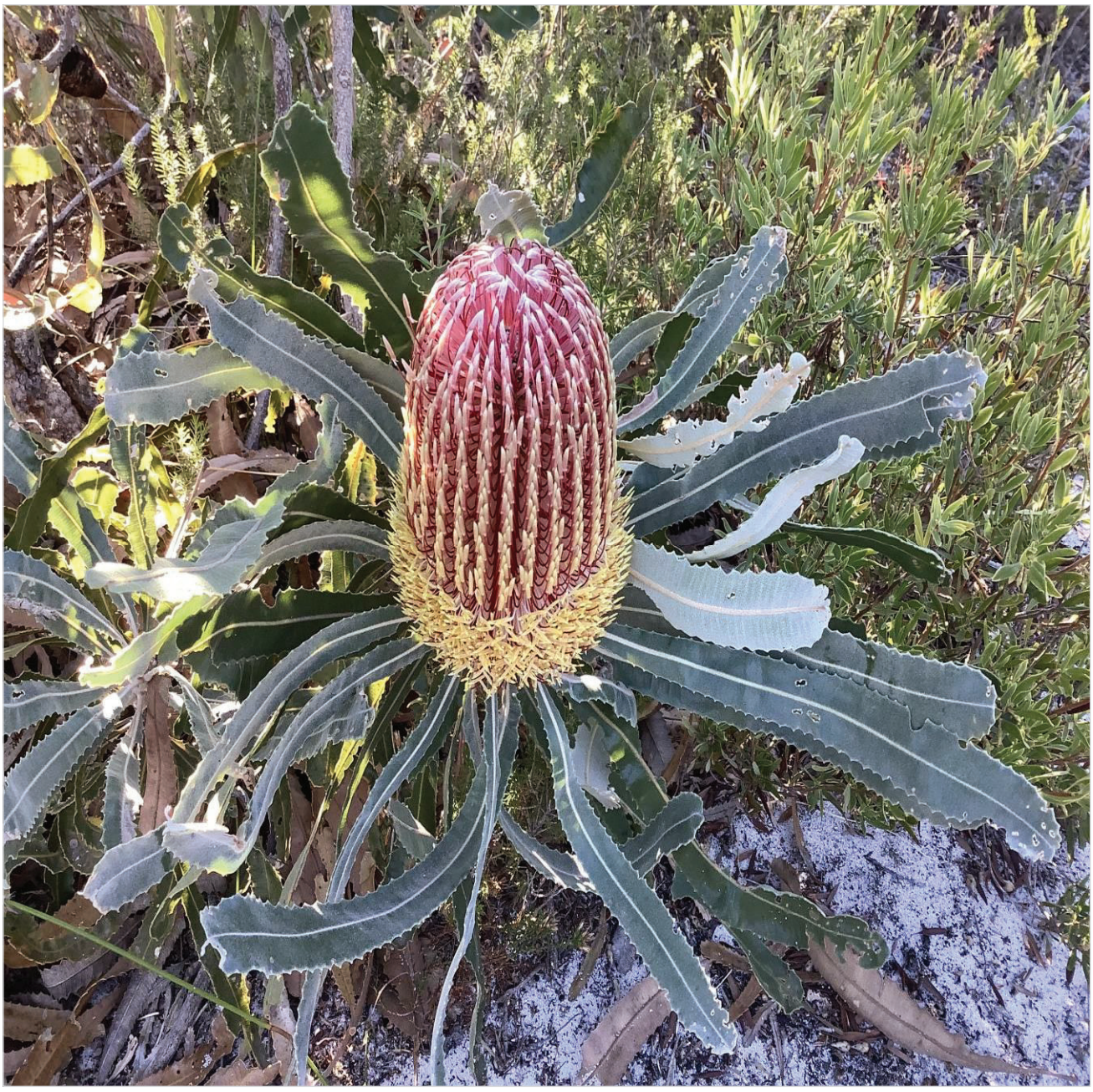
NEAVES ROAD FAUNA SURVEY

Coterra Environment

ecoscape



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EXECUTIVE SUMMARY

Ecoscape was engaged by Coterra Environment on behalf of the Sporting Shooters Association of Australia (WA) Inc. to undertake a fauna survey on a 6 ha portion of Lot 5607 Neaves Road in Pinjar (within the City of Wanneroo) to support State and Federal environmental clearing approvals. The survey consisted of a Basic terrestrial vertebrate fauna survey and a Black-Cockatoo habitat survey. The field survey was undertaken on 20 April 2022.

The desktop assessment identified the following significant aspects:

- the survey area is located on Bush Forever Site 380
- the survey area is in close proximity to buffers surrounding known Carnaby's Cockatoo breeding and roosting sites, and approximately two thirds of the survey area is classified as requiring investigation as potential feeding habitats for Carnaby's Cockatoo on the Swan Coastal Plain (Landgate & Government of Western Australia 2022; DBCA-064, DBCA-057, DBCA-054)
- combined database searches identified 52 conservation-listed terrestrial vertebrate fauna species (nine mammals, two reptiles and 41 birds) within a 20 km buffer surrounding the survey area
- no conservation-listed species is known from within the survey area; one species was identified as likely to occur and five as may occurring within the survey area during the desktop assessment.

The field survey identified the following:

- 15 vertebrate fauna species were recorded during the field survey (one mammal and 14 birds)
- no conservation-listed species were actively recorded during the field survey
- two fauna habitat types occur within the survey area: *Banksia* and *Melaleuca* Woodland
- some roosting habitat suitable for the Carnaby's Cockatoo was identified within the survey area
- the survey area provides high quality foraging habitat for the Carnaby's Cockatoo
- no fauna species recorded, or likely to occur within the survey area, is considered to be dependent on the habitat within the survey area for survival as suitable habitat in good condition occurs immediately adjacent.

ACRONYMS AND ABBREVIATIONS

Table 1: Acronyms and abbreviations

Acronyms	
BC Act	Western Australian *Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
CD	Conservation Dependent (fauna; specially protected species under the Western Australian BC Act)
CR	Critically Endangered (listed under Commonwealth EPBC Act and/or Western Australian BC Act)
DAWE	Commonwealth Department of Agriculture, Water and Environment (2020-2022)
DBCA	Western Australian Department of Biodiversity, Conservation and Attractions
DBH	Diameter at Breast Height (1.3 m)
DEC	Western Australian Department of Environment and Conservation (2006-2013, now DBCA)
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts (2007-2010, now DAWE)
DPaW	Western Australian Department of Parks and Wildlife (2013-2017, now DBCA)
DPIRD	Western Australian Department of Primary Industries and Regional Development
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (2010-2013, now DAWE)
EN	Endangered (listed under Commonwealth EPBC Act and/or Western Australian BC Act)
Ecoscape	Ecoscape (Australia) Pty Ltd
EP Act	Western Australian *Environmental Protection Act 1986*
EPA	Western Australian Environmental Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GDA 20	Geographic Datum of Australia 2020
GPS	Global Positioning System
ha	hectare/hectares
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
km	kilometre/kilometres
m	metre/metres
MA	Marine species (fauna; protected under international agreements and EPBC Act)
MI	Migratory species (fauna; specially protected species under the Western Australian BC Act, also EPBC Act)
MNES	Matters of National Environmental Significance
OS	Other specially protected species (fauna; specially protected species under the Western Australian BC Act)
P; P1, P2, P3, P4	Priority Fauna species rankings (P1-P4)
PMST	Protected Matters Search Tool (hosted by DAWE, used to search for MNES)
SSAA WA	Sporting Shooters Association of Australia (WA) Inc.
SoW	Scope of Works
sp.	Species (generally referring to an unidentified taxon or when a phrase name has been applied)
VU	Vulnerable (listed under Commonwealth EPBC Act and/or Western Australian BC Act)
WAM	Western Australian Museum

1 INTRODUCTION

1.1 BACKGROUND

Coterra Environment on behalf of the Sporting Shooters Association of Australia (WA) Inc. (SSAA WA) engaged Ecoscape to undertake a terrestrial fauna survey of a bush block adjacent to existing shooting ranges at its Wanneroo Shooting Complex, approximately 50 km north of Perth CBD.

The terrestrial fauna survey consisted of a Basic fauna survey and Black-Cockatoo habitat assessment. The survey is required to support State and Federal environmental clearing approvals for the establishment of a new shooting range and associated infrastructure.

1.2 SURVEY AREA

The SSAA WA project area, known as the 'survey area' is located on a portion of Lot 5607 Neaves Road (Pinjar) within the City of Wanneroo on the Swan Coastal Plain (**Figure** 1). The survey area is 6 ha in size, located on Bush Forever Site 380 within the Gnangara – Moore River State Forest, and is reserved for 'Parks and Recreation' under the Metropolitan Region Scheme.

