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Integrated Science & Design

Basic Fauna and Targeted Black Cockatoo Assessment

Lot 15 Nicholson Road, Forrestdale

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Executive Summary

Australian Islamic College (Perth) Inc. engaged Emerge Associates (Emerge) to conduct a 'basic' fauna survey and a 'targeted' black cockatoo survey to provide information on the fauna and black cockatoo values within Lot 15 Nicholson Road in Forrestdale (referred to herein as the 'site').

As part of the assessment a desktop review of relevant background information was completed and a field survey was undertaken on 11 March 2021. During the field survey opportunistic sightings of fauna were recorded and an assessment was made on the fauna habitat within the site and its suitability to provide habitat for conservation significant fauna. A targeted black cockatoo survey was also undertaken to determine the presence of habitat for threatened black cockatoo species.

Outcomes of the basic fauna survey include the following:

- A total of 22 native and two non-native fauna species were recorded within the site.
- Four fauna habitats were identified within the site: **woodland – upland**, **woodland – wetland**, **shrubland** and **predominantly cleared** area. The **woodland – upland** habitat in the northern and south eastern portions of the site has the highest habitat values due to the presence of more intact native vegetation and microhabitats. However, due to the relatively poor condition of habitats generally, the site is likely to primarily be utilised by common and widespread native species without specific habitat requirements.
- One conservation significant species, Carnaby's cockatoo is likely to occur in the site. It is possible that a further 13 conservation significant species may also occur within the site. These species would primarily be associated with the **woodland – upland** and to a lesser extent **shrubland** habitats, if they occurred at all. The likelihood that the site would provide important habitat for these species is low, due to the relatively poor condition and limited extent of habitat within the site.

Outcomes of the targeted black cockatoo survey include the following:

- The site occurs within the modelled distribution of Baudin's cockatoo, Carnaby's cockatoo and forest red tailed black cockatoo and there are records within the broader area. Therefore, while no evidence of any black cockatoo species was recorded within the site, due to the presence of suitable habitat that may utilise the site. Carnaby's cockatoo are considered more likely to occur within the site than the other species due to the larger amount of higher value foraging habitat present than is available for Baudin's and forest red-tailed black cockatoo.
- The site occurs within the modelled breeding range of the forest red tailed black cockatoo. Three habitat trees were recorded in the site, of which none contain hollows that are suitable for use by black cockatoos for breeding. Therefore, the site does currently not provide breeding habitat for any species of black cockatoo.
- No evidence of black cockatoo roosting activity was observed within the site. Potential roosting habitat suitable for all three species of black cockatoo occurs within the site in the form of tall native and non-native trees.
- Extensive areas of remnant vegetation that may provide foraging habitat are located within the local area adjacent to the site. Foraging habitat in the site comprises 2.82 ha of high, moderate and low value foraging habitat for Carnaby's cockatoo, 2.07 ha of low value foraging habitat for

Baudin's cockatoo and 0.16 ha of high and low value foraging habitat for forest red-tailed black cockatoo.

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Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
BoM	Bureau of Meteorology
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
WA Museum	Western Australian Museum

Table A2: Abbreviations – General terms

General terms	
CR	Critically endangered
EN	Endangered
MI	Migratory
OS	Other specially protected fauna
P3	Priority 3
P4	Priority 4
VU	Vulnerable

Table A3: Abbreviations – Legislation

General terms	
BAM Act	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016*
EBPC Act	*Environment Protection and Biodiversity Conservation Act 1999*

Table A4: Abbreviations – units of measurement

Units of measurement	
DBH	Diameter at breast height
cm	Centimetre
ha	Hectare
km	Kilometre
mm	Millimetre
m AHD	m in relation to the Australian height datum

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1 Introduction

Emerge Associates (Emerge) were engaged by the Australian Islamic College (Perth) Inc. to characterise the fauna and black cockatoo values within Lot 15 Nicholson Road in Forrestdale (referred to herein as the 'site'). The site is located approximately 25 kilometres (km) south of the Perth Central Business District within the City of Armadale.

The site is approximately 16.73 hectares (ha) in size and is bounded by native vegetation to the east, Oxley Road to the north, Nicholson Road to the west and rural land to the south. The location and extent of the site is shown in **Figure 1**.

1.1 Purpose and scope of work

The scope of work was specifically to undertake a terrestrial vertebrate fauna assessment to the standard required of a 'basic' fauna survey and a 'targeted' black cockatoo survey with reference to the Environmental Protection Authority's (EPA's) technical guidance (EPA 2020) and the *Environment Protection and Biodiversity Conservation Act* black cockatoo referral guidelines (DSEWPaC 2012).

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

- Desktop assessment of relevant background information pertaining to the site and surrounds, including database and literature searches for fauna species.
- A field survey to identify fauna species and fauna habitats within the site with particular focus on habitat for species of black cockatoo.
- Compilation of a list of fauna species with potential to occur within the site as identified from the desktop assessment and opportunistically recorded as part of the field survey.
- Identification of potential habitat for conservation significant fauna species and an assessment of likelihood of occurrence.
- Mapping of fauna habitat and black cockatoo habitat.
- Documentation of the desktop assessment, survey methodology and results into a report.

2 Background

2.1 Environmental Context

The site occurs on the Swan Coastal Plain, which is the geomorphic unit that characterises much of the Perth metropolitan area.

Examination of physiographic mapping by Gozzard (2011) places the site in the Bassendean Dune system. The Bassendean Dune system consists of low hills on quartz sand with sandy swamps in depressions between the dunes (Gozzard 2007).

The elevation of the site ranges from 25 m in relation to the Australian height datum (mAHD) in the central portion to 30 mAHD in the northern and southern portions of the site (DoW 2008) (**Figure 2**).

No Ramsar or listed 'important wetlands' are located within the site.

The Ramsar listed 'Forrestdale & Thomsons Lakes' (number 35) is located 500 m to the north east of the site. This Ramsar site is also listed as an 'important wetland'. In addition, an 'important wetland' ('Gibbs Road Swamp System') is located directly to the north and west of the site. The Gibbs Road Swamp System is an extensive but fragmented wetland system covering approximately 750 ha between Armadale and Rowley Road. These 'important wetlands' are shown on **Figure 2**.

Examination of the Department of Water and Environmental Regulation (DWER) hydrography dataset (DWER 2020) shows that two perennial swamps occur within the site.

A review of the *Geomorphic Wetlands, Swan Coastal Plain* dataset indicated that one wetland feature (UFI 7236) occurs within the central portion of the site (DBCA 2020). Two wetland features (UFIs 7233 and 7235) occur adjacent to the northern and eastern sides of the site, respectively. UFIs 7233 and 7235 are largely mapped as external to the site but both have small portions that lie within the site. All three features are classified as sumpland wetlands and are named 'Forrestdale Sumpland'. The locations of the geomorphic wetlands in and around the site are shown in **Figure 2**.

Heddle *et al.* (1980) mapping shows the majority of the site as comprising the 'Southern River' vegetation complex, with a small portion in the south west of the site mapped as comprising the 'Bassendean central and south complex'. The 'Southern River' complex is described as comprising open woodland of *Corymbia calophylla*, *Eucalyptus marginata* and *Banksia* spp. with fringing woodland of *Eucalyptus rudis* and *Melaleuca rhaphiophylla* along creek beds. The 'Bassendean central and south complex' comprises vegetation ranging from woodland of *Eucalyptus marginata*, *Allocasuarina fraseriana*, *Banksia* spp. to low woodland of *Melaleuca* spp. and sedgelands on the moister sites.

One biodiversity linkage (No. 52) occurs over the north eastern corner of the site, extending to the south east and north west and intersecting with another ecological linkage (No. 57). These ecological linkages connect areas of Bush Forever and wetlands located in the wider local area, such as Forrestdale Lake. The locations of theses linkages are shown in **Figure 3.**

Review of aerial imagery indicates that the vegetation within the eastern portion of the site is connected to extensive areas of native vegetation within the wider local area.

Review of historical images available from 1953 onwards shows that the majority of the site was cleared of native vegetation between 1953 and 1961, with pockets of vegetation remaining in the eastern portion (WALIA 2021).

Wetland features in the site support native vegetation in imagery from 1953 to 1991, after which they are almost entirely devoid of native vegetation. Since 1991 some vegetation has regrown in these areas, particularly near the eastern boundary of the site.

2.2 Conservation significant fauna

2.2.1 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 Ministerial approval.

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**.

2.2.2 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 DBCA *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**.

2.2.3 Migratory fauna species

Some fauna species that migrate to Australia and its external territories or pass though or over Australian waters during their annual migrations are protected 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 Ministerial approval. Further information on migratory species is provided in **Appendix A**.

2.2.4 Specially protected fauna species

In Western Australia, fauna species that are of special conservation interest, including migratory species and cetaceans, species subject to international agreement or species otherwise in need of

special protection may be listed as 'specially protected' under the BC Act. Further information on specially protected species and their categories is provided in **Appendix A**.

2.2.5 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. Pest fauna species are generally not native but some Australian or Western Australian fauna may also be considered pests.

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. Further information on categories of declared pests is provided in **Appendix A**.

2.2.6 Black cockatoos

Three threatened species of black cockatoo occur in the south-west of WA (referred to herein collectively as 'black cockatoos'):

- *Calyptorhynchus latirostris* (Carnaby's cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus baudinii* (Baudin's cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which is listed as 'vulnerable' under the EPBC Act and the BC Act.

