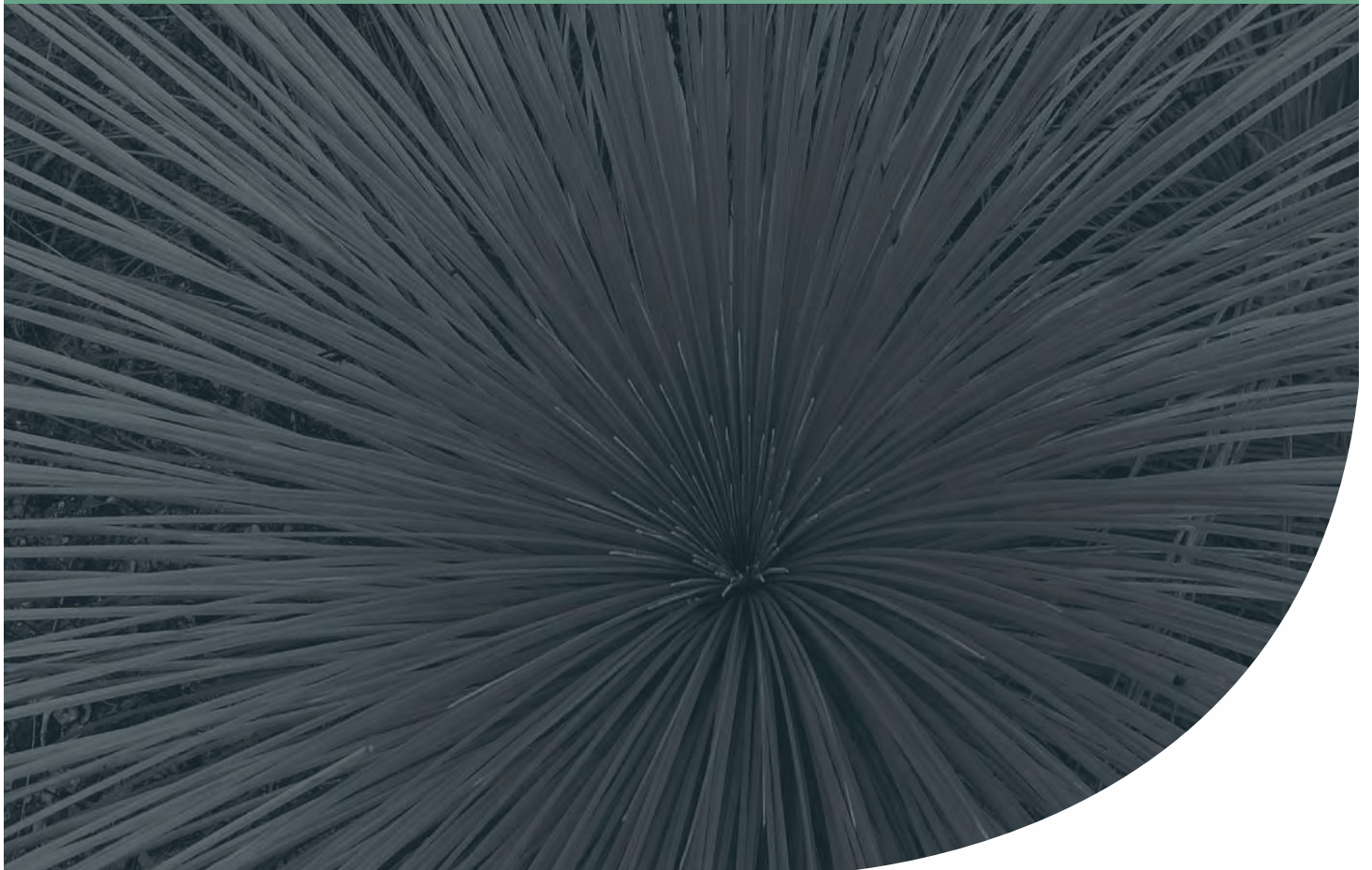


# Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks

Project No: EP19-105(26)

**Prepared for Linc Property Pty Ltd  
November 2019**



# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



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# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## Executive Summary

Linc Property Pty Ltd (Linc) engaged Emerge Associates (Emerge) to undertake a level 1 fauna and a targeted black cockatoo survey within the current Middle Swan Brickworks in Middle Swan (referred to herein as 'the site'). The site, which is approximately 83.36 hectares (ha) in size, is adjacent to the Swan River within the City of Swan.

An ecologist from Emerge visited the site on the 18 of September, 8 and 24 of October 2019 during the day to conduct the level 1 fauna and targeted black cockatoo field survey.

Outcomes of the survey include the following:

- A total of eight native and two non-native fauna species were positively identified to occur within the site. Additionally, 11 species of conservation significance are considered to have potential to occur within the site. However, the likelihood that the site would provide important habitat for these species is low, as the majority of habitat within the site is in relatively poor condition and limited in extent.
- The site contains 32 black cockatoo habitat trees, of which three contain hollows that are potentially suitable as breeding habitat for black cockatoos.
- No evidence of black cockatoo roosting activity was observed within the site. A number of plant species within the site provide potential foraging habitat for black cockatoos, particularly areas containing marri and wandoo trees (approximately 1.05 ha). Given the relatively small extent and presence of extensive areas of higher quality foraging habitat in nearby areas, the site is considered unlikely to represent important foraging habitat for black cockatoos.
- With the exception of the aforementioned species of black cockatoo, the site is likely to be primarily utilised by common and widespread native species without specific habitat requirements.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



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# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## Table of Contents

<b>1</b>	<b>Introduction</b> .....	<b>1</b>
1.1	Project background .....	1
1.2	Purpose and scope of work.....	1
<b>2</b>	<b>Environmental Context</b> .....	<b>2</b>
2.1	Significant fauna .....	2
2.1.1	Threatened fauna species .....	2
2.1.2	Priority fauna species .....	2
2.1.3	Migratory fauna species.....	2
2.1.4	Pest fauna species .....	2
2.2	Bush Forever .....	3
2.3	Ecological linkages .....	3
2.4	Black cockatoo habitat.....	3
2.4.1	Distribution .....	4
2.4.2	Breeding habitat.....	4
2.4.3	Roosting habitat .....	5
2.4.4	Foraging habitat .....	5
2.5	Previous surveys .....	5
<b>3</b>	<b>Methods</b> .....	<b>6</b>
3.1	Desktop assessment .....	6
3.1.1	Database searches .....	6
3.1.2	Likelihood of occurrence .....	6
3.2	Field survey .....	6
3.2.1	Level 1 fauna .....	6
3.2.2	Targeted black cockatoo .....	7
3.3	Mapping and data analysis .....	8
3.3.1	Fauna habitat .....	8
3.3.2	Black cockatoo habitat .....	8
3.4	Survey limitations .....	8
<b>4</b>	<b>Results</b> .....	<b>10</b>
4.1	General site conditions .....	10
4.2	Fauna habitat .....	10
4.3	Fauna .....	15
4.3.1	Desktop assessment.....	15
4.3.2	Species inventory .....	15
4.3.3	Conservation significant fauna.....	15
4.3.1	Declared pests.....	18
4.4	Black cockatoo habitat.....	18
4.4.1	Breeding habitat.....	18
4.4.2	Roosting habitat .....	19
4.4.3	Foraging habitat .....	19
<b>5</b>	<b>Discussion</b> .....	<b>20</b>
5.1	Fauna habitat values .....	20
5.2	Black cockatoo habitat values.....	20
<b>6</b>	<b>Conclusions</b> .....	<b>21</b>
<b>7</b>	<b>References</b> .....	<b>22</b>

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



7.1	General references .....	22
7.2	Online references.....	24

## List of Tables

Table 1: Attributes recorded as part of the black cockatoo habitat tree (HT) assessment.....	7
Table 2: Evaluation of survey methodology against standard constraints outlined in EPA Technical Guidance – Terrestrial fauna Surveys. ....	9
Table 3: Fauna habitats identified within the site. ....	11
Table 4: Summary of conservation significant fauna species with have potential to occur within the site. ....	16
Table 5: Habitat trees recorded within the site .....	19

## List of Plates

Plate 1: Corymbia calophylla forest.....	12
Plate 2: Eucalyptus rudis woodland .....	12
Plate 3: Eucalyptus wandoo woodland .....	13
Plate 4: Scattered native and non-native trees and shrubs .....	13
Plate 5: Shrubland .....	14
Plate 6: Artificial waterbody .....	14
Plate 7: Cleared area .....	15

## Figures

Figure 1: Site Location
Figure 2: Environmental Features
Figure 3: Black Cockatoo Context
Figure 4: Fauna Habitat
Figure 5: Black Cockatoo Habitat

## Appendices

### Appendix A

Additional Information

### Appendix B

*NatureMap* Database Results

### Appendix C

Conservation Significant Species and  
Likelihood of Occurrence Assessment

### Appendix D

Species List

### Appendix E

Black Cockatoo Habitat Tree Data

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## Abbreviation Tables

*Table A1: Abbreviations – Organisations*

Organisations	
EPA	Environmental Protection Authority
DBCA	Department of Biodiversity, Conservation and Attractions
DPaW	Department of Parks and Wildlife (now DBCA)
DoEE	Department of the Environment and Energy
WA Museum	Western Australian Museum

*Table A2: Abbreviations – General terms*

General terms	
T	Threatened
EN	Endangered
EX	Extinct
VU	Vulnerable
MI	Migratory
HT	Habitat tree
P1	Priority 1
P2	Priority 2
P3	Priority 3
P4	Priority 4
P5	Priority 5
EPDNS	Established Pests and Diseases of National Significance

*Table A3: Abbreviations – Legislation*

Legislation	
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
BC Act	<i>Biodiversity Conservation Act 2016</i>

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



*Table A4: Abbreviations – planning*

Planning terms	
MRS	Metropolitan region scheme
LPS	Local Planning Scheme

*Table A5: Abbreviations – units of measurement*

Units of measurement	
DBH	Diameter at breast height
cm	Centimetre
ha	Hectare
km	Kilometre
m	Metre



# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## 1 Introduction

### 1.1 Project background

Linc Property Pty Ltd (Linc) intends to develop what is currently the Middle Swan Brickworks in Middle Swan for residential purposes. The brickworks comprises multiple Lot 15, 87, 103, 104 Great Northern Highway, Lot 6 Bassett Road, Lot 72 Eveline Road, Lot 23 Winston Crescent, Lot 9000 Cranwood Crescent and multiple smaller undeveloped lots on Winston Crescent and Somerset Street which are referred to herein as 'the site' as shown in **Figure 1**.

The site is located approximately 17 kilometres (km) north east of the Perth Central Business District within the City of Swan and is zoned 'industrial', 'rural' and 'urban' under the Metropolitan Region Scheme (MRS) and 'general industrial', 'light industrial', 'local road' and 'residential development' under the City of Swan's *Local Planning Scheme* (LPS) No. 17.

The site is approximately 83.36 hectares (ha) in size and is bound by the Swan River to the north west, Reid Highway to the north, Great Northern Highway and Leslie Road to the east, Eveline Road and parklands to the south east and Cranwood Crescent to the west.

### 1.2 Purpose and scope of work

Emerge Associates (Emerge) were engaged by Linc Property Pty Ltd to provide environmental consultancy services to support the planning process for the site. The purpose of this assessment is to provide sufficient information on the fauna values within the site to inform this process.

The scope of work was specifically to conduct a fauna assessment to the standard required of a 'level 1' fauna survey and a targeted black cockatoo survey in accordance with the Environmental Protection Authority's (EPA's) *Technical Guidance – Terrestrial fauna Surveys* (EPA 2016).

As part of this scope of work, the following tasks were undertaken:

- Desktop review of background information regarding fauna species relevant to the site and surrounds.
- Compilation of a list of fauna species opportunistically recorded as part of the field survey.
- Identification of potential habitat for conservation significant fauna species and likelihood of occurrence.
- A targeted black cockatoo survey.
- Documentation of the desktop assessment, survey methodology and results into a report.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## 2 Environmental Context

### 2.1 Significant fauna

#### 2.1.1 Threatened fauna species

Certain fauna taxa that are considered to be rare or under threat warrant special protection under Commonwealth and/or State legislation. At a Commonwealth level, fauna taxa may be listed as 'threatened' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any action likely to have a significant impact on a taxon listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment and Energy.

In Western Australia fauna species may also be classed as 'threatened' under the *Biodiversity Conservation Act 2016* (BC Act). It is an offence to 'take' or 'disturb' threatened fauna without Ministerial approval.

Threatened fauna species listed under the EPBC Act and/or BC Act are assigned a conservation status according to attributes such as population size and geographic distribution. Further information on threatened species and their categories is provided in **Appendix A**.

#### 2.1.2 Priority fauna species

Fauna species that do not currently meet the criteria for listing as threatened but are potentially rare or threatened may be added to the Department of Biodiversity, Conservation and Attractions (DBCAs) *Priority Fauna List*. These species are classified into 'priority' levels based on threat. Whilst priority species are not under direct statutory protection, they are considered during State approval processes. Further information on priority species and their categories is provided in **Appendix A**.

#### 2.1.3 Migratory fauna species

Migratory fauna species that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations warrant special protection under Commonwealth and State legislation. At a Commonwealth level, migratory fauna taxa may be listed as 'migratory' under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any action likely to have a significant impact on a taxon listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment and Energy.

In Western Australia migratory fauna taxa may be listed as 'specially protected species' and classed as 'migratory' under the *Biodiversity Conservation Act 2016* (BC Act). Further information on migratory species is provided in **Appendix A**.

#### 2.1.4 Pest fauna species

The term 'pest fauna' can refer to any animal that requires some form of action to reduce its effect on the economy, the environment, human health and amenity. Many non-native fauna species and some fauna species native to Australia but not Western Australia are considered to be pest fauna.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



A particularly invasive or detrimental pest species may be listed as a 'declared pest' pursuant to Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act), indicating that it warrants special management to limit its spread. At a National level, pest fauna may be listed as 'Established Pests and Diseases of National Significance' (EPDNS) under the *Australian Pest Animal Strategy (2017-2027)* (DoA 2017). Further information on categories of declared pests is provided in **Appendix A**.

## 2.2 Bush Forever

The Government of Western Australia's *Bush Forever* policy is a strategic plan for conserving regionally significant bushland within the Swan Coastal Plain portion of the Perth Metropolitan Region. The objective of *Bush Forever* is to protect comprehensive representations of all original ecological communities by targeting a minimum of 10% of each vegetation complex for protection (Government of WA 2000). *Bush Forever* sites are representative of regional ecosystems and habitat and have a key role in the conservation of Perth's biodiversity.

Bush Forever Site 302 'Swan River and Jane Brook, Ashfield to Upper Swan', extends into the north western portion of the site. This *Bush Forever* site is associated with the Swan River and extends beyond the site. The location of the part of Bush Forever Site 302 within the site is shown in **Figure 2**.

