Appendix D Fauna Surveys and Assessments

Strike West Pty Ltd

EP 469 West Erregulla Field Development Program

FAUNA DESKTOP REVIEW – REVISION 0

15 June 2021

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

www.jbsg.com.au

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1. Introduction

1.1 Project Description

Strike West Pty Ltd (Strike Energy), on behalf of the EP 469 Joint Venture is proposing to develop the following components within petroleum exploration permit EP 469]:

- A gathering network to connect four (4) existing wells and convey the extracted gas from the wells to an Upstream Facility, including all major trunklines and flowlines.
- Up to two (2) new conventional wells, if required (G and J).
- Solar powered Remote Terminal Unit (RTU) and corrosion inhibitor chemical injection systems at each well location.
- Pigging facilities for trunklines and flowlines (pig launchers and sump tanks for collection of minor drained liquid) in the field.
- An Upstream Facility which comprises separation and metering and sump tanks for collection of minor drained liquid and pigging drainage.

The Project development envelope (Project Area) is located approximately 50 km southeast of Dongara and 234 km north of Perth (Figure 1.1). The Project requires the clearing of up to 38.53 ha of native vegetation within a development envelope of 93.97 ha.

Legend:

- Development Envelope
- Legislated Lands and Waters (DBCA)
- National Park
- Section 5(1)(h) Reserve
- Nature Reserve
- Watercourses
- Highways
- Main road
- Minor road

Scale 1:350,000 at A4

0 2.5 5
Kilometres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 60738

Client: Strike Energy

Version: A | Date: 11-Jun-2021

Drawn By: cthatcher | Checked By: LT

REGIONAL LOCATION

FIGURE 1.1

strategen JBS&G

File Name: W:\Projects\1)Open\Strike West\60738 Field Development Program\GIS\Maps\R01_Rev_A\60738_0x_RegLocn.mxd
Image Reference: SLIP Public Services Locate 2020.

Legend

- Development Envelope
- Disturbance Footprint
- Existing well pads and access tracks

Scale 1:26,000 at A4 (0 250 500 metres)		**PROJECT AREA**
Coord. Sys. GDA 1994 MGA Zone 50		
Job No: 60738		
Client: Strike Energy		**FIGURE 1.2**
Version: A	Date: 14-Jun-2021	strategen JBS&G
Drawn By: cthatcher	Checked By: LT	

File Name: W:\Projects\1)Open\Strike West\60738 Field Development Program\GIS\Maps\R01_Rev_A\60738_0x_ProjectArea.mxd
Image Reference: Client imagery 2020.

1.2 Climate

The climate of the region is described as Mediterranean, with dry, warm summers and wet, cool winters (BOM, 2020). The nearest open weather station is Carnamah, approximately 65 km south east of the Project Area, shows the warmest period in the region is from December to March, with average maximum temperatures from 1940 to 2019 ranging from 32.8 to 36.1°C during these months.

The lowest temperatures generally occur between June and September, with average minimum temperatures ranging from 7.2to 8.7°C during these months (BOM 2020).

Average rainfall in the region from 1887 to 2020 is highest during the cooler months between May and August. Rainfall during these months' ranges from 50.0 to 74.4 mm per month. The driest months are between November and April, with rainfall ranging from 8.7 to 22.7 mm in this period. The average annual rainfall at Carnamah is 377.9 mm (BOM 2020). Monthly average rainfall and temperature for Carnamah are shown in Figure 1.3.

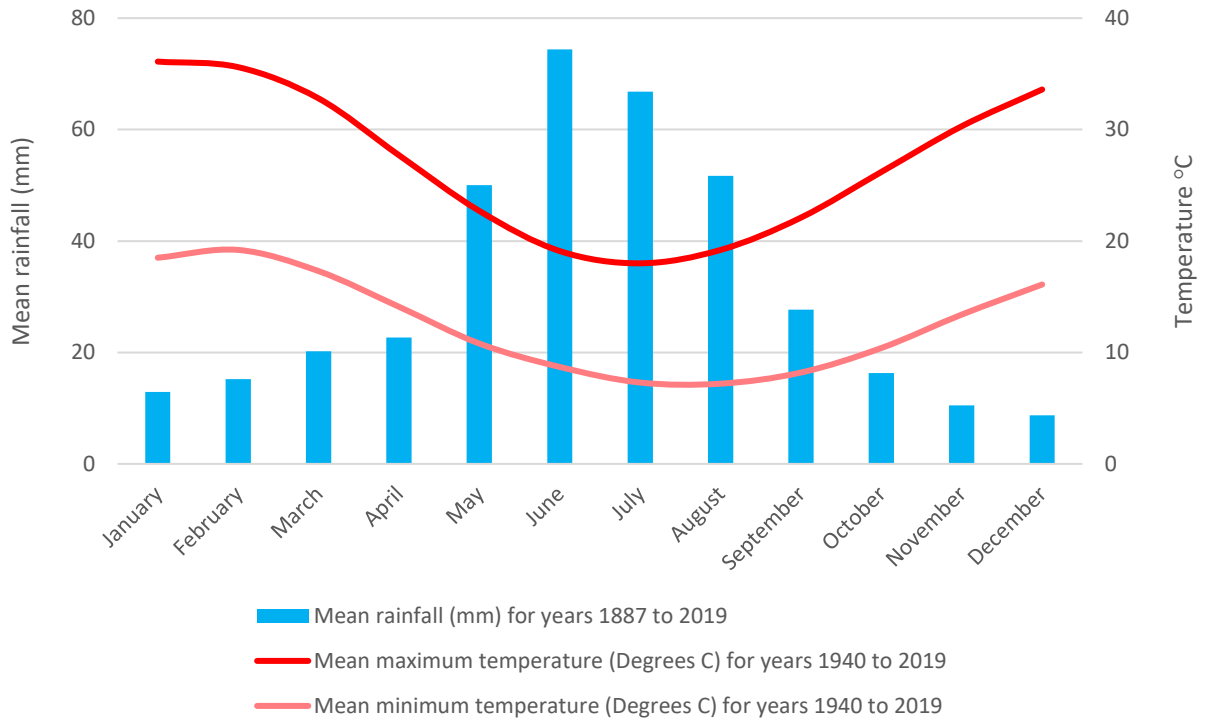


Figure 1.3: Monthly Average Rainfall and Temperature (Station 008025 Carnamah)

1.3 Geology, Soils and Landform

Regionally, the Project Area is located in the northern part of the onshore Northern Perth Basin. Structurally, the Project Area straddles the transition between the Allanooka High and the Dandaragan Trough between the Eneabba and Urella Faults (RPS, 2011).

Soils in this region are described as yellow sands inland and leached sandy soils near the coast, which overlay laterite. This region is almost completely underlain by sedimentary rocks of siliceous nature. The sedimentary rocks form a series of plateaux, including the Dandaragan Plateau, on which the permit is located. These plateaux have been eroded by the sea on the west and dissected by rivers, but substantial stretches of the plateau surfaces are still preserved and form extensive monotonous sandplains (Beard 1990).

No specific soil characterisation has been undertaken within the Project Area; however, data from Woodman Environmental study in the local vicinity indicates that soils in proximity to the Project Area consist of grey or brown clay loams (Ecological 2020).

The topography of Project Area is generally flat with the elevation dropping gently away to the NNW of the proposed well location.

2. Methods

A review of all available literature relevant to the Project Area and database searches within proximity to the Project Area (Table 2.1) and wider region (Appendix B) was undertaken to compile a list of vertebrate fauna species with the potential to occur with the Project Area.

Table 2.1. Databases Searches Undertaken

Database*	Reference	Type of records held in database	Parameters
DBCA Threatened Fauna Database Search	DBCA (2020a)	Records from the Western Australian Museum (WAM) and Department of Biodiversity, Conservation and Attractions (DBCA) databases, including historical data and Threatened and Priority species in WA.	40 km radius around the central point 115° 18' 27'' E,29° 24' 59'' S of the Project Area.
NatureMap	DBCA (2020b)	Records from the Western Australian Museum (WAM) and Department of Biodiversity, Conservation and Attractions (DBCA) databases, including historical data and Threatened and Priority species in WA.	20km radius around the central point 115° 18' 27'' E,29° 24' 59'' S) of the Project Area.
EPBC Protected Matters Search Tool	DoEE (2020)	Records on MNES protected under the EPBC Act.	10 km radius around the central point 115° 18' 27'' E,29° 24' 59'' S) of the Project Area.

* Data accessed September 2020.

2.1 Fauna Surveys undertaken within proximity to the Project Area

Coffey (2013) completed a Level 1 fauna assessment of the wider local area, which is inclusive of the Project Area (Figure 1.2). The Coffey (2013) desktop assessment identified a total of 302 species that have previously been recorded in the region, comprising 168 birds, 29 mammals, 94 reptiles and 11 amphibians (Appendix C).

Ecological completed a Basic Fauna Survey to support the development and construction of a gas pipeline, directly south of the Project Area (Ecological 2021).

The desktop assessment search area is likely to contain habitats which do not occur within the Project Area and given that species tend to be patchily distributed even where appropriate habitats are present, the results of the desktop review presented within Appendix C are likely to include species which may not occur within the Project Area. Many species of birds listed occur as regular migrants, occasional visitors or vagrants.