Black cockatoo habitat is conventionally separated into breeding, roosting and foraging categories:

- Black cockatoos' nest in hollows that form in trees which are usually more than ~200 years old. 'Breeding habitat' comprises 'habitat trees' which are trees of a species known to support black cockatoo breeding and which either have a suitably large enough nest hollow or have a large enough diameter at breast height (DBH) to indicate that a suitable nest hollow could develop in time (DSEWPaC 2012). A minimum DBH for a habitat tree is defined as ≥50 centimetres (cm) for most tree species used by black cockatoos and ≥30 cm for *Eucalyptus wandoo* (wandoo) and *Eucalyptus salmonophloia* (salmon gum) (DSEWPaC 2012). Breeding habitat is also generally expected to be located within 7 km of food and water resources (Saunders 1990).
- Roosting refers to black cockatoos congregating in a tree or group of trees to rest overnight. 'Roosting habitat' consists of groups or individual tall trees used for roosting. Roosts generally comprise the tallest trees in an area and can include native and non-native trees (DSEWPaC 2012). They are often located within 6 km of water and food resources, with additional foraging ranges within 12 km (Shah 2006; DSEWPaC 2012; Le Roux 2017). The use of a particular roost may vary depending on availability of food and water resources.
- Black cockatoos feed on the fruit and seeds of a range of native and non-native plant species. 'Foraging habitat' is vegetation that contains plant species known to be foraged on by black cockatoos.

Each black cockatoo species has a defined breeding season, with Baudin's cockatoo breeding from August/September to February/March and Carnaby's cockatoo breeding from July/August to January/February (DSEWPaC 2012). Forest red-tailed black cockatoo breeds in October/November but may breed in March/April if there is good autumn rainfall (DSEWPaC 2012). There is also evidence that forest red-tail black cockatoos breed throughout the year, with peaks in April – June and August – October (Johnstone *et al.* 2013).

2.3 Previous surveys

No previous fauna surveys are known to have been undertaken over the site.

3 Methods

3.1 Desktop assessment

3.1.1 Basic fauna

A search was conducted for fauna species that have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DAWE 2021b) and *NatureMap* (DBCA 2021). A search of DBCA's conservation significant fauna database was also conducted using a 5 km radius, as advised by DBCA (reference no. FAUNA6634). Searches were also conducted for previous relevant surveys and literature references.

3.1.2 Black cockatoo

A search was conducted for records of black cockatoos and potential black cockatoo habitat mapping occurring within 10 km of the site using a range of publicly available regional studies and datasets. Detailed information on each dataset considered as part of the desktop review is provided in **Appendix A**.

3.2 Field survey

An ecologist from Emerge visited the site on 11 March 2021 during the day to conduct the basic fauna survey and targeted black cockatoo field survey. The survey was conducted from approximately 10:00 am until 3:30 pm.

The weather conditions prior to and during the survey were warm and humid (refer to **Section 2.1** for recorded weather conditions).

3.2.1 Basic 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.

An opportunistic fauna species list was compiled and fauna habitat values were described, with particular reference to conservation significant fauna species with potential to occur within the site.

3.2.2 Targeted black cockatoo

Transects were traversed across the site and the presence of potential black cockatoo breeding, night roosting and foraging habitat was recorded. If observed, the presence of black cockatoos within or near the site was noted. Active searches for secondary evidence of breeding, roosting and foraging activity such as chew marks, branch clippings, droppings, moulted feathers and chewed marri or banksia fruit were conducted.

3.2.2.1 Breeding habitat

A 'habitat tree' was defined as a native eucalypt that is typically known to support black cockatoo breeding such as marri, jarrah, blackbutt, tuart, wandoo, salmon gum or to a lesser extent flooded gum, with a DBH ≥50 cm or DBH ≥30 cm for wandoo or salmon gum. As any tree that has a suitable hollow may provide breeding habitat for black cockatoos, other tree species were also considered to be habitat trees if they contained a suitable hollow.

To be suitable for use as breeding habitat by black cockatoos it was considered a hollow must:

- have an entrance opening of at least 10 cm but preferably 20-30 cm (Saunders *et al.* 1982; Groom 2010; Johnstone *et al.* 2013).
- be located at least 3 m from the ground (Saunders 1979b; Johnstone and Storr 1998; Groom 2010; Saunders 2014).
- be located in a trunk or branch that is generally large enough to contain a hollow that has a floor diameter of at least 40 cm and depth of 50-200 cm such that it could house an adult black cockatoo and nestlings (Saunders 1979a; Johnstone and Storr 1998; Saunders 2014; DPaW 2015).
- have vertical or near vertical orientation (Johnstone and Kirkby 2008; Johnstone *et al.* 2013).

Occasionally, native eucalypts were encountered that met DBH requirements but did not contain a trunk/branch of a sufficient size to support a hollow suitable for use by black cockatoos. For example, the tree may have been less than 3 m tall or had a trunk that forked between 1.3 m and 3 m in height and after the fork no limbs had a diameter of ≥50 cm or ≥30 cm for wandoo or salmon gum. These trees were not recorded as habitat trees as the likelihood they would form a suitable hollow was low.

Habitat trees were individually identified and the attributes outlined in **Table 1** were recorded for each tree.

Table 1: Attributes recorded for each habitat tree in the site

Attribute	Description
Image	Trees were individually photographed
GPS location	The location was recorded using a handheld GPS unit
Tree species	Species and common name were identified
Diameter at breast height (DBH) (cm)	DBH was measured at breast height (1.3 metres) using a diameter tape
Hollows potentially suitable for breeding by a black cockatoo	Number of hollows potentially suitable for breeding by a black cockatoo recorded (assessed from ground level only)

Hollows that appeared potentially suitable for use by a black cockatoo from the ground were further inspected using a drone and/or a pole-mounted camera. During the hollow inspection the internal dimensions of the hollow were confirmed if possible and an assessment was made for signs of use such as chew marks around the hollow entrance, nesting material, eggs, feathers or the presence of birds within the hollow.

Each habitat tree was assigned to a category listed in **Table 2**.

Table 2: Habitat tree categories

Category	Specifications
Nest	The tree contains a hollow used by black cockatoos for breeding as confirmed by records of black cockatoos, their eggs or fledglings or other evidence of recent nesting activity by black cockatoos
Potential nest	The tree contains one or more hollows that are suitable for use by black cockatoos as breeding habitat as confirmed by internal hollow inspection^ and potential evidence of use by black cockatoos such as feathers, chew marks or nest material has been recorded within a hollow
Suitable hollow(s)	The tree contains one or more hollows that are suitable for use by black cockatoos as breeding habitat as confirmed by internal hollow inspection^
Potentially suitable hollow(s)	The tree contains or is suspected to contain one or more hollows that have the potential to be suitable for use by black cockatoos when either viewed from the ground or following an internal hollow inspection that was inconclusive^
No suitable hollow(s)	The tree does not contain hollow(s) that have the potential to be suitable for use by black cockatoos when viewed from the ground or contains hollows that were determined to be unsuitable for use by black cockatoos by internal inspection^

^Hollow determined to be suitable for use as breeding habitat by black cockatoos as listed above in **Section 3.2.2.1**

3.2.2.2 Roosting habitat

The site was assessed for the presence of active or historical roosts and its potential to provide roosting habitat for black cockatoos. Groups of large native and non-native trees were generally assumed to provide potential roosting habitat.

No evening roost survey was undertaken within the site. The site was searched during daytime surveys for secondary evidence of roosting activity, such as branch clippings, droppings or moulted feathers.

3.2.2.3 Foraging habitat

Foraging habitat was identified by comparing the literature on plant species known to be foraged upon by black cockatoos (Davies 1966; Saunders 1980; Johnstone and Storr 1998; Johnstone and Kirkby 1999; Groom 2011; Johnstone *et al.* 2011; DSEWPaC 2012).

The value of foraging habitat was then further classified as 'high', 'moderate' or 'low' value based on the proportion of 'primary' or 'secondary' food plants it contained as outlined in **Table 3**.

Table 3: Foraging habitat values

Value	Definition
High	Greater than 50% primary food plants
Moderate	Greater than 10% to 50% primary food plants
Low	10% or less primary foodplants^
Nil	No primary or secondary food plants

^includes areas with 1-100% secondary food plants where no primary food plants are available

Primary food plants were defined as those with historical and contemporary records of regular consumption by a black cockatoo species. Secondary food plants were defined as plants that black cockatoo species have been recorded consuming occasionally or that, based on their limited extent or agricultural origin, should not be considered a sustaining resource. A list of plant species classified as primary or secondary food plants is provided as **Appendix B.**

Each patch of foraging habitat was assigned a foraging value for each species of black cockatoo likely to occur within the site. As it is not always possible to separate out food plants from non-food plants, mapped foraging habitat may also include vegetation comprising non-food plants. The proportion of non-food plants in mapped foraging habitat was minimised as far as practicable.

Evidence of black cockatoo foraging, such as chewed fruits, was searched for within the site and allocated to a species where possible. The locations of black cockatoo foraging evidence within the site were recorded using a hand-held GPS unit.

3.3 Data analysis

3.3.1 Desktop assessment

A total number of species within the desktop assessment search area 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*.

Habitat requirements of conservation significant vertebrate fauna was specifically reviewed in relation to habitat within the site to determine a total number of conservation significant fauna species with potential to occur. Fauna species with no potential to occur within the site were excluded from this count (e.g. marine mammals and marine fish).