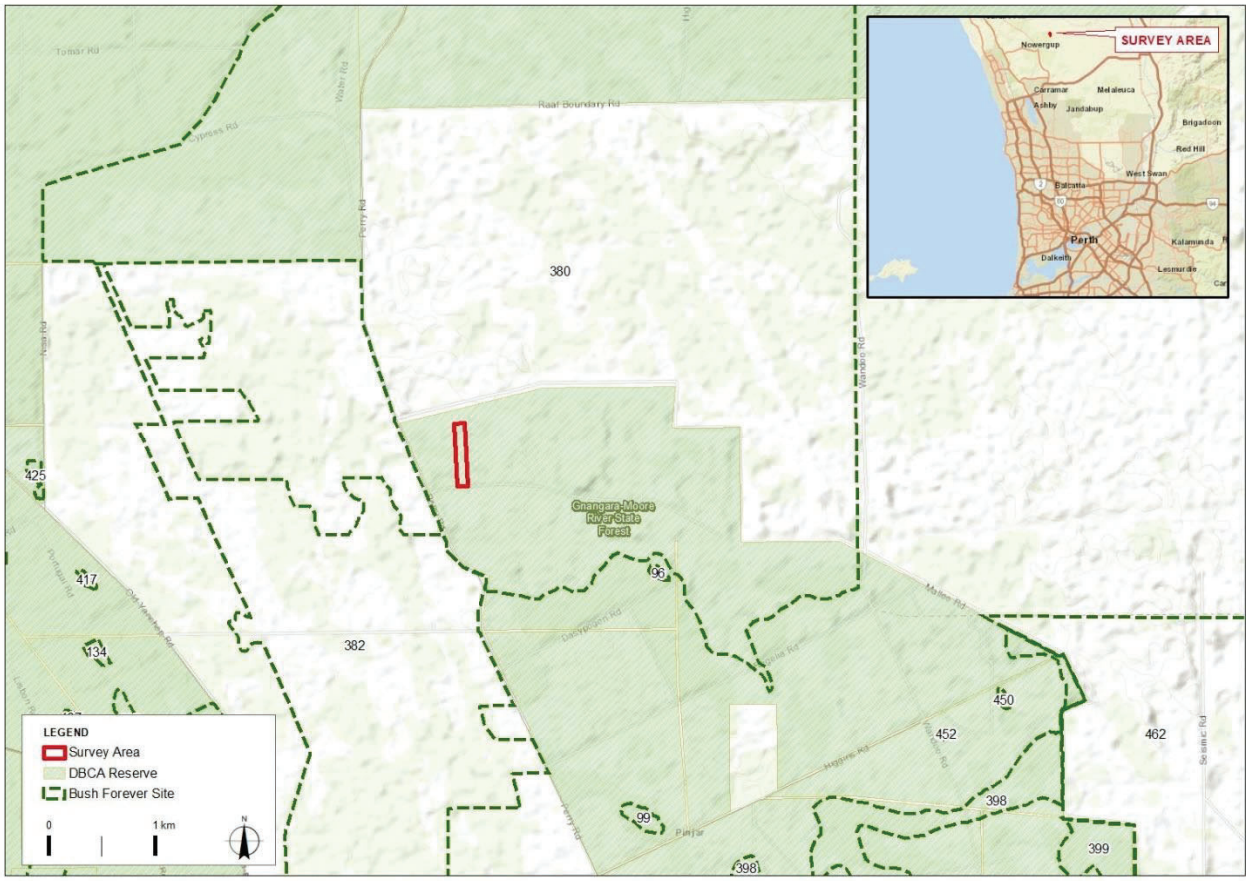

Figure 1: Survey area location

1.3 SURVEY REQUIREMENTS

The survey requirements were to undertake a Basic terrestrial vertebrate fauna survey, including targeted searches of species identified during the desktop assessment, as known or likely to occur within the survey area. The survey incorporated a Black-Cockatoo Habitat Assessment in accordance with EPBC Act referral guidelines (Bamford 2016; DSEWPC 2012).

1.4 COMPLIANCE

This environmental assessment was conducted in accordance with Commonwealth and State legislation and guidelines:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Western Australian *Environmental Protection Act 1986* (EP Act)
- Western Australian *Biodiversity Conservation Act 2016* (BC Act)
- Western Australian *Biodiversity Conservation Regulations 2018*
- Western Australian *Animal Welfare Act 2002*
- Department of Environment, Water, Heritage and the Arts (DEWHA 2009) *Matters of National Environmental Significance. Significant impact guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999*
- Department of Sustainability Environment Water Population and Communities (DSEWPaC 2011a) *Survey guidelines for Australia's threatened mammals*
- DSEWPaC (2011b) *Survey guidelines for Australia's threatened reptiles*
- DEWHA (2010) *Survey guidelines for Australia's threatened birds*
- DSEWPaC (2012) *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris, Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii, Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso*, known in this document as the Black Cockatoo Referral Guidelines
- Bamford Environmental Consulting (2016) *Black Cockatoo potential nest tree grading system*

Summaries of the main Acts under which this assessment was conducted, and related criteria and definitions, are available in **Appendix One**.

As well as those listed above, the assessment complied with Environmental Protection Authority (EPA) requirements for environmental survey and reporting in Western Australia, as outlined in:

- EPA (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*, known herein as the Fauna Technical Guidance
- EPA (2016) *Environmental Factor Guideline – Terrestrial Fauna*
- EPA (2016) *Environmental Factor Guideline – Terrestrial Environmental Quality*
- EPA (2021) *Statement of environmental principles, factors, objectives and aims of EIA*.

Additional details (definitions and criteria) relevant to these works are available in **Appendix One**.

2 DESKTOP ASSESSMENT

2.1 PHYSICAL ENVIRONMENT

2.1.1 CLIMATE

The southwest of Western Australia has a Mediterranean-type climate of mild, wet winters and warm to hot, dry summers. The climate of the region is strongly influenced by the position of a band of high pressure known as the sub-tropical ridge. For much of the year the ridge is located to the south allowing the east or south easterly winds to prevail. During the cooler months the ridge periodically moves to the north, allowing cold fronts to pass over the west coast and deliver much of the annual rainfall (Beard 1990).

According to the Köppen-Geiger climate classification, the survey area has a temperate climate with hot, dry summers (Class Csa) (Peel, Finlayson & McMahon 2007). This classification is considered to represent a Mediterranean climate where average summer maximum temperatures exceed 22°C and the average coldest month maximum is between 18° and -3°C, and summer rainfall is less than one third of winter rainfall.

The closest Bureau of Meteorology (BoM) station with long term records for rainfall is Wanneroo (BoM 2022a station number 9105, operating since 1905) which is located approximately 13 km south of the survey area. The mean annual rainfall is 794.7 mm with 56.12 % (446 mm) falling during the winter months (June to August). The rainfall during the six month period prior to the field survey was 67% of the long-term average for this period.

The closes BoM station with long term records for temperature is Perth Metro (BoM2022a station number 9225, operating since 1993) which is located approximately 34 km south of the survey area. February is the hottest month with a mean maximum temperature of 31.6°C and minimum of 18.4°C. July is the coldest month with a mean maximum of 18.5°C and minimum of 8°C.

Figure 2 shows the average rainfall and temperatures of the survey area, with rainfall for the year preceding the field survey.

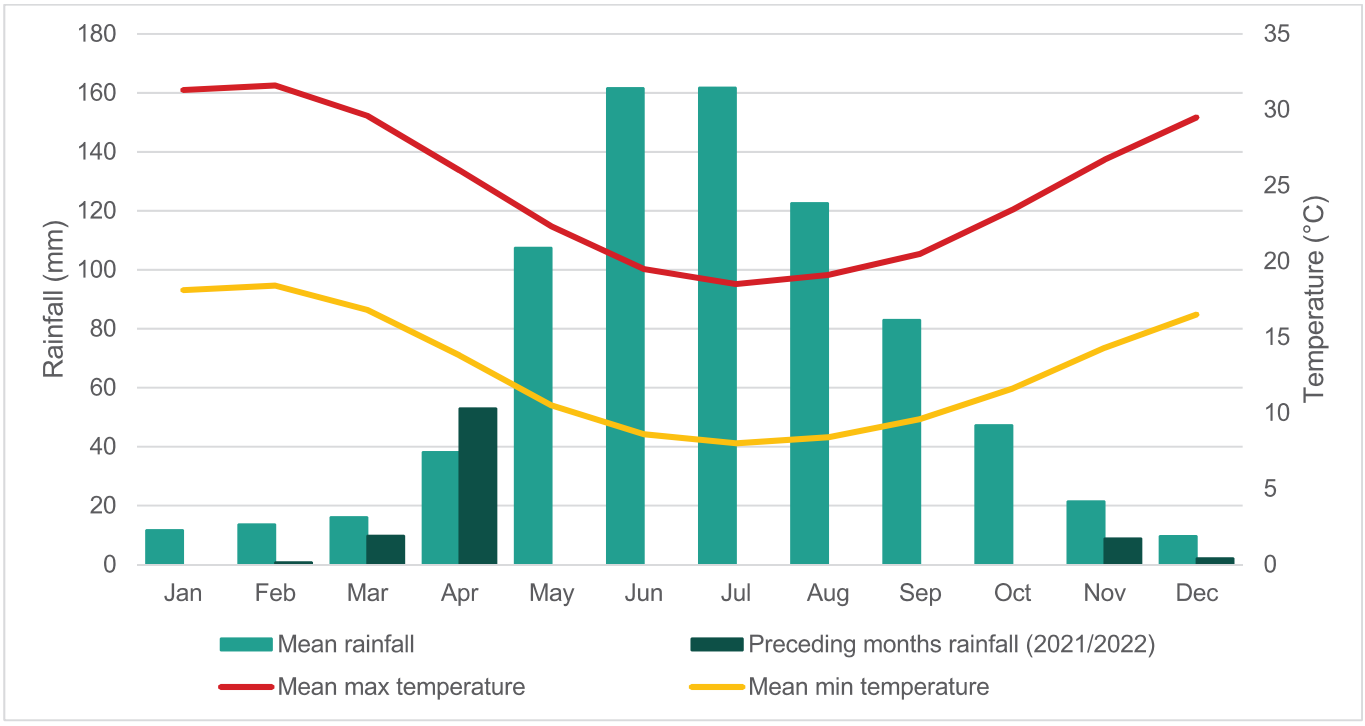

Figure 2: Rainfall and temperature data for the survey area (BoM 2022)

2.1.2 LAND SYSTEMS

According to the Department of Primary Industries and Regional Development (DPIRD 2020) soil landscape mapping, the following land systems intersect the survey area (**Table 2**).