2.2 Database and Literature Review

A total of 39 conservation significant species (including 14 migratory species) were identified from the literature review and database searches, as having previously been recorded and/ or have the potential to occur based on distribution and habitat. This comprised of three mammals, 27 birds, three reptiles and six invertebrates (Table 2.2).

Table 2.2: Literature Review and Database Results for Conservation Significant Fauna within proximity to the Project Area

Taxon	Common Name	Conservation Status	
		EPBC Act	BC Act
Birds			
Anous tenuirostris melanops	Australian Lesser Noddy	VU	EN
Arenaria interpres	Ruddy Turnstone	MI	S5-MI

Taxon	Common Name	Conservation Status	
		EPBC Act	BC Act
Calidris ferruginea	Curlew Sandpiper	Critically Endangered, MI, MA	S1- CR
Calidris ruficolus	Red-necked Stint	MI	S5-MI
Hydroprogne caspia	Caspian tern	MI	S5-MI
Calyptorhynchus latirostris	Carnaby's Cockatoo	Endangered	S2- EN
Leipoa ocellata	Malleefowl	Vulnerable	S- VU
Falco hypoleucos	Grey Falcon	Vulnerable	S3- VU
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered, MI, MA	S1- CR
Rostratula australis	Australian Painted Snipe	Endangered, MA	S2- EN
Thalasseus bergii	Crested Tern	MI	S5- MI
Tringa nebularia	Common Greenshank	MI	S5- MI
Tringa stagnatilis	Marsh Sandpiper	MI	S5- MI
Limosa lapponica	Bar-tailed Godwit	MI, MA	S5- MI
Motacilla cinerea	Grey Wagtail	MI, MA	S5- MI
Actitis hypoleucos	Common Sandpiper	MI, MA	S5- MI
Calidris acuminata	Sharp-tailed Sandpiper	MI, MA	S5- MI
Pandion haliaetus	Osprey	MA	S5- MI
Ardea alba	Great Egret, White Egret	MA	-
Ardea ibis	Cattle Egret	MA	-
Calidris melanotos	Pectoral Sandpiper	MI	S5- MI
Chrysococcyx osculans	Black-eared Cuckoo	MA	-
Haliaeetus leucogaster	White-bellied Sea-Eagle	MA	-
Merops ornatus	Rainbow Bee-eater	MA	-
Falco peregrinus	Peregrine Falcon	-	S7-OS
Apus pacificus	Fork-tailed Swift	MI	S5-MI
Oxyura australis	Blue-billed Duck		Priority- P4
Mammals			
Dasyurus geoffroii	Chuditch, Western Quoll	Vulnerable	S3-VU
Notamacropus irma	Western Brush Wallaby	-	Priority- P4
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale	-	CD
Reptiles			
Egernia stokesii badia	Western Spiny-tailed Skink	Endangered	S3-VU
Aspidites ramsayi	Woma Python	-	Priority- P1
Nelaps calonotos	Black-striped Snake		Priority- P3
Invertebrates			
Idiosoma nigrum	Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider	Vulnerable	S2- Endangered
Idiosoma arenaceum	Geraldton Sandplain Shield-backed Trapdoor Spider		Priority- P3
Idiosoma kwongan	Kwongan heath Shield-backed Trapdoor Spider		Priority- P1
Phasmodes jeeba	Springtime corroboree stick katydid (Eneabba), cricket	-	Priority- P3
Hemisaga verpreculae	Thorny bush katydid (Moora)		Priority- P2
Hylaeusglobuliferus	Wollybush Bee		Priority- P3

[1] EPBC Act listings: E = Endangered, V = Vulnerable, M = Migratory, MA = Marine CD= Conservation Dependent (see Appendix A).
[2] WA Biodiversity Conservation Act 2016 listings: S1 to S7 = Schedules 1 to 7 (see Appendix A).

2.1 Fauna Habitat

Vegetation types are important in determining assemblage characteristics for fauna habitat. The Coffey (2013) fauna assessment identified five fauna habitat types within the wider local area (inclusive of the Project Area) comprising:

1. Mixed shrubland with/without woodland species;
2. Laterite breakaway;
3. Open Eucalyptus forest;
4. Minor drainage lines; and
5. Planted Eucalypts habitats.

These habitats descriptions have been aligned with the mapped VT's within the Project Area to determine broad fauna habitat types present.

These are consistent with the fauna habitats described by Ecological (2021).

Ecological values for Carnaby's Cockatoo within the Project Area were based on the definitions of breeding, foraging and roosting habitat as per the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral guidelines for black cockatoos (DSEWPaC 2012). Vegetation was assessed for roosting habitat potential based on the suitability of tree species present and on the occurrence of local confirmed or potential roosting sites (DBCA 2020).

3. Results

3.1 Fauna Habitat

Two fauna habitats were identified within the Project Area comprising mixed shrubland with/ without woodland species (71.42%) and open Eucalyptus forest (28.58%) of the Project Area. The total proposed clearing area is 38.53 ha comprising 27.44 ha within the mixed shrubland with woodland species habitat,11.02 ha within the open Eucalyptus forest and 0.07 ha as 'cleared'. The native vegetation within all fauna habitats to be cleared was assessed by Woodman (2013) to be Pristine at the time of survey according to the Keighery (1994) vegetation condition scale (Figure 3.1; Table 3.1). However, since the Woodman (2013) survey almost the entire Project Area has been relatively recently burnt, within the last two years (WEC 2020).

Table 3.1: Fauna habitat within the Project Area

Fauna Habitat type	VT	VT description	Representation within the Project Area (ha)
Mixed shrubland with/ without woodland species	7a	Mid mallee woodland to isolated mallees of *Eucalyptus conveniens* or mid open shrubland of *Allocasuarina campestris* over low shrubland and sedgeland of mixed species frequently dominated by *Ecdeiocolea monostachya* and *Melaleuca aspalathoides*, or occasionally *M. tinkeri, Hakea auriculata* or *Hakea lissocarpha*, on gravelly grey or brown clay loams or sands, usually with laterite on or near the surface, on slopes and crests	9.97
	7b	Mid mallee woodland to isolated mallees of *Eucalyptus conveniens* or mid open shrubland of *Allocasuarina campestris* over low shrubland and sedgeland of mixed species dominated by *Banksia carlinoides*, *Ecdeiocolea monostachya*, *Hakea incrassata, Hibbertia hypericoides* and *Melaleuca aspalathoides* on gravelly grey or brown clay loams or sands, usually with laterite on or near the surface, on slopes and crests	16.09
	8	Mid mallee woodland to isolated mallees of *Eucalyptus conveniens* over mid shrubland to open shrubland dominated by *Allocasuarina campestris* over low shrubland and sedgeland of mixed species dominated by *Ecdeiocolea monostachya, Hakea auriculata, Melaleuca radula, M. aspalathoides* and *Banksia fraseri* var. *fraseri* on gravelly grey or brown clay loams usually over massive laterite on breakaway tops, ridges and lateritic rises	2.05
	10	Mid sparse to open shrubland of mixed species including *Calothamnus quadrifidus* subsp. *angustifolius*, *Grevillea biformis* subsp. *biformis* and *Banksia attenuata* over low shrubland and sedgeland of mixed species dominated by *Ecdeiocolea monostachya, Melaleuca leuropoma, Daviesia divaricata* subsp. *divaricata ms, Mesomelaena pseudostygia* and *Banksia shuttleworthiana* on yellow-brown or occasionally grey sand on slopes and valley floors	8.38
	11	Mid sparse to open shrubland of *Allocasuarina campestris* and *Grevillea biformis* subsp. *biformis* over low shrubland and sedgeland dominated by *Hakea circumalata, Lepidobolus preissianus* subsp. *preissianus, Mesomelaena pseudostygia* and *M. stygia* subsp. *deflexa* (P3) on yellow or yellow-brown sand or sandy loam on mid to upper slopes.	22.81

Fauna Habitat type	VT	VT description	Representation within the Project Area (ha)
	14	Low open shrubland dominated by *Calothamnus quadrifidus* subsp. *angustifolius, Banksia carlinoides, Hakea lissocarpha* and *Verticordia densiflora* over low open shrubland, sedgeland and forbland dominated by *Dampiera teres* (broad-leaf variant), *Jacksonia angulata, Harperia lateriflora, Opercularia vaginata* and *Melaleuca trichophylla* on grey-brown sands, sandy loams and clay loams in minor drainage lines and on flats	2.38
Open Eucalyptus forest	13a	Low open woodland of *Eucalyptus todtiana* over mid to low shrubland of mixed species dominated by *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus*, *Eremaea beaufo*rtioides var. microphylla, Melaleuca aff. leuropoma and Hibbertia hypericoides over low shrubland and sedgeland of mixed species including Banksia dallanneyi subsp. media, Conostylis canteriata, Mesomelaena pseudostygia and Caustis dioica on grey or brown sand on lower and mid slopes	2.13
	13b	Low open woodland of *Eucalyptus todtiana* over mid to low shrubland of mixed species dominated by *Allocasuarina humilis, Calothamnus sanguineus, Hakea trifurcata, Hibbertia hypericoides* and *Melaleuca leuropoma* over low shrubland and rushland of mixed species including *Banksia dallanneyi* subsp. *media, Conostylis aculeata* subsp. *breviflora* and *Conostylis canteriata* on grey, brown or yellow sand on flats, in depressions and on slopes.	21.77
		Cleared (nil habitat)	8.39
		Total	**93.97**

Legend:

- Development Envelope
- Disturbance Footprint
- Minor road
- Track

Fauna habitat

- Mixed Shrubland with/without some woodland species.
- Open Eucalyptus Forest
- Nil

Scale 1:26,000 at A4 (0 250 500 Metres)		**FAUNA HABITAT AND BLACK COCKATOO HABITAT**
Coord. Sys. GDA 1994 MGA Zone 50		
Job No: 60738		
Client: Strike Energy		**FIGURE 3.1**
Version: A	Date: 14-Jun-2021	strategen JBS&G
Drawn By: cthatcher	Checked By: LT	

File Name: W:\Projects\1)Open\Strike West\60738 Field Development Program\GIS\Maps\R01_Rev_A\60738_0x_FaunaHabitat.mxd
Image Reference: Client Imagery 2020

3.1.1 Carnaby's Cockatoo Habitat Assessment

The foraging value to black cockatoos of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. A Carnaby's Cockatoo habitat assessment was undertaken to assign areas of vegetation within the Project Area a foraging value score and assigning large trees (greater than 500 millimetres diameter at breast height, as per (DSEWPaC 2012), a nesting value score. These scoring systems have been developed by Bamford Consulting Ecologists based on guidance from DSEWPaC (2012).