3.3.2 Fauna habitat

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 2021). The identified fauna habitats were mapped on aerial photography with the boundaries interpreted from aerial photography, previously identified plant communities (Emerge Associates 2021) and notes taken in the field.

3.3.3 Likelihood of occurrence

Information on habitat preferences and distribution of conservation significant fauna species with potential occur within the site or wider area was reviewed and assessed against the general site conditions and fauna habitat types recorded during the field survey.

Based on the results of the desktop assessment and information recorded during the field survey, an assessment of the likelihood of occurrence of conservation significant fauna within the site was undertaken using the categories outlined in **Table 4**.

Table 4: Likelihood of occurrence assessment categories and definitions

Likelihood	Definition
Recorded	The species was recorded during the current field survey or during previous field surveys.
Likely	The site contains suitable habitat for the species and it is likely the species may occur based on presence of a recent historical record within or close to the site.
Possible	The site contains habitat of at least marginal quality and/or extent for the species and the site is located within the known distribution range of the species which is supported by recent literature records from near the site.
Unlikely	The site contains no or marginal habitat for the species and/or no recent literature records occur near the site.

3.3.4 Black cockatoo habitat

Habitat trees were classified according to the scheme outlined in **Table 2** and mapped on aerial imagery. A complete summary of the recorded attributes of habitat trees was compiled in a tabular format. Foraging habitat was mapped on aerial photography with the boundaries interpreted from aerial photography and notes taken in the field.

Foraging habitat was described according to the dominant flora species or vegetation type present and mapped using boundaries interpreted from aerial photography and notes taken in the field. The foraging value of each patch of foraging habitat was attributed separately for each species of black cockatoo likely to occur in the site. Foraging value was assigned as outlined in **Table 3**. The proportions of high, moderate and low value foraging habitat mapped within the site were calculated for each species of black cockatoo.

3.4 Nomenclature and sources of information

Taxonomy and nomenclature of scientific and common names for fauna species follow *the Western Australian Museum* (WAM) *Checklist of the Terrestrial Vertebrate Fauna of Western Australia* (WAM 2020). Where common names were not provided by the *Western Australian Museum*, these have been derived from other sources as noted.

Literature listed in **Appendix A** represent the main publications used to identify fauna species and habitats within the site.

3.5 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's document *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020) is provided in **Table 5**.

Table 5: Evaluation of survey methodology against standard constraints outlined in the EPA's Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020)

Constraint	Degree of limitation	Details
Level of survey	No limitation	A basic survey (desktop study and field survey) in combination with a targeted black cockatoo survey was undertaken. The level of survey and survey effort are considered adequate to assess the fauna and black cockatoo habitat values within the site.
Scope	No limitation	The survey focused on vertebrate fauna and habitat values, with particular focus on black cockatoos and other 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 and previous surveys.
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	No limitation	This fauna assessment was undertaken by a qualified ecologist with three-years' experience. Technical review was undertaken by a senior environmental consultant with over 10 years' experience in environmental science in Western Australia.
Suitability of timing, weather and season	No limitation	Survey timing is not considered to be of great importance for basic fauna assessments. Nonetheless, the day time survey limits the ability to detect nocturnal species.
Completeness	No limitation	The desktop assessment, field survey and targeted black cockatoo components of the survey were completed comprehensively.
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.
Influence of disturbance	No limitation	Portions of the site are 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. The guidance currently available from Commonwealth and State agencies on the assessment of black cockatoo habitat is limited and relies heavily on technical experts preparing their own methodology. This assessment applies an internally developed methodology that is considered to provide a systematic and balanced characterisation of black cockatoo habitat.

Table 5: Evaluation of survey methodology against standard constraints outlined in the EPA's Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020) (continued)

Constraint	Degree of limitation	Details
Compliance with EPA (2020) guidance	Minor limitation	The EPA guidance requires that a full list of all fauna species with potential to occur within the site is compiled. As part of this assessment a comprehensive list of fauna species of conservation significance was compiled. Non-conservation taxa with potential to occur within the site were not compiled into a list but are provided as raw data in **Appendix C**. Given that all species with potential to occur within the site are still identified within the relevant appendices this is not considered to affect the outcomes of this assessment. The EPA guidance recommends that the *Australian Faunal Directory* (DAWE 2021a) nomenclature is used for bird species. This assessment uses the WAM *Checklist of the Terrestrial Vertebrate Fauna of Western Australia* (WAM 2020) nomenclature for birds and therefore does not strictly comply.

4 Results

4.1 General site conditions

The site consists of sandy hills in the north and south and a lower lying depression running through the centre of the site.

The majority of the site has been cleared and is currently used for rural purposes. Remnant native vegetation occurs within the northern and eastern portions of the site.

4.2 Fauna habitat

Four fauna habitats were identified within the site, as listed in in **Table 6**.

Table 6: Fauna habitats identified within the site

Fauna habitat	Description	Area (ha)
Woodland – upland	Low sparse to open woodland of *Banksia menziesii, B. attenuata*, *B. ilicifolia*, *Eucalyptus todtiana* and *Nuytsia floribunda* over sparse to open shrubland of *Kunzea glabrescens, Scholtzia involucrata, Acacia pulchella var. glaberrima, Macrozamia riedlei* and *Macarthuria australis* over sparse forbland of *Desmocladus flexuosus, Conostylis aculeata, Lyginia barbata* and *Lomandra spp*. and open grassland of **Ehrharta calycina* and **Briza maxima* (**Plate 1**).	2.17
Woodland – wetland	Sparse woodland of *Melaleuca preissiana* over tall closed shrubland of *Kunzea glabrescens* over forbland of **Hypochaeris* spp. and grassland of **Cynodon dactylon* (or understorey layers absent) (**Plate 2**).	1.06
Shrubland	Tall shrubland to closed tall shrubland of *Kunzea glabrescens* over shrubland of *Scholtzia involucrata* or *Brachyloma preissii* and *Acacia pulchella var. glaberrima* (or absent) and forbland (or absent) **(Plate 3**).	3.39
Predominantly cleared area	Heavily disturbed areas comprising weeds with occasional native shrubs and forbs and planted vegetation (**Plate 4**).	10.11

The highest fauna habitat values within the site are associated with **woodland - upland** habitat in the northern and south-eastern portions of the site. In particular where this vegetation remains in good[1] condition (as mapped by Emerge Associates (2021)), it provides a cover of native trees and shrubs, dense ground cover and contains microhabitats such as logs, rocks and leaf litter.

The **woodland – wetland** habitat occurs within the eastern portion of the site, and contains dense mid-storey vegetation with minimal understorey vegetation or microhabitat providing limited cover for ground-dwelling species. **Shrubland** habitat occurs in the northern and eastern portions of the site, and whilst it is degraded and lacks contiguous vegetation cover, does provide limited cover for ground-dwelling species. The **predominantly cleared area** is located over the remainder of the site where historical clearing has occurred.

[1] Keighery, B. 1994, *Bushland Plant Survey: A guide to plant community survey for the community*, Wildflower Society of WA (Inc), Nedlands.

A description and the area of each habitat is provided in **Table 6** and representative photographs of each are provided in **Plate 1** to **Plate 4**. The location of each habitat is shown on **Figure 4.**

Plate 1: ***Woodland – upland*** *habitat*

Plate 2: ***Woodland – wetland*** *habitat*

Plate 3: ***Shrubland*** *habitat*

Plate 4: ***Predominantly cleared areas*** *habitat*

4.3 Fauna

4.3.1 Desktop assessment

A total of 446 fauna species were identified from database searches as occurring or potentially occurring within 10 km of the site[2] as listed in **Appendix C.**

Of these species, 64 are conservation significant, including 20 threatened, 17 priority, 26 migratory fauna and one other specially protected species as listed in **Appendix D.**

4.3.2 Species inventory

A total of 22 native and two introduced fauna species were directly or indirectly (from scat evidence) recorded during the field survey.

A complete species list is provided in **Appendix E**.

4.3.3 Conservation significant fauna

No conservation significant fauna species were recorded within the site.

It is considered likely that one threatened species and possible that four threatened, one migratory, seven priority and one other specially protected species may occur in the site based on habitat requirements, species distribution and site conditions as listed in **Table 7**.

The remainder of the conservation significant fauna species identified in the desktop assessment (53 species) are considered unlikely to occur in the site due to lack of suitable habitat or because the site lies outside of the species known distribution. Fauna species classed as unlikely to occur are listed in **Appendix D**.

Table 7: Summary of conservation significant fauna species recorded or deemed possible or likely to occur within the site

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
Birds					
Apus pacificus	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).	**Possible**: May opportunistically occur in or fly over the site on commute or while searching for prey.

[2] Includes native and non-native species

Table 7: Summary of conservation significant fauna species recorded or deemed possible or likely to occur within the site (continued)

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU	*Eucalyptus* 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).	**Possible**: Scattered foraging habitat present within the site. Historical records occur adjacent to the site and species call was heard during the site survey undertaken by Emerge.
Calyptorhynchus baudinii	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).	**Possible**: Species prefers dense eucalypt forests and does not usually occur in the Perth metropolitan area. However, it may occasionally fly over the site or forage opportunistically.
Calyptorhynchus latirostris	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).	**Likely**: Foraging habitat present. Historical records occur adjacent to the site.
Falco peregrinus	Peregrine falcon	OS	-	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	**Possible**: Marginal habitat present. May opportunistically occur in or fly over the site on commute or while searching for prey.