Table 2: Land systems (DPIRD 2020)

Mapping unit	Land system	Description	Extent (ha)	%
212Bs_DL	Bassendean Drainage Line Phase	Broad, shallow channels, peaky soils, fringe of *Melaleuca* spp. and *E. rudis*; reeds and sedges in central zone.	1.28	21.33
212Bs_Ja	Bassendean, Jandakot Phase	Jandakot low dunes. Slopes < 10 % and general more than 5 m relief. Grey sand over pale yellow sands generally underlain by humic and iron podsols; *Banksia* spp. low open woodland with a dense shrub layer.	4.72	78.67

2.1.3 ENVIRONMENTALLY SENSITIVE AREAS

The survey area is located within an Environmentally Sensitive Area (ESA) (Landgate 2021). The ESA is likely associated with Bush Forever Site 380, on which the survey area is situated.

2.1.4 CONSERVATION LANDS

The survey area is located within the Gnangara – Moore River State Forest.

2.2 BIOLOGICAL ENVIRONMENT

2.2.1 BIOGEOGRAPHIC REGION

Biogeographic regions are delineated on the basis of similar climate, geology, landforms, vegetation and fauna, and are defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (Department of Agriculture Water and the Environment 2020).

The survey area is located in the Swan Coastal Plain IBRA region in the Perth subregion (SWA2), described as (Mitchell, Williams & Desmond 2002):

> *…a low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils, Casuarina obesa on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The climate is Warm Mediterranean. Three phases of marine sand dune development provide relief. The outwash plains, once dominated by C. obesa-marri woodlands and Melaleuca shrublands, are extensive only in the south. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of seasonal wetlands and also includes Rottnest, Carnac and Garden Islands etc. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean. The subregional area is 1,333,901 ha.*

2.2.2 PRE-EUROPEAN VEGETATION

During the 1970s, John Beard and associates conducted a systematic survey of native vegetation, describing the vegetation systems in Western Australia at a scale of 1:250,000 in the south-west and at a scale of 1:1,000,000 in less developed areas.

Beard's vegetation maps attempted to depict the native vegetation as it was presumed to be at the time of settlement and is known as the pre-European vegetation type and extent. Beard's vegetation maps have since been developed in digital form by Shepherd, Beeston & Hopkins (2002) and updated by DPIRD (2019). Extents are updated every two years by the Department of Biodiversity Conservation and Attractions (2019a). This mapping indicates that the survey area intersects one pre-European vegetation unit:

- Association 949: described as; Low woodland other *Acacia* spp., *Banksia* spp., Peppermint (*Agonis flexuosa*), Cypress Pine (*Callitris* spp.), Casuarina (*Allocasuarina* spp.), York Gum (*Eucalyptus loxophleba*).

The pre-European vegetation association identified from the survey area (DPIRD 2019) and its pre-European and current extents are listed in **Table 3** (DBCA 2019a).

Table 3: Pre-European vegetation association representation (DBCA 2019a)

Region	Vegetation association	Original extent (ha)	Current extent (ha)	% remaining
Western Australia	949	218,193.94	123,104.02	56.42
IBRA biogeographic region (Swan Coastal Plain)	949	209,983.26	120,287.93	57.28
IBRA biogeographic sub-region (Perth (SWA2))	949	184,475.82	104,128.96	56.45
LGA (City of Wanneroo)	949	37,138.40	17,196.34	46.30

2.2.3 THREATENED AND PRIORITY FAUNA

Combined database search results are incorporated into **Table 15** in **Appendix Three**.

Species identified by these database searches that are excluded from the field survey and further assessments (including likelihood assessments) are listed in **Table 16** along with the reason for their exclusion (e.g. marine / aquatic species whose habitat does not occur within the survey area or invertebrates that are not within the scope of the survey). Such excluded species are not further referenced in this document.

2.2.3.1 EPBC-listed Threatened Fauna

The *Protected Matters Search Tool* (PMST) search (DAWE 2022, with a 10 km buffer), identified the following as having been recorded or having potential to occur within the search area buffer:

- two mammals: one 'species or species habitat likely to occur within area', one 'species or species habitat may occur within area'
- twenty birds: three 'species or species habitat known to occur within area', eight 'species or species habitat likely to occur within area', nine 'species or species habitat may occur within area'.

2.2.3.2 NatureMap

NatureMap (DBCA 2007) is maintained collaboratively by the DBCA and the WAM. These records represent a combination of vouchered museum specimens and records obtained via the Fauna Survey Returns Database maintained by the DBCA.

The *NatureMap* search identified 16 conservation listed vertebrate fauna species (five mammals and 11 birds) previously recorded within the applied 10 km buffer.

2.2.3.3 DBCA Database Search

A search of the DBCA databases was conducted (FaunaSearches_Ecoscape_Carlsson7104) using a 20 km buffer around the provided shapefile of the survey are]. Forty-two conservation listed species were identified as having previously been recorded from within the search area buffer, consisting of eight mammals, 32 birds and two reptiles.

2.2.3.4 Threatened and Priority Fauna Likelihood Assessment

The likelihood of conservation listed fauna species, as identified by the database and literature searches, occurring within the survey area was assessed using the following criteria:

- suitability of habitat types likely to be present within the survey area
- distance between previous record of conservation-listed species and the survey area
- frequency and number of records in the region
- date of record of conservation-listed species (recent or historical)
- the record is naturally occurring (not from a sanctuary or translocated population).

The following were also taken into consideration during the assessment:

- sufficiency of information
- behavioural and ecological characteristics such as cryptic behaviours, size and mobility of species
- record certainty.

The categories of likelihood of occurrence, assessed using the above criteria, are shown in **Table 4**.

Table 4: Categories for likelihood of occurrence of conservation-listed fauna

Likelihood Category	Criteria
Known to occur	Species previously recorded within the survey area within 25 years.
Likely to occur	Suitable habitat is expected to occur within the survey area and records of the species within 25 years exist within close proximity*
May occur	Suitable habitat is expected to occur within the survey area and historic records of the species exist within close proximity* OR Suitable habitat is expected to occur within the survey area and recent (<25yrs) records exist within the database search buffer but not in close proximity*
Unlikely to occur	Suitable habitat is expected to occur within the survey area however previous records are limited and/or historic and/or not in proximity** OR Suitable habitat is not expected to occur within the survey area and recent (<25yrs) records do not occur in close proximity*
Very Unlikely to occur	Suitable habitat is not expected to occur in the survey area AND/OR previous records are limited and/or historic and/or not in proximity**

* close proximity = five km [= ¼ of the distance of the database search buffer]
** proximity = 10 km [= ½ of the distance of the database search buffer]

The likelihood of species occurring within the survey area is indicated in **Table 15** in **Appendix Three**. No conservation-listed species have been previously recorded and one species (Carnaby's Cockatoo) was assessed as being Likely to occur within the survey area.

Likelihood of occurrence does not take into consideration factors such as frequency that a species occurs (or may occur), the duration that such species occupies (or may occupy) the survey area or dependence on habitat or resources within the survey area. Highly mobile species potentially only occur within (or for birds, overflying) the survey area for very brief periods and/or on very infrequent intervals. If a previous observation included in the database search records corresponds with this event it is listed as 'Recorded'; if such a transient visitation is possible in the future the likelihood of such species occurring is likely listed as 'Likely'.

Following the field survey, when actual survey area characteristics are better understood and the level of survey effort was considered, the likelihood of occurrence was re-evaluated. The post-survey likelihood is also incorporated into this table and discussed further in **Section 5.1.3.1**, including providing an indication of dependence of species on the habitat and resources available within the survey area.

2.2.3.5 Black-Cockatoos

According to DBCA mapping (Landgate 2021; DBCA-064, DBCA-057, DBCA-054):

- approximately two thirds of the survey area require investigation as potential Carnaby's Cockatoo feeding habitat on the Swan Coastal Plain
- is situated less than 3 km away from a confirmed Carnaby's Cockatoo breeding area at its north-western boundary and less than 6 km away from a confirmed Carnaby's Cockatoo breeding area at its eastern boundary
- at its north-western end is less than 5 m away from the buffer boundary surrounding a confirmed Carnaby's Cockatoo roost site

2.3 RELEVANT LITERATURE

2.3.1 PREVIOUS SURVEYS

No previous surveys have been recorded in areas intersecting with the current survey area. the recorded surveys below are sufficiently close to provide contextual information:

- Ecoscape (2020) Neerabup Industrial Area Environmental Assessments – Portion 2. The survey area is located approximately 5.2 km south-west of the Wanneroo Shooting Complex. During the survey one species of conservation interest (Rainbow Bee-Eater listed as MA) was recorded. The survey area was considered as providing suitable habitat for Black-Cockatoos and the Quenda.
- Eco Logical (2020a) Black Cockatoo Habitat Assessment of Part of Lot 51 Walding Road, Carabooda. The survey area is located approximately 10 km to the north-west of the Wanneroo Shooting Complex and was surveyed to determine suitable Black-Cockatoo habitat by Eco Logical for the Public Transport Authority. It was determined that only Carnaby's occur in the area. 22.8 ha of suitable foraging habitat, 20.7 ha of roosting habitat and 585 breeding trees were recorded.
- Eco Logical (2020b)Black Cockatoo Habitat Assessment of Lot 5 Dayrell Road, Nowergup. The survey area is located approximately 8 km south-west of the Wanneroo Shooting Complex and was investigated by Eco Logical for the Public Transport Authority to determine suitability for Black-Cockatoos. The survey determined that the area is suitable for Carnaby's Cockatoos and Forest Red-tailed Cockatoos. 17.93 ha of suitable foraging habitat, 1.98 ha of suitable roosting habitat and 27 breeding trees were recorded.