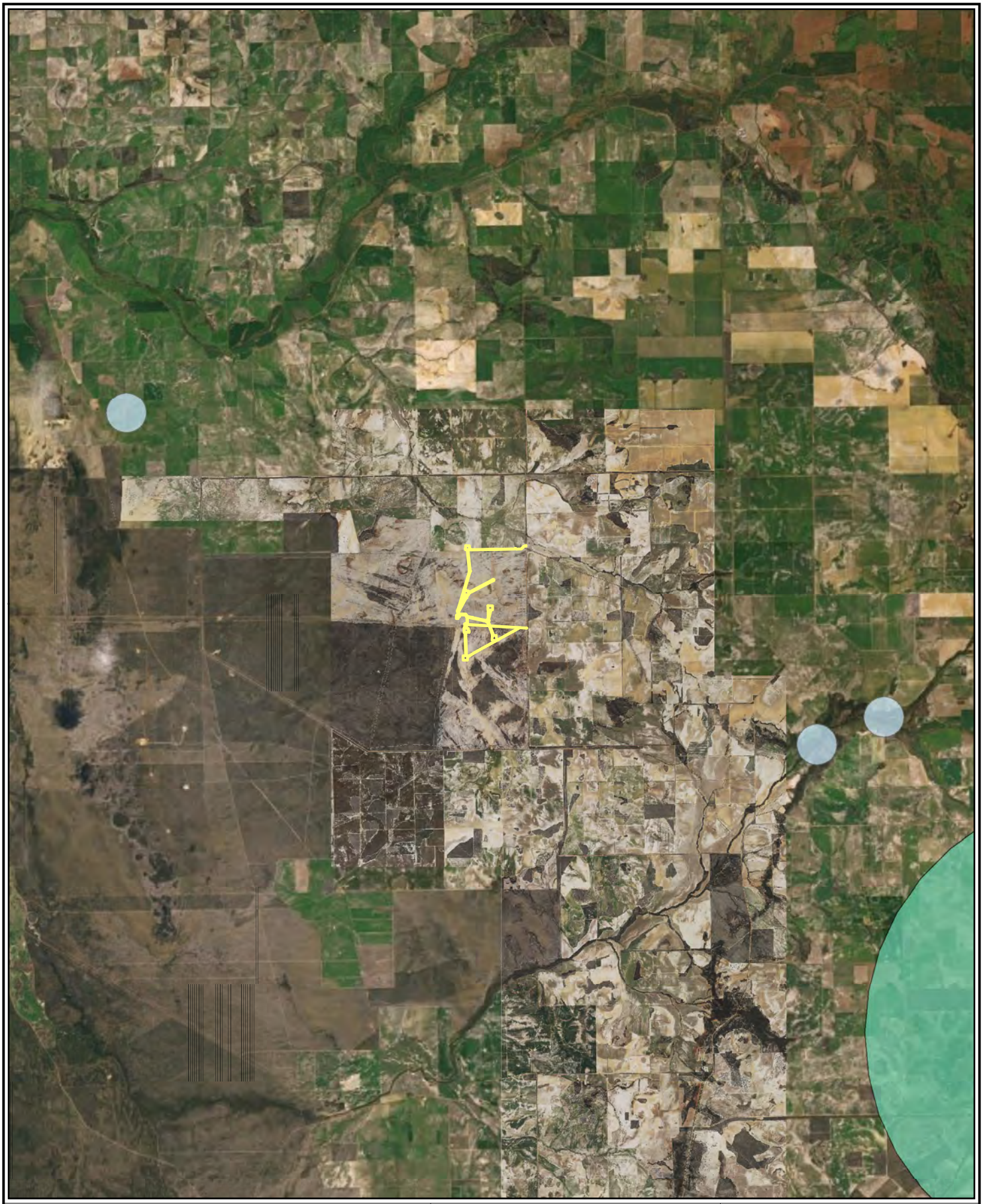
Bamford Consulting Ecologists (2018) determined assessment criteria (Appendix B) for calculating the total score (out of 6) for comparison across the Project Area which requires the following steps:

- determining a score out of six for the vegetation composition, condition and structure; plus
- assigning the total score of foraging habitat suitability out of 6.

Foraging habitat values for vegetation within the Project Area are shown in Figure 3.1.

No suitable breeding habitat for the Carnaby's cockatoo was observed within the Project Area (Coffey 2013). Figure 3.2 shows regional foraging habitat and known roost locations for Carnaby's Cockatoo.

The Carnaby's Cockatoo foraging habitat assessment mapped a total of 61.68 ha Low and 23.9 ha Low to moderate value Carnaby's Cockatoo foraging habitat within the Project Area, of which 27.44 ha of Low and 11.02 ha of low to moderate value foraging habitat is proposed to be cleared. The low to moderate value foraging habitat was represented by low shrubland with a proteaceous cover representing foraging species of between 10 and 15%. The low value foraging habitat has a similar structure; however, suitable foraging species represented less than 10% projected foliage cover. This assessment was based on the Woodman (2013) survey vegetation mapping, however recent fires in the area have impacted vegetation across the sand plains which have reduced the immediate suitability of native vegetation for the species across the project and adjacent areas. Therefore, the current status of Black Cockatoo foraging habitat value across the entire Project Area is considered 'negligible- low' as a result of the recent fire disturbance.



Legend

- Development Envelope
- Carnabys Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054)
- Black Cockatoo Roosting Sites - Buffered (DBCA-064)

Scale 1:250,000 at A4	0 2.5 5 Kilometres	**CARNABY'S BLACK COCKATOO REGIONAL FORGING HABITAT AND KNOWN ROOST LOCATIONS**
Coord. Sys. GDA 1994 MGA Zone 50		
Job No: 60738		
Client: Strike Energy		**FIGURE 3.2**
Version: A	Date: 15-Jun-2021	strategen JBS&G
Drawn By: cthatcher	Checked By: LT	

File Name: W:\Projects\1)Open\Strike West\60738 Field Development Program\GIS\Maps\R01_Rev_A\60738_0x_RegBCHabitat.mxd
Image Reference: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Client imagery 2020.

3.2 Vertebrate Fauna Assemblage

The literature review and desktop assessment for the local area (which encompassed the Project Area) identified a total of 302 species that have previously been recorded in the wider region of the Project Area, comprising:

- 168 birds;
- 29 mammals;
- 94 reptiles; and
- 11 amphibians.

The current NatureMap (DBCA 2021) searches undertaken for the Project Area identified records comprising eleven (11) birds, three (3) mammals, five (5) reptiles, two (2) amphibians and 27 invertebrate species (Appendix C). A total of 39 listed species of conservation significance have been identified through current database searches and literature review, the likelihood of occurrence of these species within the Project Area are discussed in further detail in Section 3.3 below.

3.3 Conservation Significant Fauna

Based on habitats present within the Project Area and nearby records, it was assessed that two species of conservation significance are likely to occur, three species of conservation significance may possibly occur, and 34 species of conservation significance are unlikely to occur within the Project Area (Table 3.2). These species are discussed in further detail below.

Table 3.2 Likelihood of Occurrence of Conservation Significant Fauna.