Table 7: Summary of conservation significant fauna species recorded or deemed possible or likely to occur within the site (continued)

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
Invertebrates					
Idiosoma sigillatum	Swan Coastal Plain shield-backed trapdoor spider	P3	-	Widely distributed in sandy areas on the Swan Coastal Plain and on Rottnest Island (Prince 2003).	**Possible:** Suitable habitat present. Recent records in the broader area.
Leioproctus contrarius	a short-tongued bee	P3	-	Life history and habits are poorly documented/ unknown. It has been recorded only on flowers of Goodeniaceae and possibly *Lechenaultia stenosepala* (Bamford 2003).	**Possible:** Historic records within the broader area and one Goodeniaceae species present within the site.
Leioproctus douglasiellus	a short-tongued bee	EN	CR	Life history and habits are poorly documented/ unknown. It has been recorded only on the flowers of *Goodenia filiformis* and *Anthotium junciforme* (Houston 2000).	**Possible:** Recent record nearby and the site is connected to this record via native vegetation. Species poorly documented and it is unknown whether this bee species uses other hostplants.
Synemon gratiosa	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 *Lomandra maritima*. Banksia woodland on Spearwood and Bassendean dunes, where the second known host *plant L. hermaphrodita* is widespread (DEC 2011).	**Possible:** Site is located within the Bassendean dunes, host species (*L. hermaphrodita*) recorded in the site.
Neopasiphae simplicior	a short-tongued bee	EN	CR	This species of native bee has been collected on flowers of *Goodenia filiformis*, *Lobelia tenuior*, *Angianthus preissianu*s and *Velleia* sp. (Houston 2000).	**Possible:** Historic record near the site and host species (*Lobelia tenuior*) was recorded in the site.

Table 7: Summary of conservation significant fauna species recorded or deemed possible or likely to occur within the site (continued)

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
Mammals					
Isoodon fusciventer	Quenda	P4	-	Dense scrubby, often swampy, vegetation with dense cover up to one metre high (DEC 2012).	**Possible**: Vegetation within the northern and eastern parts of the site provide adequate ground cover for this species but are limited in extent.
Notamacropus irma	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).	**Possible:** Marginal habitat present and recent records occur to the north-west and north-east of the site. Occurrence possible as the site forms part of a larger area of vegetation but would only occur occasionally and for short periods of time.
Reptiles					
Lerista lineata	Perth slider	P3	-	Sandy coastal heath and low scrubland. *Banksia* spp. woodland, *Eucalyptus gomphocephala* open woodland over deep sands, and coastal dunes immediately adjacent to the beach.	**Possible:** May utilise the banksia woodland vegetation and sandy soils within the site. Recent records near the site.
Neelaps calonotos	Black-striped snake	P3	-	Coastal and near-coastal dunes, sandplains supporting heathlands and *Banksia* spp. woodlands.	**Possible:** May utilise the banksia woodland vegetation. Recent records near the site.

4.3.4 Declared pests

Two species listed as a declared pest (C3) pursuant to the BAM Act, **Oryctolagus cuniculus* (rabbit) and *Vulpes vulpes* (fox), were identified from scats within the site.

4.4 Black cockatoos

4.4.1 Desktop assessment

The black cockatoo desktop assessment indicated that the site is located within the distribution range of all three species of black cockatoo and the breeding range of forest red-tailed black cockatoo. The results of the black cockatoo desktop assessment are summarised in **Table 8**, **Table 9** and **Table 10**, and shown in **Figure 5**.

Table 8: Summary of black cockatoo background review

Category		Site context	Source
Species distribution		• Site is in the modelled distribution of Baudin's cockatoo, but not within its known or predicted breeding range. • Site is in the modelled distribution of Carnaby's cockatoo but not within its known or predicted breeding range. • Site is in the modelled distribution for forest red-tailed black cockatoo and within its known breeding range.	(DoEE 2016a, b, c)
Breeding sites		• No nesting records occur within the site. • Breeding of forest red-tailed black cockatoo and white tailed^ black cockatoos has been reported in Bungendore Park approximately 12 km from the site#.	BirdLife Australia database search (2021)
Carnaby's cockatoo breeding areas (12 km radius surrounding breeding sites)		• No confirmed breeding areas intersect the site. • Two possible breeding areas intersect the site.	(Glossop *et al.* 2011)
Important bird areas for Carnaby's cockatoo		• None within the site. • None within 12 km of the site.	(DPaW 2013)
Roost site		• None within the site. • 35 roost sites within 12 km of the site (see **Table 9** and **Table 10**): ○ 16 associated with white-tailed^ black cockatoos only ○ 8 associated with forest red-tailed black cockatoos only ○ 11 associated with white^ and red-tailed black cockatoos	*BirdLife Australia* database search (2021)
Foraging habitat	White-tailed black cockatoo^	• Potential native foraging habitat mapped within the eastern portion of the site. • Extensive areas of potential native foraging habitat are mapped within the wider local area of the site, including within nearby *Bush Forever* sites and Forrestdale Lake Nature Reserve.	(Emerge Associates 2020a)
		• No pine plantations mapped within the site or within 12 km.	(Forest Products Commission 2020)
	Forest red-tailed black cockatoo^	• Potential native foraging habitat mapped within the eastern portion of the site. • Extensive areas of potential native foraging habitat are mapped within the wider local area of the site, including within nearby *Bush Forever* sites and Forrestdale Lake Nature Reserve.	(Emerge Associates 2020b)

^Carnaby's and/or Baudin's cockatoo
#Data provided by Birdlife Australia includes information provided by Tony Kirkby, who has reported breeding within Bungendore Park, approximately 12 km from the site. However, exact coordinates have not been provided.

Table 9: White-tailed black cockatoos recorded in roosts within 12 km of the site (Birdlife Australia 2021) (Peck et al. 2019)

Roost ID	Year and number of individuals									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ARMCHAR001	NS	NS	NS	NS	NS	NS	NS	0	3	0
ARMFORR001	NS	NS	NS	0	0	18	0	0	NS	0
ARMHARR001	NS	0	0	NS	0	1	3	0	0	0
ARMKELR001	14	0	0	0	0	NS	NS	NS	0	0
ARMKELR002	0	10	NS	0	0	0	0	0	0	NS
COCBANR001	NS	NS	NS	NS	NS	45	NS	0	20	0
COCBANR002	NS	NS	NS	NS	53	NS	0	0	0	0
COCBANR003	NS	NS	NS	NS	NS	NS	NS	6	16	0
COCMUNR003	NS	NS	NS	NS	NS	NS	0	0	0	3
COCSCCR001	252	0	NS	NS	NS	NS	NS	NS	NS	NS
COCSCCR002	15	3	NS	NS	NS	NS	NS	NS	NS	NS
GOSCNVR001	0	19	NS	NS	0	0	0	0	NS	80
GOSCNVR002	NS	NS	26	52	0	0	151	0	0	0
GOSSOUR002	NS	NS	NS	NS	NS	NS	50	0	0	0
KWICASR001	2	NS	NS	0	19	NS	NS	0	59	0
KWIWANR001	63	0	0	1	0	0	0	0	0	NS
KWIWANR002	NS	NS	NS	0	0	0	0	5	0	0
KWIWANR004	NS	NS	NS	NS	NS	NS	NS	73	0	0
MELLEER001	0	0	12	0	70	0	0	0	15	2
SERDARR001	NS	NS	NS	NS	NS	NS	8	0	0	0
SEROAKR001	0	110	NS	0	0	NS	NS	0	0	NS
SEROAKR002	0	0	0	2	NS	NS	NS	0	0	0
SEROAKR003	167	0	0	0	0	0	NS	NS	0	0
SEROAKR004	45	3	0	0	50	0	26	2	33	NS
SEROAKR005	31	0	NS	0	0	0	0	0	0	NS
SEROAKR007	NS	NS	NS	NS	NS	NS	NS	2	0	NS
SERWELR002	NS	NS	NS	NS	NS	NS	NS	298	75	0

NS = not surveyed

Table 10: Forest red-tailed black cockatoo recorded in roosts within 12 km of the site (Birdlife Australia 2021) (Peck et al. 2019)

Roost ID	Year and number of individuals					
	2014	2015	2016	2017	2018	2019
GOSCNVR001	2	0	0	0	NS	0
GOSCNVR002	0	4	0	0	0	0
GOSGOSR004	19	NS	31	32	79	0
GOSSOUR002	NS	NS	0	36	208	15
ARMCHAR001	NS	NS	NS	11	16	0
ARMKELR004	NS	NS	NS	NS	NS	6
ARMARMR002	NS	NS	17	NS	15	0
ARMARMR004	NS	NS	NS	0	6	4
SERDARR001	NS	NS	26	0	24	0
SERBYFR002	NS	NS	0	2	0	NS
SERBYFR003	NS	NS	6	NS	0	NS
SEROAKR002	NS	NS	NS	4	15	0
KWICASR001	0	NS	NS	75	16	0
COCMUNR001	92	NS	73	0	365	259
COCMUNR003	NS	NS	38	0	108	0
COCBANR001	NS	0	NS	6	17	0
COCBANR002	3	NS	32	24	109	15
COCCOCR001	NS	NS	NS	NS	15	102
MELLEER001	0	0	11	25	5	0

NS = not surveyed

4.4.2 Breeding

Three black cockatoo habitat trees were recorded within the site as shown in **Figure 6**. The habitat trees were all *Eucalyptus todtiana* (coastal blackbutt). None of the habitat trees within the site contain hollows that are suitable for use by breeding by black cockatoos and no internal hollow inspection was undertaken.

A summary of the habitat trees recorded within the site is provided in **Table 11** and an inventory in **Appendix F**.