3 METHODS

3.1 GUIDING PRINCIPLES

The Basic fauna survey was conducted in accordance with the Fauna Technical Guidance (EPA 2020). The EPA recommends a Basic survey should:

- be conducted as a low intensity survey to gather broad fauna and habitat information
- verify the adequacy of the desktop assessment
- map, describe and photograph habitats
- record opportunistic fauna observations
- identify possible future survey site locations, access and logistics
- determine if a Detailed survey is required.

Targeted surveys were also conducted to gather information on significant fauna and habitats, including a specific Black-Cockatoo Habitat Assessment.

3.2 FAUNA FIELD SURVEY

The methods utilised during the field survey followed those outlined in the Fauna Technical Guidance (EPA 2020), conducted as a Basic survey.

Conservation criteria used in this assessment are included in **Table 11** and **Table 12** in **Appendix One**.

Survey method details are outlined below.

3.2.1 FAUNA SURVEY METHODS

The Basic fauna survey incorporated a number of techniques as per the Terrestrial Fauna Technical Guidance (EPA 2020) including habitat assessment, active searches (day-time only) and searches for secondary evidence such as scats and tracks, as well as opportunistic searches.

Terrestrial vertebrate fauna were the main targets of the field survey. Survey techniques included:

- opportunistic bird observations while moving through the survey area
- turning of surface debris (rocks, logs, vegetation spoil heaps) that reptiles and mammals may shelter beneath
- raking of litter beds to locate fossorial reptile species
- tree hollow inspection to detect arboreal fauna

Fauna species were identified opportunistically based on sightings, calls, remains, diggings and other signs. Potential habitats for conservation-listed species were identified and evaluated (see **Section 3.2.1.1**) and their likelihood of occurrence re-assessed.

Based on the desktop assessment, the following was considered most likely to occur within the survey area and they, and habitat suitable to support them, were targeted during the field survey:

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo, listed as EN under the EPBC and BC Acts).

3.2.1.1 Fauna Habitat Assessment

The fauna habitats present within the survey areas were identified and mapped. Fauna habitats were described as an area which is distinguishable from its surrounding area by its landform, vegetation and fauna assemblage. In addition, its likelihood to harbour specialised fauna species which are not found in adjacent areas was taken into consideration.

The following information was used to identify and map all fauna habitats within the survey area:

- previous fauna habitat mapping
- land systems
- vegetation type and condition mapping
- aerial imagery
- landforms
- soil characteristic
- fauna assemblage information.

The composition and characteristics of each fauna habitat type was recorded, including noting suitability for various fauna suites or conservation-listed species. Habitat types were delineated in the field and digitised upon return from the field survey.

3.2.2 TARGETED SURVEY METHODS

3.2.2.1 Black-Cockatoo Assessment Methods

'Black-Cockatoos' refer to three threatened Western Australian species: *Calyptorhynchus latirostris* (Carnaby's Cockatoo; EPBC and BC Act EN), *Calyptorhynchus baudinii* (Baudin's Cockatoo; EPBC and BC Act EN) and *Calyptorhynchus banksii naso* (Forest Red-tailed Black-Cockatoo; EPBC and BC Act VU). The survey area is within the mapped distribution of the Carnaby's Cockatoo and the Forest Red-tailed Black-Cockatoo (DSEWPaC 2012).

Potential and active (actual) Black-Cockatoo breeding trees were assessed as per Commonwealth guidance (DSEWPaC 2012) and Bamford (2016) methods (see below). The suitability of the survey area for breeding (additional to the specific tree survey) and as foraging habitat was also assessed and discussed (see 'foraging habitat survey methods' below).

Tree Survey Methods

Potential and actual Black-Cockatoo habitat trees are:

- tree species as listed in the Commonwealth guidance (DSEWPaC 2012)
- a minimum size of 500 mm diameter at breast height (DBH) for most species, or 300 mm DBH for Salmon Gum and Wandoo.

The following were recorded for each potential and actual habitat tree:

- location, recorded using a handheld GPS device with an accuracy of approximately 5 m
- species
- identifying if tree hollows of suitable size and orientation are present, and recording evidence of use by cockatoos such as chewing at the hollow entrance
- habitat value according to the scoring system developed by Dr Mike Bamford (2016); this score reflects the existing value of the tree characteristics with respect to its potential to be used as a nesting tree (as per **Table 13** in **Appendix Two**)
- photographs of tree, showing hollows if present and possible
- known nesting trees as per DBCA data.

Foraging Habitat Survey Methods

The suitability of the survey area for breeding (additional to the specific tree survey) and as foraging habitat was assessed and mapped as per Bamford (2020) foraging habitat methods.

The Bamford (2020) scoring system (**Table 14** in **Appendix Two**) takes into consideration:

- site condition (vegetation composition, condition and structure)
- site context (the site in relation to other native vegetation within a 15 km radius of the site)
- species density (stocking rate: frequency and abundance of Black-Cockatoos at the site)
- modification, if needed, for vegetation with little or no foraging value and for pine plantations that provide valuable food sources.

4 FIELD SURVEY RESULTS

The fauna survey was conducted by Louisa Carlsson (Ecologist) and Sam Rycken (Zoologist) on 20 April 2022. The entire site was traversed on foot and all habitats were assessed for quality and capability of supporting both locally common and significant fauna species.

4.1 FAUNA HABITAT

Two fauna habitat types were recorded within the survey area (**Table 5**):

- *Banksia* Woodland
- *Melaleuca* Woodland.

Small, partly cleared but regenerating areas are not considered as a separate habitat type. It is expected that they support the local fauna assemblages in a similar way to the adjacent native vegetation.

The quality of each habitat type was based on the field surveyors' experience and takes into consideration the level of disturbance to habitats from weeds, the amount of native vegetation, vegetation cover (density) and the context of the habitat with the surrounding landscape.

Table 5: Fauna habitat types

Habitat type	Description	Photograph
***Banksia* Woodland**	**Description: Open *Banksia* woodland over shrubs and sedges on grey sandy soils** Habitat is suitable for a range of small mammals, reptiles and woodland birds. It is significant foraging habitat for the Carnaby's Cockatoos. **Extent**: 4.87 ha; 81.17%	
***Melaleuca* Woodland**	**Description: Open *Melaleuca* low woodland with scattered Marri trees over shrubs on grey sandy soils** Habitat is suitable for a range of small mammals, reptiles and woodland birds. It has significance as roosting and foraging habitat for Black-Cockatoos. **Extent**: 1.13 ha; 18.83%	

4.2 FAUNA ASSEMBLAGE

Fifteen vertebrate fauna species, none of which is conservation-listed or an introduced species, were recorded during the survey (**Table 6**).

Table 6: Recorded fauna species

Species	Common name
Mammals	
Macropus fuliginosus	Western Grey Kangaroo
Birds	
Acanthiza inornata	Western Thornbill
Anthochaera carunculata	Red Wattlebird
Coracina novaehollandiae	Black-faced Cuckoo-shrike
Corvus coronoides	Australian Raven
Cracticus tibicen	Australian Magpie
Gavicalis virescens	Singing Honeyeater
Malurus splendens	Splendid Fairy-wren
Petroica boodang	Scarlet Robin
Phaps chalcoptera	Common Bronzewing (Pigeon)
Phylidonyris niger	White-cheeked Honeyeater
Phylidonyris novaehollandiae	New Holland Honeyeater
Platycercus zonarius	Australian Ringneck
Rhipidura leucophrys	Willie Wagtail
Zosterops lateralis	Silvereye

Survey sites are listed in **Table 7**.

Table 7: Fauna recording sites (GDA20, Zone 50)

Site Name	Site Type	Easting	Northing
HA01	Fauna: Habitat Assessment and Ornithological Survey	388291.975	6501576.670
HA02	Fauna: Habitat Assessment and Ornithological Survey	388266.873	6501678.833
HA03	Fauna: Habitat Assessment and Ornithological Survey	388247.768	6501770.197
HA04	Fauna: Habitat Assessment and Ornithological Survey	388221.317	6501891.746
HA05	Fauna: Habitat Assessment and Ornithological Survey	388216.742	6501937.703
HA06	Fauna: Habitat Assessment and Ornithological Survey	388234.520	6502101.412
O01	Tracks/Digging/Scratching	388277.874	6501711.59
O02	Tracks/Digging/Scratching	388255.26	6501943.59

4.3 SIGNIFICANT FAUNA AND ASSOCIATED HABITAT

4.3.1 BLACK-COCKATOO HABITAT ASSESSMENT

The survey area is within the mapped distribution of Carnaby's Cockatoo and Forest Red-tailed Black-Cockatoo (DSEWPaC 2012). Neither was recorded during the survey, but secondary evidence (chewed Marri nuts) and sightings by locals indicate that Carnaby's Cockatoos use the area.