Taxon	Common Name	Conservation Status		Likelihood of occurrence in the Project Area
		EPBC Act	BC Act	
Birds				
Anous tenuirostris melanops	Australian Lesser Noddy	VU	EN	Unlikely to occur
Arenaria interpres	Ruddy Turnstone	MI	S5-MI	Unlikely to occur
Calidris ferruginea	Curlew Sandpiper	Critically Endangered, MI, MA	S1- CR	Unlikely to occur
Calidris ruficolus	Red-necked Stint	MI	S5-MI	Unlikely to occur
Hydroprogne caspia	Caspian tern	MI	S5-MI	Unlikely to occur
Calyptorhynchus latirostris	Carnaby's Cockatoo	Endangered	S2- EN	**Likely to occur**
Leipoa ocellata	Malleefowl	Vulnerable	S- VU	Unlikely to occur
Falco hypoleucos	Grey Falcon	Vulnerable	S3- VU	Unlikely to occur
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered, MI, MA	S1- CR	Unlikely to occur
Rostratula australis	Australian Painted Snipe	Endangered, MA	S2- EN	Unlikely to occur
Thalasseus bergii	Crested Tern	MI	S5- MI	Unlikely to occur
Tringa nebularia	Common Greenshank	MI	S5- MI	Unlikely to occur
Tringa stagnatilis	Marsh Sandpiper	MI	S5- MI	Unlikely to occur
Limosa lapponica	Bar-tailed Godwit	MI, MA	S5- MI	Unlikely to occur
Motacilla cinerea	Grey Wagtail	MI, MA	S5- MI	Unlikely to occur
Actitis hypoleucos	Common Sandpiper	MI, MA	S5- MI	Unlikely to occur
Calidris acuminata	Sharp-tailed Sandpiper	MI, MA	S5- MI	
Pandion haliaetus	Osprey	MA	S5- MI	

Taxon	Common Name	Conservation Status		Likelihood of occurrence in the Project Area
		EPBC Act	BC Act	
Ardea alba	Great Egret, White Egret	MA	-	
Ardea ibis	Cattle Egret	MA	-	
Calidris melanotos	Pectoral Sandpiper	MI	S5- MI	
Chrysococcyx osculans	Black-eared Cuckoo	MA	-	Unlikely to occur
Haliaeetus leucogaster	White-bellied Sea-Eagle	MA	-	Unlikely to occur
Merops ornatus	Rainbow Bee-eater	MA	-	**Likely to occur**
Falco peregrinus	Peregrine Falcon	-	S7-OS	**May possibly occur**
Apus pacificus	Fork-tailed Swift	MI	S5-MI	**May possibly occur**
Oxyura australis	Blue-billed Duck		Priority- P4	Unlikely to occur
Mammals				
Dasyurus geoffroii	Chuditch, Western Quoll	Vulnerable	S3-VU	Unlikely to occur
Notamacropus irma	Western Brush Wallaby	-	Priority- P4	**May possibly occur**
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale		CD	Unlikely to occur
Reptiles				
Egernia stokesii badia	Western Spiny-tailed Skink	Endangered	S3-VU	Unlikely to occur
Aspidites ramsayi	Woma Python	-	Priority- P1	Potentially locally extinct (unlikely to occur) (historic record 32 km east of Project Area)
Nelaps calonotos	Black-striped Snake		Priority- P3	Unlikely to occur
Invertebrates				
Idiosoma nigrum	Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider	Vulnerable	S2-Endangered	Unlikely to occur (species has undergone taxonomic review and *I nigrum* distribution is now confined to a small area of the central Wheatbelt)
Idiosoma arenaceum	Geraldton Sandplain Shield-backed Trapdoor Spider		Priority- P3	Unlikely to occur nearest record 35km north east of the Project Area)
Idiosoma kwongan	Kwongan heath Shield-backed Trapdoor Spider		Priority- P1	Unlikely to occur nearest record 46 km south of the Project Area)
Phasmodes jeeba	Springtime corroboree stick katydid (Eneabba), cricket	-	Priority- P3	Insufficient information available (nearest record 16 km west of the Project Area)
Hemisaga verpreculae	Thorny bush katydid (Moora)		Priority- P2	Insufficient information available (nearest record approximately 40km south of the Project Area)
Hylaeus globuliferus	Wollybush Bee		Priority- P3	Insufficient information available (nearest record 30km south of the Project Area)

3.3.1 Listed Threatened Species

Carnaby's Cockatoo

The Project Area is located within the mapped distribution of Carnaby's cockatoo (DSEWPaC, 2012). The nearest known record for this species is 8 km southwest of the Project Area (DBCA 2020a).

Carnaby's Cockatoo is listed as Endangered under the EPBC Act and as Schedule 2 under the BC Act. This species mainly occurs in uncleared or remnant native eucalypt woodlands, especially those that contain Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*E. wandoo*), and in shrubland or kwongan heathland dominated by Hakea, Banksia and Grevillea species (Johnstone *et al*. 2011). The Carnaby's Cockatoo is considered likely to be a regular migrant that may utilise the habitat within the Project Area to forage. However, given the recent impact from fires (within the past 2 years) it is considered unlikely that the Carnaby's Cockatoo will forage within the Project Area, given the current condition of vegetation and the lack of food sources available.

The Project Area is situated at the northern most extent of the mapped breeding range for Carnaby's cockatoo (DSEWPaC, 2011). Carnaby's Cockatoo forages in proteaceous heath, banksia woodlands and eucalypt woodlands, and this foraging habitat occurs in the Project Area. Breeding is considered unlikely within the Project Area given the lack of suitable large trees (Coffey 2013; Ecological 2021).

Roost sites for the Carnaby's cockatoo are known in the general region, with the nearest known roost locations situated approximately 17 km to the southeast and 20 km northwest of the Project Area (Figure 3.2).

Malleefowl

The Malleefowl is listed as Vulnerable under the EPBC Act and BC Act. Malleefowl are restricted to mainly southern arid and semiarid zones mainly in scrubs and thickets of mallee and other dense litter-forming shrublands. Much of their range has been cleared for agriculture. The Malleefowl has occasionally been recorded in the general area and the WA Museum has reported breeding (mounds) in the general region, but details are not available. The nearest known record of Malleefowl occurs 25.2 km northeast of the Project Area (DBCA 2020a). There is no indication that there is a resident, breeding population in the Project Area and this species was not recorded during the Coffey 2013 field survey and is considered unlikely to occur. Additionally, the recent fire has also decreased the likelihood of the species, as the effect of fire on Malleefowl is severe, with breeding in burnt areas usually reduced for at least 30 years (Benshemesh 2007).

Grey Falcon

The Grey Falcon is listed as Vulnerable under the EPBC Act and BC Act. Grey Falcons prefer sparsely-treed, open plains and creek lines for hunting (Olsen & Olsen, 1986). They typically nest in the abandoned nest of a raptor or corvid (Olsen & Olsen, 1986) in trees or man-made structures, most notably repeater towers. This species is considered unlikely to occur or be reliant on the habitat within the Project Area due to the lack of preferred habitat and the proximity of the nearest record occurs greater than 40 km from the Project Area (DBCA 2020a).

Chuditch, Western Quoll

The Chuditch occurs mostly in Jarrah *Eucalyptus marginata* forests and woodlands, mallee shrublands and heathlands. It is now largely restricted to the south-west of Western Australia, with small numbers in the Midwest, Wheatbelt and South Coast Regions (DBCA 2017). The Chuditch is considered unlikely to occur in the Project Area given the patchy distribution of this species, the

Project Area falls within the historical distribution for this species and the proximity to the nearest record is approximately 37 km northwest the Project Area (DBCA 2020a).

***Phascogale tapoatafa wambenger* (South-western Brush-tailed Phascogale)**

Like the Red-tailed Phascogale this subspecies was formerly widespread in woodland habitats across south western Australia, but is now mainly restricted to remnants of Jarrah forest (*Eucalyptus marginata*) and other pockets of remnant woodland in the Western Australian Wheatbelt that contain hollow-bearing trees but a sparse ground cover (Menkhorst & Knight 2004). Like other small arboreal fauna species it shows a preference for long unburnt habitat with a continuous canopy, as well as tree hollows. Historic records indicate a broader range of habitats (Aplin *et al*. 2015). This species is considered unlikely to occur within the Project Area due to a lack of suitable woodland habitat within the Project Area. The nearest record is approximately 28.5 km east of the Project Area (DBCA 2020a).

***Egernia stokesii badia* (Western Spiny-tailed Skink)**

The Western Spiny Tailed Skink inhabits semiarid scrubs and woodlands, sheltering in hollow logs and behind bark of fallen trees (Storr et al, 1999). This species lives in small groups of related individuals; often parents are found sheltering with their young in refugia and occasionally larger groups of several adults and juveniles are encountered. Given the Project Area is located outside the known distribution of the species it is unlikely to occur. The nearest records of this species are situated greater than 40 km (43.9 km southeast) from the Project Area (DBCA 2020a).

Shield-backed Trapdoor Spider

Within the coastal mid-west areas, this species is associated with sheltered habitats in eucalypt woodland and acacia shrubland. The shield-backed trapdoor spider group was formerly identified as *I. nigrum* which has undergone a taxonomic review (Rix et al. 2018). This review has divided *I. nigrum* into five separate species with the distribution of *I. nigrum* now being confined to a small area of the central Wheatbelt. The nearest record of the Shield-backed Trapdoor Spider is approximately 46.4 km south (DBCA 2020). The Shield-backed Trapdoor Spider was not found during the Coffey (2013) field survey, most likely due to the absence of suitable habitat or potential disturbance from Cattle or other stock. The Shield-backed Trapdoor Spider (*I. nigrum*) is considered unlikely to occur within the Project Area based on its revised distribution and proximity to nearest known records. The nearest known location of the Kwongan heath Shield-backed Trapdoor Spider (Priority 1) is 46.5 km south and the Geraldton Sandplain Shield-backed Trapdoor Spider (Priority 3) is 34.6 km northeast of the Project Area (DBCA 2020a).

