x	
	<i>Melaleuca viminea</i>	x				x				
	<i>Pericalymma ellipticum</i>	x						x	x	
<i>Scholtzia involucreta</i>			x				x			

Family	Species	AfVaLm	AfXpEc	CcAhMt	CcHtCa	CcWmEc	CcXpTo	HtNa	PeCaBs
Myrtaceae	<i>Verticordia ?densiflora</i>			x					
	<i>Verticordia acerosa</i> var. <i>preissii</i>	x					x	x	
	<i>Verticordia huegelii</i> var. <i>decumbens</i>							x	
Orchidaceae	<i>Caladenia flava</i>	x					x		
	<i>Microtis media</i>	x					x		
	<i>Microtis media</i> subsp. <i>media</i>							x	
	Orchidaceae sp. (sterile)	x					x		x
	<i>Thelymitra graminea</i>	x		x			x		
	<i>Thelymitra vulgaris</i>								x
Oxalidaceae	<i>Oxalis pes-caprae</i>	x	x			x	x		x
Papaveraceae	<i>Fumaria capreolata</i>					x		x	
Philydraceae	<i>Philydrella pygmaea</i>								x
Pittosporaceae	<i>Billardiera fraseri</i>	x							
Poaceae	<i>Billardiera fusiformis</i>			x					
	<i>Austrostipa compressa</i>			x					
Polygalaceae	<i>Avena barbata</i>		x			x		x	x
	<i>Briza maxima</i>	x		x			x	x	x
	<i>Briza minor</i>							x	x
	<i>Ehrharta calycina</i>		x	x		x	x	x	
	<i>Eragrostis curvula</i>		x				x	x	x
	<i>Neurachne alopecuroidea</i>	x		x			x	x	x
	<i>Pentameris airoides</i>						x		
	<i>Comesperma calymega</i>	x							
Primulaceae	<i>Lysimachia arvensis</i>						x		x
Proteaceae	<i>Adenanthos miesneri</i>						x		x
	<i>Banksia armata</i>							x	
	<i>Banksia dallanneyi</i>			x			x	x	x
	<i>Banksia sessilis</i>						x		
	<i>Banksia squarrosa</i>			x					
	<i>Grevillea bipinnatifida</i>						x		
	<i>Grevillea pilulifera</i>						x		
	<i>Grevillea wilsonii</i>			x			x	x	
	<i>Hakea cyclocarpa</i>			x					
	<i>Hakea divaricata</i>	x							
	<i>Hakea incrassata</i>						x	x	x
	<i>Hakea lissocarpa</i>					x	x		
	<i>Hakea neospathulata</i>			x			x		
	<i>Hakea prostrata</i>								x
	<i>Hakea stenocarpa</i>						x		
	<i>Hakea trifurcata</i>	x				x	x	x	
	<i>Hakea undulata</i>	x							
	<i>Hakea varia</i>								x
	<i>Lambertia multiflora</i> var. <i>darlingensis</i>			x					x
	<i>Stirlingia latifolia</i>						x		x
<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>			x	x		x			
<i>Hakea ceratophylla</i>						x			
Restionaceae	<i>Chaetanthus aristatus</i>	x						x	x
	<i>Desmocladus fasciculatus</i>			x			x		
	<i>Hypolaena exsulca</i>	x					x	x	x
Rhamnaceae	<i>Trymalium ledifolium</i>	x							
Rubiaceae	<i>Opercularia apiciflora</i>	x					x		
	<i>Opercularia vaginata</i>						x		
Stylidiaceae	<i>Levenhookia pusilla</i>	x					x		x
	<i>Stylidium araeophyllum</i>			x					
	<i>Stylidium brunonianum</i>	x		x					
	<i>Stylidium dichotomum</i>	x							
	<i>Stylidium diuroides</i>						x		
	<i>Stylidium diuroides</i> subsp. <i>diuroides</i>	x							
	<i>Stylidium emarginatum</i>								x
	<i>Stylidium hispidum</i>	x							
<i>Stylidium repens</i>			x						
Thymeleaceae	<i>Pimelea ciliata</i> subsp. <i>ciliata</i>							x	
	<i>Pimelea</i> sp.							x	

Family	Species	AfVaLm	AfXpEc	CcAhMt	CcHtCa	CcWmEc	CcXpTo	HtNa	PeCaBs
Xanthorrhoeaceae	<i>Chamaescilla corymbosa</i>			x			x	x	x
	<i>Xanthorrhoea acanthostachya</i>							x	x
	<i>Xanthorrhoea gracilis</i>			x			x		
	<i>Xanthorrhoea preissii</i>		x	x	x		x	x	x

Appendix C

Quadrat Data

Appendix C Quadrat Data

Appendix C Quadrat Data

Site No: Byf01	Type: Releve	Longitude: 116.0021	Latitude: -32.2409
Date: 10/7/2019		Soils: clay gravel	
Topography: drainage		Litter:	
Outcrops: water present		Soil Condition:	
Community: CcWmEc, riparian vegetation		Fire History:	
Vegetation Condition: degraded,			



Taxon	Height (cm)	% Alive
<i>*Avena barbata</i>	80	5
<i>Corymbia calophylla</i>	1800	20
<i>*Ehrharta calycina</i>	80	5
<i>*Fumaria capreolata</i>	20	5
<i>Hakea lissocarpa</i>		0.001
<i>Kennedia prostrata</i>	3	0.1

Taxon	Height (cm)	% Alive
<i>Nuytsia floribunda</i>	400	1
* <i>Oxalis pes-caprae</i>	10	20
* <i>Watsonia meriana</i>	50	50

Site No: Byf02 Type: Quadrat Longitude: 116.0021 Latitude: -32.2402

Date: 10/7/2019 Soils: sand loam gravel

Topography: flat Litter: 90% gravel

Outcrops: laterite Soil Condition: Dry

Vegetation Condition: very good, Fire History: 10+

Community: CcXpTo, Represents *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered) and/or *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (SCP3c) (EPBC Endangered, WA Critically Endangered),



Taxon	Height (cm)	% Alive
<i>Acacia saligna</i>	40	0.5
<i>Allocasuarina fraseriana</i>	10	0.001
<i>Banksia dallaneyi</i>	16	2
* <i>Briza maxima</i>	15	0.5
<i>Burchardia congesta</i>	50	0.2
<i>Caesia micrantha</i>	20	2
<i>Corymbia calophylla</i>	400	30
<i>Cyathochaeta avenacea</i>	40	1

Taxon	Height (cm)	% Alive
<i>Dampiera alata</i>	20	0.1
<i>Darwinia thymoides</i>	30	0.1
<i>Drosera macrantha</i>	5	0.1
* <i>Ehrharta calycina</i>	70	0.5
* <i>Eragrostis curvula</i>	80	0.5
<i>Gompholobium marginatum</i>	10	0.5
<i>Haemodorum sp.</i>	10	0.2
<i>Hakea stenocarpa</i>	60	1
<i>Hibbertia hypericoides</i>	40	0.001
* <i>Hypochaeris radicata</i>	1	0.1
<i>Lechenaultia biloba</i>	30	2
<i>Lepidosperma tenue</i>	40	0.5
* <i>Lotus angustissimus</i>	10	0.5
<i>Mesomelaena tetragona</i>	40	2
<i>Microtis media</i>	15	0.2
<i>Orchidaceae sp. (sterile)</i>	10	0.1
* <i>Oxalis pes-caprae</i>	10	1
* <i>Pentameris airoides</i>	10	0.1
<i>Tetraria octandra</i>	20	2
<i>Xanthorrhoea gracilis</i>	40	0.2
<i>Xanthorrhoea preissii</i>	150	8

Site No: byf03 Type: Quadrat Longitude: 116.0026 Latitude: -32.2387

Date: 10/8/2019 Soils: sand loam gravel
 Topography: flat Litter: 60%
 Outcrops: none Soil Condition: Dry
 Vegetation Condition: very good, Fire History: 10+

Community: CcXpTo, Represents *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered) and/or *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (SCP3c) (EPBC Endangered, WA Critically Endangered),



Taxon	Height (cm)	% Alive
<i>*Briza maxima</i>	15	1
<i>Caesia micrantha</i>	20	0.5
<i>Corymbia calophylla</i>	600	35
<i>Darwinia thymoides</i>		0.001
<i>*Eragrostis curvula</i>	100	4
<i>Grevillea wilsonii</i>		0.001
<i>Haemodorum sp.</i>	10	0.1