Breeding Habitat

Black-Cockatoo habitat trees were assessed according to the criteria outlined in Commonwealth guidelines (DSEWPaC 2012), with additional information recorded using the Bamford (2016) grading classifications to identify the potential suitability of trees to be used for nesting based on the presence of, size and orientation of hollows (**Table 13** in **Appendix Two**).

Photographs of all trees are included in **Appendix Four**; locations are shown on **Map 2**.

Two trees of suitable diameter (DBH > 500 mm) to be Black-Cockatoo nesting trees were recorded. Both were Marri (*Corymbia calophylla*) with details in **Table 8**. Jarrah *(Eucalyptus marginata*) was also present within the survey area, but trees were not of suitable DBH. Both Marri trees are class 5, meaning no hollows suitable for Black-Cockatoos are currently present but may develop in the future.

Table 8: Black-Cockatoo habitat tree locations (GDA20, Zone 50)

Tree number	Tree species	DBH (mm)	Number of hollows	Tree class	Bees present	Easting	Northing
M1	*Corymbia calophylla* (Marri)	630	0	5	No	388249.685	6501926.751
M2	*Corymbia calophylla* (Marri)	690	0	5	No	388232.920	6501924.242

Foraging and Roosting Habitat

There is limited roosting habitat within the survey area. The northern portion of the *Melaleuca* woodland with scattered Marri trees provides opportunities for roosting behaviour and is closest to the known roosting site identified during the desktop assessment.

The suitability of the survey area as foraging habitat was assessed as per the Bamford (2020) foraging habitat methods (**Table 14** in **Appendix Two**).

The Bamford (2020) scoring system takes into consideration:

- site condition (vegetation composition, condition and structure)
- site context (the site in relation to other native vegetation within a 15 km radius of the site)
- species density (stocking rate: frequency and abundance of Black-Cockatoos at the site)
- modification, if needed, for vegetation with little or no foraging value and for pine plantations that provide valuable food sources.

Application of the Bamford (2020) foraging value tool (**Table 14** in **Appendix Two**), the *Banksia* woodland within the survey area scores eight of a possible total of 10 for the Carnaby's Cockatoo and one out of 10 for the Forest Red-tailed Black-Cockatoo (**Table 9**). The *Melaleuca* woodland scores four of a possible total of 10 for the Carnaby's Cockatoo and two out of 10 for the Forest Red-tailed Black-Cockatoo.

Table 9: Black-Cockatoo foraging value (Bamford Consulting Ecologists 2020)

Score	Carnaby's Cockatoo		Forest Red-tailed Black-Cockatoo	
Fauna Habitat Type	*Banksia* woodland	*Melaleuca* woodland	*Banksia* woodland	*Melaleuca* woodland
Site condition	5	1	1	2
Site context	2	2	0	0
Species density/stocking rate	1	1	0	0
TOTAL SCORE	**8**	**4**	**1**	**2**

4.3.2 QUENDA

Quendas (South-western Brown Bandicoots) are widely distributed in the southwest of Western Australia from Guilderton (north of Perth) to east of Esperance. They have a patchy distribution through the Jarrah and Karri forest, the Swan Coastal Plain, and inland as far as Hyden, and have been recorded in swampy, vegetation with dense cover up to 1 m high. Quenda often feed in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. Quenda will thrive in more open habitat subject to introduced predator control (Department of Environment and Conservation 2012).

The area mapped as *Banksia* Woodland within the survey area provides suitable shelter and foraging habitat for the Quenda. Diggings found within the survey area are most likely attributed to the Quenda (**Image 1** and **Image 2**).

Image 1: Diggings

Image 2: Diggings

4.4 FAUNA SURVEY LIMITATIONS

Table 10: Fauna survey limitations

Possible limitations	Constraints (yes/no): Significant, moderate or negligible	Comment
Availability of data and information	No	Previous reports referencing field surveys in close proximity to the survey area and / or methods to detect the likely occurring conservation-listed species were readily available and reviewed prior to the survey.
Competency/experience of the survey team, including bioregion experience	No	The biologists carrying out the field survey were experienced with the survey methods, the identification of fauna species and the habitats occurring on the Swan Coastal Plain.
Scope of survey e.g. excluded fauna groups	No	The survey was conducted as a Basic Terrestrial Vertebrate Fauna Survey and Black-Cockatoo Habitat Survey. Sufficient time was allocated to determine habitats present in the survey area, identify fauna assemblages and carry out Targeted Searches, including the Black-Cockatoo Habitat Assessment.
Timing, weather, season	No	The timing of the field survey was suitable to obtain an adequate representation of habitat types and fauna assemblages present. The seasonal conditions prior to the field survey area were representative of the climate and the weather on the day of the field survey was suitable.
Disturbances that may have affected results	No	No disturbances were detected during the desktop assessment and the field survey with the potential to affect results.
Proportion of fauna identified, recorded, or collected	No	The survey and survey effort were considered suitable to detect the presence / potential presence of conservation-listed fauna or suitable habitat for such within the survey area.
Adequacy of survey intensity and proportion of survey achieved	No	The whole survey area was traversed on foot, sufficient time and effort was applied to habitat assessments, ornithological surveys, searches for secondary evidence and targeted searches. The area was adequately surveyed.
Access	No	The entire survey area was accessible.

5 DISCUSSION

5.1 FAUNA SIGNIFICANCE

5.1.1 FAUNA HABITAT TYPES

Two fauna habitat types were recorded during the field survey (**Section 4.1**):

- *Banksia* Woodland (5.75 ha)
- *Melaleuca* Woodland (1.13 ha).

Banksia Woodland is the dominant habitat within the survey area, covering more than 80%. It provides for significant high value foraging habitat for the Carnaby's Cockatoo and provides shelter and foraging opportunities to other common terrestrial vertebrate species on the Swan Coastal Plain. The open *Melaleuca* Woodland with scattered Marri trees compromises less than 20% of the survey area, but provides potential foraging and roosting habitat for the endangered Carnaby's Cockatoo and can provide foraging habitat for the vulnerable Forest Red-tailed Black-Cockatoo. Both habitat types in similar condition extend beyond the survey area boundaries, with Marri trees becoming more abundant.

5.1.1.1 Black-cockatoo habitat assessment

The survey area provides significant foraging habitat for Carnaby's cockatoo in regard to healthy *Banksia* woodland. The *Melaleuca* woodland with scattered Marri trees did not provide high quality roosting habitat for either Black-cockatoo species mentioned above. Marri can provide high quality foraging habitat for both species, but due to the low number of these trees occurring within the survey area, the *Melaleuca* woodland was not regarded as significant habitat.

5.1.2 FAUNA ASSEMBLAGE

Fifteen vertebrate fauna species were recorded during the field survey (**Section 4.2**). All species were recorded at habitat assessment points, during ornithological surveys or opportunistically and are representative of the terrestrial vertebrate fauna found on the Swan Coastal Plain. Within the proposed clearing area and in its immediate surrounds, no other major impacts or threats have been identified which allows individuals to move into adjacent habitat if disturbance or clearing of the survey area occurs.

5.1.3 RECORDED CONSERVATION-LISTED SPECIES

No conservation-listed species were recorded during the field survey. Evidence suggests that the survey area is used by the endangered Carnaby's Cockatoo and the Priority 4 listed Quenda see **Section 5.1.3.1.**

5.1.3.1 Post-survey Likelihood Assessment

The post-survey likelihood assessment is incorporated into **Table 15** in **Appendix Three**.

Conservation-listed fauna species identified during the desktop assessment as having a High or Medium likelihood of occurring that were not recorded during the field survey are discussed below with respect to each species' habitat requirements, taking into consideration the findings of the field survey and survey effort.

High Likelihood Species

Carnaby's Cockatoo – EPBC status EN; BC status EN

Carnaby's Cockatoos occur in uncleared or remnant native Eucalypt woodlands, shrublands or Kwongan heathland dominated by *Hakea, Banksia* or *Grevillea* species. It is a seasonal visitor to plantations of exotic pines (*Pinus* spp.) and sometimes occurs in forests. The survey area is situated within the species distribution on the Swan Coastal Plain and in close proximity to known roost and breeding sites as identified during the desktop assessment.

The Carnaby's Cockatoo was not recorded during the field survey but given the contextual information it is highly likely that it uses habitat within the survey area occasionally for foraging.

Quenda (Southern Brown Bandicoot) – DBCA status P4

Quendas are widely distributed in the southwest of Western Australia from Guilderton, north of Perth, to east of Esperance. They have a patchy distribution throughout the Jarrah and Karri forest, the Swan Coastal Plain, and inland as far as Hyden and have been recorded in swampy vegetation with dense cover up to 1 m high. Quenda often feed in adjacent forest or woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. Quenda will thrive in more open habitat subject to introduced predator control (DEC 2012).

Quenda were not recorded during the field survey. The Woodland habitat identified within the survey area provides suitable shelter and foraging habitat for the Quenda, nearby records and diggings found within the survey area indicate that the Quenda uses it.

Medium Likelihood Species

Forest Red-tailed Black-Cockatoo – EPBC status VU; BC status VU

The Forest Red-tailed Black-Cockatoo was formerly common in this area but is now rare to uncommon and patchily distributed over a range which has become markedly reduced. The species is usually observed in pairs or small flocks, seldom large flocks (up to 200 individuals). It has declined due to destruction of forests and woodlands, competition for nest hollows with native and exotic species, and the impact of fires (DEC 2008).