Table 11: Habitat trees recorded within the site

Category	No. trees	No. suitable hollows
Confirmed nest	0	0
Potential nest	0	0
Suitable hollow(s)	0	0
Potentially suitable hollow(s)	0	0
No suitable hollow(s)	3	0
Total	**3**	**0**

4.4.3 Roosting

No roosts or evidence of roosting were observed within the site during the survey.

Native and non-native trees within the site have the potential to be used as a roost by black cockatoos.

4.4.4 Foraging

A total of 2.82 ha of foraging habitat for Carnaby's cockatoo, 2.07 ha for Baudin's cockatoo and 0.16 ha for forest red-tailed black cockatoo was recorded in the site as shown in **Figure 7** to **Figure 9**.

Primary food plants within the site include *Banksia attenuata* (slender banksia), *Banksia menziesii* (firewood banksia) and *Pinus* spp. for Carnby's cockatoo and *Melia azedarach* (Cape lilac) for forest red tailed black cockatoo. A summary of the food plant preferences for each species of black cockatoo is provided in **Table 12**.

Table 12: Dominant primary and secondary black cockatoo foraging plants recorded within the site

Name	Black cockatoo species and foraging habitat category		
	Carnaby's	Baudin's	Forest red-tailed
Banksia attenuata (slender banksia)	Primary	Secondary	-
Banksia menziesii (firewood banksia)	Primary	Secondary	-
Pinus spp.	Primary	Secondary	-
Melia azedarach (Cape lilac)	Secondary	-	Primary
Eucalyptus camaldulensis (river red gum)	-	-	Secondary

*Denotes non-native species

The extent of foraging habitat by value category is detailed in **Table 13.**

Table 13: Foraging habitat value

Foraging value	Black cockatoo species and foraging habitat area (ha)		
	Carnaby's	Baudin's	Forest red-tailed
High	0.59 (21%)	-	0.002 (2%)
Moderate	1.44 (51%)	-	-
Low	0.79 (28%)	2.07 (100%)	0.11 (98%)
Total	2.82	2.07	0.16

5 Discussion

The 22 native and two introduced fauna species opportunistically recorded within the site are all generally common and widespread across the Swan Coastal Plain.

Habitat values within the site are highest in the northern and south east portions within the **woodland – upland** habitat, particularly where this habitat was mapped by Emerge Associates (2021) as being in good[3] condition and supports understorey vegetation and microhabitat including logs, rocks and leaf litter.

The **woodland – wetland** and **shrubland** habitats are degraded and provide varying value to native fauna depending on the plant species and density present, but are likely to be primarily used by common and widespread native and non-native fauna with non-specific habitat requirements. The **predominantly cleared area** located over the western and southern portions of the site provides limited habitat for native fauna species.

5.1 Conservation significant fauna

No conservation significant fauna species were recorded within the site.

Carnaby's cockatoo are likely to occur in the site from time to time, given primary food plants are present and the species occurs in the local area. It is also possible that Baudin's cockatoo and forest red-tailed black cockatoo may utilise the site. However, the foraging habitat for these species in the site is of lower relative value.

The site is unlikely to provide important habitat for *Apus pacificus* (pacific swift) and *Falco peregrinus* (peregrine falcon) as these species may opportunistically fly over or utilise habitat within the site as part of a much larger home range.

It is also unlikely that the site provides important habitat for the invertebrate species that were identified as possibly occurringincluding *Idiosoma sigillatum* (Swan Coastal Plain shield-backed trapdoor spider), *Leioproctus contrarius* (a short-tongued bee), *Leioproctus douglasiellus* (a short-tongued bee), *Neopasiphae simplicior* (a short-tongued bee) and *Synemon gratiosa* (graceful sunmoth). If these species were to occur in the site it would most likely be in association with the **woodland – upland** habitat. Host plants for two of the short-tongued bee species (*Leioproctus contrarius* and *Neopasiphae simplicior*were noted in this habitat. Recent and historic records for the three bee species and the trapdoor spider also exist adjacent to the site. As no targeted survey of invertebrates was completed as part of this assessment it is not possible to rule out that these species may be present. However, vegetation condition provides a fair indicator of invertebrate habitat value and it is therefore reasonable to conclude that it the site is unlikely to provide important habitat for any of the identified invertebrates on that basis.

The **woodland – upland** and **shrubland** habitat are likely to be suitable for *Isoodon fusciventer* (quenda), *Lerista lineata* (Perth slider) and *Neelaps calonotos* (black-striped snake), and to a lesser

[3] Keighery, B. 1994, *Bushland Plant Survey: A guide to plant community survey for the community*, Wildflower Society of WA (Inc), Nedlands.

extent also *Notamacropus irma* (Western brush wallaby). Particularly where the understorey shrubland layer is present and provides cover. If the western brush wallaby occurred in the site, it would likely only be as part of a much larger home range and while possible that this species may occur, it is unlikely that a population would permanently reside within the site.

Targeted surveys would need to be undertaken to detect the above conservation significant fauna species and provide the ability to make further conclusions on whether they do or do notoccur within the site.

5.2 Black cockatoo habitat values

5.2.1 Breeding

The site lies within the known breeding range of the forest red-tailed black cockatoo. However, none of the habitat trees within the site had hollows that could be used by black cockatoos for breeding . Therefore, the site does not currently support breeding habitat for any black cockatoo. The habitat trees recorded within the site have the potential to form hollows in the future. However, it will likely take many years for hollows to form that are suitable for use by black cockatoos.

5.2.2 Roosting

The field survey did not include an evening (sunset) visit to check for roosts. However, there was no indication from the current or previous surveys or other sources that roosting may occur within the site. Therefore, an evening survey was not considered crucial to confirming the absence of roosts within the site.

The tall stands of native and non-native trees within the site do have the potential to be used by black cockatoos for roosting. However, this is does not mean the site would ever be used for roosting. It is difficult to predict where black cockatoos may roost given that the availability and suitability of nearby resources such as food and water that would influence roosting behaviour are ostensibly unknowable. The best indicator of roosting is therefore roosting. As there are no BirdLife Australia (2021) roosts nearby, the importance of the site as roosting habitat is likely to be low.

5.2.3 Foraging

No evidence of back cockatoos was recorded within the site. However, this does not mean that black cockatoos do not forage in the site, as they range over large areas and may not necessarily return to the same location frequently. Nevertheless, the foraging habitat within the site is a relatively small area and mainly of low quality.

The foraging habitat is of highest value to Carnaby's in particular, as it is dominated by primary food plants like banksia and *Pinus* sp. The high value food plant for forest red tailed black cockatoo is white cedar white has become an important food source for these birds on the swan coastal plain.

Extensive areas of foraging habitat of similar or higher value are located adjacent to the site and in the wider area. Therefore, the foraging habitat is a relatively smaller part of extensive food resources available to black cockatoos in the local area.

6 Conclusions

6.1 Fauna and fauna habitat

Approximately one third of the site (39.61%) contains native vegetation and the remainder of the site that has been subject to historical disturbance and is dominated by cleared areas. The **woodland – upland** habitat in the northern and south eastern portions of the site have higher fauna habitat values due to the presence of more intact native vegetation and microhabitats.

A total of 22 native and two introduced fauna species were recorded within the site.

Fourteen species of conservation significance, including three species of threatened black cockatoo, may occur in the site. These species would primarily be associated with the **woodland – upland** and to a lesser extent **shrubland** habitats, if they occur at all. Targeted surveys would need to be undertaken to confirm whether these species occur within the site.

6.2 Black cockatoos

The site occurs within the modelled distribution of Baudin's cockatoo, Carnaby's cockatoo and forest red tailed black cockatoo and there are records within the broader area. Therefore, while no evidence of any black cockatoo species was recorded within the site, due to the presence of suitable habitat that may utilise the site. Carnaby's cockatoo are considered more likely to occur within the site than the other species due to the larger amount of higher value foraging habitat present than is available for Baudin's and forest red-tailed black cockatoo.

The site occurs within the modelled breeding range of the forest red tailed black cockatoo. Three habitat trees were recorded in the site, of which none contain hollows that are suitable for use by black cockatoos for breeding. Therefore, the site does currently not provide breeding habitat for any species of black cockatoo.

No evidence of black cockatoo roosting activity was observed within the site. Potential roosting habitat suitable for all three species of black cockatoo occurs within the site in the form of tall native and non-native trees.

Extensive areas of remnant vegetation that may provide foraging habitat are located within the local area adjacent to the site. Foraging habitat in the site comprises 2.82 ha of high, moderate and low value foraging habitat for Carnaby's cockatoo, 2.07 ha of low value foraging habitat for Baudin's cockatoo and 0.16 ha of high and low value foraging habitat for forest red-tailed black cockatoo.