## 2.3 Ecological linkages

Ecological linkages are linear landscape elements that allow the movement of fauna, flora and genetic material between areas of remnant habitat. The movement of fauna and the exchange of genetic material between vegetation remnants improve the viability of those remnants by allowing greater access to breeding partners and food sources, refuge from disturbances such as fire and maintenance of genetic diversity of plant communities and populations. Ecological linkages are ideally continuous or near-continuous as the more fractured a linkage is, the less ease flora and fauna have in moving within the corridor (Alan Tingay and Associates 1998).

The Perth Biodiversity Project, supported by the Western Australia Local Government Association (WALGA), have identified and mapped regional ecological linkages within the Perth Metropolitan Region (WALGA and PBP 2004). This study was extended beyond the Perth Metropolitan Region through the South West Biodiversity Project, resulting in the identification and mapping of the South West regional ecological linkages (Molloy *et al.* 2009).

One ecological linkage, no. 35, occurs in the north western portion of the site. This linkage appears to be associated with the Swan River and extends beyond the site. The location of this linkage is shown in **Figure 2**.

## 2.4 Black cockatoo habitat

The Swan Coastal Plain is known to provide habitat for three threatened species of black cockatoo, including *Calyptorhynchus latirostris* (Carnaby's cockatoo), *Calyptorhynchus baudinii* (Baudin's cockatoo) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) (referred to herein collectively as 'black cockatoos').

# Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



Important black cockatoo habitat includes the following:

- Breeding habitat: Trees that contain hollows that are suitable for breeding black cockatoos. These must generally be located within 7 km of food and water resources (Saunders 1990).
- Roosting habitat: Groups of large trees that are located within 6 km of water and food resources, with overlapping foraging ranges within 12 km (Shah 2006; Le Roux 2017).
- Foraging habitat: Vegetation that contains known foraging plant species for black cockatoos.

The Department of Planning (DoP), in partnership with the Department of the Environment and Energy (DoEE) and fauna experts have identified and mapped Carnaby's cockatoo habitat (breeding, roosting and foraging) on the Swan Coastal Plain and Jarrah Forest to help identify areas of highest potential conflict between land-use planning and conservation of habitat (DEC 2011; Johnstone *et al.* 2011).

The dataset includes confirmed (chicks or eggs observed) and potential (breeding behavior or chew marks observed but no chicks or eggs) Carnaby's cockatoo breeding habitat, as well as confirmed (roosting observed) and potential roosting (requiring further investigation) habitat. Both confirmed and potential breeding sites are presented with a 12 km radius buffer. Potential foraging habitat is mapped based on regional vegetation mapping that may contain plant species known to be foraged upon by Carnaby's cockatoo (Hedde *et al.* 1980; Havel and Mattiske 2000; DEC 2007; Strelein *et al.* 2009).

While this dataset only predicts potential habitat presence for Carnaby's cockatoo, the information is also largely applicable for Baudin's cockatoo and forest red-tailed black cockatoo. Many plant species that are foraged upon by Carnaby's cockatoo are also consumed by Baudin's cockatoo (e.g. *Banksia* spp. cones and *Corymbia calophylla* (marri) nuts) and forest red-tailed cockatoo (e.g. *Eucalyptus marginata* (jarrah) and marri nuts). Similarly, breeding sites that are suitable for Carnaby's cockatoo may also be suitable for Baudin's cockatoo and forest red-tailed cockatoo if located within their distribution/breeding ranges. The potential foraging habitat dataset is likely an overestimation of available foraging habitat for forest red-tailed cockatoos, as it includes a number of plant species that are not consumed by this species (e.g. *Banksia* spp.).

Additionally, Birdlife Australia undertakes annual monitoring of black cockatoo roost sites, as part of the 'Great Cocky Count'. Information gathered from these monitoring events is analysed and published in annual reports. Spatial information for these roost sites is available to environmental consultancies and is also reviewed as part of this assessment (Peck *et al.* 2017).

## 2.4.1 Distribution

The site is located within the known distribution range of all three species of black cockatoo.

## 2.4.2 Breeding habitat

The site is located on the border of Baudin's cockatoos modelled breeding range (DoEE 2016), which is extending eastwards from the site.

The site is located approximately 600 m west of a Carnaby's cockatoo confirmed breeding site 12 km buffer (DEC 2011). This breeding site is associated with the Darling Scarp. The entire site is also mapped as potential Carnaby's cockatoo breeding habitat (DEC 2011).

## Level 1 Fauna and Targeted Black Cockatoo Assessment

### Middle Swan Brickworks



#### 2.4.3 Roosting habitat

A number of potential roost sites are mapped as occurring near the site. However, no birds have been recorded at most of these sites. The closest known roost site where birds have been recorded is located approximately 6 km west of the site. This roost site is associated with forest red-tailed black cockatoos.

#### 2.4.4 Foraging habitat

The site is located within approximately 5 km of extensive areas of potential black cockatoo foraging habitat, which comprises remnant native vegetation of the Jarrah Forest on the Darling Scarp. This vegetation is likely suitable for foraging by all three species of black cockatoo. Within the local area, a number of smaller pockets of vegetation are located in close proximity of the site.

The extent of potential black cockatoo breeding and foraging habitat and roosting sites within the site and the wider area is shown in **Figure 3**.

#### 2.5 Previous surveys

Strategen JBS&G undertook a flora, vegetation and fauna survey of the south eastern portion of the site in April and May 2019, prior to the current survey (Strategen JBS&G 2019). Three 'fauna habitats' were identified, with the remainder of the site mapped as 'cleared areas'. No threatened or priority fauna species were recorded in the site.

A total of 67 black cockatoo habitat trees were recorded within the site, comprising *Corymbia calophylla* (marri), *Eucalyptus camaldulensis* (river red gum) and *Eucalyptus rudis* (flooded gum) trees. However, none of these trees contained hollows that were considered currently suitable for breeding species of black cockatoo. A total of 19.3 ha of low to moderate quality black cockatoo foraging habitat, comprising marri, river red gum and flooded gum trees, was also recorded within the site. No evidence of black cockatoo foraging within the site was recorded.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## 3 Methods

### 3.1 Desktop assessment

#### 3.1.1 Database searches

A search was conducted for threatened and priority fauna that may occur or have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DoEE 2019a) and *NatureMap* (DBCA 2019). DBCA's threatened and priority fauna database search was also requested and results were provided within a radius of five km (reference number FAUNA#6176).

A total number of species with potential to occur within the site was calculated by adding the total count of non-conservation significant species provided by *NatureMap* to the combined number of conservation significant species provided by *NatureMap* and *Protected Matters Search Tool*.

#### 3.1.2 Likelihood of occurrence

Information on habitat preferences and distribution of threatened and priority vertebrate fauna species<sup>1</sup> identified to potentially occur within the site or wider area was reviewed. This was assessed against the general site conditions and fauna habitat types recorded during the field survey.

An assessment of the likelihood of occurrence of threatened and priority fauna species within the site was undertaken and each was assigned to one of the following categories:

- Recorded: The species in question was positively identified as being present within the site during the field survey or from recent literature records.
- Likely: Potentially suitable habitat for the species in question was identified during the field survey and the site lies within the known distribution of the species.
- Possible: Potentially suitable habitat for the species in question was identified but of marginal quality and/or extent and the site lies within or close to the known distribution of the species.
- Unlikely: The site lies outside of the known distribution of the species in question and/or no suitable habitat was identified within the site.

### 3.2 Field survey

An ecologist from Emerge visited the site on the 18 of September, 8 and 24 of October 2019 during the day to conduct the level 1 fauna and targeted black cockatoo field survey.

#### 3.2.1 Level 1 fauna

Transects were traversed across the site, during the day, and the characteristics of fauna habitat and presence of fauna species was recorded. Microhabitats such as logs, rocks and leaf litter were investigated and secondary evidence of species presence such as tracks, scats, skeletal remains, foraging evidence or calls was also noted.

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<sup>1</sup> Invertebrate taxa were not assessed and no evaluation of the potential for invertebrate taxa to occur within the site is provided.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



A vertebrate fauna list was compiled and fauna habitat values were described, with particular reference to ‘threatened’ and ‘priority’ fauna<sup>1</sup> species with potential to occur within the site. Taxonomy and nomenclature for vertebrate fauna species was taken from the *Western Australian Museum Checklist of the Terrestrial Vertebrate Fauna of Western Australia* (Western Australian Museum 2019). Literature listed in **Appendix A** represent the main publications used to identify fauna species and habitats within the site. Non-native species are denoted with asterisk (\*) in text and raw data.

## 3.2.2 Targeted black cockatoo

The site was searched for potential black cockatoo breeding, roosting and foraging habitat. Habitat trees (HT) were individually identified, tagged and assessed against attributes outlined in **Table 1** below. HTs are typically defined as native eucalypts with diameter at breast height (DBH)  $\geq 50$  cm. Tree hollows were deemed as potentially suitable for use by breeding black cockatoos if the opening diameter was  $\geq 10$  cm (Groom 2010) and if the hollow was located in a trunk or branch that is generally large enough to accommodate a black cockatoo. Hollows that were considered to be potentially suitable for breeding by black cockatoos from the ground were then investigated further using a pole-mounted camera to determine internal dimensions.

Table 1: Attributes recorded as part of the black cockatoo habitat tree (HT) assessment.

Attribute	Description
Tag	Unique identifier on a metal tag was attached to each habitat tree (HT).
Image	Each HT was individually photographed.
GPS location	The location of each HT was recorded using a handheld GPS unit.
Tree species	Species and common name were identified.
Diameter at breast height (DBH) (cm)	Each HT was measured using a diameter tape.
Tree height (m)	The height of each HT was estimated.
Hollow information	If observed, hollows were noted and photographed.
Entrance information	The entrance diameter was estimated and the entry position noted (e.g. top-entry or side-entry).
Hollow orientation	The orientation of hollows was recorded (vertical, near-vertical, non-vertical).
Signs of use of hollows	Signs of use of hollows by black cockatoos or other species were noted.

A dusk roost survey was not undertaken. The site was assessed for the potential of providing roosting habitat for black cockatoos, and secondary evidence of roosting activity, such as branch clippings, droppings or moulted feathers was searched. Patches of large native and non-native trees were assumed to provide potential black cockatoo roosting habitat.

Potential black cockatoo foraging habitat was identified by comparing the literature on known foraging habitat resources against the vegetation within the site (Davies 1966; Saunders 1980; Johnstone and Storr 1998; Johnstone and Kirkby 1999; Groom 2011; Johnstone *et al.* 2011; DoEE 2012). Potential foraging habitat was then assessed for importance based on the presence of plant species known to be primary as a food source for black cockatoos, vegetation extent and regional

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



context of the site. Secondary evidence of black cockatoo foraging, such as chewed marri nuts or banksia cones, within the site was searched and allocated to a species where possible.

Active searches were conducted for secondary evidence of breeding, roosting and foraging activity such as chew marks, branch clippings, droppings, moulted feathers and chewed marri nuts or banksia cones.

### 3.3 Mapping and data analysis

#### 3.3.1 Fauna habitat

Fauna habitats were described and mapped based on plant communities identified in (reference). Fauna habitats were described according to the dominant flora species and vegetation type present, as determined from observations made during the field survey and information provided in the '*Detailed Flora and Vegetation Assessment*' (Emerge Associates 2019). The identified fauna habitats were mapped on aerial photography with the boundaries interpreted from aerial photography, previously identified plant communities (Emerge Associates 2019) and notes taken in the field.

Information on specific habitat requirements for conservation significant vertebrate fauna species with potential to occur within the site were compiled as part of the desktop assessment. This information was compared to the fauna habitats identified within the site to determine whether any conservation significant fauna species are considered to have potential to utilise the site.

#### 3.3.2 Black cockatoo habitat

The location of potential black cockatoo habitat trees recorded in the site and information on hollows (if present) were mapped on aerial imagery. The data for each black cockatoo habitat tree was compiled in a table format.

Potential black cockatoo foraging habitat was mapped according to the fauna habitats recorded and notes taken in the field.

### 3.4 Survey limitations

It is important to note the specific constraints imposed on surveys and the degree to which these may have limited survey outcomes. An evaluation of the survey methodology against standard constraints outlined in the EPA document *Technical Guidance – Terrestrial Fauna Surveys* (EPA 2016) is provided in **Table 2**.



# Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



*Table 2: Evaluation of survey methodology against standard constraints outlined in EPA Technical Guidance – Terrestrial fauna Surveys.*

Constraint	Degree of limitation	Details
Level of survey	No limitation	A level 1 survey (desktop study and field survey) in combination with level 2 (targeted) black cockatoo survey was considered adequate given the relatively low habitat values within the site and the generally good availability of fauna information for the region.
Scope	No limitation	The survey focused on vertebrate fauna and habitat values, with particular focus on conservation significant taxa with potential to occur within the site.
Proportion of fauna identified, recorded and/or collected.	No limitation	All observed vertebrate fauna were identified.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data.	No limitation	Adequate information was available from database searches.
The proportion of the task achieved and further work which might be needed.	No limitation	The task was achieved in its entirety.
Experience level of personnel	Minor limitation	This fauna assessment was undertaken by a qualified, early career ecologist. The ecologist is experienced in conducting fauna surveys but is relatively new to Western Australia. Technical review was undertaken by a senior environmental consultant with 15 years' experience in environmental science in Western Australia.
Suitability of timing	No limitation	The survey was undertaken from the late morning until late afternoon, which is typically not the highest activity period for bird species. However, the weather conditions were optimal for identifying fauna species and survey timing is not considered to be of great importance for Level 1 assessments.
Completeness	No limitation	The desktop assessment, field survey and targeted black cockatoo components of the survey were completed.
Spatial coverage and access	No limitation	Site coverage was comprehensive (track logged).
	No limitation	All parts of the site could be accessed as required.
Survey intensity	No limitation	The intensity of the survey was adequate given the size of the site and the relatively low habitat value present.
Influence of disturbance	No limitation	The site is highly modified due to historical disturbance. However, no recent disturbance was noted that may have affected outcomes of the survey.
Adequacy of resources	No limitation	All resources required to perform the survey were available.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## 4 Results

### 4.1 General site conditions

The site is flat except for the north western boundary where it slopes steeply down to the Swan River. The slope of the river bank varies from gentle in the northern and southern portions where the bank is wider, to very steep in the central portion where it is narrower. The river bank has been subject to erosion along the majority of the waterline.

The majority of the site has been subject to long term repeated historical disturbance due to its use as a brickworks and has been devoid of native vegetation for more than 60 years. Planted and opportunistic flora species occur in these areas, particularly planted trees such as *Eucalyptus camaldulensis* (river-red gum).