The *Melaleuca* Woodland with scattered Marri trees habitat type within the survey area potentially contains suitable foraging habitat for the Forest Red-tailed Black-Cockatoo. Due to the low number of trees present and their size it is considered to not represented good roosting habitat. Although the species has been recorded within 15 km from the survey area, it is our position that the survey area provides limited value to this species and that Forest Red-tailed Black-Cockatoo would only occur in a vagrant manner.

Western Brush Wallaby –DBCA status P4

The Western Brush Wallaby's optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland and is uncommon in Karri forests (DEC 2010).

The *Melaeuca* Woodland habitat within the survey area provides shelter and foraging habitat for the Western Brush Wallaby Records of it exist within 10 km from the survey area indicating that the Western Brush Wallaby may occasionally use the habitat within the survey area but given it's small extent less than 20% of the survey area it is not deemed critical.

6 CONCLUSIONS

The Basic Terrestrial fauna survey and Black-Cockatoo habitat assessment (feeding, roosting and breeding habitat) was conducted on the 20th of April 2022 by experienced biologists. The survey limitations were negligible.

The following can be concluded from the results of the field survey:

- two habitat types occur within the survey area; *Banksia* and *Melaleuca* woodland, supporting ground-dwelling vertebrate species and woodland birds
- no conservation-listed fauna species was recorded from within the survey area, but evidence suggests that the survey area is utilised by the endangered Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Priority 4 Quenda (*Isoodon fusciventer*)
- the survey area provides high quality foraging habitat for the Carnaby's Cockatoo
- the survey area provides some foraging habitat for the Forest Red-tailed Black-Cockatoo
- no local fauna species recorded during the field survey or likely to occur within the survey area is considered to be dependent on the habitat present within the survey area for survival due to its small extent (6 ha) and the availability of suitable habitat outside the survey area
- no fauna species recorded during the field survey or likely to occur within the survey area, is considered to be dependent on the habitat within the survey area.

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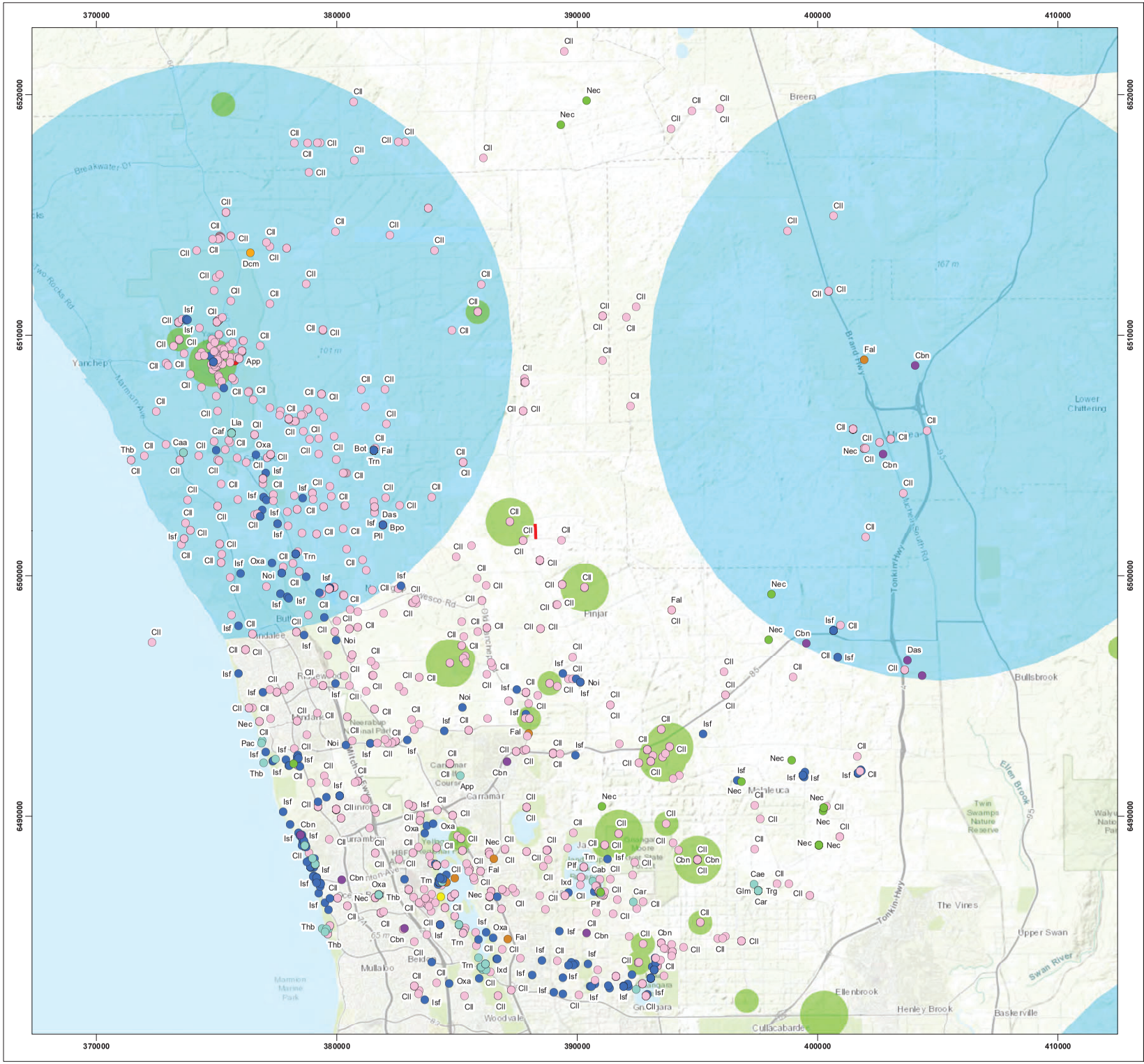
MAPS



LEGEND

- Survey Area

Conservation Significant Fauna

- Critically Endangered
- Endangered
- Vulnerable
- Migratory
- Other Specially Protected
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Carnabys Cockatoo Confirmed Roost Sites
- Carnabys Cockatoo Confirmed Breeding Areas

Taxon Name	Code	Taxon Name	Code
Apus pacificus	App	*Hydromys chrysogaster*	Hyc
Arenaria interpres	Ari	*Hydroprogne caspia*	Hyd
Bettongia penicillata ogilbyi	Bpo	*Isoodon fusciventer*	Isf
Botaurus poiciloptilus	Bot	*Ixobrychus dubius*	Ixd
Calidris acuminata	Caa	*Ixobrychus flavicollis australis*	Ixf
Calidris canutus	Cal	*Limosa lapponica*	Lla
Calidris ferruginea	Caf	*Limosa limosa*	Lli
Calidris ruficollis	Car	*Neelaps calonotos*	Nec
Calidris subminuta	Cas	*Notamacropus irma*	Noi
Calidris tenuirostris	Cat	*Oxyura australis*	Oxa
Calonectris leucomelas	Cae	*Pandion cristatus*	Pac
Calyptorhynchus banksii naso	Cbn	*Petrogale lateralis lateralis*	Pll
Calyptorhynchus baudinii	Cab	*Plegadis falcinellus*	Plf
Calyptorhynchus latirostris	Cll	*Pluvialis squatarola*	Plu
Charadrius leschenaultii	Chl	*Sternula nereis nereis*	Snn
Dasyurus geoffroii	Das	*Thalasseus bergii*	Thb
Delma concinna major	Dcm	*Tringa glareola*	Trg
Falco peregrinus	Fal	*Tringa nebularia*	Trn
Glareola maldivarum	Glm	*Tringa stagnatilis*	Trs

DATA SOURCES :
SOURCE DATA: FAUNA DATA (DBCA 2022); BLACK COCKATOO ROOSTING SITES - BUFFERED (DBCA-064); CARNABYS COKATOO CONFIRMED BREEDING AREAS WITHIN THE SWAN COASTAL PLAIN AND JARRAH FOREST IBRA REGIONS (DBCA-054)
BASEMAP-ESRI WORLD TOPOGRAPHIC MAP
SERVICE LAYERS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

ecoscape

DBCA DATABASE SEARCH RESULTS - FAUNA

NEAVES ROAD FAUNA SURVEY

COTERRA ENVIRONMENT

COORDINATE SYSTEM: GDA2020 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA2020
UNITS: METER

N

SCALE: 1:155,000 @ A3

0 1 2 3 4 5 km

PROJECT NO: 4721-22

REV	AUTHOR	APPROVED	DATE
00	LC	KP	17/05/2022

MAP 01

LEGEND

- Survey Area
- Habitat Assessment Points

Fauna Habitat

- *Banksia* Woodland
- *Melaleuca Woodland*

Corymbia calophylla

- Class 5
- Survey Tracks

DATASOURCES:
SOURCE DATA: FAUNA HABITAT, HABITAT ASSESSMENT POINTS, BLACK COCKATOO HABITAT TREES (ECOSCAPE 2022)
AERIAL:ESRI BASEMAP
SERVICE LAYERS: SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

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FAUNA HABITAT

NEAVES ROAD FAUNA SURVEY

COTERRA ENVIRONMENT

COORDINATE SYSTEM: GDA2020 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA2020
UNITS: METER

N

SCALE: 1:2,500 @ A3

0 20 40 60 80 100 m

PROJECT NO: 4721-22

REV	AUTHOR	APPROVED	DATE
01	LC	KP	08/08/2022

MAP 02

APPENDIX ONE LEGISLATIVE CONTEXT, DEFINITIONS AND CRITERIA

COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act is a legal framework to protect and manage matters of national environmental significance (MNES) including important flora, fauna, ecological communities and heritage areas listed under the Act.