Taxon	Height (cm)	% Alive
<i>Hakea lissocarpha</i>		0.001
<i>Kingia australis</i>	250	5
<i>Lepidobolus preissianus</i>		0.001
<i>Lepidosperma pubisquameum</i>	30	5
<i>Lomandra ?caespitosa</i>	20	1
* <i>Lysimachia arvensis</i>		0.001
<i>Mesomelaena tetragona</i>	4	30
<i>Patersonia occidentalis</i>	20	0.1
<i>Tetragonia octandra</i>	20	15
* <i>Watsonia meriana</i>		0.001
<i>Xanthorrhoea preissii</i>	200	15

Site No: Byf04 Type: Quadrat Longitude: 116.0030 Latitude: -32.2374

Date: 10/8/2019 Soils: sand loam gravel
 Topography: flat Litter: 20%
 Outcrops: none Soil Condition: Dry
 Vegetation Condition: Excellent Fire History: 10+

Community: CcXpTo, Represents *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered) and/or *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (SCP3c) (EPBC Endangered, WA Critically Endangered),



Taxon	Height (cm)	% Alive
? <i>Lobelia anceps</i>	15	0.5
<i>Acacia alata</i>	20	0.3
<i>Acacia browniana</i>	10	1
<i>Borya</i> ? <i>scirpoidea</i>	10	0.1
* <i>Briza maxima</i>	20	1
<i>Caesia micrantha</i>	20	1
<i>Centrolepis aristata</i>	5	0.1

Taxon	Height (cm)	% Alive
<i>Conostylis setigera</i> subsp. <i>setigera</i>		0.001
<i>Corymbia calophylla</i>	800	15
<i>Cyathochaeta avenacea</i>	60	0.5
<i>Darwinia thymoides</i>	20	2
<i>Daviesia decurrens</i>		0.001
<i>Desmocladus fasciculatus</i>	20	5
<i>Drosera glanduligera</i>	2	0.1
<i>Drosera macrantha</i>	10	0.1
* <i>Eragrostis curvula</i>	150	3
<i>Eucalyptus wandoo</i>		0.001
<i>Gastrolobium dilatatum</i>	20	0.2
<i>Gompholobium marginatum</i>	10	0.1
<i>Grevillea bipinnatifida</i>	10	4
<i>Haemodorum laxum</i>	40	0.1
<i>Haemodorum</i> sp.	10	0.2
<i>Hakea incrassata</i>	40	4
<i>Hakea neospathulata</i>	30	1
<i>Hibbertia hypericoides</i>	30	0.2
<i>Hypocalymma angustifolium</i>	50	1
* <i>Hypochoeris glabra</i>	1	0.5
<i>Hypolaena exsulca</i>	30	2
<i>Lechenaultia biloba</i>	5	0.5
<i>Lepidosperma pubisquameum</i>	30	2
<i>Lomandra preissii</i>	20	0.2
<i>Mesomelaena tetragona</i>	40	20
<i>Neurachne alopecuroidea</i>	20	0.5
<i>Pericalymma ellipticum</i>		0.001
<i>Schoenus grandiflorus</i>	40	0.5
<i>Scholtzia involucrata</i>	40	1
<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>	40	1
<i>Tetraria octandra</i>	20	30
<i>Tetrateca hirsuta</i> subsp. <i>hirsuta</i>	5	0.1
<i>Thelymitra graminea</i>	15	0.1
<i>Thysanotus manglesianus</i> / <i>patersonia</i> complex		0.1
<i>Thysanotus multiflorus</i>	20	0.2
* <i>Watsonia meriana</i>	10	0.1
<i>Xanthorrhoea preissii</i>	150	6

Site No: Byf05	Type: Quadrat	Longitude: 116.0035	Latitude: -32.2361
Date: 10/8/2019		Soils: clay	
Topography: low lying		Litter: 5%	
Outcrops: none		Soil Condition: Waterlogged	
Vegetation Condition: very good to good, weeds		Fire History:	
Community: PeCaBs, Likely to represent Claypans of the Swan Coastal Plain (EPBC Critically Endangered) and may represent WA TEC Herb rich shrublands in claypans (FCT8). Likely to be a GDE.			



Taxon	Height (cm)	% Alive
<i>Acacia browniana</i>	30	0.5
* <i>Avena barbata</i>	50	1
<i>Borya ?scirpoidea</i>	10	2
* <i>Briza maxima</i>	20	10
* <i>Briza minor</i>	10	0.5
<i>Chaetanthus aristatus</i>	60	10
<i>Chamaescilla corymbosa</i>	2	0.1

Taxon	Height (cm)	% Alive
<i>Conostylis aculeata</i> subsp. <i>preissii</i>	20	1
<i>Cyathochaeta avenacea</i>	80	3
<i>Drosera micrantha</i>	15	0.2
* <i>Eragrostis curvula</i>	120	2
* <i>Hypochaeris glabra</i>	1	0.1
<i>Hypolaena exsulca</i>	70	10
<i>Isolepis cernua</i>	4	0.1
<i>Kunzea micrantha</i>	50	1
<i>Lechenaultia floribunda</i>	30	0.3
* <i>Lysimachia arvensis</i>	5	0.5
<i>Melaleuca preissiana</i>		0.001
<i>Mesomelaena tetragona</i>	50	3
* <i>Oxalis pes-caprae</i>	2	0.1
<i>Patersonia occidentalis</i>	30	0.1
<i>Pericalymma ellipticum</i>	100	4
<i>Siloxerus filifolius</i>	1	0.1
* <i>Ursinia anthemoides</i>	10	0.5
* <i>Watsonia meriana</i>	40	6
<i>Thelymitra vulgaris</i>	20	0.1
<i>Xanthorrhoea preissii</i>	150	3

Site No: Byf06	Type: Quadrat	Longitude: 116.0040	Latitude: -32.2341
Date: 10/8/2019		Soils: clay	
Topography: winter wet		Litter: 5%	
Outcrops: none		Soil Condition: Waterlogged	
Vegetation Condition: very good		Fire History: 10+	
Community: PeCaBs, Likely to represent Claypans of the Swan Coastal Plain (EPBC Critically Endangered) and may represent WA TEC Herb rich shrublands in claypans (FCT8). Likely to be a GDE.			



Taxon	Height (cm)	% Alive
<i>Anigozanthos viridis</i>	40	0.1
<i>Banksia dallanneyi</i>	20	5
<i>Borya ?scirpoidea</i>	5	6
<i>Chaetanthus aristatus</i>	50	5
<i>Chamaescilla corymbosa</i>	5	0.1
* <i>Cicendia filiformis</i>	2	0.1
<i>Dampiera linearis</i>	20	0.2
<i>Dampiera sp.</i>	15	0.1

Taxon	Height (cm)	% Alive
<i>Dasypogon bromeliifolius</i>	20	1
<i>Drosera gigantea</i>		0.001
<i>Drosera glanduligera</i>	5	0.1
<i>Drosera marchantii</i>	10	0.5
* <i>Gladiolus caryophyllaceus</i>	5	0.1
<i>Haemodorum simplex</i>		0.001
<i>Haemodorum sp.</i>	20	0.1
<i>Hakea incrassata</i>	20	0.5
<i>Hakea prostrata</i>	40	1
<i>Hakea varia</i>	200	5
* <i>Hypochaeris glabra</i>	1	0.5
<i>Hypolaena exsulca</i>	40	4
<i>Hypolaena exsulca</i>	10	0.2
<i>Isolepis cernua</i>	5	0.1
<i>Levenhookia pusilla</i>	1	0.1
<i>Lomandra micrantha</i>	20	1
<i>Mesomelaena tetragona</i>	50	6
<i>Neurachne alopecuroidea</i>	30	1
<i>Orchidaceae sp. (sterile)</i>	15	0.1
<i>Pericalymma ellipticum</i>	80	3
<i>Philydrella pygmaea</i>		0.001
<i>Schoenus clandestinus</i>	5	0.5
<i>Schoenus efoliatus</i>	30	5
<i>Stirlingia latifolia</i>	40	3
<i>Stylidium emarginatum</i>		0.001
<i>Thysanotus multiflorus</i>	20	0.5
<i>Tricostularia neesii</i>	20	2
<i>Viminaria juncea</i>	500	0.001
* <i>Watsonia meriana</i>	60	18
<i>Xanthorrhoea acanthostachya</i>	80	8
<i>Adenanthos meisneri</i>		0.001
<i>Agrostocrinum scabrum</i>		0.001
<i>Johnsonia pubescens</i>		0.001
<i>Lambertia multiflora var. darlingensis</i>		0.001

Site No: Byf07	Type: Quadrat	Longitude: 116.0052	Latitude: -32.2337
Date: 10/8/2019		Soils: sandy	
Topography: lower slope		Litter: 5% litter	
Outcrops: limestone small and medium size		Soil Condition: Moist	
Community: AfVaLm		Fire History: 10+	
Vegetation Condition: excellent			