3.3.2 Listed Migratory Species

Migratory waterbirds

Database searches within 40 km of the Project Area identified fifteen species listed as Migratory under the EPBC Act and as Schedule 5 under the BC Act that are known to occur locally and regionally within wetland environments (Table 2.2). Given the lack of open wetland habitat within the Project Area these species are considered unlikely to occur. The nearest known records of the majority of migratory species listed in Table 2.2 are greater than 40 km from the Project Area with the exception of the Common Greenshank which was recorded 21.9 km south east of the Project Area and the Crested Tern, 33.3 km southwest (DBCA 2020a).

Fork-tailed Swift

This species is listed as Migratory under the EPBC Act and breeds in the northeast and mid-east Asia and spends winters in Australia and southern New Guinea. It is a visitor to most parts of Western

Australia, beginning to arrive in the Kimberley in late September, in the Pilbara November and in the southwest land division in mid-December, and leaving by late April. The Fork-tailed swift is almost entirely aerial and therefore it is possible that it will visit the Project Area intermittently but is unlikely to be reliant on habitat within the Project Area. The nearest known record of this species is 21.9 km southeast of the Project Area (DBCA 2020a).

3.3.3 Listed Marine Species

Great Egret

The Great Egret is listed as a Marine species under the EPBC Act. Egrets depend, to some extent, upon surface water for foraging. The largest of the Australian egrets, the Great Egret is a large, white wader dependent upon floodwaters, rivers, shallow wetlands and intertidal mudflats. It is possible that the Great Egret may pass over the Project Area, however due to a lack of suitable habitat with Project Area it is considered unlikely to occur or be reliant on habitat within the Project Area.

Cattle Egret

The Cattle Egret is listed as a Marine species under the EPBC Act. It is most widespread and common in north eastern Western Australia. The Cattle Egret occurs in grasslands, woodlands and wetlands, and is not common in arid areas. This species prefers pastures and croplands, especially where drainage is poor. It is possible that the Cattle Egret may pass over the Project Area, however due to a lack of suitable habitat with Project Area it is considered unlikely to occur or be reliant on habitat within the Project Area.

Rainbow Bee-eater

The Rainbow Bee-eater is listed as a Marine species under the EPBC Act. Numerous records of the Rainbow Bee-eater occur within the vicinity of the Project Area (Coffey 2013). The species is found over a wide range of habitats especially on sandy soils and is therefore this species is considered likely to occur but is unlikely to be reliant on habitat within the Project Area, given the large expanse of suitable habitat present in the Project Area surrounds. The nearest record of this species is 26 km southwest of the Project Area (DBCA 2020).

White-bellied Sea Eagle

The White-bellied Sea Eagle is listed as a Marine species under the EPBC Act. White-bellied Sea Eagles are most commonly found around the coastline; however, they have been reported many kilometres inland, often along watercourses. Records of these species in the vicinity of the Project Area are predominantly in coastal parts. Given that the Project Area is some distance from the coast, it is unlikely that the White-bellied Sea Eagle occurs within the Project Area (Coffey 2013).

3.3.4 Priority Species

Western Brush Wallaby

This species is listed on the DBCA Priority as Priority 4. The Western Brush Wallaby has suffered a large range reduction and fragmentation of populations across this range due to clearing for agriculture and predation by introduced predators. The preferred habitat for the Western Brush Wallaby is open forest or woodland, in which it favours open, seasonally wet flats with low grasses and open, scrubby thickets, and areas of dense vegetation. It is considered possible that this species may utilise the habitat within the Project Area, given the occurrence of suitable habitat within the Project Area and the nearest known record occurring 17 km to the west of the Project Area (DBCA 2020a).

Springtime corroboree stick katydid (Eneabba), cricket

This species is listed on the DBCA Priority list as Priority 3. Little is known about the biology of this species and an assessment could not be made on current information available. The nearest known record of this species occurs 16 km west northwest of the Project Area (DBCA 2020a).

Thorny bush katydid (Moora)

This species is listed on the DBCA Priority as Priority 3. Katydids inhabit tree and shrubs and can be found mostly in the southern half of Australia in heath or mixed woodland and often host plant species or genus specific. Little is known about the biology of this species and an assessment could not be made on current information available. The nearest known record of this species occurs 40 km south of the Project Area (DBCA 2020a).

Woollybush Bee

This species is listed on the DBCA Priority as Priority 3. This native bee has distribution in Western Australia from north of Eneabba, through the southern Wheatbelt and the Swan Coastal Plain, and east along the south coast to the Fitzgerald National Park (ALA 2018). *Hylaeus globuliferus* is known to be associated with *Adenanthos cygnorum* and *Banksia attenuata* amongst other native plants. These species occur in vegetation type 13b (Woodman 2013) of which 0.67 ha occurs within the Project Area.

The known distribution of this species occurs to the south of the Project Area and records are historical in nature with little information about the biology of this species available within the public domain, It is possible that this species could occur within the Project Area, however an accurate assessment could not be made on current information available. The nearest known record of this species occurs 30 km south of the Project Area (DBCA 2020a) and this species is unlikely to be reliant on the 0.67 ha of potentially suitable habitat within the Project Area.

Woma Python

The Woma has been historically recorded near Geraldton (How et al., 1983). The Woma is classified as Priority 1 by the DBCA. The Coffey (2013) assessment of the EP 469 survey area considered that it is possible this species occurs within the EP469 survey area, given the presence of suitable habitat and the proximity of historic records. The few recent records of this species in the Southwest have included records near Watheroo and Badgingarra (DBCA 2020). It is possible that this species could be locally extinct, however it can be very difficult to detect and therefore is considered unlikely to occur within the Project Area. Distance to nearest record is 31.8 km east of the Project Area, however this is a historical record (DBCA 2020a).

3.3.5 Other Specially Protected fauna

Peregrine Falcon

This species is listed as Schedule 7 (Other Specially Protected fauna) under the BC Act. The Peregrine falcon is known to occur over a wide range of environments throughout most of Australia. Preferred nesting locations include a range of highly elevated locations with steep topography such as rocky hills, breakaways, cliffs and will also nest on high artificial structures. The Peregrine Falcon inhabits areas near cliffs along coastlines or rivers and near ranges or wooded watercourses. This species of Falcon is found throughout the state. The Coffey (2013) survey did not record this species or identify any suitable nesting habitat within the Project Area, however as the species is nomadic, it is considered likely to occur within the Project Area at least intermittently. The nearest known record of this species occurs 26.4 km south of the Project Area (DBCA 2020a).

Black-striped Snake

The Black-striped snake is a small-bodied burrowing snake, with a flat head and protruding snout occurring in Banksia woodlands and sandy areas of the Perth region. The nearest known record of this

species is 18.2 km west of the Project Area (DBCA 2020a) and this species is considered unlikely to occur within the Project Area.

4. Conclusion

This desktop assessment included a literature review and database searches to validate the data presented in the Coffey (2013) desktop assessment and assess the fauna species with the potential to occur in the Project Area. A total of 304 vertebrate fauna species, 39 of which are listed conservation significant, have previously been recorded within the region and therefore have the potential to occur within the Project Area. The likelihood of conservation significant species occurring within the Project Area was assessed on the availability of suitable habitat, known distribution of each species and currency and proximity of species records.

Based on habitats present within the Project Area and nearby records, it was assessed that two listed species of conservation significance are 'likely' to occur (Carnaby's Cockatoo and the Rainbow Bee-eater), three listed species of conservation significance may possibly occur, however are considered unlikely to be reliant on the habitat within the Project Area given the extensive disturbance from recent fires (Peregrine Falcon, Fork-tailed Swift and the Western Brush Wallaby) and the remaining 34 species of conservation significance were considered unlikely to occur within the Project Area.

Two fauna habitats were identified within the Project Area comprising mixed shrubland with/ without woodland species (71.42 %) and open Eucalyptus forest (28.58 %) of the Project Area. The total proposed clearing area within the Project area is 38.53 ha comprising 27.44 ha within the mixed shrubland with woodland species habitat, of Low value Carnaby's Cockatoo foraging habitat and 11.02 ha within the open Eucalyptus forest of Low to moderate value Carnaby's Cockatoo foraging habitat.

This assessment was based on the Woodman (2013) survey vegetation mapping, however recent fires in the area have impacted vegetation across the sand plains which have reduced the immediate suitability of native vegetation for the species across the project and adjacent areas. Therefore, the current status of Black Cockatoo foraging habitat at the time of this report across the entire Project Area is considered 'negligible- low' as a result of the recent fire disturbance.

No potential hollow-bearing trees were noted during the field investigation undertaken by Coffey (2013), with the fauna habitats mapped highly unlikely to support breeding tree species.

Overall impacts to fauna from the Project are considered to be minimal given the scale of the clearing associated with the Project, the extent of recent fires within the Project Area and surrounds and the abundance of similar fauna habitat within the local and regional surrounds situated in conservation estate.

5. Limitations

Scope of services

This report ("the report") has been prepared by Strategen-JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen-JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen-JBS&G has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen-JBS&G has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen-JBS&G has also not attempted to determine whether any material matter has been omitted from the data. Strategen-JBS&G will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen-JBS&G. The making of any assumption does not imply that Strategen-JBS&G has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen-JBS&G disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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Appendix A Definitions of Conservation Status

Table A1: Schedules used in the WA Biodiversity Conservation Act 2016

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

Table A2. WA DBCA Priority species.

Priority status	Description
Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands.
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands.
Priority 4. (P4)	Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.
Priority 5 (P5)	Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (IUCN Conservation Dependent).