Threatened taxa (flora and fauna) are protected under the EPBC Act, which lists species and ecological communities that have been assessed as meeting the criteria to be listed as Critically Endangered, Endangered, Vulnerable, Conservation Dependant, Extinct, or Extinct in the Wild, as detailed in **Table 11**.

Threatened Ecological Communities protected under the EPBC Act are categorised as Critically Endangered, Endangered or Vulnerable, also detailed in this table.

Migratory species subject to international agreements are also protected under the EPBC Act. The definition of a migratory species under the Act follows that prescribed by the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (Department of the Environment 2021):

> *Migratory species are the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.*

Species listed by the following international agreements are currently protected under the EPBC Act:

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

Table 11: EPBC Act categories for flora, fauna and ecological communities

Category	Threatened species	Threatened Ecological Communities
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.	n/a
Extinct in the wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.	n/a
Critically Endangered (CE)	A native species is eligible to be included in the *critically endangered* category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the *critically endangered* category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria

Category	Threatened species	Threatened Ecological Communities
Endangered (EN)	A native species is eligible to be included in the *endangered* category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the *endangered* category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable (VU)	A native species is eligible to be included in the *vulnerable* category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the *vulnerable* category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.	n/a

WESTERN AUSTRALIAN ENVIRONMENTAL PROTECTION ACT 1986

The Western Australian EP Act was created to provide for an Environmental Protection Authority (the EPA) that has the responsibility for:

- prevention, control and abatement of pollution and environmental harm
- conservation, preservation, protection, enhancement and management of the environment
- matters incidental to or connected with the above.

The EPA is responsible for providing the guidance and policy under which environmental assessments are conducted. It conducts environmental impact assessments (based on the information provided by the proponent), initiates measures to protect the environment and provides advice to the Minister responsible for environmental matters.

WESTERN AUSTRALIAN BIODIVERSITY CONSERVATION ACT 2016

The Western Australian BC Act provides for the conservation, protection and ecologically sustainable use of biodiversity and biodiversity components in Western Australia.

Threatened species (both flora and fauna) and ecological communities that meet the categories listed within the BC Act are protected under this legislation and require authorisation by the Minister to take or disturb. These are known as Threatened Flora, Threatened Fauna and Threatened Ecological Communities. The conservation categories of Critically Endangered, Endangered and Vulnerable are detailed in **Table 12**; these categories align with those of the EPBC Act. Some State-listed threatened species and ecological communities are provided with additional protection as they are also listed under the Commonwealth EPBC Act (see **Table 11** for conservation status category descriptions).

The most recent Western Australian flora and fauna listings were published in the Government Gazette on 11 September 2018 (Government of Western Australia 2018a).

PRIORITY-LISTED FLORA AND FAUNA

Flora are listed as PF where populations are geographically restricted or threatened by local processes, or where there is insufficient information to formally assign them to TF categories. Whilst PF are not specifically listed in the BC Act, some may qualify as being of special conservation interest and thereby have a greater level of protection than unlisted species.

There are three categories covering Western Australian-listed TF and four categories covering PF species which are outlined in **Table 12**. PF for Western Australia are regularly reviewed by the DBCA whenever new information becomes available, with species status altered or removed from the list when data indicates that they no longer meet these requirements.

Conservation-listed fauna species are listed by the DBCA as Priority Fauna where populations are geographically restricted or threatened by local processes, or where there is insufficient information to formally assign them to threatened fauna categories. Whilst Priority Fauna are not specifically listed in the BC Act, these have a greater level of significance than other native species. The categories covering Priority Fauna species are outlined in **Table 12**.

Flora and fauna species may be listed as being of special conservation interest if they have a naturally low population, have a restricted natural range, are subject to or recovering from a significant population decline or reduction of range or are of special interest, and the Minister considers that taking may result in depletion of the species. Migratory species and those subject to international agreement are also listed under the Act. These are known as 'specially protected species' in the BC Act.

Table 12: Conservation codes for Western Australian flora and fauna (DBCA 2019b)

Conservation Codes for Western Australian Flora and Fauna	
Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such. **The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.** **Categories of Threatened, Extinct and Specially Protected fauna and flora are:**	
T	**Threatened species** Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act). Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna. Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Conservation Codes for Western Australian Flora and Fauna	
CR	**Critically endangered species** Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*". Listed as critically endangered undersection 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.
EN	**Endangered species** Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.
VU	**Vulnerable species** Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*". Listed as vulnerable undersection 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.
Extinct species **Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.**	
EX	**Extinct species** Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.
EW	Extinct in the wild species Species that "*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
Specially protected species **Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.** **Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.**	
MI	**Migratory species** Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
CD	**Species of special conservation interest (conservation dependent fauna)** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14of the BC Act). Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018.*
OS	**Other specially protected species** Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18of the BC Act). Published as other specially protected fauna under schedule 7of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

Conservation Codes for Western Australian Flora and Fauna	
P	**Priority species** Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.
1	**Priority 1: Poorly-known species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
2	**Priority 2: Poorly-known species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
3	**Priority 3: Poorly-known species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
4	**Priority 4: Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[1] The definition of flora includes algae, fungi and lichens.
[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

ENVIRONMENTALLY SENSITIVE AREAS

There are a number of areas within Western Australia identified as being of environmental significance within which the exemptions to the Native Vegetation Clearing Regulations do not apply. These are referred to as Environmentally Sensitive Areas (ESAs), and are declared under section 51B of the EP Act and described in the *Environmental Protection (Environmentally Sensitive Areas) Notice*.

CONSERVATION ESTATE

The National Reserve System is a network of protected areas managed for conservation under international guidelines. The objective of placing areas of bushland into the Conservation Estate is to achieve and maintain a comprehensive, adequate and representative reserve system for Western Australia. The Conservation and Parks Commission is the vesting body for conservation lands, forest and marine reserves that are managed by DBCA (Government of Western Australia 2018b).

APPENDIX TWO FIELD SURVEY CRITERIA

Table 13: Grading system for the assessment of potential nest trees for Black-Cockatoos (Bamford Consulting Ecologists 2016)

Class	Description of tree and hollows/activity
1	Active nest observed; adult (or immature) bird seen entering or emerging from hollow.
2	Hollow of suitable size and angle (i.e. near-vertical) visible with chew marks around entrance.
3	Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present (as suggested by structure of tree, such as large, vertical trunk broken off at a height of >10m).
4	Tree with large hollows or broken branches that might contain large hollows but hollows or potential hollows are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos.
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.

Table 14: Black-Cockatoo foraging value scoring system (Bamford Consulting Ecologists 2020)

Site condition: vegetation composition, condition and structure scoring			
Site Score	**Carnaby's Cockatoo**	**Baudin's Cockatoo**	**Forest Red-tailed Black-Cockatoo**
0	No foraging value: no Proteaceae, Eucalypts or other potential sources of food. Examples: • Water bodies (e.g. salt lakes, dams, rivers) • Bare ground • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits) or with vegetation of no food value (e.g. some suburban landscapes) • Mown grass.	No foraging value: no Eucalypts or other potential sources of food. Examples: • Water bodies (e.g. dams, rivers) • Bare ground • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).	No foraging value: no Eucalypts or other potential sources of food. Examples: • Water bodies (e.g. 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 lightly vegetated with melons or other known food-source (weeds e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source • Blue Gum plantations (foraging by Carnaby's Cockatoos has been reported but appears to be unusual).	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.

Site condition: vegetation composition, condition and structure scoring			
Site Score	**Carnaby's Cockatoo**	**Baudin's Cockatoo**	**Forest Red-tailed Black-Cockatoo**
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.	Low foraging value. Examples: ▪ Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover • Urban areas with scattered foraging trees.	Low foraging value. Examples: ▪ Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah or Sheoak) 1-5% projected foliage cover • Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.
3	Low to Moderate foraging value. Examples: ▪ Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover ▪ Woodland with tree banksias 5-20% projected foliage cover ▪ Eucalypt Woodland/Mallee of small-fruited species • Eucalypt Woodland with Marri < 10% projected foliage cover.	Low to Moderate foraging value. Examples: ▪ Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover ▪ Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management) • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	Low to Moderate foraging value. Examples: ▪ Eucalypt Woodland with known food plants (especially Marri and Jarrah) 5-20% projected foliage cover ▪ Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management) • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).

Site condition: vegetation composition, condition and structure scoring			
Site Score	**Carnaby's Cockatoo**	**Baudin's Cockatoo**	**Forest Red-tailed Black-Cockatoo**
4	Moderate foraging value. Examples: ▪ Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover ▪ Kwongan/Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover • Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.	Moderate foraging value. Examples: ▪ Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover ▪ Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths ▪ Eucalypt Woodland/Forest with diverse, healthy understorey and known food trees (especially Marri) 10-20% projected foliage cover • Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits)	Moderate foraging value. Examples: ▪ Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover ▪ Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths • Sheoak Forest with 40-60% projected foliage cover.
5	Moderate to High foraging value. Examples: ▪ Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover ▪ Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths • Pine plantations with trees more than 10 years old (but see pine modifier score if relevant).	Moderate to High foraging value. Examples: ▪ Marri-Jarrah Forest with 40-60% projected foliage cover • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths.	Moderate to High foraging value. Examples: ▪ Marri-Jarrah Forest with 40-60% projected foliage cover ▪ Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths • Sheoak Forest with > 60% projected foliage cover.
6	High foraging value. Example: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).