The central southern portion of the site appears to have been subject to lower levels of disturbance and supports native vegetation. This includes areas of high quality intact native vegetation as well as patches of disturbed vegetation with native trees over non-native shrubs and grasses.

The portion of the Swan River foreshore that occurs in the site has been subject to disturbance and is dominated by non-native vegetation. Scattered native species occur primarily along the edge of the banks, with one area of native shrubland recorded.

An artificial waterbody is present within the northern portion of the site as a result of historical clay excavation.

### 4.2 Fauna habitat

Historical disturbance has significantly compromised habitat values within the site. The majority of the native vegetation has been removed and vegetation now predominantly comprises cleared area, and areas dominated by non-native and weed species with scattered or patches of native and non-native trees and shrubs.

A total of seven fauna habitats were identified within the site, including '*Corymbia calophylla* forest', '*Eucalyptus rudis* woodland', '*Eucalyptus wandoo* woodland', 'scattered native and non-native trees and shrubs', 'shrubland', 'artificial waterbody', and 'cleared area'.

A description and the area of each habitat is provided in **Table 3** and representative photographs of each are provided in **Plate 1** to **Plate 7**. The location of each habitat is shown on **Figure 3**.

The highest natural fauna habitat values within the site are associated with *Corymbia calophylla* forest, *Eucalyptus rudis* woodland and shrubland. Particularly where the vegetation within these habitats remains in very good<sup>2</sup> or better condition it provides a cover of native trees and shrubs, dense ground cover and contains microhabitats such as logs, rocks and leaf litter.

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<sup>2</sup> Keighery, B. 1994, *Bushland Plant Survey: A guide to plant community survey for the community*, Wildflower Society of WA (Inc), Nedlands.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



Table 3: Fauna habitats identified within the site.

Fauna habitat classification	Description	Area (ha)
<b>Corymbia calophylla forest</b>	Open forest <i>Corymbia calophylla</i> over shrubland <i>Hibbertia</i> sp. and <i>Xanthorrhoea preissii</i> over open sedgeland <i>Cyathochaeta avenacea</i> and <i>Mesomelaena tetragona</i> over open herbland <i>Agrostocrinum hirsutum</i> over open grassland * <sup>3</sup> <i>Eragrostis curvula</i> ( <b>Plate 1</b> ).	0.71
<b>Eucalyptus rudis woodland</b>	Woodland <i>Eucalyptus rudis</i> over tall shrubland <i>Jacksonia sternbergiana</i> over shrubland <i>Billardiera heterophylla</i> and <i>Phyllanthus calycinus</i> and <i>Hakea</i> spp. over closed non-native grassland ( <b>Plate 2</b> ). This habitat type gently slopes towards a low-lying area in the west, where standing water was present and sedges covered the ground.	0.47
<b>Eucalyptus wandoo woodland</b>	Woodland <i>Eucalyptus wandoo</i> over open non-native grassland ( <b>Plate 3</b> ).	0.34
<b>Scattered native and non-native trees and shrubs</b>	Woodland to tall shrubland of various planted species, particularly <i>Eucalyptus camaldulensis</i> , with scattered <i>E. rudis</i> over scattered native and non-native shrubs over non-native grassland with occasional native species ( <b>Plate 4</b> ). Where this habitat occurs in lower lying areas it was partially saturated with standing water.	26.89
<b>Shrubland</b>	Shrubland <i>Acacia pulchella</i> var. <i>pulchella</i> , <i>Hakea undulatum</i> and <i>Hypocalymma angustifolium</i> over sedgeland <i>Mesomelaena tetragona</i> over open grassland <i>Neurachne alopecuroidea</i> over herbland <i>Stylidium</i> spp. ( <b>Plate 5</b> ).	0.22
<b>Artificial waterbody</b>	Artificial waterbody that is surrounded by non-native and scattered native vegetation ( <b>Plate 6</b> ).	1.81
<b>Cleared area</b>	Heavily disturbed areas comprising planted non-native trees and shrubs over non-native herbs and grasses, with occasional native shrubs and forbs ( <b>Plate 7</b> ).	52.53

<sup>3</sup> '\*' denotes non-native flora species

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



Plate 1: *Corymbia calophylla* forest



Plate 2: *Eucalyptus rudis* woodland

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



*Plate 3: Eucalyptus wandoo woodland*



*Plate 4: Scattered native and non-native trees and shrubs*

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



*Plate 5: Shrubland*



*Plate 6: Artificial waterbody*

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



Plate 7: Cleared area

### 4.3 Fauna

#### 4.3.1 Desktop assessment

A total number of 598 fauna species were identified from database searches as occurring or potentially occurring within 10 km of the site<sup>4</sup> as listed in **Appendix B**.

This includes 30 threatened, 10 priority, 11 migratory fauna and two other specially protected species as listed in **Appendix C**.

#### 4.3.2 Species inventory

A total of eight native and two introduced fauna species were directly or indirectly (from secondary evidence) recorded during the field survey. Additionally, although not observed during the survey, staff of the Midland Brick factory have advised Emerge that the artificial waterbody contains turtles which are most likely *Chelodina colliei* (oblong turtle). No fauna species of conservation significance were recorded within the site.

A complete fauna species list is provided in **Appendix D**.

#### 4.3.3 Conservation significant fauna

The majority of the threatened and priority fauna species identified in the desktop assessment are not considered to occur in the site due to lack of suitable habitat or because the site lies outside of

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<sup>4</sup> Includes native and non-native species

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



the species known distribution range. A total of 11 conservation significant fauna species identified from database searches are considered to have the potential to utilise the site as shown in **Table 4**.

Table 4: Summary of conservation significant fauna species with have potential to occur within the site.

Species	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
<b>Birds</b>					
<i>Apus pacificus</i>	Pacific swift	MI	MI	Aerial, migratory species that is most often seen over inland plains and sometimes above open areas, foothills or in coastal areas. Sometimes occurs over settled areas, including towns, urban areas and cities (Johnstone and Storr 1998).	<b>Possible:</b> This aerial species may opportunistically occur in or fly over the site on commute or while searching for prey.
<i>Botaurus poiciloptilus</i>	Australasian bittern	EN	EN	In or over water, in tall reedbeds, sedges, rushes, cumbungi, lignum. Also occurs in ricefields, drains in tussocky paddocks and occasionally in saltmarshes and brackish wetlands.	<b>Possible:</b> This mobile species occurs in areas near the site and therefore could also occur in the site. However, habitat within the site is very marginal as dense reed vegetation is absent.
<i>Calyptorhynchus banksii naso</i>	Forest red-tailed black cockatoo	VU	VU	Eucalypt and Corymbia forests, often in hilly interior. More recently also observed in more open agricultural and suburban areas including Perth metropolitan area. Attracted to seeding Corymbia calophylla, Eucalyptus marginata, introduced Melia azedarach and Eucalyptus spp. trees (Johnstone and Storr 1998).	<b>Likely:</b> This species occurs in areas surrounding the site and potential foraging habitat is present within the site.
<i>Calyptorhynchus baudinii</i>	Baudin's cockatoo	EN	EN	Mainly eucalypt forests. Attracted to seeding Corymbia calophylla, Banksia spp., Hakea spp., and to fruiting apples and pears (Johnstone and Storr 1998).	<b>Likely:</b> This species occurs in areas surrounding the site and potential foraging habitat is present within the site.



## Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



Table 3: Summary of conservation significant fauna species deemed possible or likely to occur within the site (continued).

Species	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		WA	EPBC Act		
<b>Aves</b>					
<i>Calyptrorhynchus latirostris</i>	Carnaby's cockatoo	EN	EN	Mainly proteaceous scrubs and heaths and adjacent eucalypt woodlands and forests; also plantations of Pinus spp. Attracted to seeding Banksia spp., Dryandra spp., Hakea spp., Eucalyptus spp., Corymbia calophylla, Grevillea spp., and Allocasuarina spp. (Johnstone and Storr 1998).	<b>Likely:</b> This species occurs in areas surrounding the site and potential foraging habitat is present within the site.
<i>Falco peregrinus</i>	Peregrine falcon	S	-	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	<b>Possible:</b> This highly mobile species may opportunistically occur in or fly over the site on commute or while searching for prey.
<i>Oxyura australis</i>	Blue-billed duck	P4	-	Mainly deeper freshwater swamps and lakes; occasionally saltlakes and estuaries freshened by flood waters (Johnstone and Storr 1998a).	<b>Possible:</b> This mobile species occurs in areas near the site and therefore could also occur in the site.
<i>Plegadis falcinellus</i>	Glossy Ibis	MI	MI	Shallow and adjacent flats of freshwater lakes and swamps, also river pools, flooded samphire and sewage ponds.	<b>Possible:</b> This mobile species occurs in areas near the site and therefore could also occur in the site.
<b>Mammals</b>					
<i>Isoodon fusciventer</i>	Quenda	P4	-	Dense scrubby, often swampy, vegetation with dense cover up to one metre high (DEC 2012).	<b>Possible:</b> Some parts of the site provide adequate ground cover required by this species. However, they are limited in extent.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



Table 3: Summary of conservation significant fauna species deemed possible or likely to occur within the site (continued).

Species	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		WA	EPBC Act		
<b>Reptiles</b>					
<i>Ctenotus delli</i>	Dell's skink	P4	-	Jarrah and marri woodland with a shrub dominated understorey, sheltering in dense vegetation, inside grass trees and beneath rocks, sometimes in burrows (Nevill 2005).	<b>Possible:</b> Limited suitable habitat occurs within <i>Corymbia calophylla</i> forest and shrubland. However, this species has not been recorded within the wider area of the site for many years.
<b>Moluscs</b>					
<i>Westralunio carteri</i>	Carter's freshwater mussel	VU	VU	Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots. Salinity tolerance quite low (Morgan et al. 2011).	<b>Possible:</b> May occur in waterbody or streams within the site or in adjacent Swan River.

### 4.3.1 Declared pests

Two species, *Oryctolagus cuniculus* (rabbit) and *Trichoglossus moluccanus* (rainbow lorikeet) listed as a declared pest (C3) pursuant to the BAM Act, were identified within the site.

## 4.4 Black cockatoo habitat

### 4.4.1 Breeding habitat

A total of 32 black cockatoo (BC) habitat trees were observed within the site, of which six contained potential hollows as listed in **Table 5** and shown in **Figure 5**. These trees comprise *Corymbia calophylla* (marri), *Eucalyptus wandoo* (wandoo) and stag trees. The site also comprises a number of mature *Eucalyptus rudis* (flooded gum) trees. However, these trees were not mapped as habitat trees, as flooded gums are not known to be a preferred breeding tree species for BCs.

To be suitable for use by breeding BCs, hollows must have an entrance diameter of at least 10 cm (Groom 2010) and be situated in a branch/trunk that is generally big and high enough and suitably orientated (vertical or near-vertical) to accommodate BCs. Based on these criteria, two trees (tag number 364 and 496) could be classified as unsuitable.

A further four trees had hollows with some potential to be suitable for use by BCs due to the size of the apparent entrance or where the entrance could not be seen due to the size of the trunk or branch

# Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



section within which a hollow appeared to be present. One of these trees (tag number 366) was inspected using a pole-mounted camera and was deemed unsuitable as the hollows that it contained were not deep enough for breeding by BCs. The remaining three trees with potentially suitable hollows (tag number 462, 463 and 484) were not assessed using the pole-mounted camera and the internal dimensions of hollows located within these trees remain unconfirmed. These trees were stag trees located along the Swan River foreshore.

No signs of use by BCs, such as chew marks, droppings or moulted feathers, was recorded within any of the habitat trees with hollow(s) in the site.

An inventory of all habitat trees recorded within the site is provided in **Appendix E**.

Table 5: Habitat trees recorded within the site

Habitat trees	Count
No hollows	26
Unsuitable hollows	3
Potentially suitable hollows	3
<b>Total</b>	<b>32</b>

#### 4.4.2 Roosting habitat

No evidence of BC roosting, such as branch clippings, droppings and moulted feathers was observed within the site and no anecdotal records of BCs roosting within the site were reported by Midland Brick staff. A number of native and non-native trees within the site have the potential to provide roosting habitat for BCs.

#### 4.4.3 Foraging habitat

Foraging habitat within the site is generally limited and patchily distributed throughout the site. The main BC foraging species recorded within the site are *Acacia saligna*, *Allocasuarina humilis*, *Banksia dallanneyi*, *Casuarina obesa*, *Hakea* spp., *Eucalyptus wandoo* (wandoo), marri and *Xanthorrhoea preissii*. Portions of vegetation where these species are dominant were mapped as potential BC foraging habitat as shown in **Figure 5**.

The areas mapped as potential foraging habitat within the site primarily relate to vegetation containing marri and wandoo trees. These species are consumed by all three species of BC. The site also contains a number of flooded gum and non-native eucalypt trees such as *Eucalyptus camaldulensis* (river red gum). While some evidence exists that these species are foraged upon by species of BC, they are not considered a primary resource and consumption of these species is likely opportunistic if it occurs at all. The flooded gums and non-native eucalypt trees within the site were therefore not mapped as potential foraging habitat.

The total area of potential foraging habitat within the site adds up to approximately 1.05 ha. However, this number is likely an overestimation, as it would include any non-foraging plant species that occurred amongst the foraging species. On the other hand, areas of vegetation where foraging species occur only sporadically amongst non-foraging plant species, were not mapped as potential foraging habitat, resulting in a slight underestimation of potential foraging habitat in these areas.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

## Middle Swan Brickworks



## 5 Discussion

### 5.1 Fauna habitat values

Fauna habitat values within the site are limited and the native fauna species recorded within the site are all generally common and widespread.

Habitat value is greatest with respect to *Corymbia calophylla* forest, *Eucalyptus rudis* woodland, shrubland, as well as, scattered native trees within the site that likely provide value to a range of native species including some that are conservation significant, such as species of BC (further discussed in **Section 4.2** below). However, the extent of these habitats within the site is relatively small (1.05 ha). For the majority of the site, habitat values are compromised by the removal of most or all native vegetation and historical degradation. The site now primarily provides habitat that is suitable for common and widespread fauna species with non-specific habitat requirements.

### 5.2 Black cockatoo habitat values

No recorded of BCs within the site was made during the field survey. Nor was the presence of BCs within the site reported by Midland Brick staff.

Of the 32 BC habitat trees identified within the site of which six were observed to contain hollows. Three of these trees with hollows were considered unsuitable for breeding by BCs due to the small size of their hollows and in one case because the hollow was located too close to the ground (approximately 2 m high). The remaining three trees with hollows contain hollows that are potentially suitable as breeding habitat for BCs. However, the internal dimensions of these hollows are unknown and further assessment would be required to confirm their suitability for use by BCs. Given that the site is located within the predicted breeding range of all three species of BC, the site can be considered to provide potential breeding habitat for BCs.