Taxon	Height (cm)	% Alive
<i>Acacia pulchella</i> var. <i>glaberrima</i>	60	1
<i>Allocasuarina fraseriana</i>	500	2
<i>Astroloma pallidum</i>	15	0.3
<i>Borya ?scirpoidea</i>	5	0.5
<i>Cassyltha racemosa</i>		0.1
<i>Chaetanthus aristatus</i>	40	2
<i>Conostylis aculeata</i> subsp. <i>preissii</i>	20	2
<i>Cyathochaeta avenacea</i>	40	4
<i>Dampiera linearis</i>	15	0.5

Taxon	Height (cm)	% Alive
<i>Dasypogon bromeliifolius</i>	15	0.5
<i>Dianella revoluta</i>	20	0.5
<i>Drosera marchantii</i>	3	0.1
<i>Gompholobium marginatum</i>	10	0.3
<i>Hakea divaricata</i>	200	1.5
<i>Hakea divaricata</i>	50	0.001
<i>Hakea undulata</i>	150	1
<i>Hemigenia incana</i>	20	1
* <i>Hypochoeris glabra</i>	1	0.5
<i>Hypolaena exsulca</i>	20	1
<i>Isolepis cernua</i>	2	0.1
<i>Lasiopetalum floribundum</i>	20	1
<i>Levenhookia pusilla</i>	2	0.1
<i>Lomandra drummondii</i>	30	0.5
<i>Lomandra micrantha</i>	20	7
<i>Melaleuca viminea</i>	20	0.5
<i>Mesomelaena tetragona</i>	50	7
<i>Microtis media</i>	10	0.1
<i>Neurachne alopecuroidea</i>	20	5
<i>Opercularia apiciflora</i>	15	0.2
Orchidaceae sp. (sterile)	15	0.1
* <i>Oxalis pes-caprae</i>	3	0.1
<i>Patersonia pygmaea</i>	15	0.5
<i>Pericalymma ellipticum</i>	40	1
<i>Stylidium brunonianum</i>	5	0.5
<i>Stylidium dichotomum</i>	5	2
<i>Stylidium hispidum</i>	5	0.1
<i>Thysanotus multiflorus</i>	5	0.1
<i>Trymalium ledifolium</i>	20	0.2
<i>Verticordia acerosa</i> var. <i>preissii</i>	40	4
<i>Thelymitra graminea</i>	20	0.1
<i>Xanthosia candida</i>	5	0.1

Site No: Byf08	Type: quadrat	Longitude: 116.0054	Latitude: -32.2322
Date: 10/8/2019		Soils: gravel	
Topography: lower slope		Litter: 4%	
Outcrops: laterite		Soil Condition: Dry	
Community: AfVaLm		Fire History: 10+	
Vegetation Condition: very good, historically cleared and contoured			



Taxon	Height (cm)	% Alive
<i>Acacia lateriticola</i>	20	1
<i>Acacia pulchella</i> var. <i>glaberrima</i>	30	1
<i>Billardiera fraseri</i>	20	0.5
* <i>Briza maxima</i>		0.001
<i>Caladenia flava</i>	5	0.1
<i>Calytrix depressa</i>	80	0.2
<i>Chaetanthus aristatus</i>		0.001
<i>Comesperma calymega</i>	20	0.1

Taxon	Height (cm)	% Alive
<i>Corymbia calophylla</i>	200	1
<i>Daviesia triflora</i>	20	0.2
<i>Drosera marchantii</i>	10	0.2
<i>Eremaea pauciflora</i>	20	2
<i>Haemodorum laxum</i>		0.001
<i>Hakea trifurcata</i>	300	3
<i>Hakea undulata</i>	20	0.3
<i>Kunzea micrantha</i>	150	0.5
<i>Lechenaultia biloba</i>	20	0.5
* <i>Leptospermum laevigatum</i>	200	4
<i>Lomandra drummondii</i>	20	0.1
<i>Mesomelaena tetragona</i>	40	17
<i>Nuytsia floribunda</i>		0.001
<i>Pericalymma ellipticum</i>	20	0.2
<i>Stylidium diuroides</i> subsp. <i>diuroides</i>	5	4
<i>Verticordia acerosa</i> var. <i>preissii</i>	30	10

Site No: Byf09	Type: Releve	Longitude: 116.0055	Latitude: -32.2314
Date: 10/8/2019		Soils: gravel	
Topography: lower slope to wetland		Litter: 60% litter	
Outcrops: laterite rocks		Soil Condition: Dry	
Community: CcHtCa ?GDE		Fire History: 10+	
Vegetation Condition: very good, watsonia			



Taxon	Height (cm)	% Alive
<i>Acacia pulchella</i> var. <i>glaberrima</i>	50	0.5
* <i>Acacia</i> sp. (planted)	200	1
<i>Conostylis aculeata</i> subsp. <i>preissii</i>	20	1
<i>Corymbia calophylla</i>	800	25
<i>Cyathochaeta avenacea</i>	40	20
<i>Hakea trifurcata</i>	350	30
<i>Juncus kraussii</i>		0.001
<i>Kunzea micrantha</i>	300	15
<i>Lepidosperma leptostachyum</i>		0.001

Taxon	Height (cm)	% Alive
<i>Melaleuca viminea</i>	100	0.2
<i>Mesomelaena tetragona</i>	40	25
<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>	30	0.5
<i>Viminaria juncea</i>	200	1
* <i>Watsonia meriana</i>	60	5
<i>Xanthorrhoea preissii</i>	150	0.2
* <i>Zantedeschia aethiopica</i>		0.001

Site No: Byf10 Type: Quadrat Longitude: 116.0068 Latitude: -32.2270

Date: 10/8/2019

Soils: loam brown

Topography: slope to flat

Litter: 20%

Outcrops: none

Soil Condition: Moist

Vegetation Condition: good to very good, watsonia

Fire History: 10+

Community: CcXpTo, Represents *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered) and/or *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (SCP3c) (EPBC Endangered, WA Critically Endangered),



Taxon	Height (cm)	% Alive
<i>Acacia lateriticola</i>	20	0.5
<i>Acacia pulchella</i> var. <i>glaberrima</i>	60	1
<i>Allocasuarina humilis</i>	150	4
<i>Banksia dallanneyi</i>	10	3
* <i>Briza maxima</i>		0.001
<i>Burchardia congesta</i>	30	0.1
<i>Caesia micrantha</i>	30	0.5

Taxon	Height (cm)	% Alive
<i>Corymbia calophylla</i>	1800	35
<i>Dampiera linearis</i>	10	0.1
<i>Desmocladius fasciculatus</i>	10	0.2
* <i>Gladiolus caryophyllaceus</i>	20	0.1
<i>Grevillea bipinnatifida</i>	10	0.5
<i>Grevillea pilulifera</i>	30	0.2
<i>Hakea trifurcata</i>	200	2
<i>Hakea ceratophylla</i>	140	4
<i>Hypocalymma angustifolium</i>	30	0.2
<i>Hypolaena exsulca</i>	30	0.2
<i>Lechenaultia biloba</i>	30	1
<i>Lomandra drummondii</i>	30	0.1
<i>Mesomelaena tetragona</i>	50	10
<i>Neurachne alopecuroidea</i>	20	7
<i>Opercularia apiciflora</i>	30	4
<i>Patersonia occidentalis</i>		0.001
<i>Stirlingia latifolia</i>	60	2
<i>Synaphea petiolaris subsp. petiolaris</i>	20	1
<i>Tetraria octandra</i>	30	15
<i>Viminaria juncea</i>	200	2
* <i>Watsonia meriana</i>	50	4
<i>Xanthorrhoea preissii</i>	140	30

Site No: Byf12	Type: Revele	Longitude: 116.0108	Latitude: -32.1625
Date: 10/8/2019		Soils: gravel	
Topography: flat		Litter: 20%	
Outcrops: none		Soil Condition: Dry	
Community: AfXpEc		Fire History: 10+	
Vegetation Condition: degraded,			



Taxon	Height (cm)	% Alive
*Acacia sp. (planted)	600	3
Allocasuarina fraseriana	500	1
*Avena barbata	60	2
*Ehrharta calycina	70	10
*Eragrostis curvula	60	3
*Eucalyptus sp. (planted)	700	5
*Freesia alba x leightlinii	10	20
Lechenaultia biloba	40	1
Lepidosperma leptostachyum	40	1

Taxon	Height (cm)	% Alive
* <i>Lotus angustissimus</i>	5	1
* <i>Oxalis pes-caprae</i>	20	1
<i>Xanthorrhoea preissii</i>	200	30