Appendix B Carnaby's Cockatoo Habitat Assessment Criteria

The following scoring systems have been developed by Bamford Consulting Ecologists based upon guidance from DSEWPaC (2012). Calculating the total score (out of 10) requires the following steps:

A. Determining a score out of six for the vegetation composition, condition and structure; plus
B. Determining a score out of three for the context of the site; plus
C. Determining a score out of one for species density.
D. Determining the total score out of 10, which may require moderation for context and species density with respect to the vegetation composition. This includes consideration of pine plantations as a special case for foraging value.

Calculation of scores and the moderation process are described in detail below.

Table B1. Vegetation composition, condition and structure scoring

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

Vegetation structural class terminology follows Keighery (1994).

Appendix C Literature Review: Vertebrate fauna records within the surrounding region of the Project Area

Table C1: Literature Review: Vertebrate fauna records within the surrounding region of the Project Area

Species	Common Name	Conservation Status			Database Search 2020			Database Search (Coffey 2013)					Literature Review											
		EPBC Act	BC Act	DBCA	EPBC Protected Matters (10km)	NatureMap (20 km Radius centre point	DBCA Threatened Fauna	EPBC Protected Matters	DBCA Threatened Fauna	NatureMap	GHD 2011	Desmond and Heriot 2002	Ecologia 2002	Bamford 1998	Dames and More 1993	RCCWA 2009	How et al 1983	ATA 2006	Bamford 2012	Calm 1989	Ecologia 1994	ATA 2004	Ecological (2020)	Site Observations Coffey (2013)
AMPHIBIAN																								
Hylidae																								
Litoria adelaidensis	Slender Tree Frog					X				X														
Litoria moorei	Motorbike Frog					X				X	X	X		X										
Limnodynastidae																								
Heleioporus albopunctatus	Western Spotted Frog									X		X				X	X							X
Heleioporus eyrei	Moaning Frog									X							X			X				X
Heleioporus psammophilus	Sand Frog									X							X							
Limnodynastes dorsalis	Western Banjo Frog									X	X	X	X	X		X	X			X				
Neobatrachus kunapalari	Kunapalari Frog									X														
Neobatrachus pelobatoides	Humming Frog									X	X	X					X							
Neobatrachus sutor	Shoemaker Frog																X							
Myobatrachidae																								
Crinia pseudinsignifera	Bleating Froglet									X							X							
Myobatrachus gouldii	Turtle Frog										X	X					X							
Pseudophryne guentheri	Crawling toadlet									X	X	X					X			X				X
BIRDS																								
Acanthizidae																								
Acanthiza apicalis	Inland Thornbill									X	X					X		X	X	X	X	X		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill									X	X		X	X		X			X	X		X		
Acanthiza inornata	Western Thornbill																				X			
Acanthiza robustirostris	Slatybacked Thornbill																					X		
Acanthiza uropygialis	Chestnut-rumped Thornbill									X	X					X			X			X		
Aphelocephala leucopsis	Southern Whiteface									X														

Species	Common Name	Conservation Status			Database Search 2020			Database Search (Coffey 2013)					Literature Review											
		EPBC Act	BC Act	DBCA	EPBC Protected Matters (10km)	NatureMap (20 km Radius centre point	DBCA Threatened Fauna	EPBC Protected Matters	DBCA Threatened Fauna	NatureMap	GHD 2011	Desmond and Heriot 2002	Ecologia 2002	Bamford 1998	Dames and More 1993	RCCWA 2009	How et al 1983	ATA 2006	Bamford 2012	Calm 1989	Ecologia 1994	ATA 2004	Ecological (2020)	Site Observations Coffey (2013)
Calamanthus campestris subsp. Montanellis	Rufous Fieldwren			P4		X			X															
Gerygone fusca	Western Greygone									X	X		X	X		X			X	X		X		
Pyrrholaemus brunneus	Redthroat									X												X		
Sericornis frontalis	White-browed Scrubwren									X	X		X			X			X	X	X	X		
Smicrornis brevirostris	Weebill									X	X		X		X	X			X			X		
Accipitridae																								
Accipiter cirrocephalus	Collared Sparrowhawk									X	X			X					X	X				
Accipiter fasciatus	Brown Goshawk									X	X		X	X		X			X			X	X	
Aquila audax	Wedge-tailed Eagle									X	X			X		X			X			X		X
Aquila morphnoides	Little Eagle																		X	X				
Circus approximans	Swamp Harrier									X	X													
Circus assimilis	Spotted Harrier															X								
Elanus axillaris	Black-shouldered Kite										X			X	X	X		X		X	X	X		
Haliaeetus leucogaster	White-bellied Sea-eagle	M		S5 -MI				X			X		X			X								
Haliastur sphenurus	Whistling Kite										X		X			X		X	X					
Hieraaetus morphnoides											X		X			X								
Lophoictinia isura	Square-tailed Kite																		X					
Pandion cristatus	Eastern Osprey	MI		S5- MI		X					X					X		X						
Aegothelidae																								
Aegotheles cristatus	Australian Owlet-nightjar									X						X				X		X		
Anatidae																								
Anas castanea	Chestnut Teal									X														
Anas gracilis	Grey Teal										X			X							X			
Anas superciliosa	Pacific Black Duck									X	X			X				X		X	X			
Biziura lobata	Musk Duck										X													
Chenonetta jubata	Australian Wood Duck									X	X													

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Cygnus atratus	Black Swan										X					X								
Oxyura australis	Blue-billed Duck			Priority-P4																				
Tadorna tadornoides	Australian Shelduck									X	X									X	X			X
Anhingidae																								
Anhinga novaehollandiae	Australasian Darter															X								
Apodidae																								
Apus pacificus	Fork-tailed Swift	MI	S5		X			X			X					X								
Ardeidae																								
Ardea ibis	Cattle Egret	M	S5					X			X													
Ardea modesta	Eastern Great Egret	M	S5					X			X													
Ardea pacifica	White-necked Heron									X	X													
Egretta novaehollandiae	White-faced Heron													X	X	X				X				
Nycticorax caledonicus	Nankeen Night Heron										X													
Artamidae																								
Artamus cinereus	Black-faced Woodswallow					X				X	X		X		X	X			X	X	X	X		
Artamus personatus	Masked Woodswallow									X													X	
Artamus minor	Little Woodswallow																					X		
Strepera versicolor	Grey Currawong									X	X							X	X					
Cracticus nigrogularis	Pied Butcherbird									X	X				X	X		X	X	X				X
Cracticus tibicen	Australian Magpie									X	X				X	X				X	X		X	X
Cracticus torquatus	Grey Butcherbird									X	X				X	X		X		X	X			
Cacatuidae																								
Cacatua pastinator	Western Corella									X						X			X		X	X		
Cacatua sanguinea	Little Corella									X														
Calyptorhynchus banksii	Red-tailed Black-Cockatoo					X																X		
Calyptorhynchus baudinii	Baudin's Black-Cockatoo	VU	T- EN						X															

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Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	EN	T- EN		X	X	X	X	X	X									X	X	X			
Eolophus roseicapillus	Galah									X			X	X		X		X	X	X	X	X		X
Nymphicus hollandicus	Cockatiel									X														
Campephagidae																								
Coracina novaehollandiae	Black-faced Cuckoo-shrike									X	X		X	X	X	X		X	X	X	X	X	X	X
Lalage sueurii	White-winged Triller																		X			X		
Caprimulgidae																								
Eurostopodus argus	Spotted Nightjar																		x					
Casuariidae																								
Dromaius novaehollandiae	Emu														X	X			X	X	X		X	X
Charadriidae																								
Charadrius australis	Inland Dotterel									X														
Charadrius leschenaultii	Greater Sand Plover	MI									X													
Charadrius mongolus	Lesser Sand Plover	MI									X													
Charadrius ruficapillus	Red-capped Plover										X					X								
Pluvialis fulva	Pacific Golden Plover	MI									X													
Pluvialis squatarola	Grey Plover	MI									X													
Vanellus tricolor	Banded Lapwing									X						X			X	X	X			
Cinclosmatidae																								
Cinclosoma castaneothorax	Chestnut-brested Quail-thrush																					X		
Psophodes occidentalis	(Western Wedgebill									X														
Columbidae																								
Columba livia	Rock Dove									X	X			X		X								
Geopelia cuneata	Diamond Dove									X	X											X		
Ocyphaps lophotes	Crested Pigeon					X				X	X		X	X	X	X		X	X		X	X	X	X
Phaps chalcoptera	Common Bronzewing									X	X			X	X	X		X	X			X	X	X
Phaps elegans	Brush Bronzewing									X					X				X	X	X			