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Figures

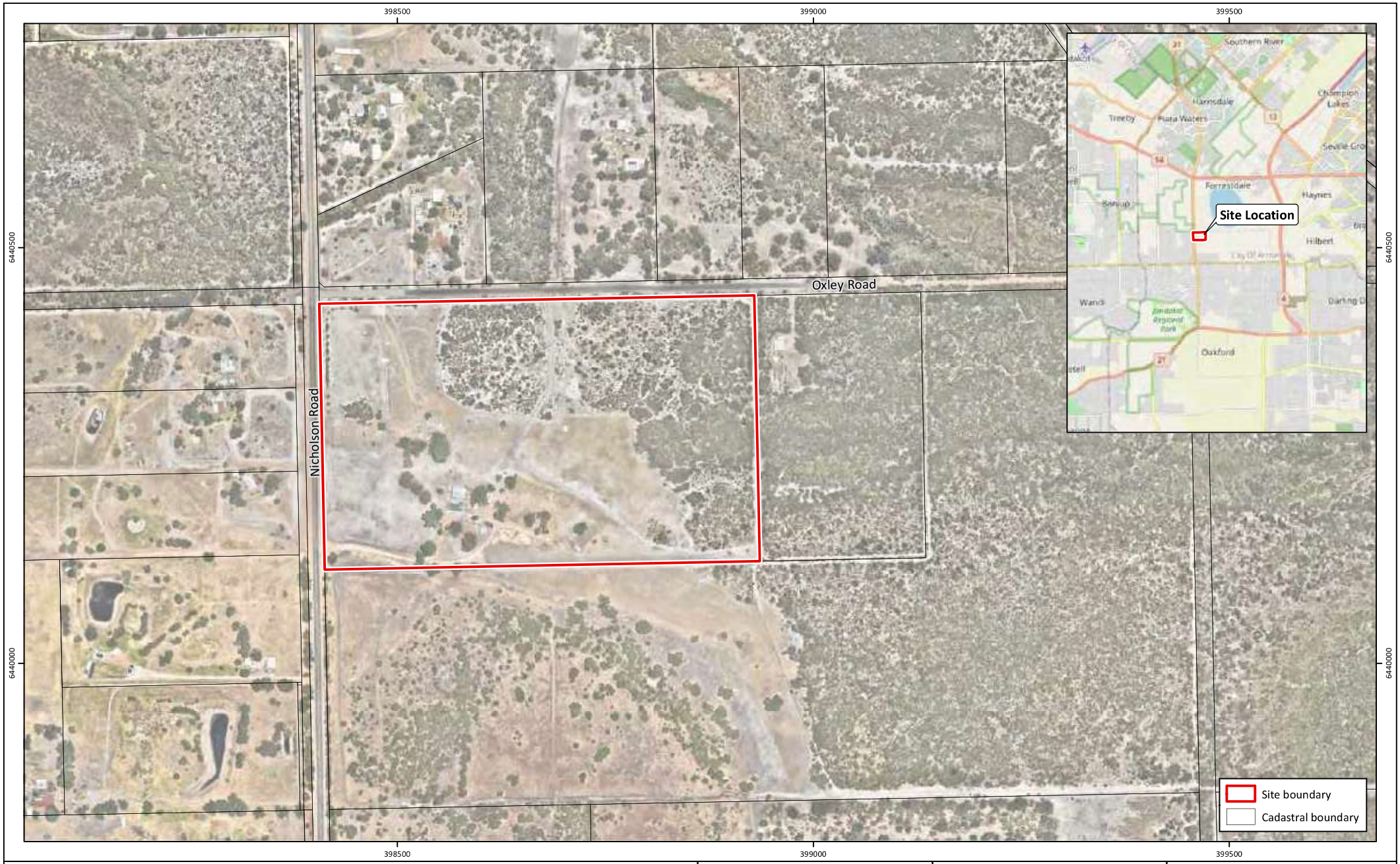

Figure 1: Site Location

Project:	Basic Fauna and Targeted Black Cockatoo Assessment Lot 15 Nicholson Road, Forrestdale
Client:	Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F12

Drawn:	GAR
Date:	26/03/2021
Checked:	SCM
Approved:	RAW
Date:	25/05/2021

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Scale: 1:6,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

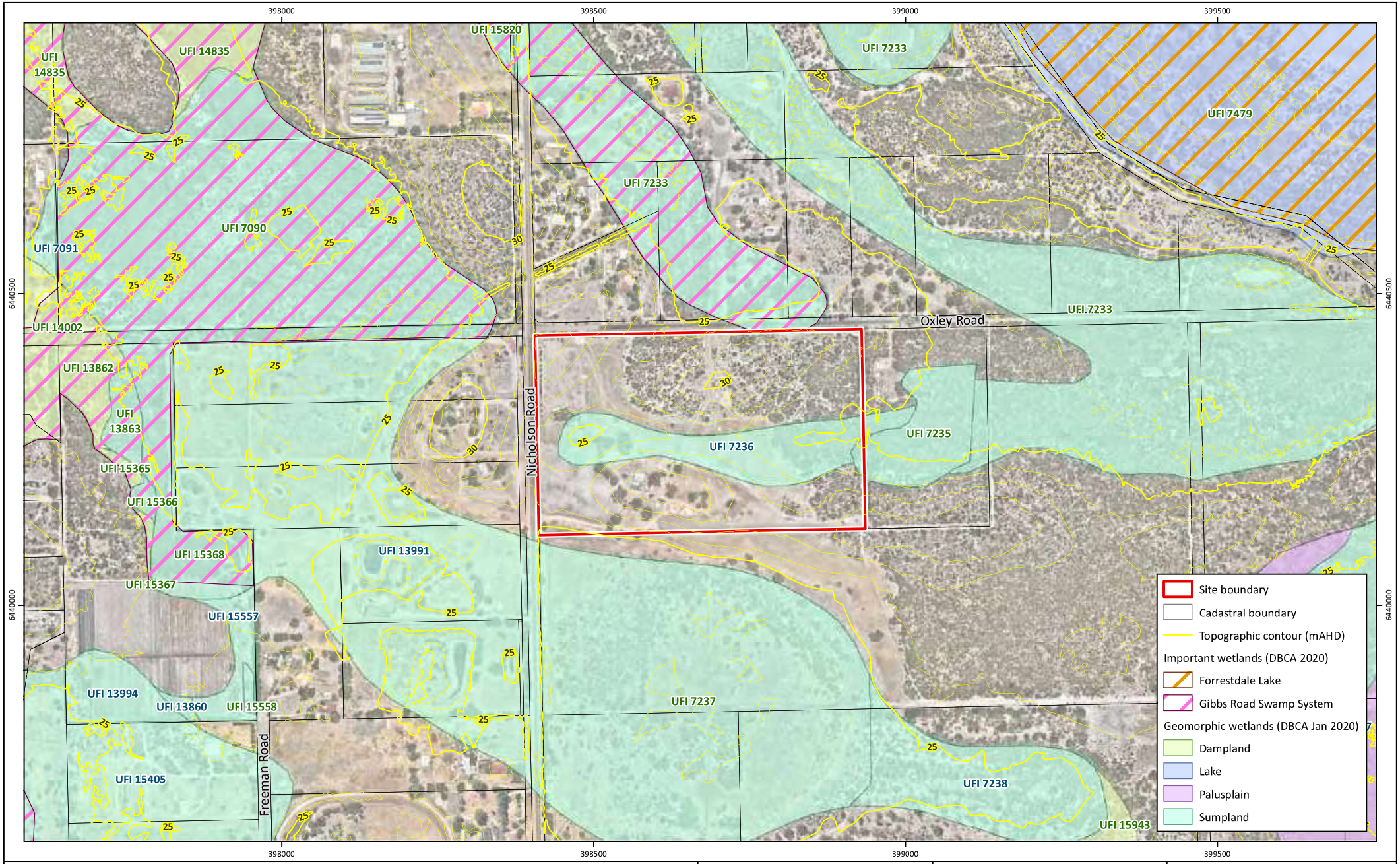

Figure 2: Topographic and Wetland Features

Project: Basic Fauna and Targeted Black Cockatoo Assessment
Lot 15 Nicholson Road, Forrestdale