Site No: Byf13	Type: Quadrat	Longitude: 116.0044	Latitude: -32.2327
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Date: 10/8/2019

Soils: sand grey

Topography: flat

Litter: 50%

Outcrops: none

Soil Condition: Dry

Vegetation Condition: Excellent

Fire History: 10+

Community: CcXpTo, Represents *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered) and/or *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (SCP3c) (EPBC Endangered, WA Critically Endangered),



Taxon	Height (cm)	% Alive
? <i>Lobelia anceps</i>	20	0.2
<i>Acacia lateriticola</i>	20	2
<i>Acacia pulchella</i> var. <i>glaberrima</i>	80	1
<i>Adenanthos meisneri</i>	5	0.1
<i>Agrostocrinum scabrum</i>	40	0.5
<i>Anigozanthos manglesii</i>	40	0.2
<i>Banksia dallanneyi</i>	15	2

Taxon	Height (cm)	% Alive
<i>Banksia sessilis</i>		0.001
<i>Borya ?scirpoidea</i>	5	1
* <i>Briza maxima</i>	20	1
<i>Caesia micrantha</i>	40	0.2
<i>Caladenia flava</i>	5	0.1
<i>Calectasia grandiflora</i>	20	0.5
<i>Cassytha racemosa</i>		0.1
<i>Chamaescilla corymbosa</i>	10	0.1
<i>Conostylis setigera</i> subsp. <i>setigera</i>	5	0.5
<i>Corymbia calophylla</i>	1500	8
<i>Dampiera linearis</i>	15	0.1
<i>Dasypogon bromeliifolius</i>	30	8
<i>Daviesia preissii</i>	20	1.5
<i>Daviesia triflora</i>	30	1
<i>Desmocladus fasciculatus</i>	10	1
<i>Drosera porrecta</i>	10	0.5
* <i>Ehrharta calycina</i>	100	0.1
<i>Eucalyptus marginata</i>	1500	0.001
<i>Haemodorum laxum</i>		0.001
<i>Hakea trifurcata</i>	200	2
<i>Hovea trisperma</i>	10	0.1
<i>Hypolaena exsulca</i>	20	0.1
<i>Johnsonia pubescens</i>	10	0.2
<i>Kingia australis</i>	50	1
<i>Lechenaultia biloba</i>	20	0.5
<i>Lepidosperma pubisquameum</i>	30	2
<i>Lomandra drummondii</i>	20	1
<i>Lomandra hermaphrodita</i>	10	0.1
<i>Lomandra micrantha</i>	10	3
<i>Mesomelaena tetragona</i>	40	10
<i>Neurachne alopecuroidea</i>	30	3
<i>Opercularia apiciflora</i>	20	1
<i>Opercularia vaginata</i>	20	2
<i>Pericalymma ellipticum</i>	60	0.5
<i>Schoenus pedicellatus</i>	20	0.2
<i>Stirlingia latifolia</i>	10	0.5
<i>Stylidium diuroides</i>	10	0.1

Taxon	Height (cm)	% Alive
<i>Tetraria octandra</i>	30	25
<i>Thysanotus multiflorus</i>	15	0.1
* <i>Ursinia anthemoides</i>	10	0.1
<i>Verticordia acerosa</i> var. <i>preissii</i>		0.001
<i>Thelymitra graminea</i>	30	0.1
<i>Xanthorrhoea gracilis</i>	50	3
<i>Xanthorrhoea preissii</i>	150	25

Site No: Byf14	Type: Releve	Longitude: 116.0048	Latitude: -32.2313
Date: 10/9/2019		Soils: clay	
Topography: winter wet		Litter: low	
Outcrops: none		Soil Condition: Waterlogged	
Community: HtNa, GDE		Fire History: 10+	
Vegetation Condition: Excellent			



Taxon	Height (cm)	% Alive
<i>Aphelia cyperoides</i>	2	15
<i>Chaetanthus aristatus</i>	50	30
<i>Drosera</i> sp.	5	0.5
<i>Hakea trifurcata</i>	200	50
<i>Hypolaena exsulca</i>	40	10
<i>Isolepis cernua</i>	5	0.5
<i>Kingia australis</i>	400	5
<i>Kunzea micrantha</i>	200	15
<i>Patersonia pygmaea</i>	20	1

Taxon	Height (cm)	% Alive
<i>Pericalymma ellipticum</i>	50	5
* <i>Watsonia meriana</i>	30	1

Site No: Byf15	Type: Quadrat	Longitude: 116.0056	Latitude: -32.2294
Date: 10/9/2019		Soils: gravel	
Topography: flat		Litter:	
Outcrops: none		Soil Condition: Dry	
Community: HtNa, GDE		Fire History: 10+	
Vegetation Condition: very good, historically cleared, ground contoured			



Taxon	Height (cm)	% Alive
<i>Acacia lateriticola</i>	30	0.1
* <i>Avena barbata</i>	80	0.5
<i>Borya ?scirpoidea</i>	10	50
* <i>Briza maxima</i>	10	5
* <i>Briza minor</i>	10	0.5
<i>Chamaescilla corymbosa</i>	5	5
<i>Dampiera linearis</i>	10	0.1
<i>Drosera erythrorhiza</i>	1	0.1
<i>Drosera marchantii</i>	10	0.1

Taxon	Height (cm)	% Alive
<i>*Eragrostis curvula</i>	80	1
<i>*Fumaria capreolata</i>	20	0.2
<i>Haemodorum simplex</i>	30	3
<i>Hakea trifurcata</i>	130	4
<i>*Hypochaeris radicata</i>	1	0.1
<i>Neurachne alopecuroidea</i>	30	10
<i>Pimelea ciliata subsp. ciliata</i>	20	0.2
<i>Ptilotus manglesii</i>		0.001
<i>Thysanotus multiflorus</i>	10	0.1
<i>Verticordia acerosa var. preissii</i>	30	10
<i>Verticordia huegelii var. decumbens</i>	30	5
<i>*Watsonia meriana</i>	40	2
<i>Xanthorrhoea preissii</i>	110	6

Site No: byf15	Type: Quadrat	Longitude: 116.0083	Latitude: -32.1785
Date: 10/9/2019		Soils: sandy grey	
Topography: flat		Litter: 35%	
Outcrops: none		Soil Condition: Dry	
Vegetation Condition: excellent,		Fire History: 10+	
Community: CcAhMt, Represents <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered)			
Community: CcAhMt		Fire History: 10+	



Taxon	Height (cm)	% Alive
? <i>Nuytsia floribunda</i>	10	0.1
<i>Acacia</i> sp.	15	0.1
<i>Agrostocrinum scabrum</i>		0.001
<i>Allocasuarina humilis</i>	100	8
<i>Banksia dallaneyi</i>	20	5
<i>Banksia squarrosa</i>	50	1
<i>Billardiera fusiformis</i>		0.001

Taxon	Height (cm)	% Alive
<i>Borya ?scirpoidea</i>	5	1
* <i>Briza maxima</i>		0.001
<i>Burchardia congesta</i>	40	0.1
<i>Caesia micrantha</i>	20	0.1
<i>Chamaescilla corymbosa</i>	5	0.5
<i>Conostylis setigera</i> subsp. <i>setigera</i>	5	1
<i>Corymbia calophylla</i>	2000	6
<i>Cyathochaeta avenacea</i>		0.001
<i>Daviesia decurrens</i>	30	1.5
<i>Desmocladius fasciculatus</i>	10	3
<i>Drosera porrecta</i>	10	0.5
<i>Eucalyptus lane-poolei</i>		0.001
<i>Eucalyptus marginata</i>	800	0.001
* <i>Freesia alba x leightlinii</i>	10	0.1
<i>Gastrolobium spathulatum</i>	20	0.2
<i>Gompholobium marginatum</i>	10	1
<i>Grevillea wilsonii</i>	40	5
<i>Haemodorum laxum</i>	50	0.1
<i>Hakea cyclocarpa</i>	30	0.5
<i>Hakea neospathulata</i>	30	4
<i>Hibbertia hypericoides</i>	30	6
<i>Hovea trisperma</i>	10	0.1
<i>Hypocalymma angustifolium</i>	80	2
<i>Kingia australis</i>	250	1
<i>Lambertia multiflora</i> var. <i>darlingensis</i>	50	0.001
<i>Lechenaultia biloba</i>	20	0.2
<i>Lepidosperma</i> sp.	20	0.5
<i>Lomandra caespitosa</i>	30	1
<i>Lomandra drummondii</i>	20	1
<i>Mesomelaena tetragona</i>	40	5
<i>Neurachne alopecuroidea</i>	30	0.5
<i>Patersonia occidentalis</i>	20	0.5
<i>Patersonia pygmaea</i>	15	0.1
<i>Pterochaeta paniculata</i>	5	0.1
<i>Schoenus clandestinus</i>	5	0.2
<i>Scholtzia involucrata</i>	20	0.1
<i>Sphaerolobium medium</i>	30	0.2