A small number of trees within the site have the potential to provide roosting habitat for BCs. However, no evidence of recent or historical roosting activity was observed within the site.

Several plant species within the site provide a potential foraging resource for BCs, including marri and wandoo trees, as well as, scattered foraging species. Particularly marri is recognised as primary foraging species for BCs. However, the extent of marri within the site is very small. Large areas of remnant native vegetation are located within close proximity to the site (DEC 2011) as shown in **Figure 3**. This vegetation is likely to comprise foraging habitat for all three species of BC and also to be of higher quality than the vegetation within the site. Given the small extent of primary foraging species within the site and that extensive areas of higher quality foraging habitat are located near the site on the Darling Scarp, it is considered unlikely that the site provides important foraging habitat for BCs.

## Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



### 6 Conclusions

A total of eight common and widespread native and two non-native fauna species were positively identified to occur within the site. Additionally, 11 species of conservation significance are considered to have potential to occur within the site. However, the likelihood that the site would provide important habitat for these species is low, as the majority of habitat within the site is in relatively poor condition and limited in extent.

The site contains a total of 26 black cockatoo habitat trees without hollows, three habitat trees with hollows that are unsuitable for breeding by black cockatoos and three with hollows that are potentially suitable as breeding habitat for black cockatoos. However, the internal dimensions of the potentially suitable hollows are currently unconfirmed. No evidence of black cockatoo roosting activity was observed within the site. A number of plant species within the site provide potential foraging habitat for black cockatoos, particularly areas containing marri and wandoo trees (approximately 1.05 ha). Given the relatively small extent and presence of extensive areas of higher quality foraging habitat nearby, the site is considered unlikely to represent important foraging habitat for black cockatoos.

With the exception of the aforementioned species of black cockatoo, the site is likely to be primarily utilised by common and widespread native species without specific habitat requirements.

# Level 1 Fauna and Targeted Black Cockatoo Assessment

Middle Swan Brickworks



## 7 References

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## Middle Swan Brickworks



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# Figures



*Figure 1: Site Location*

*Figure 2: Environmental Features*

*Figure 3: Black Cockatoo Context*

*Figure 4: Fauna Habitat*

*Figure 5: Black Cockatoo Habitat*





**Figure 1: Site Location**

**Project:** Level 1 Fauna and Targeted Black Cockatoo Assessment  
Middle Swan Brickworks

**Client:** Linc Property Pty Ltd

**Plan Number:**  
EP19-105(26)-F34

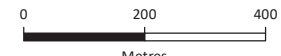
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**Date:** 08/11/2019

**Checked:** IMS

**Approved:** TAA

**Date:** 25/11/2019

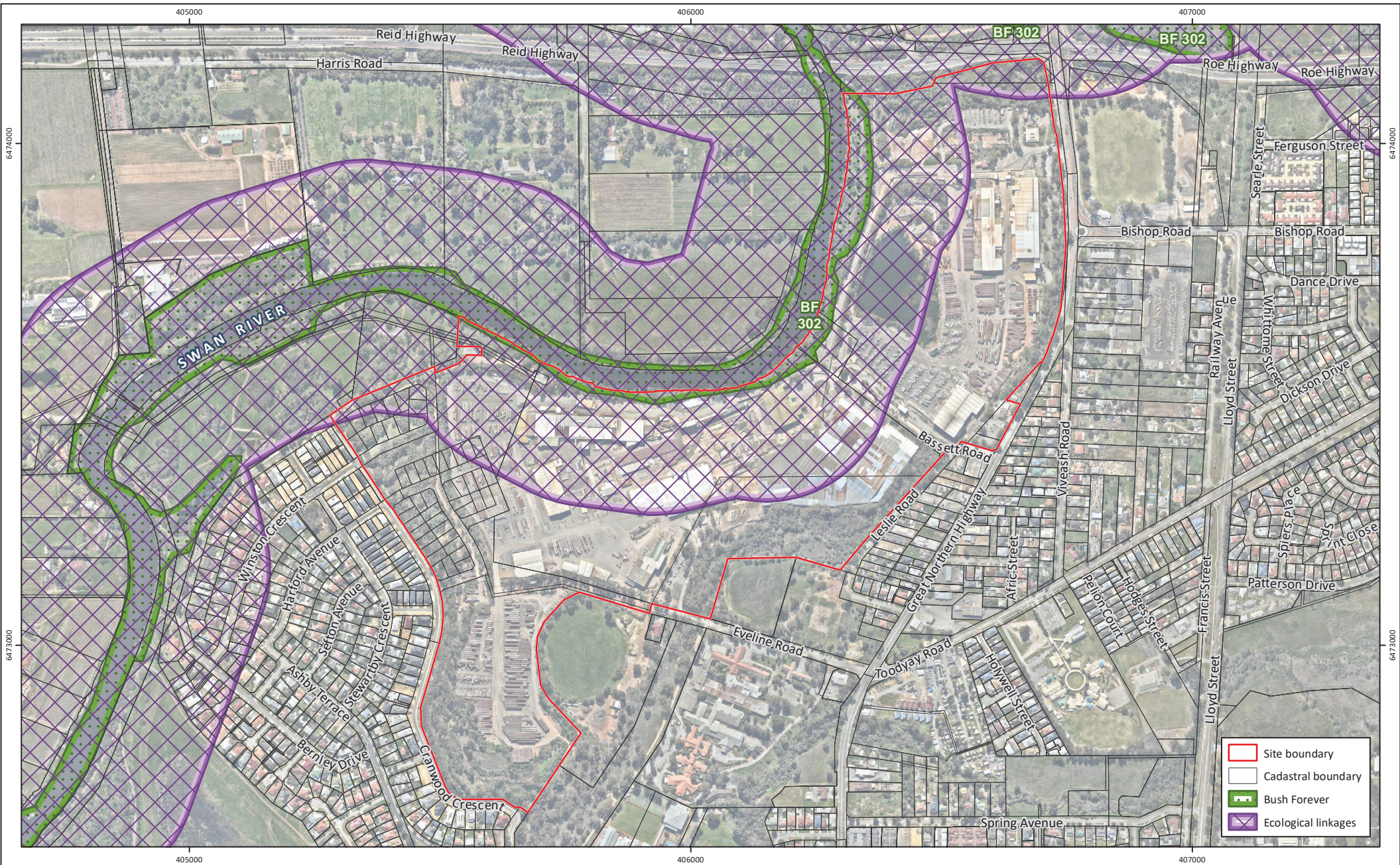


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GDA 1994 MGA Zone 50



While Emmerge Associates makes every attempt to ensure the accuracy and completeness of data, Emmerge accepts no responsibility for externally sourced data used





**Figure 2: Environmental Features**

**Project:** Level 1 Fauna and Targeted Black Cockatoo Assessment  
Middle Swan Brickworks

**Client:** Linc Property Pty Ltd

**Plan Number:**  
EP19-105(26)--F35

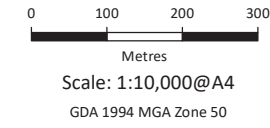
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**Date:** 08/11/2019

**Checked:** IMS

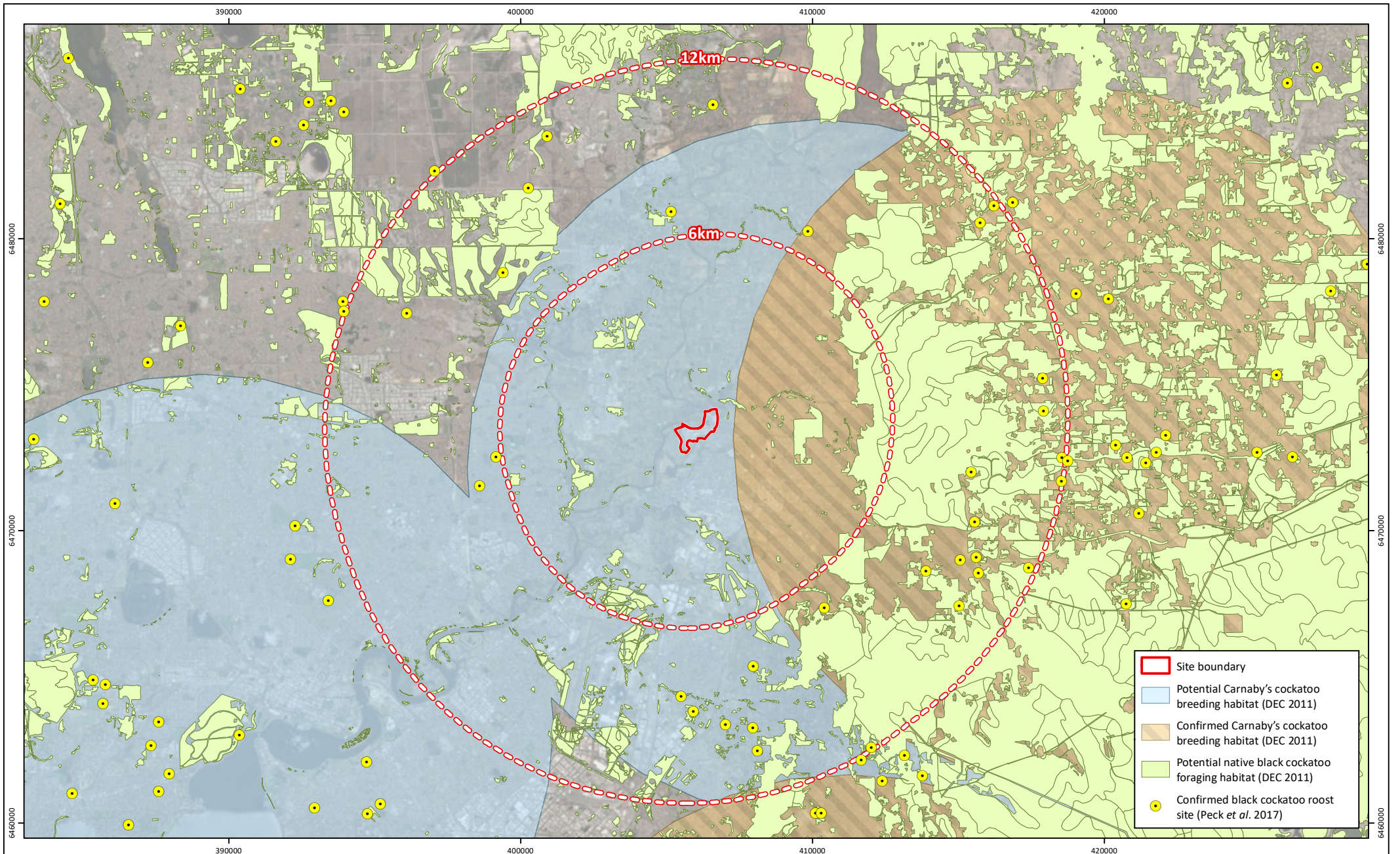
**Approved:** TAA

**Date:** 25/11/2019



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**Figure 3: Black Cockatoo Habitat Context**

**Project:** Level 1 Fauna and Targeted Black Cockatoo Assessment  
Middle Swan Brickworks  
**Client:** Linc Property Pty Ltd

**Plan Number:**  
EP19-105(26)--F36a  
**Drawn:** GAR  
**Date:** 04/12/2019  
**Checked:** IMS  
**Approved:** TAA  
**Date:** 04/12/2019



0 2 4 6  
Kilometres  
Scale: 1:170,000@A4  
GDA 1994 MGA Zone 50









**Figure 4: Fauna Habitat**

**Project:** Level 1 Fauna and Targeted Black Cockatoo Assessment  
Middle Swan Brickworks

**Client:** Linc Property Pty Ltd

**Plan Number:**  
EP19-105(26)-F37

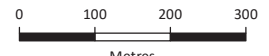
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**Date:** 08/11/2019

**Checked:** IMS

**Approved:** TAA

**Date:** 25/11/2019

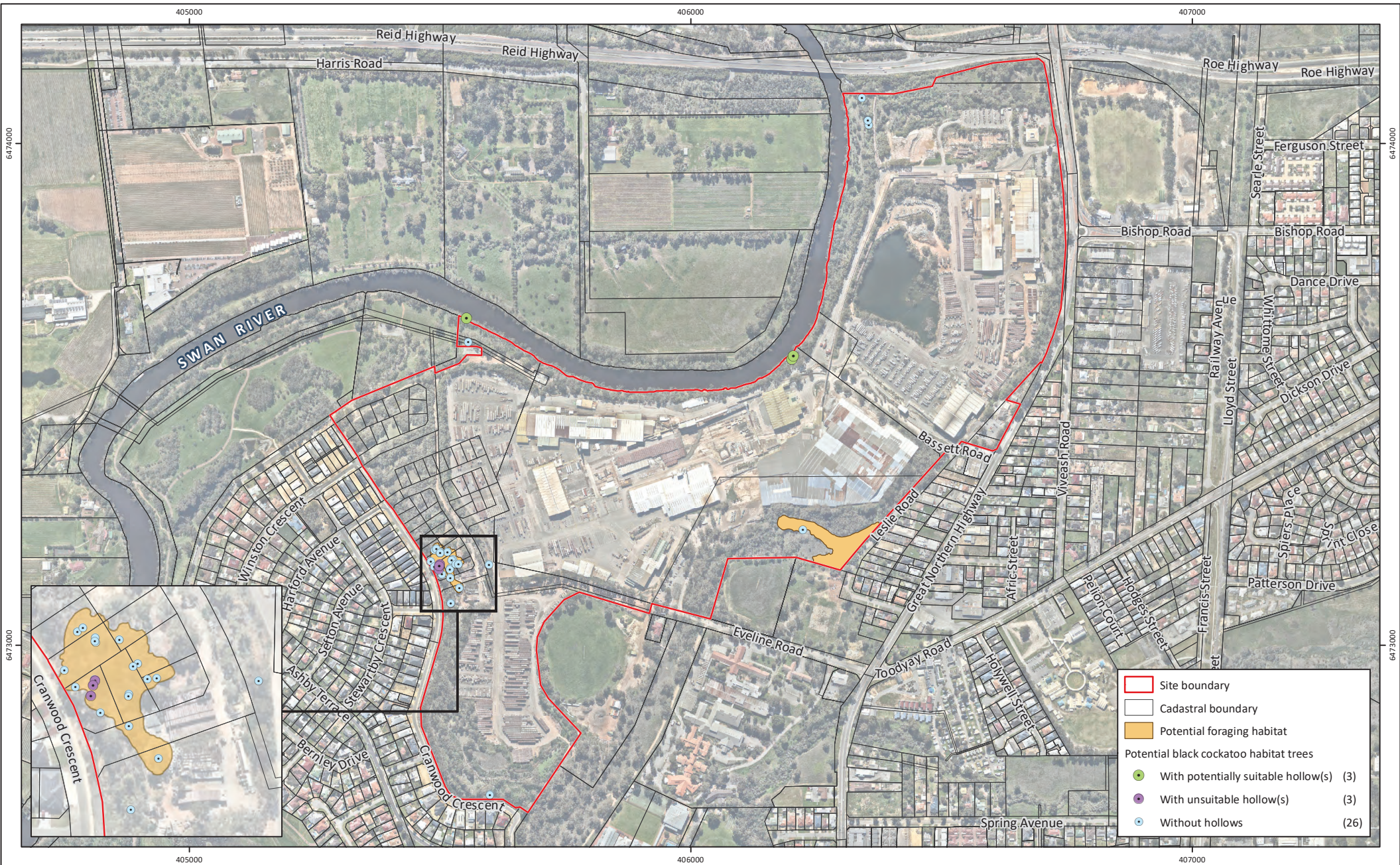


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GDA 1994 MGA Zone 50



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**Figure 5: Black Cockatoo Habitat**

**Project:** Level 1 Fauna and Targeted Black Cockatoo Assessment  
Middle Swan Brickworks

**Client:** Linc Property Pty Ltd

**Plan Number:**  
EP19-105(26)-F38

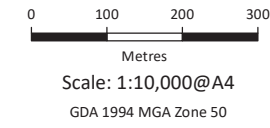
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**Date:** 08/11/2019

**Checked:** IMS

**Approved:** TAA

**Date:** 25/11/2019



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# Appendix A

Additional Information





## Conservation Significant Fauna

### Threatened and priority fauna

Fauna species considered rare or under threat warrant special protection under Commonwealth and/or State legislation. At the Commonwealth level, fauna species can be listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Migratory birds may be recognised under international treaties including:

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

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as ‘matters of national environmental significance’ (MNES) under the EPBC Act. Fauna species considered ‘threatened’ pursuant to Schedule 1 of the EPBC Act are assigned categories as outlined in **Table 1**.