Client: Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F13

Drawn:	GAR
Date:	26/03/2021
Checked:	SCM
Approved:	RAW
Date:	25/05/2021

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emerge ASSOCIATES

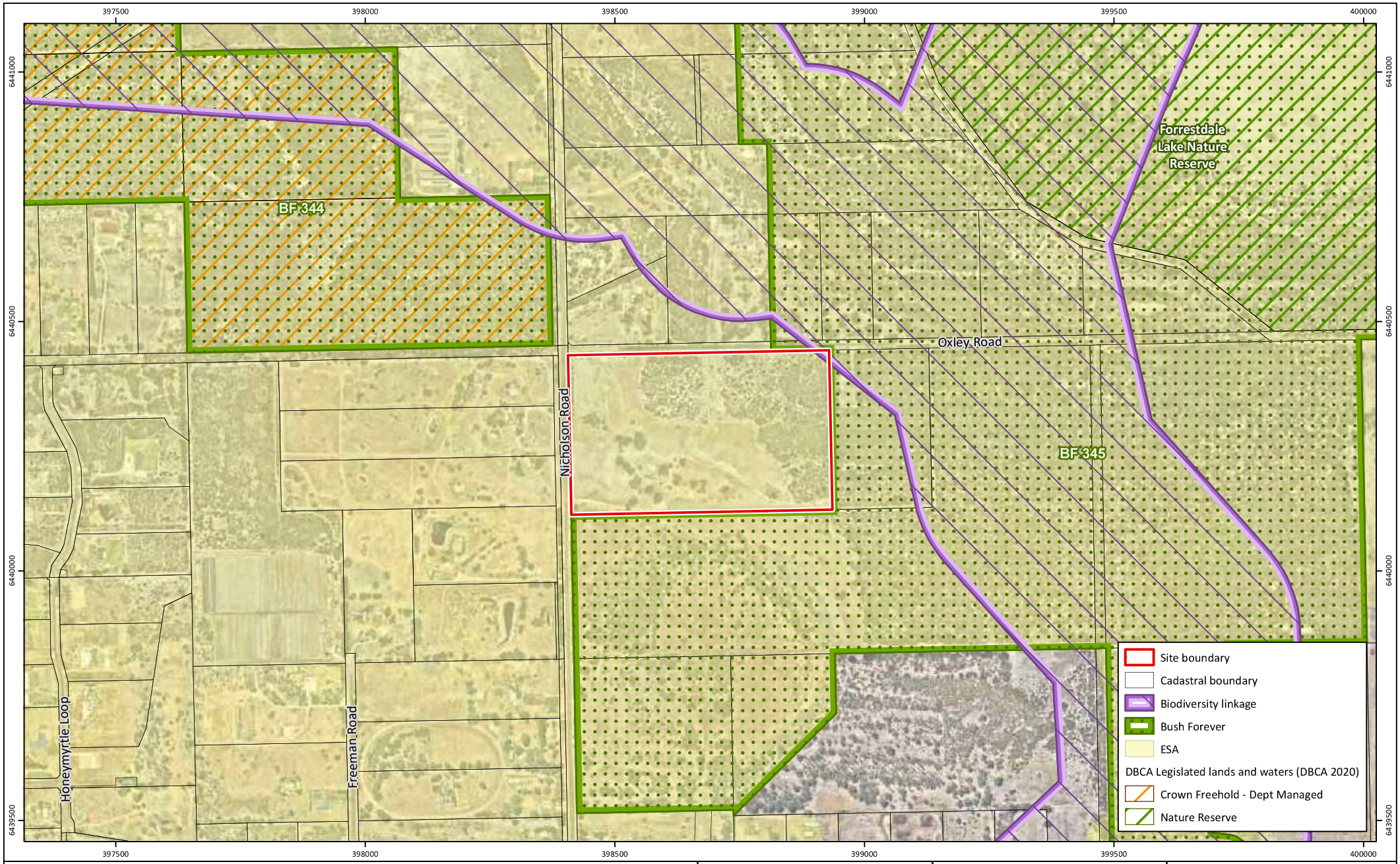

Figure 3: Environmental Features

Project: Basic Fauna and Targeted Black Cockatoo Assessment
Lot 15 Nicholson Road, Forrestdale

Client: Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F14

Drawn:	GAR
Date:	26/03/2021
Checked:	SCM
Approved:	RAW
Date:	25/05/2021

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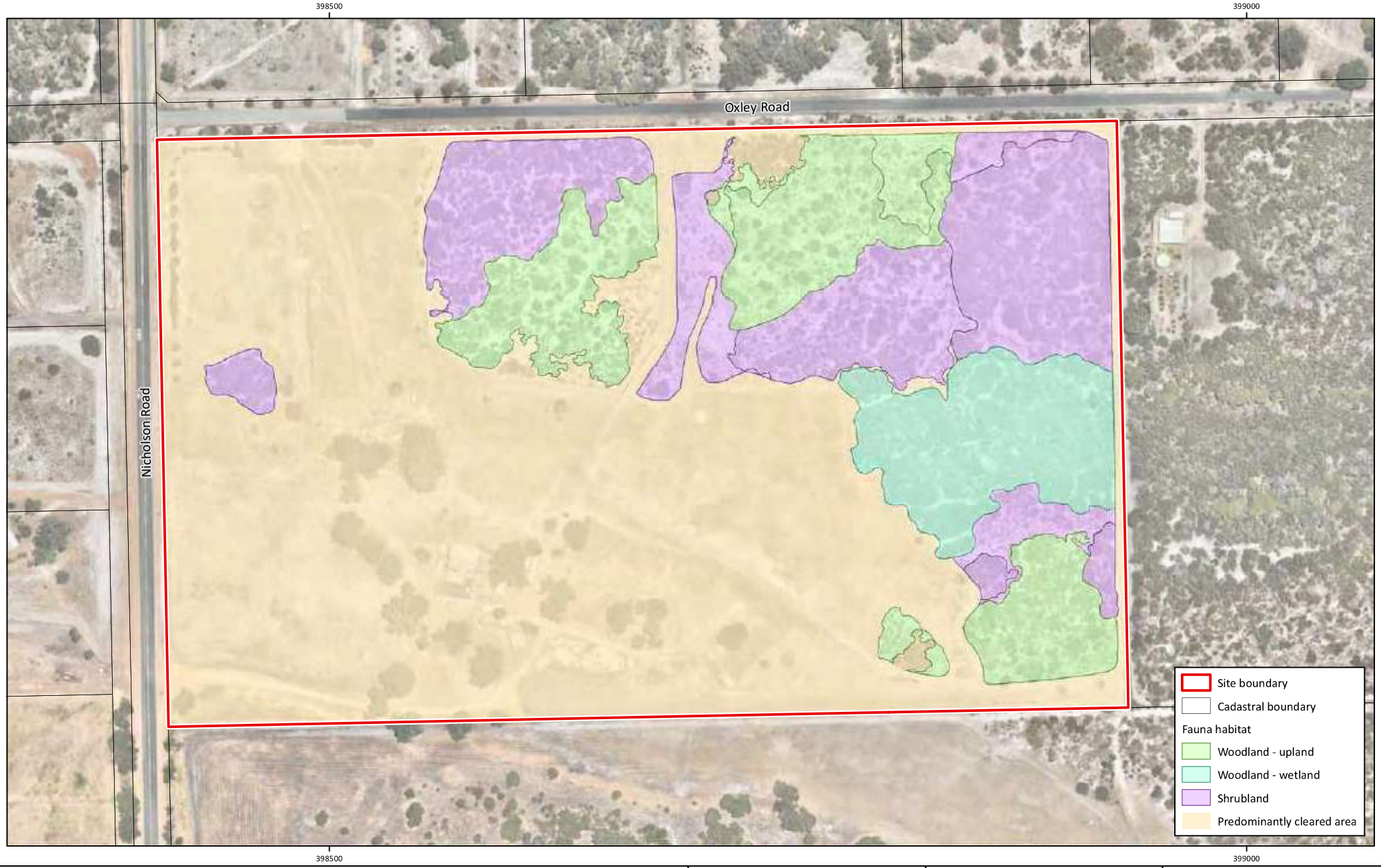

Figure 4: Fauna Habitat

Project: Basic Fauna and Targeted Black Cockatoo Assessment
Lot 15 Nicholson Road, Forrestdale

Client: Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F15

Drawn:	GAR
Date:	26/03/2021
Checked:	SCM
Approved:	RAW
Date:	25/05/2021

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emerge ASSOCIATES

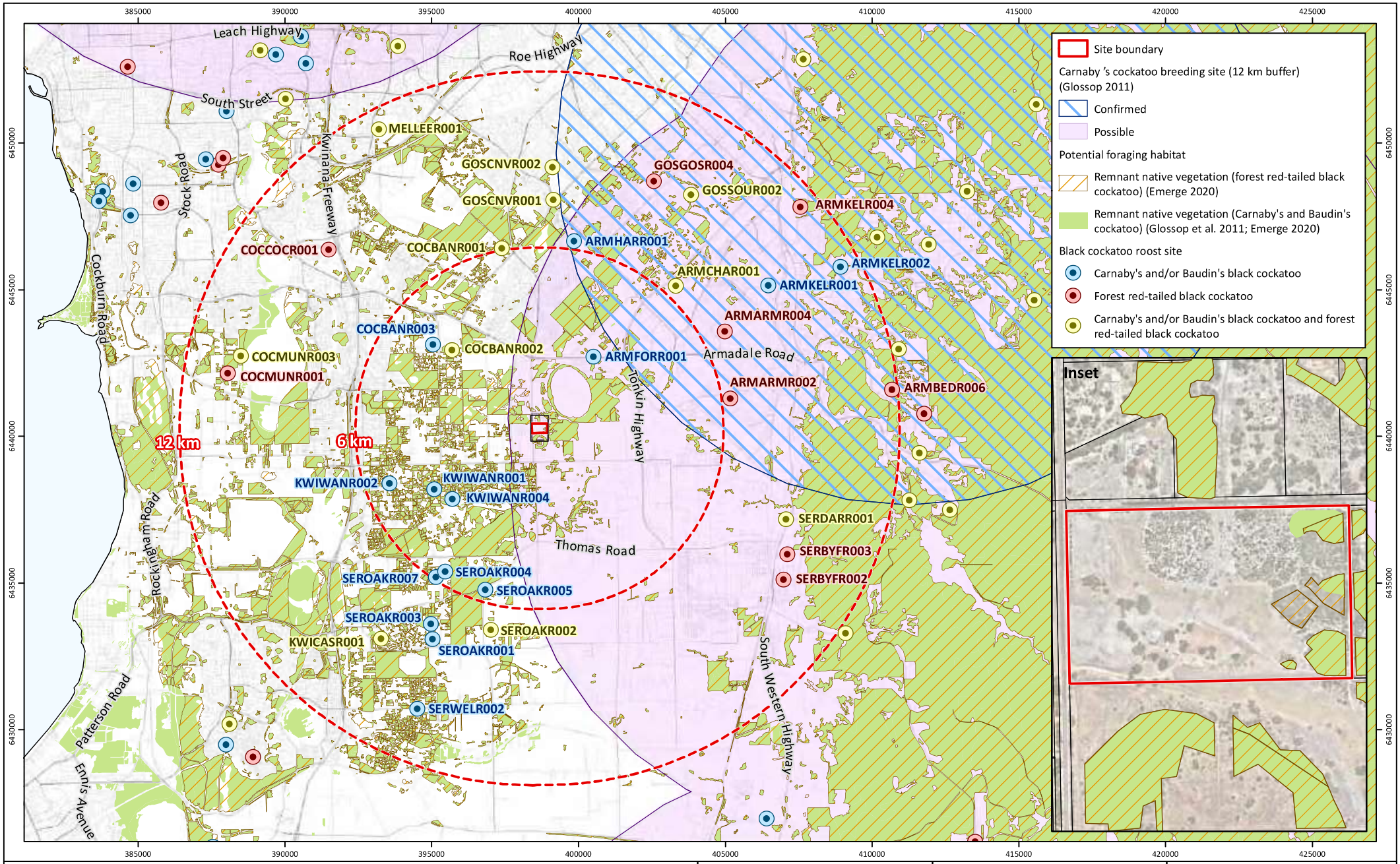

Figure 5: Black Cockatoo Context

Project:	Basic Fauna and Targeted Black Cockatoo Assessment Lot 15 Nicholson Road, Forrestdale
Client:	Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F16