Site condition: vegetation composition, condition and structure scoring		
Site Score	**Carnaby's Cockatoo** **Baudin's Cockatoo** **Forest Red-tailed Black-Cockatoo**	
Site context	Percentage of the 'local' (i.e. within 15 km) area native vegetation that the survey area represents	
Score	**'Local' breeding known/likely**	**'Local' breeding unlikely**
3	>5%	>10%
2	1-5%	5-10%
1	0.1-1%	1-5%
0	<0.1%	<1%
Species density/stocking rate		
1	Species is regularly reported/recorded and/or abundant foraging evidence or Direct evidence lacking but at least moderate condition score and site is part of connected habitat where Black-Cockatoos are known to occur.	
0	Species is irregularly or very infrequently reported and little or no foraging evidence is present.	

APPENDIX THREE DESKTOP ASSESSMENT RESULTS AND LIKELIHOOD ASSESSMENTS

Table 15: Fauna database results and likelihood assessments

Blue shading indicates high likelihood; darker blue indicates species is known (recorded) from the survey area. Species identified by database searches but not included in this assessment are listed in **Table 16**, along with the reason for their exclusion.

Species	Common name	Conservation status		Database			Likelihood of occurrence	
		EPBC Act	WA	PMST**	DBCA	*Nature Map*	Desktop	Post-survey
Mammals								
Bettongia penicillata ogilbyi	Woylie / Brush-tailed Bettong	EN	CR		X	X	Very unlikely	Very unlikely
Dasyurus geoffroii	Chuditch / Western Quoll	VU	VU	Likely	X	X	Unlikely	Very unlikely
Falsistrellus mackenziei	Western False Pipistrelle		P4		X[1]		Very unlikely	Very unlikely
Hydromys chrysogaster	Water-rat / Rakali		P4		X		Unlikely	Very unlikely
Isoodon fusciventer	Quenda / Southwestern Brown Bandicoot		P4		X	X	May	Likely
Macroderma gigas	Ghost Bat	VU	VU	May			Very unlikely	Very unlikely
Notamacropus Irma	Western Brush Wallaby		P4		X	X	May	May
Petrogale lateralis lateralis	Black-flanked/footed Rock-Wallaby	EN	EN		X	X	Very unlikely	Very unlikely
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale		CD		X[1]		Very unlikely	Very unlikely
Birds								
Actitis hypoleucos	Common Sandpiper	MI	MI	Known			Very unlikely	Very unlikely
Apus pacificus	Fork-tailed Swift	MI	MI	Likely	X	X	Unlikely	Unlikely
Ardea ibis	Cattle Egret	MA		May			Very unlikely	Very unlikely
Arenaria interpres	Ruddy Turnstone	MI	MI		X		Very unlikely	Very unlikely
Botaurus poiciloptilus	Australian Bittern	EN	EN	May	X	X	Very unlikely	Very unlikely
Calidris acuminata	Sharp-tailed Sandpiper	MI	MI	Known	X		Very unlikely	Very unlikely
Calidris canutus	Red Knot	EN	EN	May	X		Very unlikely	Very unlikely
Calidris ferruginea	Curlew Sandpiper	MI	CR	Likely	X	X	Very unlikely	Very unlikely
Calidris melanotos	Pectoral Sandpiper	MI	MI	May			Very unlikely	Very unlikely
Calidris ruficollis	Red-necked Stint	MI	MI		X	X	Very unlikely	Very unlikely

[1] this species was not identified by the DBCA database search, but may be present within the survey area (DBCA written communication 27.04.2022)

Species	Common name	Conservation status		Database			Likelihood of occurrence	
		EPBC Act	WA	PMST**	DBCA	*Nature Map*	Desktop	Post-survey
Calidris subminuta	Long-toed Stint	MI	MI		X		Very unlikely	Very unlikely
Calidris tenuirostris	Great Knot	MI	CR		X		Very unlikely	Very unlikely
Calonectris leucomelas	Streaked Shearwater	MI	MI		X		Very unlikely	Very unlikely
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	VU	VU	Likely	X	X	May	May
Calyptorhynchus baudinii	Baudin's Cockatoo	EN	EN		X		May	Unlikely
Calyptorhynchus latirostris	Carnaby's Cockatoo	EN	EN	Known	X	X	Likely	Likely
Charadrius leschenaultii	Greater / large Sand Plover	MI	VU	May	X		Very unlikely	Very unlikely
Falco peregrinus	Peregrine Falcon		OS		X	X	May	Unlikely
Glareola maldivarum	Oriental Pratincole	MI	MI		X		Very unlikely	Very unlikely
Haliaeetus leucogaster	White-bellied Sea-Eagle	MA		Likely			Very unlikely	Very unlikely
Hydroprogne caspia	Caspian Tern	MI	MI		X		Very unlikely	Very unlikely
Ixobrychus dubius	Australian Little Bittern		P4		X		Very unlikely	Very unlikely
Ixobrychus flavicollis australis (southwest subpop.)	Black Bittern (southwest subpop.)		P2		X		Very unlikely	Very unlikely
Limosa lapponica	Bar-tailed Godwit	MI	MI		X	X	Very unlikely	Very unlikely
Limosa limosa	Black-tailed Godwit	MI	MI		X		Very unlikely	Very unlikely
Leipoa ocellata	Malleefowl	VU	VU	Likely			Very unlikely	Very unlikely
Merops ornatus	Rainbow Bee-eater	MA		May			Unlikely	Unlikely
Motacilla cinerea	Grey Wagtail	MA/MI		May			Very unlikely	Very unlikely
Ninox connivens connivens (southwest subpop.)	Barking Owl (southwest subpop.)		P3		X[1]		Very unlikely	Very unlikely
Numenius madagascariensis	Eastern Curlew	CR/MI	CR	May			Very unlikely	Very unlikely
Oxyura australis	Blue-billed Duck		P4		X	X	Unlikely	Very unlikely
Pandion cristatus	(Eastern) Osprey	MI	MI	Likely	X		Very unlikely	Very unlikely
Plegadis falcinellus	Glossy Ibis	MI	MI		X	X	Unlikely	Very unlikely
Pluvialis squatarola	Grey Plover	MI	MI		X		Very unlikely	Very unlikely
Rostratula australis	Australian Painted Snipe	EN	EN	Likely			Very unlikely	Very unlikely
Sternula nereis nereis	Fairy Tern	VU	VU	May	X		Very unlikely	Very unlikely
Thalasseus bergii	Crested Tern	MI	MI		X		Very unlikely	Very unlikely
Tringa glareola	Wood Sandpiper	MI	MI		X		Very unlikely	Very unlikely

Species	Common name	Conservation status		Database			Likelihood of occurrence	
		EPBC Act	WA	PMST**	DBCA	*Nature Map*	Desktop	Post-survey
Tringa nebularia	Common Greenshank	MI	MI	Likely	X	X	Very unlikely	Very unlikely
Tringa stagnatilis	Marsh Sandpiper / Little Greenshank	MI	MI		X		Very unlikely	Very unlikely
Tyto novaehollandiae novaehollandia	Masked Owl (southwest)		P3		X[1]		Very unlikely	Very unlikely
Reptiles								
Delma concinna major	Javelin legless lizard (Shark Bay)		P1		X		Very unlikely	Very unlikely
Neelaps calonotos	Black-striped (burrowing) Snake		P3		X		Unlikely	Unlikely

Table 16: Excluded species and reason for exclusion

Species	Common name	Conservation status		Reason excluded from assessment
		EPBC Act	WA	
Austroconops mcmillani	McMillan's biting midge (Swan Coastal Plain)		P2	Invertebrates were not part of the survey scope
Austrosaga spinifer	Spiny katydid (Swan Coastal Plain)		P2	Invertebrates were not part of the survey scope
Bettongia lesueur graii	Boodie / Burrowing Bettong (inland)		EX	Extinct on mainland Western Australia
Chelonia mydas	Green Turtle	VU	VU	Marine habitat does not occur within the survey area
Dermochelys coriacea	Leatherback Turtle	EN	VU	Marine habitat does not occur within the survey area
Hesperocolletes douglasi	Douglas's broad-headed Dee	CR	CR	Invertebrates were not part of the survey scope
Hurleya sp. (WAM C23193)	Crystal Cave Crangonyctoid (Cave Shrimp)		CR	Invertebrates were not part of the survey scope
Hylaeus globuliferus	Woolybush Bee		P3	Invertebrates were not part of the survey scope
Galaxiella nigrostriata	Black-stripe Minnow / dwarf Galaxias	EN	EN	Aquatic habitat does not occur within the survey area
Idiosoma sigillatum	Swan Coastal Plain Shield-backed Trapdoor Spider		P3	Invertebrates were not part of the survey scope
Leioproctus contrarius	a Short-tongued Bee		P3	Invertebrates were not part of the survey scope
Megaptera novaeangliae	Humpback Whale	VU	CD	Marine habitat does not occur within the survey area
Physeter macrocephalus	Sperm Whale	MI	VU	Marine habitat does not occur within the survey area
Pristis pristis	Freshwater Sawfish			Aquatic habitat does not occur within the survey area
Synemon gratiosa	Graceful Sunmoth		P4	Invertebrates were not part of the survey scope
Westralunio carteri	Carter's Freshwater Mussel	VU	VU	Invertebrates were not part of the survey scope and aquatic habitat does not occur within the survey area

APPENDIX FOUR BLACK-COCKATOO HABITAT TREES

Tree-M1

Tree-M2