*Table 1: Definitions of conservation significant fauna species pursuant to the EPBC Act*

Conservation Code	Category
X	Threatened Fauna –Extinct There is no reasonable doubt that the last member of the species has died.
EW <sup>#</sup>	Threatened Fauna –Extinct in the Wild Taxa which are known only to survive in cultivation, captivity or as a naturalised population outside its past range, or taxa which have not been recorded in its known and/or expected habitat despite appropriate exhaustive surveys.
CR <sup>#</sup>	Threatened Fauna – Critically Endangered Taxa which are considered to be facing an extremely high risk of extinction in the wild.
EN <sup>#</sup>	Threatened Fauna – Endangered Taxa which are considered to be facing a very high risk of extinction in the wild.
VU <sup>#</sup>	Threatened Fauna – Vulnerable Taxa which are considered to be facing a high risk of extinction in the wild.
Migratory <sup>#</sup>	Migratory Fauna All migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and All native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Ma	Marine Fauna Species in the list established under s248 of the EPBC Act

<sup>#</sup>matters of national environmental significance (MNES) under the EPBC Act

## Additional Background Information



In Western Australia, fauna taxa may be classed as ‘specially protected’ under the *Biodiversity Conservation Act 2016* (BC Act) which is enforced by Department of Biodiversity Conservation and Attractions (DBCA). Specially protected fauna species are listed under Schedules 1 to 7 according to their conservation status. The definitions of these Schedules are provided in **Table 2**.

*Table 2: Definitions of specially protected fauna schedules under the BC Act.*

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



## Additional Background Information



Fauna species that may be threatened or near threatened but lack sufficient information to be legislatively listed may be added to the DBCA's *Priority Fauna List* (DBCA 2018). Priority fauna species are considered during State approval processes. Priority fauna categories and definitions are listed in **Table 3**.

*Table 3: Definitions of priority fauna categories on DBCA's Priority Fauna List*

Conservation Code	Category
P1	<p>Priority 1 – Poorly known</p> <p>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.</p>
P2	<p>Priority 2 – Poorly known</p> <p>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.</p>
P3	<p>Priority 2 – Poorly known</p> <p>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.</p>
P4	<p>(a) Priority 4 – Rare species</p> <p>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.</p> <p>(b) Priority 4 – Near Threatened</p> <p>Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(c) Priority 4 – Other</p> <p>Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

## Pest fauna

A number of legislative and policy documents exist in relation to weed management at state and national levels. The *Biosecurity and Agriculture Management Act 2007* (BAM Act) is the principle legislation guiding weed management in Western Australia and lists declared pest species. At a national level, pest fauna may be listed as 'Established Pests and Diseases of National Significance' (EPDNS) under the *Australian Pest Animal Strategy (2017-2027)* (DoA 2017).

### Declared Pests

Part 2.3.23 of the BAM Act requires a person must not; “a) keep, breed or cultivate the declared pest; b) keep, breed or cultivate an animal, plant or other thing that is infected or infested with the declared pest; c) release into the environment the declared pest, or an animal, plant or other thing that is infected or infested with the declared pest; or d) intentionally infect or infest, or expose to infection or infestation, a plant, animal or other thing with a declared pest”.

Under the BAM Act, all declared pests are assigned a legal status, as described in **Table 4**. Species assigned to the 'declared pest, prohibited - s12' category are placed in one of three control categories, as described in **Table 5**.

The *Biosecurity and Agriculture Management Regulations 2013* specify keeping categories for species assigned to the 'declared pest - s22(2)' category, which relate to the purposes of which species can be kept, as well as the entities that can keep them. The categories are described in **Table 6**.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act (DAFWA 2016).

*Table 4: Legal status of declared pest species listed under the BAM Act (DAFWA 2016).*

Category	Description
Declared Pest Prohibited - s12	May only be imported and kept subject to permits. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Declared Pest s22(2)	Must satisfy any applicable import requirements when imported, and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia

*Table 5: Control categories of declared pest species listed under the BAM Act (DAFWA 2016).*

Category	Description
C1	Exclusion Not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2	Eradication Present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3	Management

## Additional Background Information



Category	Description
	Established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

*Table 6: Keeping categories of declared pest species listed under the BAM Act (DAFWA 2016).*

Category	Description
Prohibited	Can only be kept under a permit for public display and education purposes, and/or genuine scientific research, by entities approved by the state authority.
Exempt	No permit or conditions are required for keeping.
Restricted	Organisms which, relative to other species, have a low risk of becoming a problem for the environment, primary industry or public safety and can be kept under a permit by private individuals.

## References

### General references

Department of Biodiversity, Conservation and Attractions (DBCA) 2018, *Threatened and Priority Fauna List 15 February 2018*, Perth.

Department of Agriculture (DoA) 2017, *Australian Pest Animal Strategy (2017-2027)*, Canberra.

## Literature

Table 1: Standard literature used for identifying fauna species and habitats.

Conservation Code	Category
Birds	Johnstone and Storr (1998b), Johnstone and Storr (1998a), Pizzey and Knight (2012), Slater <i>et al.</i> (2003)
Mammals	Menkhorst and Knight (2011), Triggs (2003)
Amphibia	Tyler and Doughty (2009), Bush <i>et al.</i> (2002)
Reptiles	Bush <i>et al.</i> (2002)

## References

Bush, B., Maryan, B., Browne-Cooper, R. and Robinson, D. 2002, *Reptiles and Frogs of the Perth Region*, UWA Press, Crawley.

Johnstone, R. E. and Storr, G. M. 1998a, *Handbook of Western Australian Birds. Volume 2 - Passerines (Blue-winged Pitta to Goldfinch)*, Western Australian Museum, Perth.

Johnstone, R. E. and Storr, T. 1998b, *Handbook of Western Australian Birds: Volume 1 - Non-passerines (Emu to Dollarbird)*, Western Australian Museum, Perth.

Menkhorst, P. and Knight, F. 2011, *Field guide to the mammals of Australia (Third edition)*, Oxford University Press Australia & New Zealand, Melbourne, VIC, Australia.

Pizzey, G. and Knight, F. 2012, *The Fieldguide to the Birds of Australia*, Harper Collins Publishers, Sydney, Australia.

Slater, P., Slater, P. and Slater, R. 2003, *The Slater Field Guide to Australian Birds*, Reed New Holland, Australia.

Triggs, B. 2003, *Tracks, Scats and Other Traces A Field Guide to Australian Mammals*, Oxford University Press Australia, Melbourne, Victoria.

Tyler, M. J. and Doughty, P. 2009, *Field Guide to Frogs of Western Australia*, Western Australian Museum, Perth, Western Australia.



# Appendix B

*NatureMap* Database Results







# NatureMap Species Report

Created By Guest user on 25/10/2019

**Kingdom** Animalia  
**Current Names Only** Yes  
**Core Datasets Only** Yes  
**Method** 'By Circle'  
**Centre** 116° 00' 29" E, 31° 52' 17" S  
**Buffer** 10km