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Sterptopelia senegalensis	Laughing Turtle-Dove										X			X	X	X		X	X					
Corvidae																								
Corvus bennetti	Little Crow									X	X								X					
Corvus coronoides	Australian Raven									X	X		X	X		X		X	X		X	X	X	X
Corvus orru	Torresian Crow										X													
Cuculidae opportunity																								
Cacomantis flabelliformis	Fan-tailed Cuckoo									X	X					X				X				
Cacomantis pallidus	Pallid Cuckoo												X							X				
Chalcites basalis	Horsfield's Bronze-Cuckoo												X	X					X	X				
Chalcites lucidus	Shining Bronze-Cuckoo									X										X				
Chalcites osculans	Black-eared Cuckoo																					X		
Diomedeidae																								
Diomedae exulans	Wandering Albatross	VU/M	VU								X													
Thalassarche certeri	Indian Yellow Nosed Albatross	M									X													
Estrildidae																								
Taeniopygia guttata	Zebra Finch									X	X		X			X			X					
Eurostopodidae																								
Eurostopodus argus	Spotted Nightjar															X								
Falconidae																								
Falco berigora	Brown Falcon									X						X			X	X		X		X
Falco cenchroides	Nankeen Kestrel									X	X			X	X	X		X	X	X	X		X	X
Falco longipennis	Australian Hobby									X	X								X	X				
Falco peregrinus	Peregrine Falcon		S7-OS						X	X			X											
Falco hypoleucos	Grey Falcon	VU																						
Halcyonidae																								
Dacelo novaeguineae	Laughing Kookaburra									X	X									X				
Todiramphus sanctus	Sacred Kingfisher									X	X		X			X								

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Hirundinidae																								
Cheramoeca leucosterna	White-backed Swallow									X				X		X			X	X				
Hirundo neoxena	Welcome Swallow									X	X		X	X		X		X	X	X	X	X		
Petrochelidon ariel	Fairy Martin									X														
Petrochelidon nigricans	Tree Martin										X		X		X	X			X			X		
Laridae																								
Chroicocephalus novaehollandiae	Silver Gull														X	X		X		X				
Anous tenuirostris melanops	Australian Lesser Noddy	VU	EN																					
Hydroprogne caspia	Caspian Tern	MI	MI																					
Thalasseus bergii	Crested Tern	MI	MI																					
Maluridae																								
Malurus lamberti	Variegated Fairy-wren												X	X		X			X	X	X		X	X
Malurus leucopterus	White-winged Fairy-wren					X							X		X	X			X	X			X	
Malurus pulcherrimus	Blue-breasted Fairy-wren																	X						
Malurus splendens	Splendid Fairy-wren												X			X			X	X	X	X	X	X
Megaluridae																								
Cincloramphus cruralis	Brown Songlark									X						X			X					
Cincloramphus mathewsi	Rufous Songlark									X									X					
Magalurus gramineus	Little Grassbird																			X				
Megapodiidae																								
Leipoa ocellata	Malleefowl	VU	S3-VU		X			X	X	X												X		
Meliphagidae																								
Acanthagenys rufogularis	Spiny-cheeked Honeyeater									X						X			X			X		
Acanthagenys superciliosus	Western Spinebill									X										X				
Anthochaera carunculata	Red Wattle Bird									X									X	X	X			
Anthochaera lunulata	Western Little Wattlebird									X									X					

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Epthianura albifrons	White-fronted Chat					X				X						X			X	x				
Epthianura tricolor	Crimson Chat					X				X									X					
Lichenostomus leucotis	White-eared Honeyeater												X									X		
Lichenostomus ornatus	Yellow-plumed Honeyeater									X					X									
Lichenostomus penicillatus	White-plumed Honeyeater									X					X	X			X					
Lichenostomus plumulus	Grey-fronted Honeyeater									X												X		
Lichenostomus virescens	Singing Honeyeater									X			X	X	X	X		X	X	X	X	X	X	
Lichmera indistincta	Brown Honeyeater					X				X			X		X	X			X	X		X	X	
Manorina flavigula	Yellow-throated Miner									X					X	X			X			X		
Melithreptus brevirostris	Brown-headed Honeyeater									X								X				X		
Phylidonyris melanops	Tawny-crowned Honeyeater									X									X	X	X			
Phylidonyris niger	White-Cheeked Honeyeater														X	X			X				X	
Phylidonyris novaehollandiae	New Holland Honeyeater									X											X		X	
Meropidae																								
Merops ornatus	Rainbow Bee-eater	MA								X			X			X		X	X				X	
Monarchidae																								
Grallina cyanoleuca	Magpie-lark									X	X		X	X	X	X		x	X		X	X	X	
Motacillidae																								
Anthus novaes	Australasian Pipit									X					X	X		X	X	X			X	
Nectariniidae																								
Dicaeum hirundinaceum	Mistletoebird									X	X				X	X			X	X		X		
Neosittidae																								
Daphoenositta chrysoptera	Varied Sittella									X												X		
Otididae																								
Ardeotis australis	Australian Bustard								X	X					X						X			
Pachycephalidae																								
Colluricincla harmonica	Grey Shrike-thrush									X			X	X		X			X	X	X	X		

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Oreoica gutturalis	Crested Bellbird					X				X			X						X			X		X
Pachycephala pectoralis	Golden Whistler									X						X			X	X	X	X		
Pachycephala rufiventris	Rufous Whistler									X			X			X			X	X		X	X	
	Pardalotinae																							
Pardalotus punctatus	Spotted Pardalote									X									X					
Pardalotus rubricatus	Red-browed Pardalote																		X					
Pardalotus striatus	Striated Pardalote									X									X			X		
Petroicidae																								
Drymodes brunneopygia	Southern Scrub Robin									X												X		
Eopsaltria georgiana	White-breasted Robin									X						X			X	X				
Eopsaltria griseogularis	Western Yellow Robin																					X		
Microeca fascinans	Jacky Winter																					X		
Petroica goodenovii	Red-capped Robin									X						X			X			X		X
Phalacrocoracidae																								
Microcarbo melanoleucos	Little Pied Cormorant															X								
Phalacrocorax carbo	Great Cormorant																			X				
Phalacrocorax sulcirostris	Little Black Cormorant															X								
Phalacrocorax varius	Pied Cormorant																			X				
Phasianidae																								
Coturnix pectoralis	Stubble Quail									X						X		X						
Podargidae																								
Podargus strigoides	Tawny Frogmouth									X						X			X	X				
Podicipedidae																								
Tachybaptus novaehollandiae	Australasian Grebe									X														
Pomatostomidae																								
Pomatostomus superciliosus	White-browed Babbler									X				X		X						X		

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Pomatostomus superciliosus subsp. Ashbyi	White-browed Babbler								X															
Psittacidae																								
Barnardius zonarius	Australian Ringneck									X			X	X	X	X			X	X	X		X	X
Glossopsitta porphyrocephala	Purple-crowned Lorikeet									X														
Melopsittacus undulatus	Budgerigar					X				X														
Neophema splendida	Scarlet-chested Parrot																		X					
Psephotus varius	Mulga Parrot									X														
Platycercus elegans	Elegant Parrot									X									X					
Motacillidae																								
Motacilla cinerea	Grey Wagtail	MI	S5- MI		X																			
Ptilonorhynchidae																								
Ptilonorhynchus guttatus	Western Bowerbird																				X			
Rallidae																								
Gallirallus ventralia	Black tailed native hen																			X				
Porzana fluminea	Australian Spotted Crake																			X				
Recurvirostridae																								
Himantopus himantopus	Black-winged Stilt															X				X				
Rhipiduridae																								
Rhipidura albiscapa	Grey Fantail															X			X	X	X	X		
Rhipidura leucophrys	Willie Wagtail					X				X	X		X	X	X	X		X	X	X	X	X	X	X
Rostratulidae																								
Rostratula australis	Australian Painted Snipe	EN	S2- EN		X																			
Scolopacidae																								
Numenius madagascariensis	Eastern Curlew	CE	S1- CR		X	X																		
Actitis hypoleucos	Common Sandpiper	MI	S5- MI		X					X														
Arenaria interpres	Ruddy Turnstone	MI	S5- MI																					

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Calidris acuminata	Sharp-tailed Sandpiper	MI	S5- MI		X																			
Calidris ruficollis	Red necked stint	MI	S5- MI																					
Calidris ferruginea	Curlew Sandpiper	MI	S5- MI		X																			
Calidris melanotos	Pectoral Sandpiper	MI	S5- MI		X																			
Limosa lapponica	Bar-tailed Godwit	MI	S5- MI																					
Tringa nebularia	Common Greenshank	MI	S5- MI																					
Tringa stagnatilis	Marsh Sandpiper	MI	S5- MI																					
Strigidae																								
Ninox novaeseelandiae	Southern Boobook	MI	S5- MI							X						X				X				
Threskiornithidae																								
Platalea flavipes	Yellow-billed Spoonbill																							X
Threskiornis spinicollis	Straw-necked Ibis									X						X								
Timaliidae																								
Zosterops lateralis	Silvereye									X				X	X	X			X	X	X			
Turnicidae																								
Turnix varia varia	Painted Button-quail																					X		
Tytonidae																								
Tyto abla	Barn Owl																	X		X	X			
Tyto javanica	Eastern Barn Owl															X								
	MAMMALS																							
Bovidae																								
*Bos taurus**	Cow*															X							X	X
*Capra hircus**	Goat*											X										X	X	X
*Ovis aries**	Sheep*															X								X
Canidae																								
*Canis lupus/familiaris**	Dingo/Dog*										X	X	X		X					X			X	X
*Vulpes vulpes**	Red Fox*										X	X	X		X	X		X	X	X	X	X		X