Taxon	Height (cm)	% Alive
<i>Stylidium brunonianum</i>	10	0.1
<i>Tetraria octandra</i>	20	6
<i>Thysanotus triandrus</i>	10	0.2
<i>Trachymene pilosa</i>	5	0.1
* <i>Ursinia anthemoides</i>	15	0.1
<i>Verticordia ?densiflora</i>	25	1
<i>Thelymitra graminea</i>	20	0.2
<i>Xanthorrhoea preissii</i>	100	14

Site No: Byf16	Type: Quadrat	Longitude: 116.0084	Latitude: -32.1818
Date: 10/9/2019		Soils: gravel loam	
Topography: flat		Litter: 20%	
Outcrops: none		Soil Condition: Dry	
Vegetation Condition: excellent,		Fire History: 10+	
Community: CcAhMt, Represents <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain (SCP3a) (EPBC Endangered, WA Critically Endangered)			



Taxon	Height (cm)	% Alive
? <i>Nuytsia floribunda</i>	10	0.1
<i>Agrostocrinum scabrum</i>		0.001
<i>Allocasuarina humilis</i>	130	2
<i>Austrostipa compressa</i>		0.001
<i>Banksia dallanneyi</i>	10	3
<i>Banksia squarrosa</i>		0.001
<i>Borya ?scirpoidea</i>	5	8
* <i>Briza maxima</i>	20	1
<i>Caesia micrantha</i>	15	0.1

Taxon	Height (cm)	% Alive
<i>Cassythra racemosa</i>	0	0.1
<i>Conostylis setigera</i> subsp. <i>setigera</i>	5	0.5
<i>Corymbia calophylla</i>	1000	10
<i>Cyathochaeta avenacea</i>	30	2
<i>Daviesia decurrens</i>	30	1
<i>Desmocladus fasciculatus</i>	5	4
<i>Drosera marchantii</i>	10	0.1
<i>Drosera porrecta</i>	10	0.5
* <i>Ehrharta calycina</i>	100	0.2
<i>Eucalyptus lane-poolei</i>		0.001
<i>Gastrolobium spathulatum</i>	20	0.1
<i>Gompholobium marginatum</i>	5	1
<i>Grevillea wilsonii</i>	20	0.5
<i>Hakea cyclocarpa</i>	40	1
<i>Hibbertia hypericoides</i>	30	3
<i>Hovea trisperma</i>	20	0.1
<i>Kingia australis</i>	100	1
<i>Lechenaultia biloba</i>	20	0.2
<i>Lepidosperma leptostachyum</i>	20	1
<i>Lomandra drummondii</i>	30	1
<i>Mesomelaena stygia</i> subsp. <i>stygia</i>	20	3
<i>Mesomelaena tetragona</i>	40	10
<i>Neurachne alopecuroidea</i>	10	0.5
<i>Nuytsia floribunda</i>	500	5
<i>Patersonia occidentalis</i>	40	0.5
<i>Schoenus clandestinus</i>	5	5
<i>Scholtzia involucrata</i>		0.001
<i>Stylidium araeophyllum</i>	10	0.2
<i>Stylidium repens</i>	5	0.1
<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>	30	0.5
<i>Tetraria octandra</i>	20	4
* <i>Ursinia anthemoides</i>	10	0.1
<i>Verticordia ?densiflora</i>	20	0.3
* <i>Watsonia meriana</i>	30	0.5
<i>Xanthorrhoea gracilis</i>	50	1
<i>Xanthorrhoea preissii</i>	150	15

Site No: Byf17	Type: Releve	Longitude: 116.0089	Latitude: -32.1798
Date: 10/9/2019		Soils: gravel loam	
Topography: mid slope		Litter: 25% leaves	
Outcrops:		Soil Condition: Dry	
Vegetation Condition: very good, partial clearing, some weeds.		Fire History: 10+	
Community: CcXpTo			



Taxon	Height (cm)	% Alive
<i>Acacia lateriticola</i>	20	2
<i>Banksia dallanneyi</i>	15	2
<i>Borya ?scirpoidea</i>	5	4
* <i>Briza maxima</i>	10	1
<i>Cassyltha racemosa</i>		0.1
<i>Conostylis setigera</i> subsp. <i>setigera</i>	5	2
<i>Corymbia calophylla</i>	1200	10
<i>Cyathochaeta avenacea</i>	30	4
<i>Dasypogon bromeliifolius</i>	15	2

Taxon	Height (cm)	% Alive
<i>Desmocladius fasciculatus</i>	5	0.5
* <i>Ehrharta calycina</i>	80	1
* <i>Eragrostis curvula</i>	100	0.5
<i>Gompholobium marginatum</i>	10	0.1
<i>Grevillea wilsonii</i>	50	0.5
<i>Hakea incrassata</i>	30	1
<i>Hibbertia hypericoides</i>	30	1
<i>Hovea trisperma</i>	15	0.2
<i>Hypolaena exsulca</i>	30	2
<i>Labichea punctata</i>	20	0.3
<i>Laxmannia squarrosa</i>	5	0.2
<i>Lechenaultia biloba</i>	30	0.1
<i>Levenhookia pusilla</i>	3	0.1
<i>Lomandra hermaphrodita</i>	20	0.1
<i>Lomandra micrantha</i>	20	0.1
<i>Mesomelaena tetragona</i>	50	15
<i>Schoenus sp.</i>	10	0.5
<i>Stirlingia latifolia</i>	80	6
<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>	20	0.5
<i>Tetraria octandra</i>	30	6
<i>Tricoryne elatior</i>	30	0.5
* <i>Ursinia anthemoides</i>	5	0.1
* <i>Watsonia meriana</i>	40	1
<i>Xanthorrhoea preissii</i>	150	8

Site No: Byf18	Type: Releve	Longitude: 116.0089	Latitude: -32.1798
Date: 10/9/2019		Soils: gravel loam	
Topography: mid slope		Litter: 70% leaves	
Outcrops:		Soil Condition: Dry	
Vegetation Condition: good,		Fire History: 10+	
Community: CcXpTo			



Taxon	Height (cm)	% Alive
<i>Allocasuarina humilis</i>	150	0.001
* <i>Briza maxima</i>	15	0.5
<i>Chamaescilla corymbosa</i>	5	0.1
<i>Conostylis setigera</i> subsp. <i>setigera</i>	10	0.001
<i>Corymbia calophylla</i>	1200	30
<i>Cyathochaeta avenacea</i>	30	15
<i>Desmocladus fasciculatus</i>	5	0.2
* <i>Ehrharta calycina</i>	50	3
<i>Grevillea wilsonii</i>	40	0.2

Taxon	Height (cm)	% Alive
<i>Kingia australis</i>	300	1
<i>Lechenaultia biloba</i>	10	0.001
<i>Lomandra hermaphrodita</i>	10	0.001
<i>Mesomelaena tetragona</i>	30	1
<i>Neurachne alopecuroidea</i>	20	0.5
<i>Nuytsia floribunda</i>		0.001
<i>Tetragonia tetragonioides</i>	20	3
<i>Tricoryne elatior</i>	20	0.001
* <i>Watsonia meriana</i>	30	0.001
<i>Xanthorrhoea preissii</i>	200	5

Site No: Byf19	Type: Revele	Longitude: 116.0072	Latitude: -32.2085
Date: 11/19/2019		Soils: gravel	
Topography: mid slope		Litter: low	
Outcrops:		Soil Condition: Dry	
Community: HtNa, GDE		Fire History: 10+	
Vegetation Condition: good, weeds, clearing, rubbish			



Taxon	Height (cm)	% Alive
<i>Acacia lateriticola</i>		0.001
* <i>Avena barbata</i>		0.001
<i>Banksia armata</i>	30	5
<i>Banksia dallanneyi</i>	15	2
<i>Borya ?scirpoidea</i>	5	8
* <i>Briza maxima</i>		0.001
<i>Conostylis serrulata</i>		0.001
* <i>Ehrharta calycina</i>	100	1