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	<i>Acanthaluteres brownii</i>			
3.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
4.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
5.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
6.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
7.	<i>Acariformes</i> sp.			
8.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
9.	24281 <i>Accipiter cirrocephalus</i> subsp. <i>cirrocephalus</i> (Collared Sparrowhawk)			
10.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
11.	24283 <i>Accipiter fasciatus</i> subsp. <i>didimus</i> (Brown Goshawk)			
12.	24282 <i>Accipiter fasciatus</i> subsp. <i>fasciatus</i> (Brown Goshawk)			
13.	<i>Acentrogobius bifrenatus</i>			
14.	25751 <i>Acridotheres tristis</i> (Common Myna)	Y		
15.	42368 <i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			
16.	<i>Acroaspis olorina</i>			Y
17.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
18.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
19.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
20.	<i>Aganippe cupulifex</i>			Y
21.	<i>Akamptogonus novarae</i>			
22.	<i>Aldrichetta forsteri</i>			
23.	<i>Allothereua maculata</i>			
24.	<i>Ambicodamus kochi</i>			
25.	<i>Amblyomma albolimbatum</i>			
26.	<i>Amblyomma fimbriatum</i>			
27.	<i>Amblyomma triguttatum</i>			
28.	<i>Amniataba caudavittata</i>			
29.	<i>Amphisopodidae</i> sp.			
30.	<i>Aname mainae</i>			
31.	<i>Aname tepperi</i>			
32.	24310 <i>Anas castanea</i> (Chestnut Teal)			
33.	24311 <i>Anas clypeata</i> (Northern Shoveler)			Y
34.	24312 <i>Anas gracilis</i> (Grey Teal)			
35.	24313 <i>Anas platyrhynchos</i> (Mallard)			
36.	<i>Anas platyrhynchos</i> subsp. <i>domesticus</i>			
37.	24315 <i>Anas rhynchos</i> (Australasian Shoveler)			
38.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
39.	<i>Ancylidae</i> sp.			
40.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
41.	44629 <i>Anilios australis</i>			
42.	24506 <i>Anous tenuirostris</i> subsp. <i>melanops</i> (Australian Lesser Noddy)		T	
43.	<i>Anser anser</i>			
44.	25319 <i>Antaresia stimsoni</i> subsp. <i>orientalis</i> (Stimson's Python)			
45.	25241 <i>Antaresia stimsoni</i> subsp. <i>stimsoni</i> (Stimson's Python)			
46.	25449 <i>Antechinus flavipes</i> (Yellow-footed Antechinus)			
47.	24088 <i>Antechinus flavipes</i> subsp. <i>leucogaster</i> (Yellow-footed Antechinus, Mardo)			
48.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
49.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
50.	25670 <i>Anthus australis</i> (Australian Pipit)			
51.	24990 <i>Aprasia pulchella</i> (Granite Worm-lizard)			
52.	24991 <i>Aprasia repens</i> (Sand-plain Worm-lizard)			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
53.	25554 <i>Apus pacificus</i> (Fork-tailed Swift, Pacific Swift)		IA	
54.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
55.	<i>Arachnura higginsii</i>			
56.	<i>Araneus cyphoxis</i>			
57.	<i>Araneus eburniventris</i>			
58.	<i>Araneus ginninderranus</i>			
59.	<i>Araneus senicaudatus</i>			
60.	25558 <i>Ardea ibis</i> (Cattle Egret)			
61.	25559 <i>Ardea intermedia</i> (Intermediate Egret)			
62.	41324 <i>Ardea modesta</i> (great egret, white egret)			
63.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
64.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
65.	<i>Argiope protensa</i>			
66.	<i>Argiope trifasciata</i>			
67.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
68.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
69.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
70.	<i>Artoria flavimana</i>			
71.	<i>Artoria impedita</i>			
72.	<i>Artoria linnaei</i>			
73.	<i>Artoriopsis expolita</i>			
74.	<i>Asadipus kunderang</i>			
75.	<i>Atherinosoma wallacei</i>			
76.	<i>Australcantha minax</i>			
77.	<i>Australomimetus aurioculatus</i>			
78.	<i>Australomimetus ovidi</i>			
79.	48574 <i>Australotomurus morbidus</i> (cemetery springtail, Guildford springtail)		P3	
80.	33972 <i>Austromerope poultoni</i> (earwigfly (southwest), scorpionfly)			
81.	47713 <i>Austronomus australis</i> (White-striped Free-tailed Bat)			
82.	24318 <i>Aythya australis</i> (Hardhead)			
83.	<i>Backobourkia brounii</i>			
84.	<i>Backobourkia heroine</i>			
85.	<i>Badumna insignis</i>			
86.	<i>Baetidae</i> sp.			
87.	<i>Baiami volucripes</i>			
88.	<i>Ballarra longipalpus</i>			
89.	<i>Barnardius zonarius</i>			
90.	25452 <i>Bettongia penicillata</i> (Woylie, Brush-tailed Bettong)		T	
91.	24162 <i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
92.	<i>Bigenditia zuytdorp</i>			
93.	24319 <i>Biziura lobata</i> (Musk Duck)			
94.	<i>Bostockia porosa</i>			
95.	24345 <i>Botaurus poiciloptilus</i> (Australasian Bittern)		T	
96.	42380 <i>Brachyurophis fasciolatus</i> subsp. <i>fasciolatus</i> (Narrow-banded Shovel-nosed Snake)			
97.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
98.	<i>Brentidae</i> sp.			
99.	24359 <i>Burhinus grallarius</i> (Bush Stone-curlew)			
100.	25713 <i>Cacatua galerita</i> (Sulphur-crested Cockatoo)			
101.	24721 <i>Cacatua galerita</i> subsp. <i>galerita</i> (Sulphur-crested Cockatoo)	Y		
102.	24722 <i>Cacatua leadbeateri</i> (Major Mitchell's Cockatoo)			
103.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
104.	24723 <i>Cacatua pastinator</i> subsp. <i>butleri</i> (Butler's Corella)			
105.	24724 <i>Cacatua pastinator</i> subsp. <i>pastinator</i> (Muir's Corella, Muir's Corella (Western Corella SW WA))		S	
106.	25715 <i>Cacatua roseicapilla</i> (Galah)			
107.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
108.	24727 <i>Cacatua sanguinea</i> subsp. <i>westralensis</i> (Little Corella)			
109.	<i>Cacatua sulphurea</i> subsp. <i>galerita</i>			Y
110.	24729 <i>Cacatua tenuirostris</i> (Eastern Long-billed Corella)	Y		
111.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
112.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
113.	<i>Caenidae</i> sp.			
114.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
115.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black Cockatoo)		T	
116.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)		T	
117.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
118.	48400 <i>Calyptorhynchus</i> sp. (white-tailed black cockatoo)		T	
119.	<i>Carabidae</i> sp.			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
120.	<i>Carassius auratus</i>			
121.	<i>Carcharhinus leucas</i>			
122.	25625 <i>Carduelis carduelis</i> (Goldfinch, European Goldfinch)	Y		
123.	24480 <i>Carduelis carduelis</i> subsp. <i>britannica</i> (Goldfinch)	Y		
124.	<i>Ceinidae</i> sp.			
125.	<i>Celaenia excavata</i>			
126.	<i>Ceratopogonidae</i> sp.			
127.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
128.	<i>Cercophonius granulatus</i>			
129.	<i>Cercophonius sulcatus</i>			
130.	<i>Ceryerda cursitans</i>			
131.	<i>Cethegus fugax</i>			
132.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
133.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
134.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
135.	43380 <i>Chelodina colliei</i> (South-western Snake-necked Turtle)			
136.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
137.	47909 <i>Cheramoeca leucosterna</i> (White-backed Swallow)			
138.	33939 <i>Cherax cainii</i> (Marron)			
139.	<i>Cherax destructor</i>			
140.	<i>Cherax quinquecarinatus</i>			
141.	<i>Cherax</i> sp.			
142.	<i>Chironominae</i> sp.			
143.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
144.	<i>Chroicocephalus novaehollandiae</i>			
145.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
146.	25601 <i>Chrysococcyx lucidus</i> (Shining Bronze Cuckoo)			
147.	24432 <i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			
148.	24288 <i>Circus approximans</i> (Swamp Harrier)			
149.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
150.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
151.	<i>Clynotis severus</i>			
152.	<i>Cnidoglanis macrocephalus</i>			
153.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
154.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
155.	24361 <i>Coracina maxima</i> (Ground Cuckoo-shrike)			
156.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
157.	<i>Corduliidae</i> sp.			
158.	<i>Corixidae</i> sp.			
159.	<i>Cormocephalus aurantiipes</i>			
160.	<i>Cormocephalus rubriceps</i>			
161.	<i>Cormocephalus strigosus</i>			
162.	<i>Cormocephalus turneri</i>			
163.	24416 <i>Corvus bennetti</i> (Little Crow)			
164.	25592 <i>Corvus coronoides</i> (Australian Raven)			
165.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
166.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
167.	24422 <i>Cracticus tibicen</i> subsp. <i>dorsalis</i> (White-backed Magpie)			
168.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
169.	25456 <i>Crenadactylus ocellatus</i> (Clawless Gecko)			
170.	24918 <i>Crenadactylus ocellatus</i> subsp. <i>ocellatus</i> (Clawless Gecko)			
171.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
172.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
173.	25400 <i>Crinia insignifera</i> (Squelching Froglet)			
174.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
175.	30893 <i>Cryptoblepharus buchanani</i>			
176.	25020 <i>Cryptoblepharus plagioccephalus</i>			
177.	30899 <i>Ctenophorus adelaidensis</i> (Southern Heath Dragon, Western Heath Dragon)			
178.	24883 <i>Ctenophorus ornatus</i> (Ornate Crevice-Dragon)			
179.	25027 <i>Ctenotus australis</i>			
180.	25035 <i>Ctenotus delli</i> (Dell's skink, Darling Range southwest Ctenotus)		P4	
181.	25039 <i>Ctenotus fallens</i>			
182.	25040 <i>Ctenotus gemmula</i> (Jewelled South-west Ctenotus (Swan Coastal Plain subpop P3), skink)			
183.	25047 <i>Ctenotus impar</i>			
184.	25049 <i>Ctenotus labillardieri</i>			
185.	<i>Culicidae</i> sp.			
186.	<i>Curculionidae</i> sp.			
187.	<i>Cyanorhamphus auriceps</i>			Y
188.	<i>Cyclosa trilobata</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
189.	24322 <i>Cygnus atratus</i> (Black Swan)			
190.	24323 <i>Cygnus olor</i> (Mute Swan)	Y		
191.	<i>Cyrtophora parnasia</i>			
192.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
193.	30902 <i>Dacelo novaeguineae</i> subsp. <i>novaeguineae</i> (Laughing Kookaburra)	Y		
194.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
195.	24606 <i>Daphoenositta chrysoptera</i> subsp. <i>pileata</i> (Varied Sittella, Black-capped Sittella)			
196.	24092 <i>Dasyurus geoffroi</i> (Chuditch, Western Quoll)		T	
197.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
198.	24999 <i>Delma grayii</i>			
199.	25296 <i>Demansia psammophis</i> subsp. <i>reticulata</i> (Yellow-faced Whipsnake)			
200.	24325 <i>Dendrocygna eytoni</i> (Plumed Whistling Duck)			
201.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
202.	<i>Dingosa serrata</i>			
203.	<i>Dinocambala ingens</i>			
204.	25469 <i>Diplodactylus granariensis</i>			
205.	24929 <i>Diplodactylus granariensis</i> subsp. <i>granariensis</i>			
206.	44654 <i>Diplodactylus lateroides</i> (Speckled Stone Gecko)			
207.	24939 <i>Diplodactylus polyophthalmus</i>			
208.	24940 <i>Diplodactylus pulcher</i>			
209.	<i>Dolichopodidae</i> sp.			
210.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
211.	<i>Dugesiiidae</i> sp.			
212.	<i>Dytiscidae</i> sp.			
213.	25251 <i>Echiopsis curta</i> (Bardick)			
214.	25096 <i>Egernia kingii</i> (King's Skink)			
215.	25100 <i>Egernia napoleonis</i>			
216.	<i>Egretta garzetta</i>			
217.	<i>Egretta novaehollandiae</i>			
218.	<i>Elanus axillaris</i>			
219.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
220.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
221.	47937 <i>Elseymis melanops</i> (Black-fronted Dotterel)			
222.	<i>Engraulis australis</i>			
223.	<i>Eodelena lapidicola</i>			
224.	<i>Eolophus roseicapillus</i>			
225.	25692 <i>Eopsaltria australis</i> (Yellow Robin)			
226.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
227.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
228.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
229.	24258 <i>Equus caballus</i> (Horse)	Y		
230.	<i>Erigone prominens</i>			
231.	<i>Eriophora biapicata</i>			
232.	<i>Eriophora pustulosa</i>			
233.	24379 <i>Erythronys cinctus</i> (Red-kneed Dotterel)			
234.	<i>Eucyrtops latior</i>			
235.	48579 <i>Euoplos inornatus</i> (inornate trapdoor spider (northern Jarrah Forest))		P3	
236.	<i>Eupograptus kottae</i>			
237.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
238.	25621 <i>Falco berigora</i> (Brown Falcon)			
239.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
240.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
241.	24472 <i>Falco cenchroides</i> subsp. <i>cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
242.	25623 <i>Falco longipennis</i> (Australian Hobby)			
243.	24474 <i>Falco longipennis</i> subsp. <i>longipennis</i> (Australian Hobby)			
244.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
245.	24189 <i>Falsistrellus mackenziei</i> (Western False Pipistrelle, Western Falsistrelle)		P4	
246.	<i>Favonigobius</i> sp.			
247.	24041 <i>Felis catus</i> (Cat)	Y		
248.	25727 <i>Fulica atra</i> (Eurasian Coot)			
249.	24761 <i>Fulica atra</i> subsp. <i>australis</i> (Eurasian Coot)			
250.	34028 <i>Galaxias occidentalis</i> (Western Minnow)			
251.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
252.	24763 <i>Gallinula tenebrosa</i> subsp. <i>tenebrosa</i> (Dusky Moorhen)			
253.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
254.	<i>Gea theridioides</i>			
255.	24959 <i>Gehyra variegata</i>			
256.	25404 <i>Geocrinia leai</i> (Ticking Frog)			
257.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
258.	34030 <i>Geotria australis</i> (Pouched Lamprey)			

P3

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
259.	<i>Gerres subfasciatus</i>			
260.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
261.	<i>Glossiphoniidae</i> sp.			
262.	30918 <i>Glossopsitta concinna</i> (Musk Lorikeet)	Y		
263.	47962 <i>Glyciphila melanops</i> (Tawny-crowned Honeyeater)			
264.	<i>Gomphidae</i> sp.			
265.	<i>Gonorynchus greyi</i>			
266.	<i>Gracula religiosa</i>			
267.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
268.	<i>Gripopterygidae</i> sp.			
269.	<i>Gyrinidae</i> sp.			
270.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)			
271.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
272.	24689 <i>Halobaena caerulea</i> (Blue Petrel)			
273.	24296 <i>Hamirostra isura</i> (Square-tailed Kite)			
274.	25408 <i>Heleioporus albopunctatus</i> (Western Spotted Frog)			
275.	25409 <i>Heleioporus barycragus</i> (Hooting Frog)			
276.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
277.	25412 <i>Heleioporus psammophilus</i> (Sand Frog)			
278.	<i>Hemicloea</i> sp.			Y
279.	<i>Hemicloea sublimbata</i>			
280.	<i>Hemicorduliidae</i> sp.			
281.	25474 <i>Hemiergis initialis</i>			
282.	25115 <i>Hemiergis initialis</i> subsp. <i>initialis</i>			
283.	25119 <i>Hemiergis quadrilineata</i>			
284.	<i>Heurodes turritus</i>			
285.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
286.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
287.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
288.	<i>Hoggicosa storri</i>			
289.	<i>Hogna crispipes</i>			
290.	<i>Hogna kuyani</i>			
291.	<i>Holasteron perth</i>			
292.	<i>Holconia westralia</i>			
293.	<i>Holocnemus pluchei</i>			
294.	24215 <i>Hydromys chrysogaster</i> (Water-rat, Rakali)		P4	
295.	<i>Hydrophilidae</i> sp.			
296.	48587 <i>Hydroprogne caspia</i> (Caspian Tern)		IA	
297.	<i>Hydroptilidae</i> sp.			
298.	<i>Hypoblemum</i> sp.			Y
299.	<i>Idiommata blackwalli</i>			
300.	48935 <i>Idiosoma sigillatum</i> (Swan Coastal Plain shield-backed trapdoor spider)		P3	
301.	<i>Isometroides vescus</i>			
302.	48588 <i>Isoodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
303.	<i>Isopeda leishmanni</i>			
304.	<i>Isopeda magna</i>			
305.	<i>Isopedella cana</i>			
306.	<i>Isopedella tindalei</i>			
307.	24347 <i>Ixobrychus flavicollis</i> subsp. <i>australis</i> (Black Bittern (southwest subpop.), Australian Black Bittern)		P2	
308.	<i>Karaops ellenaee</i>			
309.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
310.	<i>Lampona cylindrata</i>			
311.	<i>Lampona yanchep</i>			
312.	<i>Lamponella ainslie</i>			
313.	24511 <i>Larus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Silver Gull)			
314.	<i>Latrodectus hasselti</i>			
315.	<i>Latrodectus hasseltii</i>			
316.	<i>Leptoceridae</i> sp.			
317.	<i>Leptophlebiidae</i> sp.			
318.	25131 <i>Lerista distinguenda</i>			
319.	25133 <i>Lerista elegans</i>			
320.	25148 <i>Lerista lineopunctulata</i>			
321.	25165 <i>Lerista praepedita</i>			
322.	25005 <i>Lialis burtonis</i>			
323.	<i>Libellulidae</i> sp.			
324.	25659 <i>Lichenostomus leucotis</i> (White-eared Honeyeater)			
325.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
326.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
327.	<i>Limnochares australica</i>			

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328.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
329.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
330.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
331.	<i>Lophochroa leadbeateri</i>			
332.	<i>Lophoictinia isura</i>			
333.	<i>Lycosa ariadnae</i>			
334.	<i>Lycosa godeffroyi</i>			
335.	<i>Lymnaeidae</i> sp.			
336.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
337.	24135 <i>Macropus robustus</i> subsp. <i>erubescens</i> (Euro, Biggada)			
338.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte, Ninu)		T	
339.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
340.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
341.	25651 <i>Malurus lamberti</i> (Variegated Fairy-wren)			
342.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
343.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
344.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
345.	24552 <i>Malurus splendens</i> subsp. <i>splendens</i> (Splendid Fairy-wren)			
346.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
347.	<i>Maratus pavonis</i>			
348.	<i>Masasteron mas</i>			
349.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
350.	<i>Megapodagrionidae</i> sp.			
351.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
352.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
353.	24586 <i>Melithreptus brevirostris</i> subsp. <i>leucogenys</i> (Brown-headed Honeyeater)			
354.	24587 <i>Melithreptus chloropsis</i> (Western White-naped Honeyeater)			
355.	25184 <i>Menetia greyii</i>			
356.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
357.	<i>Microcarbo melanoleucos</i>			
358.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
359.	<i>Missulena granulosa</i>			
360.	<i>Missulena hoggi</i>			
361.	<i>Missulena occatoria</i>			
362.	<i>Mituliodon tarantulinus</i>			
363.	<i>Monacanthus chinensis</i>			
364.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)			
365.	25191 <i>Morethia lineocellata</i>			
366.	25192 <i>Morethia obscura</i>			
367.	48005 <i>Mormopterus kitcheneri</i> (South-western Free-tailed Bat)			
368.	<i>Mugil cephalus</i>			
369.	24223 <i>Mus musculus</i> (House Mouse)	Y		
370.	<i>Myandra bicincta</i>			
371.	25610 <i>Myiagra inquieta</i> (Restless Flycatcher)			
372.	25420 <i>Myobatrachus gouldii</i> (Turtle Frog)			
373.	<i>Nannoperca vittata</i>			
374.	<i>Neatypus obliquus</i>			
375.	25248 <i>Neelaps bimaculatus</i> (Black-naped Snake)			
376.	25249 <i>Neelaps calonotos</i> (Black-striped Snake, black-striped burrowing snake)		P3	
377.	<i>Nematoda</i> sp.			
378.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
379.	25686 <i>Neochmia temporalis</i> (Red-browed Finch)	Y		
380.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
381.	<i>Neophema pulchella</i>			
382.	<i>Nephila edulis</i>			
383.	<i>Nicodamus mainae</i>			
384.	25747 <i>Ninox connivens</i> (Barking Owl)			
385.	48022 <i>Notamacropus irma</i> (Western Brush Wallaby)		P4	
386.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
387.	<i>Notiasemus glauerti</i>			
388.	<i>Notsodipus muckera</i>			
389.	<i>Novakiella trituberculosa</i>			
390.	<i>Nunciella aspera</i>			
391.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
392.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
393.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
394.	<i>Occiperipatoides gilesii</i>			
395.	<i>Ocrisiona leucocomis</i>			
396.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
397.	<i>Oecobius navus</i>			