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Dasyuridae																								
Sminthopsis crassicaudata	Fat-tailed Dunnart									X	X	X				X								
Sminthopsis dolichura	Little long-tailed Dunnart											X				X			X			X		
Sminthopsis granulipes	White-tailed Dunnart																		X					
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU																					
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale			CD																				
Equidae																								
Equus ferus caballus	Wild Horse																							X
Felidae																								
*Felis catus**	Feral Cat*										X	X	X		X	X		X	X	X	X	X		
Leporidae																								
Oryctolagus cuniculus*	European Rabbit*											X	X	X	X	X		X	X	X	X	X	X	X
Macropodidae																								
Macropus fuliginosus	Western Grey Kangaroo									X		X	X	X	X	X		X	X	X	X	X	X	X
Macropus irma	Western Brush Wallaby			P4			X			X														
Macropus robustus	Euro											X				X			X			X		X
Macropus rufus	Red Kangaroo																					X		X
Molossidae																								
Tadarida australis	White-striped Free-tailed Bat										X	X				X			X	X				
Muridae																								
*Mus musculus**	House Mouse*									X	X	X			X	X		X		X	X	X		
Pseudomys albocinereus	Ashy-grey Mouse/Noodji																		X	X	X			
Rattus fuscipes	Western bush Rat									X										X	X			
*Rattus rattus**	Rat*										X	X				X								
Phalangeridae																								
Trichosurus vulpecula	Common Brush-tailed Possum											X				X								

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Pteropodidae																								
Pteropus scapulatus	Little Red Flying-fox											X												
Suidae																								
*Sus scrofa**	Pig*											X				X								
Tachyglossidae																								
Tachyglossus aculeatus	Echidna											X	X	X	X	X		X	X	X	X	X		
Tarsipedidae																								
Tarsipes rostratus	Honey Possum									X		X							X					
Vespertilionidae																								
Chalinolobus gouldii	Gould's Wattled Bat															X								
Chalinolobus morio	Chocolate Wattled Bat																		X					
Nyctophilus geoffroyi	Lesser Long-eared Bat									X		X				X			X					
Scotorepens balstoni	Inland Broad-nosed Bat															X								
Vespadelus regulus	Southern Forest Bat									X									X	X				
	REPTILES																							
Agamidae																								
Amphibolurus longirostris	Long-nosed Dragon																X							
Ctenophorus adelaidensis	Southern Heath Dragon					X																		
Ctenophorus maculatus maculatus	Spotted Military Dragon					X				X	X					X	X	X	X					
Ctenophorus nuchalis	Central Netted Dragon									X							X							
Ctenophorus reticulatus	Western Netted Dragon									X		X				X	X					X		
Ctenophorus scutulatus	Lozenge Marked Dragon																					X		
Moloch horridus	Thorny Devil											X					X		X					X
Pogona minor minor	Dwarf Bearded Dragon									X	X	X				X	X	X	X	X		X		
Rankinia adelaidensis	Western Heath Dragon									X		X					X		X	X				
Carphodactylidae																								

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		EPBC Act	BC Act	DBCA	EPBC Protected Matters (10km)	NatureMap (20 km Radius centre point	DBCA Threatened Fauna	EPBC Protected Matters	DBCA Threatened Fauna	NatureMap	GHD 2011	Desmond and Heriot 2002	Ecologia 2002	Bamford 1998	Dames and More 1993	RCCWA 2009	How et al 1983	ATA 2006	Bamford 2012	Calm 1989	Ecologia 1994	ATA 2004	Ecological (2020)	Site Observations Coffey (2013)
Nephrurus milii											X					X	X	X						
Nephrurus levis	Western Knob-tailed											X					X							
Chelluidae																								
Chelodina oblonga	Long-necked Tortoise											X												
Chelodina steindachneri	Flat-shelled Turtle									X														
Diplodactylidae																								
Crenadactylus occellatus	Clawless Gecko										X	X												
Diplodactylus granariensis	Western Stone Gecko										X						X	X						
Diplodactylus ornatus											X					X	X							
Diplodactylus pulcher	Beautiful Gecko															X	X							
Diplodactylus squarrosus																	X							
Strophurus spinigerus	Soft Spiny-tailed Gecko										X					X	X	X		X	X			
Strophurus strophurus																	X							
Elapidae																								
Brachyurophis semifasciata											X	X				X	X							
Brachyurophis fasciolatus																	X							
Demansia psammophis reticulata	Yellow-faced Whipsnake									X	X	X				X	X	X				X		
Echiopsis curta	Bardick									X							X							
Neelaps bimaculatus	Black-naped Snake			P3						X	X	X						X	X					
Neelaps calonotos	Black-striped Snake			P3		X	X		X															
Parasuta gouldii	Gould's Hooded Snake																X		X					
Parasuta monachus	Monk Snake									X	X	X				X	X					X		
Pseudechis affinis	Dugite																	X						
Pseudechis australis	Mulga Snake									X	X	X					X		X			X		
Pseudonaja mengdeni	Western Brown Snake					X				X	X	X	X			X	X		X					
Pseudonaja modesta	Ringed Brown Snake																X					X		

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Pseudonaja nuchalis	Northern Brown Snake										X													
Simoselaps bertholdi	Jan's Banded Snake										X	X					X		X					
Simoselaps littoralis	West Coast Banded Snake										X	X				X	X							
Gekkonidae																								
Diplodactylus granariensis	Western Stone Gecko																		X			X		
Diplodactylus pulcher																						X		
Gehyra variegata										X	X						X	X	X		X	X		
Heteronotia binoei	Bynoe's Gecko										X					X	X					X		
Lucasium alboguttatum	White-spotted Ground Gecko															X	X		X					
Strophurus spinigerus	Soft Spiny-tailed Gecko																		X					
Pygopodidae																								
Aprasia repens																	X							
Delma australis																X	X					X		
Delma fraseri											X					X	X	X	X			X		
Delma greyii																	X		X					
Delma tincta										X	X					X	X							
Lialis burtonis										X	X					X	X	X	X					
Pletholax gracilis																	X							
Pygopus lepidopodus										X	X						X		X	X	X			
Pygopus nigriceps																	X					X		
Pythonidae																								
Antaresia stimsoni stimsoni											X	X				X	X							
Aspidites ramsayi	Woma		S4	P1													X							
Morelia spilota imbricata	Western carpet python										X	X					X							
Scincidae																								
Cryptoblepharus	Fence Skink											X				X	X							
Cryptoblepharus buchananii										X														

Species	Common Name	Conservation Status			Database Search 2020			Database Search (Coffey 2013)					Literature Review											
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Cryptoblepharus carnabyi																X	X					X		
Cryptoblepharus plagiocephalus										X									X	X		X		
Ctenotus australis																	X	X						
Ctenotus fallens										X		X				X	X		X	X		X		
Ctenotus impar																	X		X					
Ctenotus mimetes																	X					X		
Ctenotus pantherinus	Leopard Skink					X				X					X		X		X			X		
Ctenotus schomburgkii																	X					X		
Ctenotus uber																						X		
Cyclodomorphus branchialis	Gilled slender-blue tongue		VU																	X	X	X		
Cyclodomorphus celatus																	X		X					
Egernia depressa																						X		
Egernia kingii	King's Skink																X							
Egernia multiscutata	Bull Skink																X							
Egernia stokesii badia	Western Spiny tailed Skink	EN	VU		X																	X		
Eremiascincus richardsonii																	X							
Hemiergis initialis																						X		
Lesrista christinae																	X		X					
Lesrista distinguenda																	X							
Lerista elegans										X		X				X	X		X					
Lerista gerrardii																X	X					X		
Lerista lineata	Lined skink			P3							X													
Lerista lineopunctulata											X	X				X	X	X						
Lerista macropisthopus				P2													X							
Lerista planiventralis decora										X	X						X	X						
Lerista praepedita											X	X				X	X		X	X				

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Menetia greyii											X	X				X	X	X	X			X		
Menetia surda																	X							
Morethia butleri																	X							
Morethia lineoocellata											X	X				X	X	X			X			
Morethia obscura																	X							
Tiliqua occipitalis	Western Bluetongue									X	X	X				X		X						
Tiliqua rugosa rugosa	Bobtail									X	X	X	X		X	X	X	X	X	X	X			
Typhlopidae																								
Ramphotyphlops australis	Australian Blind Snake									X	X	X				X	X	X						
Ramphotyphlops hamatus																	X							
Ramphotyphlops leptosoma											X	X					X							
Ramphotyphlops waitti										X	X	X					X							
Varanidae																								
Varanus caudolineatus	Striped-tailed Monitor																X					X		
Varanus gouldii	Gould's Monitor									X	X	X	X	X		X	X	X	X			X		
Varanus tristis	Black-headed Monitor										X	X				X	X					X		
Invertebrates																								
Idiosoma arenaceum	Geraldton Sandplain Shield-backed trapdoor spider			Priority-P3																				
Idiosoma kwongan	Kwongan heath shield-backed trapdoor spider			Priority-P1																				
Idiosoma nigrum	Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider	VU	S2- EN																					
Phasmodes jeeba	Springtime corroboree stick katydid (Eneabba), cricket			Priority-P3			X																	
Hemisaga vepreculae	Thorny bush Katydid			Priority-P2																				
Hylaeus globuliferus	Wolly Bush Bee			Priority-P3																				

[1] EPBC Act listings: E = Endangered, V = Vulnerable, M = Migratory, MA = Marine (see Appendix A).
[2] WA Biodiversity Conservation Act 2016 listings: S1 to S7 = Schedules 1 to 7 (see Appendix A).

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