Taxon	Height (cm)	% Alive
<i>*Eragrostis curvula</i>	100	1
<i>Grevillea wilsonii</i>	20	1
<i>Haemodorum laxum</i>		0.001
<i>Hakea incrassata</i>	50	0.5
<i>Hakea trifurcata</i>	250	15
<i>Laxmannia squarrosa</i>		0.001
<i>Lomandra drummondii</i>	20	2
<i>Lomandra micrantha</i>	20	2
<i>Lomandra sonderi</i>	20	0.5
<i>Mesomelaena stygia</i> subsp. <i>stygia</i>	20	0.2
<i>Microtis media</i> subsp. <i>media</i>		0.001
<i>Nuytsia floribunda</i>		0.001
<i>Pimelea</i> sp.		0.001
<i>Tricoryne elatior</i>	20	0.1
<i>*Ursinia anthemoides</i>	5	0.5
<i>Xanthorrhoea acanthostachya</i>		0.001
<i>Xanthorrhoea preissii</i>	130	10

Appendix D

Black Cockatoo Breeding Habitat Data

Appendix D Black Cockatoo Breeding Habitat Data

Species	Tree Height (m)	DBH (cm)	Comments	Hollows Assessment Issues	No. of Potentially Suitable Hollows	New ID
Marri	700	70			0	269
Marri	14	55			0	272
Marri	12	85			0	271
Marri	12	55			0	270
Marri	14	50			0	268
Wandoo	12	85			0	267
Marri	15	65			0	266
Marri	14	60			0	265
FloodedGum	14	65			0	264
Marri	12	58			0	279
Marri	12	65			0	280
Marri	12	54			0	311
Marri	15	55			0	312
Stag	15	52			0	313
Wandoo	17	52			0	315
Wandoo	15	31			0	317
Wandoo	13	31			0	319
Marri	20	51			0	321
Marri	22	63			0	322
Marri	25	85			0	323
Wandoo	12	60			0	324
Marri	20	70			0	325
Marri	25	80			0	326
FloodedGum	17	60			0	327
FloodedGum	25	100			0	329
Marri	27	75			0	330
Marri	20	58			0	332
Marri	25	60			0	334
Marri	16	65			0	336
Marri	22	80			0	337
Marri	20	65			0	338
Marri	20	52			0	339
Marri	30	120			0	340
Marri	18	70			0	341
Jarrah	30	100			0	342
Marri	16	55			0	344
Marri	14	80			0	348
Marri	18	55			0	347
Wandoo	12	70			0	346
FloodedGum	6	90			0	345
FloodedGum	18	120			0	343
Marri	18	70			0	335
Marri	18	80			0	333
Marri	18	160			0	331
Marri	16	60			0	328
Marri	16	52			0	320
Marri	14	52			0	318
Marri	14	50			0	316
Marri	18	90			0	314
Marri	22	110			0	310
Stag	14	70			0	309
Marri	18	85			0	308
Marri	18	70			0	307
Marri	14	52			0	306

Marri	12	52			0	305
Marri	18	65			0	304
Marri	15	50		confirmed	0	303
Marri	14	55			0	302
Marri	16	52			0	301
Marri	14	52			0	300
Stag	18	120			0	299
Marri	16	60			0	298
Marri	12	180			0	297
Marri	17	65			0	296
Marri	16	60			0	295
Marri	16	60			0	294
Marri	16	55			0	293
Marri	18	55			0	292
Marri	17	50			0	291
Marri	10	90			0	290
Marri	12	60	Multiple trunks		0	289
Marri	18	55			0	288
Marri	10	75			0	287
Marri	15	110			0	286
Marri	14	60			0	285
Marri	14	65			0	284
Marri	14	55			0	283
Marri	12	110			0	282
Marri	15	90			0	281
Marri	8	55			0	278
Marri	10	55			0	277
Marri	8	55			0	276
Marri	12	55			0	275
Marri	10	55			0	274
Stag	10	70			0	273
Jarrah	18	70			0	349
Marri	15	54			0	350
Marri	20	62			0	356
Jarrah	15	70			0	357
Stag	5	70			0	358
Marri	10	75			0	364
Marri	18	70			0	365
Marri	16	60			0	366
Marri	18	90			0	367
Marri	15	60			0	371
Stag	12	80	European Honeybee utilising tree	confirmed		373
Marri	13	52			0	375
FloodedGum	15	50			0	376
Marri	18	52			0	377
Marri	13	52			0	378
Marri	20	72			0	380
Marri	9	85	Vertical spout hollow 40 cm x 40 cm, 6 m high, facing up, looks deep with suitable chamber		1	384
Jarrah	14	80			0	388
Marri	18	80			0	389
Marri	22	75			0	390
Marri	18	53			0	400
Marri	16	65			0	401
Marri	14	51			0	402

Marri	14	57			0	403
FloodedGum	15	140			0	404
Marri	14	52			0	398
Marri	14	65			0	397
Marri	14	60			0	396
Marri	15	60			0	395
Marri	15	55			0	394
Marri	12	55			0	393
Marri	18	110			0	392
Marri	10	52			0	391
Stag	10	52			0	387
Marri	17	100			0	386
Marri	20	90			0	385
Marri	17	140			0	383
Marri	17	60			0	382
Marri	20	60			0	381
Marri	16	50			0	379
Stag	10	100	45 degrees branch hollow 20 cm x 15 cm, 6 m high, facing NW. Bees utilising. No chew / claw marks.		1	374
Marri	12	52			0	372
Marri	16	140			0	370
Marri	18	50			0	369
Marri	18	55			0	363
Marri	22	55			0	362
Marri	20	50			0	361
Marri	18	65			0	360
Marri	12	65			0	359
Marri	20	85			0	355
Marri	16	60			0	354
Marri	17	52			0	353
Marri	18	70			0	352
Marri	17	55			0	351
FloodedGum	18	55			0	405
FloodedGum	18	60			0	406
Marri	18	52			0	407
Marri	18	50	Multiple trunks		0	408
Marri	18	70	Forks directly above chest height		0	409
Marri	16	50			0	410
Marri	22	90	On border of private property, couldn't assess fully	confirmed	0	411
Marri	18	55			0	412
Marri	16	70			0	413
Marri	16	55			0	414
Marri	12	55			0	415
Marri	14	50			0	416
Marri	14	50			0	417
Marri	12	60	Tree forks just above dbh		0	418
Stag	12	50	Could not access tree due to fence but may have suitable hollows	confirmed		419
FloodedGum	15	85			0	429
Marri	16	55			0	428
Marri	15	62			0	0
Marri	20	75			0	427
Marri	16	62			0	426

FloodedGum	20	70			0	425
FloodedGum	20	85			0	424
FloodedGum	18	90			0	423
FloodedGum	12	55			0	422
FloodedGum	18	60			0	421
FloodedGum	22	65			0	420
FloodedGum	16	100			0	430
Marri	10	50			0	431
Marri	15	70			0	432
Marri	16	52			0	433
Marri	16	54			0	434
Marri	18	54	Forks just above dbh		0	435
Marri	18	50			0	436
Marri	15	50			0	437
Marri	12	55			0	438
Marri	15	50			0	439
Marri	12	50			0	440
Marri	14	78			0	441
Marri	16	57			0	442
FloodedGum	16	75			0	443
Marri	12	50			0	444
FloodedGum	18	72			0	445
Marri	12	60			0	446
Marri	17	57			0	578
Marri	18	73			0	576
Marri	16	73		confirmed		575
Stag	16	56		confirmed		574
Marri	24	61			0	573
Marri	18	66			0	548
Marri	18	63			0	571
Marri	14	59			0	545
Marri	16	60			0	544
Marri	20	51			0	569
Marri	20	73			0	567
Marri	16	71			0	565
Introduced	20	75			0	542
Marri	14	62		confirmed		564
Marri	14	51		confirmed		562
FloodedGum	25	80	Horizontal spout hollow 15 cm x 15 cm, 6 m high. No chew/ claw marks. Bees present.	confirmed	1	538
Marri	15	70	1: Vertical spout hollow 10 cm x 10 cm, 12 m high, facing down. No claw / chew marks. H2: Vertical spout hollow 10 cm x 10 cm, 12 m above ground. 3: Horizontal trunk hollow 30 cm x 30 cm, 12 m above ground. No chew / claw marks. Bees utilising.		3	559
Marri	14	56			0	556
FloodedGum	30	70	Multiple trunks, small hollows		0	536
Marri	10	51			0	555
Introduced	22	84			0	554
FloodedGum	15	65	Unable to access due to drainage line and black berry infestation. Estimated.	confirmed		535
FloodedGum	16	53			0	553