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398.	<i>Oligochaeta</i> sp.			
399.	<i>Ommatoiulus moreleti</i>			
400.	<i>Ommatoiulus moreletii</i>			
401.	<i>Oniscidae</i> sp.			
402.	<i>Opopaea</i> sp.			Y
403.	<i>Orphnaeus brevilabiatus</i>			
404.	<i>Orthocladinae</i> sp.			
405.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
406.	<i>Ostearius melanopygius</i>			
407.	34016 <i>Ovis aries</i> (Sheep)			
408.	<i>Oxyopes gracilipes</i>			
409.	<i>Oxyopes punctatus</i>			
410.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
411.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
412.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
413.	24693 <i>Pachyptila desolata</i> (Antarctic Prion)			
414.	48591 <i>Pandion cristatus</i> (Osprey, Eastern Osprey)		IA	
415.	<i>Papillogobius punctatus</i>			
416.	<i>Paralampona marangaroo</i>			
417.	<i>Parameliidae</i> sp.			
418.	<i>Parastacidae</i> sp.			
419.	25253 <i>Parasuta gouldii</i>			
420.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
421.	24625 <i>Pardalotus punctatus</i> subsp. <i>punctatus</i> (Spotted Pardalote)			
422.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
423.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
424.	25687 <i>Passer domesticus</i> (House Sparrow)	Y		
425.	<i>Pediana occidentalis</i>			
426.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
427.	<i>Pentasteron securifer</i>			
428.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
429.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
430.	48066 <i>Petroica boodang</i> (Scarlet Robin)			
431.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
432.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
433.	25698 <i>Phalacrocorax melanoleucos</i> (Little Pied Cormorant)			
434.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
435.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
436.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
437.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
438.	48070 <i>Phascogale tapoatafa</i> subsp. <i>wambenger</i> (South-western Brush-tailed Phascogale, Wambenger)		S	
439.	<i>Pholcus phalangioides</i>			
440.	<i>Phryganoporus candidus</i>			
441.	48071 <i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
442.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
443.	<i>Physidae</i> sp.			
444.	<i>Pinkfloydia harveii</i>			
445.	<i>Planorbidae</i> sp.			
446.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
447.	<i>Platycephalus indicus</i>			
448.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
449.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
450.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
451.	24750 <i>Platycercus zonarius</i> subsp. <i>semitorquatus</i> (Twenty-eight Parrot)			
452.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
453.	25007 <i>Pletholax gracilis</i> subsp. <i>gracilis</i> (Keeled Legless Lizard)			
454.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
455.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
456.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
457.	24680 <i>Podiceps cristatus</i> subsp. <i>australis</i> (Great Crested Grebe)			
458.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
459.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
460.	24681 <i>Poliocephalus poliocephalus</i> (Hoary-headed Grebe)			
461.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
462.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
463.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
464.	24767 <i>Porphyrio porphyrio</i> subsp. <i>bellus</i> (Purple Swamphen)			
465.	24769 <i>Porzana fluminea</i> (Australian Spotted Crane)			
466.	25732 <i>Porzana pusilla</i> (Baillon's Crane)			

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467.	24771 <i>Porzana tabuensis</i> (Spotless Crane)			
468.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
469.	25345 <i>Pseudemydura umbrina</i> (Western Swamp Tortoise, Western Swamp Turtle)		T	
470.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum, ngwayir)		T	
471.	25511 <i>Pseudonaja affinis</i> (Dugite)			
472.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
473.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
474.	25264 <i>Pseudonaja nuchalis</i> (Gwardar, Northern Brown Snake)			
475.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
476.	42344 <i>Purnella albifrons</i> (White-fronted Honeyeater)			
477.	<i>Purpureicephalus spurius</i>			
478.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
479.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
480.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
481.	<i>Raveniella cirrata</i>			
482.	<i>Raveniella peckorum</i>			
483.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
484.	<i>Rhabdosargus sarba</i>			
485.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
486.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
487.	24454 <i>Rhipidura leucophrys</i> subsp. <i>leucophrys</i> (Willie Wagtail)			
488.	<i>Richardsonianidae</i> sp.			
489.	<i>Sandalodes joannae</i>			
490.	<i>Sandalodes superbus</i>			
491.	<i>Scirtidae</i> sp.			
492.	<i>Scobinichthys granulatus</i>			
493.	<i>Scolopendra laeta</i>			
494.	<i>Scytodes thoracica</i>			
495.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
496.	<i>Serinus canarius</i>			
497.	<i>Servaea melaina</i>			
498.	<i>Servaea spinibarbis</i>			
499.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
500.	<i>Simuliidae</i> sp.			
501.	<i>Smeringopus natalensis</i>			
502.	<i>Smeringopus natalensis</i> ?			Y
503.	30948 <i>Smicronis brevirostris</i> (Weebill)			
504.	24645 <i>Stagonopleura oculata</i> (Red-eared Firetail)			
505.	<i>Steatoda capensis</i>			
506.	<i>Steatoda grossa</i>			
507.	24525 <i>Sterna fuscata</i> subsp. <i>nubilosa</i> (Sooty Tern)			
508.	24329 <i>Stictonetta naevosa</i> (Freckled Duck)			
509.	<i>Storena formosa</i>			
510.	<i>Storena sinuosa</i>			
511.	<i>Stratiomyidae</i> sp.			
512.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
513.	25589 <i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
514.	30951 <i>Streptopelia chinensis</i> subsp. <i>tigrina</i> (Spotted Turtle-Dove)	Y		
515.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
516.	25518 <i>Strophurus spinigerus</i>			
517.	24943 <i>Strophurus spinigerus</i> subsp. <i>inornatus</i>			
518.	24942 <i>Strophurus spinigerus</i> subsp. <i>spinigerus</i>			
519.	<i>Styloniiscidae</i> sp.			
520.	<i>Supunna funerea</i>			
521.	<i>Supunna picta</i>			
522.	24259 <i>Sus scrofa</i> (Pig)	Y		
523.	33992 <i>Synemon gratiosa</i> (Graceful Sunmoth)		P4	
524.	<i>Synothele durokoppin</i>			
525.	<i>Synothele michaelsoni</i>			
526.	<i>Synthemistidae</i> sp.			
527.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
528.	24682 <i>Tachybaptus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
529.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
530.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
531.	<i>Talitridae</i> sp.			
532.	<i>Tamopsis darlingtoniana</i>			
533.	<i>Tamopsis perthensis</i>			
534.	<i>Tanypodinae</i> sp.			
535.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			



Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
536.	<i>Tasmanicosa leuckartii</i>			
537.	<i>Tetragnatha demissa</i>			
538.	<i>Tetragnatha luteocincta</i>			Y
539.	48597 <i>Thalasseus bergii</i> (Crested Tern)		IA	
540.	48136 <i>Threskiornis moluccus</i> (Australian White Ibis)			
541.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
542.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
543.	25519 <i>Tiliqua rugosa</i>			
544.	25204 <i>Tiliqua rugosa subsp. aspera</i>			
545.	25207 <i>Tiliqua rugosa subsp. rugosa</i>			
546.	<i>Tipulidae sp.</i>			
547.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
548.	24309 <i>Todiramphus sanctus subsp. sanctus</i> (Sacred Kingfisher)			
549.	<i>Trachycosmus sculptilis</i>			
550.	<i>Trachypina mundaring</i>			
551.	48141 <i>Tribonyx ventralis</i> (Black-tailed Native-hen)			
552.	<i>Trichocycclus nullarbor</i>			
553.	<i>Trichoglossus chlorolepidotus</i>			
554.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
555.	24755 <i>Trichoglossus haematodus subsp. moluccanus</i> (Rainbow Lorikeet)	Y		
556.	24754 <i>Trichoglossus haematodus subsp. rubritorquis</i> (Red-collared Lorikeet)			
557.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
558.	24158 <i>Trichosurus vulpecula subsp. vulpecula</i> (Common Brushtail Possum)			
559.	<i>Tridentiger trigonocephalus</i>			
560.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
561.	24808 <i>Tringa nebularia</i> (Common Greenshank, greenshank)		IA	
562.	48147 <i>Turnix varius</i> (Painted Button-quail)			
563.	24851 <i>Turnix velox</i> (Little Button-quail)			
564.	25762 <i>Tyto alba</i> (Barn Owl)			
565.	24852 <i>Tyto alba subsp. delicatula</i> (Barn Owl)			
566.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
567.	<i>Urocampus carinirostris</i>			
568.	<i>Urodacus armatus</i>			
569.	<i>Urodacus novaehollandiae</i>			
570.	<i>Urodacus planimanus</i>			
571.	25577 <i>Vanellus miles</i> (Masked Lapwing)			
572.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
573.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
574.	<i>Varanus sp.</i>			
575.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			
576.	<i>Venator immansueta</i>			
577.	<i>Venatrix pullastra</i>			
578.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
579.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
580.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)		T	
581.	<i>Withius piger</i>			
582.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
583.	unknown unknown			Y

**Conservation Codes**

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

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



# Appendix C

Conservation Significant Species and  
Likelihood of Occurrence Assessment





Table B1: Likelihood of occurrence of conservation significant fauna species within the site.

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
<b>Aves</b>					
<i>Anous tenuirostris melanops</i>	Australian lesser noddy	EN	VU	Very common in blue-water seas around the Abrolhos (endemic to this area, accidental occurrences on lower west coast of Australia) (Johnstone and Storr 1998).	Unlikely
<i>Apus pacificus</i>	Pacific swift	MI	MI	Aerial, migratory species that is most often seen over inland plains and sometimes above open areas, foothills or in coastal areas. Sometimes occurs over settled areas, including towns, urban areas and cities (Pizzey & Knight 2012).	Possible
<i>Botaurus poiciloptilus</i>	Australasian bittern	EN	EN	In or over water, in tall reedbeds, sedges, rushes, cumbungi, lignum. Also occurs in ricefields, drains in tussocky paddocks and occasionally in saltmarshes and brackish wetlands.	Possible
<i>Cacatua pastinator pastinator</i>	Muir's corella	S	-	Wheat and sheep farming country with remnant native forest.	Unlikely, locally extinct
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	MI	MI	Occurs in tidal mudflats, saltmarshes and mangroves, as well as, shallow fresh, brackish or saline inland wetlands. It is also known from floodwaters, irrigated pastures and crops, sewage ponds, saltfields.	Unlikely
<i>Calidris ferruginea</i>	Curlew sandpiper	VU (MI)	CR (MI)	Mainly shallows of estuaries and near-coastal saltlakes (including saltwork ponds) and drying near-coastal freshwater lakes and swamps. Also beaches and near-coastal sewage ponds.	Unlikely
<i>Calidris melanotos</i>	Pectoral sandpiper	MI	MI	Mainly fresh waters (swamps, lagoons, river pools, irrigation channels and sewage ponds); also samphire flats around estuaries and saltlakes (Johnstone & Storr 1998).	Unlikely
<i>Calyptorhynchus banksii naso</i>	Forest red-tailed black cockatoo	VU	VU	Eucalypt and Corymbia forests, often in hilly interior. More recently also observed in more open agricultural and suburban areas including Perth metropolitan area. Attracted to seeding Corymbia calophylla, Eucalyptus marginata, introduced Melia azdarach and Eucalyptus spp. trees.	Likely

Table B1: Likelihood of occurrence of conservation significant fauna species within the site (continued).

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
<b>Aves</b>					
<i>Calyptorhynchus baudinii</i>	Baudin's cockatoo	EN	EN	Mainly eucalypt forests. Attracted to seeding <i>Corymbia calophylla</i> , <i>Banksia</i> spp., <i>Hakea</i> spp., and to fruiting apples and pears (Johnstone and Storr 1998).	Likely
<i>Calyptorhynchus latirostris</i>	Carnaby's cockatoo	EN	EN	Mainly proteaceous scrubs and heaths and adjacent eucalypt woodlands and forests; also plantations of <i>Pinus</i> spp. Attracted to seeding <i>Banksia</i> spp., <i>Dryandra</i> spp., <i>Hakea</i> spp., <i>Eucalyptus</i> spp., <i>Corymbia calophylla</i> , <i>Grevillea</i> spp., and <i>Allocasuarina</i> spp. (Johnstone and Storr 1998).	Likely
<i>Diomedea amsterdamensis</i>	Amsterdam albatross	VU (MI)	EN (MI)	The Amsterdam albatross is a marine, pelagic seabird. It nests in open patchy vegetation (among tussocks, ferns or shrubs) near exposed ridges or hillocks (Weimerskirch et al. 1985). It sleeps and rests on ocean waters when not breeding (Marchant and Higgins 1990)	Unlikely
<i>Diomedea epomophora</i>	Southern royal albatross	VU (MI)	VU (MI)	Rare visitor to Western Australian seas; it breeds on subantarctic islands south of New Zealand (Johnstone and Storr 1998).	Unlikely
<i>Diomedea exulans</i>	Wandering albatross	VU (MI)	VU (MI)	Marine, pelagic and aerial species. It breeds on Macquarie Island and feeds in Australian portions of the Southern Ocean (DoE 2018).	Unlikely
<i>Diomedea sanfordi</i>	Northern royal albatross	EN	EN	Species is marine, pelagic and aerial. Habitat includes subantarctic, subtropical, and occasionally Antarctic waters (Marchant & Higgins 1990). Rare visitors to south Western Australian waters.	Unlikely
<i>Falco peregrinus</i>	Peregrine falcon	S	-	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	Possible
<i>Leipoa ocellata</i>	Mallefowl	VU	VU	Scrubs and thickets of <i>Eucalyptus</i> spp., <i>Melaleuca lanceolata</i> and <i>Acacia linophylla</i> ; also other dense litter-forming shrublands. Attracted to fallen wheat in stubbles and along roads (Johnstone and Storr 1998).	Unlikely, locally extinct
<i>Macronectes giganteus</i>	Southern giant-petrel	MI	EN (MI)	Breeds on southern subantarctic and antarctic islands. May visit Western Australian waters from February to December (mostly June to September) (Johnstone and Storr 1998).	Unlikely

Table B1: Likelihood of occurrence of conservation significant fauna species within the site (continued).