FloodedGum	12	53	Multiple trunks		0	552
FloodedGum	20	65	Unable to access or see clearly to check for hollows. Black berry infestation	confirmed		533
Marri	15	70			0	547
FloodedGum	25	75			0	532
Marri	16	50			0	546
Marri	14	52			0	543
Marri	15	62			0	541
FloodedGum	25	65			0	528
FloodedGum	18	65			0	539
FloodedGum	17	70			0	537
FloodedGum	18	60	Access restricted by blackberry		0	534
FloodedGum	18	70			0	531
FloodedGum	35	86	Multiple trunks. 10x10 17 Horizontal branch hollow 10 cm x 10 cm, 17 above ground. No chew / claw marks. Bees utilising		1	530
Marri	23	50			0	529
FloodedGum	27	52	Lots of small hollows		0	525
FloodedGum	30	66	Hollow too shallow.		0	527
FloodedGum	35	90	Multiple trunks	confirmed		540
FloodedGum	35	120	Lots of small hollows - not wide enough. Horizontal spout hollow 10 cm x 10 cm, 20 m above ground. No claw / chew marks.		1	524
FloodedGum	15	50	Horizontal spout hollow 10 cm x 10 cm, 2 m above ground. No claw / chew marks.		1	523
FloodedGum	30	75			0	522
FloodedGum	25	85			0	516
FloodedGum	35	80			0	519
FloodedGum	35	101			0	517
Marri	17	63			0	520
FloodedGum	25	113	10x10 3 Vertical branch hollow 10 cm x 10 cm, 3 above ground, facing NW. No claw / chew marks.		1	515
FloodedGum	22	69	Multiple trunks		0	514
Marri	15	60			0	511
Introduced	22	70	Private property. Unable to access	confirmed		508
Introduced	23	70	Private property. Unable to access	confirmed		507
Introduced	20	70	Private property. Unable to access	confirmed		505
Introduced	19	50	Private property. Unable to access	confirmed		504
Introduced	23	75	Private property. Unable to access	confirmed		503
Introduced	22	85	Private property. Unable to access	confirmed		502
Introduced	15	55	Private property. Unable to access	confirmed		501
Introduced	16	60	Private property. Unable to access	confirmed		499

Marri	15	75	Private property. Unable to access	confirmed		498
Marri	20	65	Multiple trunks		0	495
Marri	18	63			0	494
Marri	22	83			0	493
Marri	24	63	One hollow, too small.		0	492
Marri	18	55			0	490
Marri	13	54			0	482
Marri	20	60	Iron bark. 10x10 3 Vertical trunk hollow 10 cm x 10 cm, 3 m above ground. No chew / claw marks. Unable to assess further due to position - potentially additional hollows.	confirmed	1	484
Marri	25	93	10x10 3 45 degree trunk hollow 10 cm x 10 cm, 3 m above ground, facing SW. Potentially additional hollows.	confirmed	1	485
FloodedGum	25	140			0	487
Marri	16	57	Multiple trunks		0	488
Marri	18	70	Two trunks. Estimated from outside boundary	confirmed		489
FloodedGum	27	93			0	481
Marri	16	50			0	480
Marri	18	63			0	478
Introduced	14	79			0	477
Introduced	15	63			0	476
Introduced	16	61			0	475
Introduced	10	107	Multiple spouts		0	474
Marri	13	67			0	473
Introduced	18	76			0	472
Introduced	15	60			0	471
Introduced	18	51			0	470
FloodedGum	25	53	Two trunks		0	0
FloodedGum	24	53	Multiple branches		0	468
Introduced	9	60	Iron bark		0	467
Introduced	16	58			0	466
Introduced	13	51			0	465
Introduced	13	55			0	464
FloodedGum	10	55			0	463
Introduced	15	57			0	462
Introduced	15	57			0	461
Introduced	12	55	Iron bark. Tree splits in two approx 1m up		0	460
Introduced	15	76	Iron bark		0	459
Introduced	10	56	Iron bark		0	458
Introduced	13	53			0	451
Introduced	15	63			0	452
Introduced	11	62			0	453
Introduced	12	56			0	455
Introduced	12	57		confirmed		456
Introduced	20	65			0	457
Introduced	10	53			0	454
FloodedGum	14	51			0	450
FloodedGum	14	50			0	449
Marri	17	62			0	448
Marri	16	85			0	447
Marri	18	70			0	579

Wandoo	20	59			0	577
Marri	16	55			0	572
Introduced	19	80			0	570
Marri	15	50			0	568
Marri	17	59			0	566
Marri	19	58			0	563
Marri	20	51			0	561
Marri	16	72			0	560
Marri	17	53			0	557
FloodedGum	20	80			0	551
Introduced	14	63			0	550
Introduced	13	65			0	549
FloodedGum	20	80	across creek cannot access to measure		0	521
Tuart	20	53			0	518
Marri	16	60			0	513
Marri	10	55	Tree bent over with termite nest at base		0	512
Marri	16	53			0	510
Marri	15	55			0	509
Marri	23	90	Private property. Unable to access	confirmed		506
Marri	16	70			0	500
Marri	17	50			0	497
Marri	18	56			0	496
Marri	20	90	On other side of regional park fence. H1: 45 degree spout hollow 15 cm x 15 cm, 12 m high, facing SW, old chew / claw markings potentially present. H2: 45 Degree spout hollow 15 cm x 15 cm, facing SW, 18 m high. No chew / claw marks. Bees present	confirmed	2	491
Marri	26	95	45 degrees spout hollow 15 cm x 15 cm, facing SW, 18 m high. No chew / claw markings, bees present		1	486
Marri	22	60			0	483
Introduced	17	80			0	479
FloodedGum	24	80	Three trunks from base, each approx. 80 cm DBH. H1: 45 degree spout hollow 15 cm x 15 cm, 13 m above ground, No chew/ claw marks. Bees present. H2: 45 Degree spout hollow 20 cm x 20 cm, facing SW, 12 m above ground. No chew / claw marks.		2	526

Appendix E

Black Cockatoo Foraging Assessments

Appendix E Black Cockatoo Foraging Assessments

Carnaby's Cockatoo

Habitat	Assess. No.	Initial Quality	Is within the Swan Coastal Plain (+3)	Contains trees known to be used for breeding and / or with suitable nest hollows (+3)	Primarily comprises Marri (+2)	Contains trees with potential to be used for breeding (DBH ≥500 mm or ≥300 mm for Salmon Gum and Wandoo (+2)	Known to be a large or key roosting site (+1)	Does not contain evidence of foraging by species (-2)	No other foraging habitat within 6 km (-2)	Is >12 km from known breeding location (-1)	Is >12km from known roosting site (-1)	Is >2 km from a watering point (-1)	Disease present (-1)	Final Score	General Comments
Drainage with Marri (potential breeding)	BC1	7	3	0	2	2	0	0	0	-1	0	0	0	13	Scattered Marri on the SCP with potential breeding trees. Foraging evidence recorded, within 12 km of roosting site and <2km from a watering point.
Scattered Trees (Mostly Marri potential breeding)	BC2	7	3	0	2	2	0	0	0	-1	0	0	0	13	Scattered trees (predominantly Marri) on the SCP with breeding and potential breeding trees. Foraging evidence recorded adjacent, within 12 km of roosting site and <2km from a watering point.
Marri Woodland (with potential breeding trees)	BC3	7	3	0	2	2	0	0	0	-1	0	0	0	13	Marri woodland on SCP. Contains potential breeding trees Foraging evidence recorded adjacent, within 12 km of roosting site and <2km from a watering point.
Wetland / woodland with occasional foraging species	BC4	1	3	0	0	2	0	0	0	-1	0	0	0	5	Wetland / Woodland with occasional foraging species on SCP. Foraging evidence recorded in close proximity, within 12 km of roosting site and <2km from a watering point.
Woodland with non-dominant foraging species	BC5	5	3	0	0	2	0	0	0	-1	0	0	0	9	Woodland with non-dominant foraging species on SCP. Foraging evidence recorded, within 12 km of roosting site and <2km from a watering point.
Shrubland with occasional foraging species	BC6	1	3	0	0	0	0	-2	0	-1	0	0	0	1	Shrubland with occasional foraging species on the SCP. No foraging evidence recorded, within 12 km of roosting site and <2km from a watering point.
Scattered Trees (occ foraging species)	BC7	1	3	0	0	0	0	-2	0	-1	0	0	0	1	Scattered trees (with occasional foraging species) on the SCP. No breeding habitat. Foraging evidence not recorded adjacent, within 12 km of roosting site and <2km from a watering point.
Scattered Intro Trees (no breeding trees)	BC8	5	3	0	0	0	0	-2	0	-1	0	0	0	5	Scattered intro eucs on the SCP. No breeding habitat. Foraging evidence not recorded adjacent, within 12 km of roosting site and <2km from a watering point.