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
<b>Aves</b>					
<i>Macronectes halli</i>	Northern giant petrel	MI	VU (MI)	Breeds on subantarctic islands. May visit Western Australian water from February to September (Johnstone and Storr 1998).	Unlikely
<i>Motacilla cinerea</i>	Grey wagtail	MI	MI	Mainly banks and rocks in fast-running fresh water habitats: rivers, creeks, streams and around waterfalls, both in forest and open country; but occurs almost anywhere during migration.	Unlikely
<i>Numenius madagascariensis</i>	Eastern curlew	VU (MI)	CR (MI)	Mainly tidal mudflats; also reef flats, sandy beaches and rarely near-coastal lakes (including saltwork ponds) (Johnstone and Storr 1998).	Unlikely
<i>Oxyura australis</i>	Blue-billed duck	P4	-	Mainly deeper freshwater swamps and lakes; occasionally saltlakes and estuaries freshened by flood waters (Johnstone and Storr 1998a).	Possible
<i>Pachyptila turtur subantarctica</i>	Fairy prion	-	VU	Breeds on subantarctic islands and is presumed to frequent subtropical waters during non-breeding period (TSSC 2015).	Unlikely
<i>Pandion haliaetus</i>	Osprey	MI	MI	Coasts, estuaries, bays, inlets, islands, and surrounding waters; coral atolls, reefs, lagoons, rock cliffs, stacks (Pizzey & Knight 2012).	Unlikely
<i>Plegadis falcinellus</i>	Glossy Ibis	MI	MI	Shallow and adjacent flats of freshwater lakes and swamps, also river pools, flooded samphire and sewage ponds.	Possible
<i>Rostratula australis</i>	Australian painted snipe	EN	EN	Mainly shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (Marchant and Higgins 1993).	Unlikely
<i>Sterna bergii</i>	Crested tern	MI	MI	Mainly blue-water seas (especially within 3 km of land), including southern estuaries in summer and autumn (when free of silt); also tidal creeks in north, but not penetrating far into larger estuaries.	Unlikely
<i>Sterna caspia</i>	Caspian tern	MI	MI	Mainly sheltered areas, estuaries (when not laden with silt) and tidal creeks; occasionally near-coastal saltlakes (including saltwork ponds) and brackish pools in lower courses of rivers; rarely fresh waters.	Unlikely
<i>Sternula nereis nereis</i>	Australian fairy tern	VU	VU	Sheltered blue-water seas close to land, estuaries (when free of silt) and near-coastal lakes (Johnstone and Storr 1998).	Unlikely

Table B1: Likelihood of occurrence of conservation significant fauna species within the site (continued).

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
<b>Aves</b>					
<i>Thalassarche cauta cauta</i>	Shy albatross	VU (MI)	VU (MI)	Scarce visitor (late May to mid-October) to southwestern and western seas. Breeds on islands off Tasmania and south New Zealand (Johnstone and Storr 1998).	Unlikely
<i>Thalassarche cauta steadi</i>	White-capped albatross	VU (MI)	VU (MI)	Scarce visitor (late May to mid-October) to southwestern and western seas. Breeds on islands off Tasmania and south New Zealand (Johnstone and Storr 1998).	Unlikely
<i>Thalassarche melanophris</i>	Black-browed albatross	EN (MI)	VU (MI)	Seas of south and west coasts. Visitor to Western Australian mainland from January to early November (mostly May to September). Breeds on southern subantarctic and antarctic islands (Johnstone and Storr 1998).	Unlikely
<i>Thalassarche melanophris impavida</i>	Campbell albatross	VU (MI)	VU (MI)	Scarce visitor to south western and western seas. Breeds on Campbell island.	Unlikely
<i>Tringa glareola</i>	Wood sandpiper	MI	MI	Mainly shallow fresh waters (lagoons, swamps, claypans, river pools, dams, bore overflows and sewage ponds); occasionally brackish swamps, rarely saltlakes and estuaries.	Unlikely
<i>Tringa hypoleucos</i>	Common sandpiper	MI	MI	Edge of sheltered waters salt or fresh, e.g. estuaries, mangrove creeks, rocky coasts, near-coastal saltlakes (including saltwork ponds), river pools, lagoons, claypans, drying swamps, flood waters, dams and sewage ponds. Preferring situations where low perches are available (Johnstone & Storr 1998).	Unlikely
<i>Tringa nebularia</i>	Common greenshank	MI	MI	Shallow fresh waters (claypans, lagoons, swamps, river pools, dams and sewage ponds) and salt waters (estuaries, mangrove creeks, lakes, samphire flats, reef flats and saltwork ponds).	Unlikely



Table B1: Likelihood of occurrence of conservation significant fauna species within the site (continued).

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
<b>Agnatha</b>					
<i>Geotria australis</i>	Pouched lamprey	P1	-	Marine, estuarine and coastal rivers and streams. Adults live in Southern Ocean and migrate upstream to spawn. Larvae live in muddy burrows in the upper reaches of streams (Bray and Gomon 2018).	Unlikely
<b>Invertebrate</b>					
<i>Euoplos inornatus</i>	Inornate trapdoor spider	P3	-	Unknown.	Not assessed
<i>Hesperocolletes douglasi</i>	Douglas's broad-headed bee	CR	CR	Banksia woodland vegetation (Pille Arnold 2019).	Unlikely
<i>Idiosoma sigillatum</i>	Swan Coastal Plain shield-backed trapdoor spider	P3	-	Unknown.	Not assessed
<i>Synemon gratiosa</i>	Graceful sunmoth	P4	-	Coastal heathland on Quindalup dunes where it is restricted to secondary sand dunes due to the abundance of the preferred host plant <i>Lomandra maritima</i> . Banksia woodland on Spearwood and Bassendean dunes, where the second known host plant <i>L. hermaphrodita</i> is widespread (DEC 2011).	Unlikely
<i>Westralunio carteri</i>	Carter's freshwater mussel	VU	VU	Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots. Salinity tolerance quite low (Morgan et al. 2011).	Possible
<b>Mammalia</b>					
<i>Bettongia penicillata ogilbyi</i>	Woylie	CR	EN	Woodlands and adjacent heaths with a dense understorey of shrubs, particularly <i>Gastrolobium</i> spp. (TSSC 2018).	Unlikely, locally extinct
<i>Dasyurus geoffroii</i>	Chuditch	VU	VU	Wide range of habitats from woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts. Appears to utilise native vegetation along road sides in the wheatbelt (DEC 2012b).	Unlikely, locally extinct
<i>Isoodon fusciventer</i>	Quenda	P4	-	Dense scrubby, often swampy, vegetation with dense cover up to one metre high (DEC 2012).	Possible

Table B1: Likelihood of occurrence of conservation significant fauna species within the site (continued).

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
<b>Mammal</b>					
<i>Macrotis lagotis</i>	Bilby	VU	VU	Open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises and hummock grassland (spinifex) growing on sandplains and dunes, drainage systems, salt lake systems and other alluvial areas (DBCA 2017a).	Unlikely, locally extinct
<i>Notamacropus irma</i>	Western brush wallaby	P4	-	Dry sclerophyll forest, Banksia spp. woodlands and shrublands, typically favouring dense low vegetation that provides dense cover (Christensen and Strahan 1983).	Unlikely
<i>Phascogale tapoatafa wambenger</i>	South-western brush-tailed phascogale	CD	0	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover (Triggs 2003).	Unlikely, no recent records
<i>Pseudocheirus occidentalis</i>	Western ringtail possum	CR	VU	On the Swan Coastal Plain in Agonis flexuosa woodlands and Agonis flexuosa/Eucalyptus gomphocephala forests. Also Eucalyptus marginata forests (DBCA 2017b).	Unlikely, locally extinct
<i>Setonix brachyurus</i>	Quokka	VU	VU	On the mainland mostly dense streamside vegetation or shrubland and heath areas, particularly around swamps (Cronin 2007).	Unlikely, locally extinct
<i>Falsistrellus mackenziei</i>	Western false pipistrelle	P4	-	High rainfall forests dominated by jarrah, karri, marri, and tuart. Occupies hollow logs for breeding and resting (Van Dyck and Strahan 2008). Also known to utilise Banksia woodland on the Swan Coastal Plain (Hosken and O'Shea 1995).	Unlikely
<b>Reptilia</b>					
<i>Ctenotus delli</i>	Dell's skink	P4	-	Jarrah and marri woodland with a shrub dominated understorey, sheltering in dense vegetation, inside grass trees and beneath rocks, sometimes in burrows (Nevill 2005).	Possible
<i>Neelaps calonotos</i>	Black-striped snake	P3	-	Coastal and near-coastal dunes, sandplains supporting heathlands and Banksia spp. woodlands (Bush et al. 2002).	Unlikely
<i>Pseudemydura umbrina</i>	Western swamp tortoise	CR	CR	Clay based ephemeral swamps (Bush et al. 2002).	Unlikely

# Appendix D

Species List





## Fauna Species List - Middle Swan Brickworks

Note: \* denotes introduced fauna species, DP=declared pest under the BAM Act

<b>Class</b>	<b>Status</b>	<b>Species</b>	<b>Common name</b>	<b>Record type</b>
<b>Aves</b>				
		<i>Cacatua roseicapilla</i>	Galah	Sight, call
		<i>Corvus coronoides</i>	Australian raven	Sight
		<i>Cracticus tibicen</i>	Australian magpie	Sight
		<i>Grallina cyanoleuca</i>	Magpie-lark	Sight
		<i>Hirundo neoxena</i>	Welcome swallow	Sight
		<i>Platycercus zonarius</i>	Australian ringneck	Sight, call
		<i>Rhipidura leucophrys</i>	Willie wagtail	Sight
	* DP	<i>Trichoglossus moluccanus</i>	Rainbow lorikeet	Sight
<b>Mammalia</b>				
	* DP	<i>Oryctolagus cuniculus</i>	Rabbit	Scat
<b>Reptilia</b>				
		<i>Notechis scutatus</i>	Tiger snake	



# Appendix 5

Black Cockatoo Habitat Tree Data







**Black Cockatoo Habitat Tree Inventory - Middle Swan Brickworks**

Tag No.	Easting	Northing	DBH (cm)	Species	Number of hollows	Number of hollows potentially suitable for BCs	Potential hollow 1 notes	Potential hollow 2 notes	General notes
337	405597	6473160.4	42	<i>Eucalyptus wandoo</i>	0	0	-	-	-
364	405492	6473192	61	<i>Eucalyptus wandoo</i>	0	0	-	-	-
365	405500	6473160.3	55	<i>Eucalyptus wandoo</i>	2	0	Side-entry hollow that may have an entrance size $\geq 10$ cm. However, accomodating branch is too thin.	Side-entry hollow that may have an entrance size $\geq 10$ cm. However, accomodating branch is too thin.	-
366	405498	6473157.8	60	<i>Eucalyptus wandoo</i>	2	0	Side-entry hollow that may have an entrance size $\geq 10$ cm. Hollow not deep enough to accommodate BCs.	Side-entry hollow that may have and entrance size $\geq 10$ cm. Hollow not deep enough to accommodate BCs.	-
367	405499	6473161.1	49	<i>Eucalyptus wandoo</i>	0	0	-	-	-
368	405488	6473156.4	76	<i>Eucalyptus wandoo</i>	0	0	-	-	-
369	405500	6473183.4	33	<i>Eucalyptus wandoo</i>	0	0	-	-	-
370	405500	6473184.3	39	<i>Eucalyptus wandoo</i>	0	0	-	-	-
371	405525	6473170.8	47	<i>Eucalyptus wandoo</i>	0	0	-	-	-
372	405522	6473168.9	36	<i>Eucalyptus wandoo</i>	0	0	-	-	-
373	405520	6473152.6	38	<i>Eucalyptus wandoo</i>	0	0	-	-	-
374	405519	6473151.1	39	<i>Eucalyptus wandoo</i>	0	0	-	-	-
375	405531	6473161.5	79	<i>Eucalyptus wandoo</i>	0	0	-	-	-
376	405536	6473161.8	44	<i>Eucalyptus wandoo</i>	0	0	-	-	-
462	406201	6473570.5	71	Stag	2	2	Top-entry hollow that may have and entrance size $\geq 10$ cm.	Top-entry hollow hollow with an entrance size $\geq 10$ cm.	Hollows internal dimensions unconfirmed.

**Black Cockatoo Habitat Tree Inventory - Middle Swan Brickworks**

Tag No.	Easting	Northing	DBH (cm)	Species	Number of hollows	Number of hollows potentially suitable for BCs	Potential hollow 1 notes	Potential hollow 2 notes	General notes
463	406205	6473575.8	88	Stag	2	1	Top-entry hollow that may have and entrance size $\geq 10\text{cm}$ .	Side-entry hollow, may have an entrance size $\geq 10\text{cm}$ . However, accomodating branch is too thin.	Hollows internal dimensions unconfirmed.
478	406341	6474090.9	45	<i>Eucalyptus wandoo</i>	0	0	-	-	-
479	406352	6474045.6	40	<i>Eucalyptus wandoo</i>	0	0	-	-	-
480	406355	6474037.1	49	<i>Eucalyptus wandoo</i>	0	0	-	-	-
484	405552	6473651.6	60	Stag	1	1	Top-entry hollow that may have and entrance size $\geq 10\text{cm}$ .	-	Hollows internal dimensions unconfirmed.
486	405556	6473603.9	72	Stag	0	0	-	-	-
487	405489	6473189.7	33	<i>Eucalyptus wandoo</i>	0	0	-	-	-
488	405514	6473184.9	42	<i>Eucalyptus wandoo</i>	0	0	-	-	-
489	405500	6473186.1	40	<i>Eucalyptus wandoo</i>	0	0	-	-	-
490	405537	6473113.8	32	<i>Eucalyptus wandoo</i>	0	0	-	-	-
491	405520	6473133.3	33	<i>Eucalyptus wandoo</i>	0	0	-	-	-
492	405521	6473083.3	33	<i>Eucalyptus wandoo</i>	0	0	-	-	-
493	405503	6473141.4	45	<i>Eucalyptus wandoo</i>	0	0	-	-	-

Black Cockatoo Habitat Tree Inventory - Middle Swan Brickworks

Tag No.	Easting	Northing	DBH (cm)	Species	Number of hollows	Number of hollows potentially suitable for BCs	Potential hollow 1 notes	Potential hollow 2 notes	General notes
496	405497	6473151.5	52	Stag	1	0	Side-enty hollow with an antrance size $\geq 10$ cm and potentially sutiable internal dimensions. However this hollow is located only approximately 2 m off the ground and was therefore deemed unsuitable.	-	-
498	405481	6473166.8	46	<i>Eucalyptus wandoo</i>	0	0	-	-	-
499	406223	6473229.7	61	<i>Corymbia calophylla</i>	0	0	-	-	-
-	405598	6472700.6	70	<i>Eucalyptus wandoo</i>	0	0	-	-	-