Habitat	Assess. No.	Initial Quality	Is within the Swan Coastal Plain (+3)	Contains trees known to be used for breeding and / or with suitable nest hollows (+3)	Primarily comprises Marri (+2)	Contains trees with potential to be used for breeding (DBH ≥500 mm or ≥300 mm for Salmon Gum and Wandoo (+2)	Known to be a large or key roosting site (+1)	Does not contain evidence of foraging by species (-2)	No other foraging habitat within 6 km (-2)	Is >12 km from known breeding location (-1)	Is >12km from known roosting site (-1)	Is >2 km from a watering point (-1)	Disease present (-1)	Final Score	General Comments
Scattered Eucalypts (with no breeding habitat)	BC9	7	3	0	0	0	0	-2	0	-1	0	0	0	7	Scattered eucalypts on the SCP, no breeding trees. No foraging evidence, within 12 km of roosting site and <2km from a watering point.
Scattered Intro / Occ Native Trees (occ breeding trees)	BC10	5	3	0	0	2	0	-2	0	0	0	0	0	8	Scattered intro and occ native eucs on the SCP. Occasional potential breeding tree. Foraging evidence not recorded adjacent, within 12 km of roosting and breeding site and <2km from a watering point.

Baudin's Cockatoo

Fauna Habitat (actually broad veg unit at this stage)	Ass No.	Initial Quality	Is within the known foraging area (+3)	Contains trees known to be used for breeding and / or with suitable nest hollows (+3)	Primarily comprises Marri (+2)	Contains trees with potential to be used for breeding (DBH ≥500 mm or ≥300 mm for Salmon Gum and Wandoo (+2)	Known to be a large or key roosting site (+1)	No other foraging habitat within 6 km (-2)	Is >12km from known roosting site (-1)	Does not contain evidence of foraging by species (-2)	Is >12 km from known breeding location (-1)	Is >2 km from a watering point (-1)	Disease present (-1)	Final Score	General Comments
Drainage with Marri	BC1	7	3	0	2	2	0	0	0	-2	-1	0	0	11	Scattered Marri in drainage within known foraging area. Contains potential breeding trees. No foraging evidence not recorded. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding not within 12km, and <2km from a watering point.
Scattered Trees (mostly Marri potential breeding)	BC2	7	3	0	2	2	0	0	0	-2	-1	0	0	11	Scattered trees (predominantly Marri) within known foraging area. Foraging evidence not recorded. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.
Marri Woodland (with potential breeding trees)	BC3	7	3	0	2	2	0	0	0	-2	-1	0	0	11	Marri woodland within known foraging area. Contains potential breeding trees. Foraging evidence not recorded. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.
Wetland with occasional foraging species	BC4	1	3	0	0	2	0	0	0	0	-1	0	0	5	Wetland with occasional foraging species. Foraging evidence recorded in close proximity. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.
Woodland with non-dominant foraging species	BC5	5	3	0	0	2	0	0	0	-2	-1	0	0	7	Woodland with non-dominant foraging species within the known foraging area. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.
Shrubland with occasional foraging species	BC6	1	3	0	0	0	0	0	0	-2	-1	0	0	1	Shrubland with occasional foraging species within the known foraging area. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.
Scattered Trees (occ foraging species)	BC7	1	3	0	0	0	0	0	0	-2	-1	0	0	1	Scattered trees with occasional foraging species within the known foraging area. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.

Fauna Habitat (actually broad veg unit at this stage)	Ass No.	Initial Quality	Is within the known foraging area (+3)	Contains trees known to be used for breeding and / or with suitable nest hollows (+3)	Primarily comprises Marri (+2)	Contains trees with potential to be used for breeding (DBH ≥500 mm or ≥300 mm for Salmon Gum and Wandoo (+2)	Known to be a large or key roosting site (+1)	No other foraging habitat within 6 km (-2)	Is >12km from known roosting site (-1)	Does not contain evidence of foraging by species (-2)	Is >12 km from known breeding location (-1)	Is >2 km from a watering point (-1)	Disease present (-1)	Final Score	General Comments
Scattered Intro Trees (no breeding trees)	BC8	5	3	0	0	0	0	0	0	-2	-1	0	0	5	Scattered intro eucs within the known foraging area. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.
Scattered Eucalypts with no breeding habitat)	BC9	7	3	0	0	0	0	0	0	-2	-1	0	0	7	Scattered eucalypts within known foraging area. Foraging evidence not recorded. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.
Scattered Intro / Occ Native Trees (occ breeding trees)	BC10	5	3	0	0	2	0	0	0	-2	-1	0	0	7	Scattered intro and native eucs within the known foraging area. Within 12 km of confirmed Birdlife (2018) white-tailed roost site (Precautionary Principle used), breeding within 12km unlikely, and <2km from a watering point.

Forest Red-tailed Black Cockatoo

Habitat	Assessment No.	Initial Quality	Jarrah and/or Marri shows good recruitment (+3)	Contains trees known to be used for breeding and / or with suitable nest hollows (+3)	Primarily contains Marri and/or Jarrah (+2)	Contains trees with potential to be used for breeding (DBH ≥500 mm or ≥300 mm for Salmon Gum and Wandoo (+2)	Known to be a large or key roosting site (+2)	No other foraging habitat within 6 km (-2)	Is >12km from known roosting site (-1)	Does not contain evidence of foraging by species (-2)	Is >12 km from known breeding location (-1)	Is >2 km from watering point (-1)	Disease present (-1)	Final Score	General Comments
Drainage with Marri	BC1	7	0	0	2	2	0	0	0	-2	-1	0	0	8	Marri in drainage. Contains potential breeding trees. No foraging evidence recorded. Is within 12 km roosting sites and <2km from a watering point.
Scattered Trees (mostly Marri potential breeding)	BC2	7	0	0	2	2	0	0	0	-2	-1	0	0	8	Scattered trees (predominantly Marri). Contains potential breeding trees. No foraging evidence recorded. Is within 12 km of roosting sites and <2km from a watering point.
Marri Woodland (with potential breeding trees)	BC3	7	0	0	2	2	0	0	0	-2	-1	0	0	8	Marri woodland. Contains potential breeding trees. No foraging evidence recorded, within 12 km of roosting sites and <2km from a watering point.
Wetland with occasional foraging species	BC4	1	0	0	0	2	0	0	0	0	-1	0	0	2	Drainage with occasional foraging species. Foraging evidence recorded in close proximity, within 12 km of roosting sites and <2km from a watering point.
Woodland with non dominant foraging species	BC5	5	0	0	0	2	0	0	0	0	-1	0	0	6	Woodland with non-dominant foraging species. Foraging evidence recorded in close proximity, within 12 km of roosting sites and <2km from a watering point.
Shrubland with occasional foraging species	BC6	1	0	0	0	0	0	0	0	-2	-1	0	0	-2	Shrubland with occasional foraging species. Foraging evidence recorded not recorded, within 12 km of roosting sites and <2km from a watering point.
Scattered Trees (occ foraging species)	BC7	1	0	0	0	0	0	0	0	-2	-1	0	0	-2	Scattered trees with occasional foraging species. No foraging evidence recorded. Within 12 km of roosting sites and <2km from a watering point.
Scattered Intro Trees (no breeding trees)	BC8	5	0	0	0	0	0	0	0	-2	-1	0	0	2	Scattered intro eucs. No foraging evidence recorded. Within 12 km of roosting sites and <2km from a watering point.
Scattered Trees (mostly Marri with	BC9	7	0	0	2	0	0	0	0	-2	-1	0	0	6	Scattered trees (predominantly Marri). Does not contain potential breeding trees. No foraging evidence recorded. Is within 12 km of roosting sites and <2km from a watering point.

Habitat	Assessment No.	Initial Quality	Jarrah and/or Marri shows good recruitment (+3)	Contains trees known to be used for breeding and / or with suitable nest hollows (+3)	Primarily contains Marri and/or Jarrah (+2)	Contains trees with potential to be used for breeding (DBH ≥500 mm or ≥300 mm for Salmon Gum and Wandoo (+2)	Known to be a large or key roosting site (+2)	No other foraging habitat within 6 km (-2)	Is >12km from known roosting site (-1)	Does not contain evidence of foraging by species (-2)	Is >12 km from known breeding location (-1)	Is >2 km from watering point (-1)	Disease present (-1)	Final Score	General Comments
no breeding habitat)															
Scattered Intro / Occ Native Trees (occ breeding trees)	BC10	5	0	0	0	2	0	0	0	-2	-1	0	0	4	Scattered intro and occ native eucs. No foraging evidence recorded. Within 12 km of roosting sites and <2km from a watering point.