Drawn:	GAR
Date:	26/03/2021
Checked:	SCM
Approved:	RAW
Date:	25/05/2021

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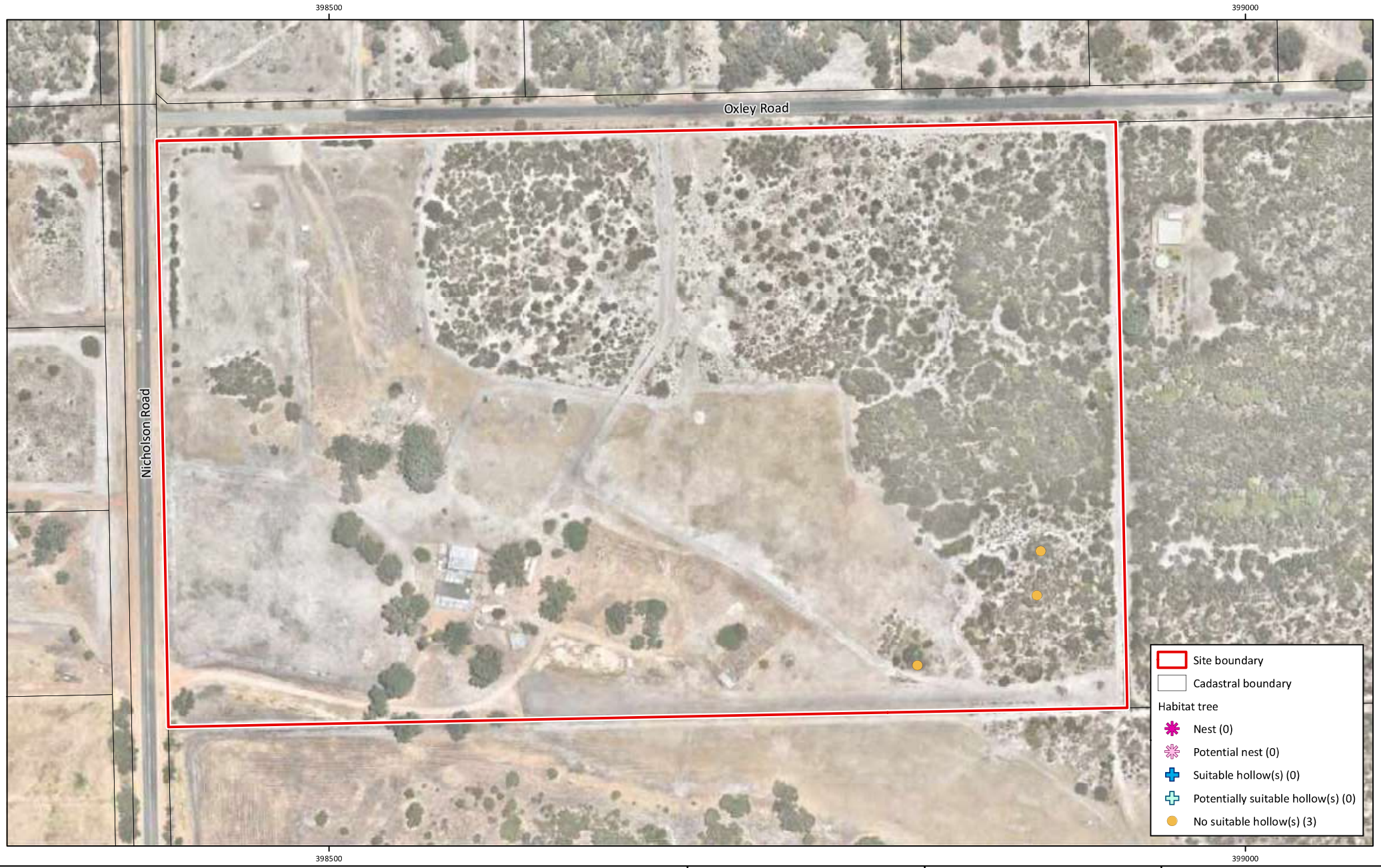

Figure 6: Black Cockatoo Habitat Trees

Project:	Basic Fauna and Targeted Black Cockatoo Assessment Lot 15 Nicholson Road, Forrestdale
Client:	Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F17

Drawn:	GAR
Date:	26/03/2021
Checked:	SCM
Approved:	RAW
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emerge ASSOCIATES

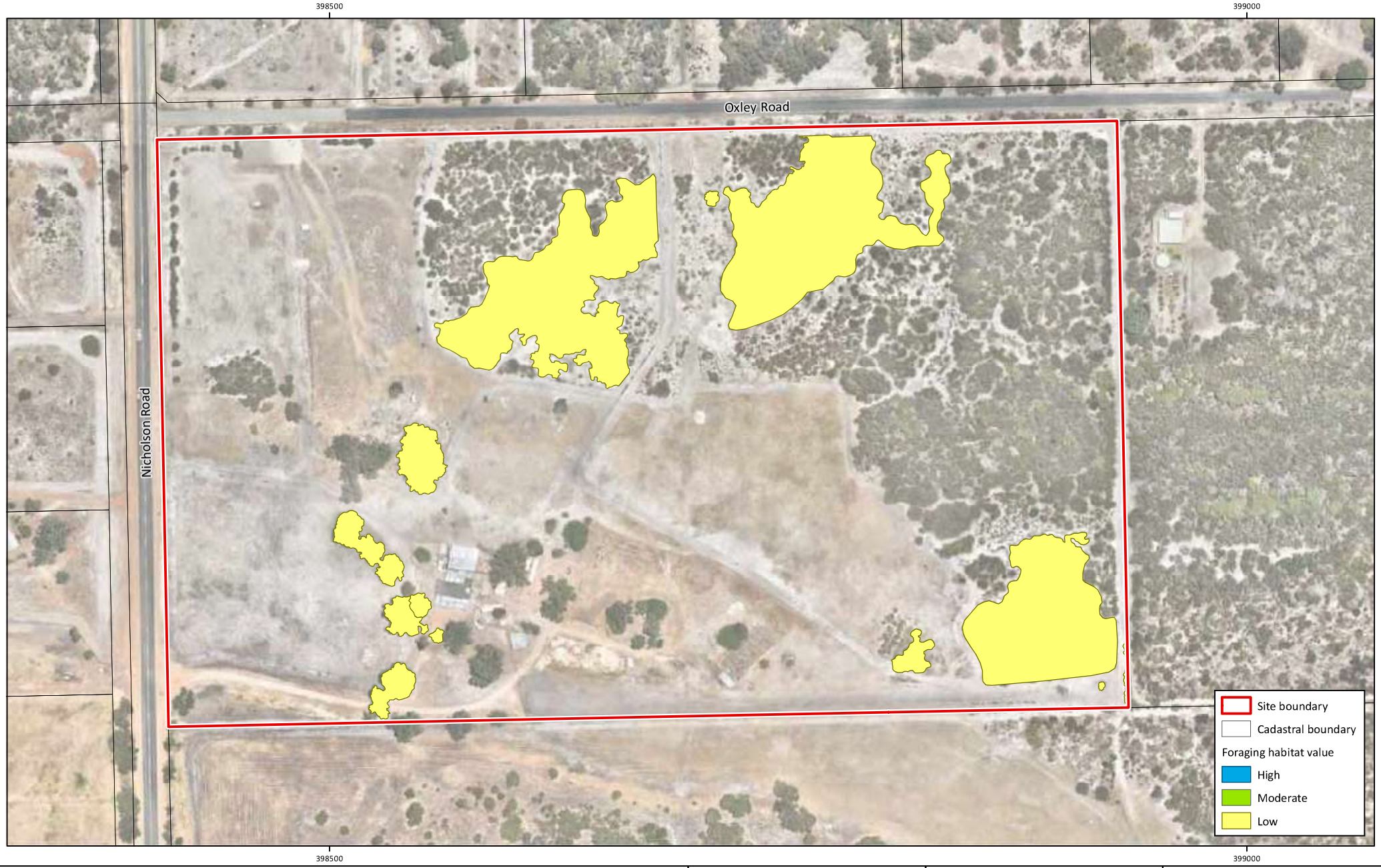

Figure 7: Baudin's Cockatoo Foraging Habitat

Project: Basic Fauna and Targeted Black Cockatoo Assessment
Lot 15 Nicholson Road, Forrestdale
Client: Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F18a

Drawn:	GAR
Date:	23/08/2021
Checked:	TAA
Approved:	TAA
Date:	24/08/2021

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emerge ASSOCIATES

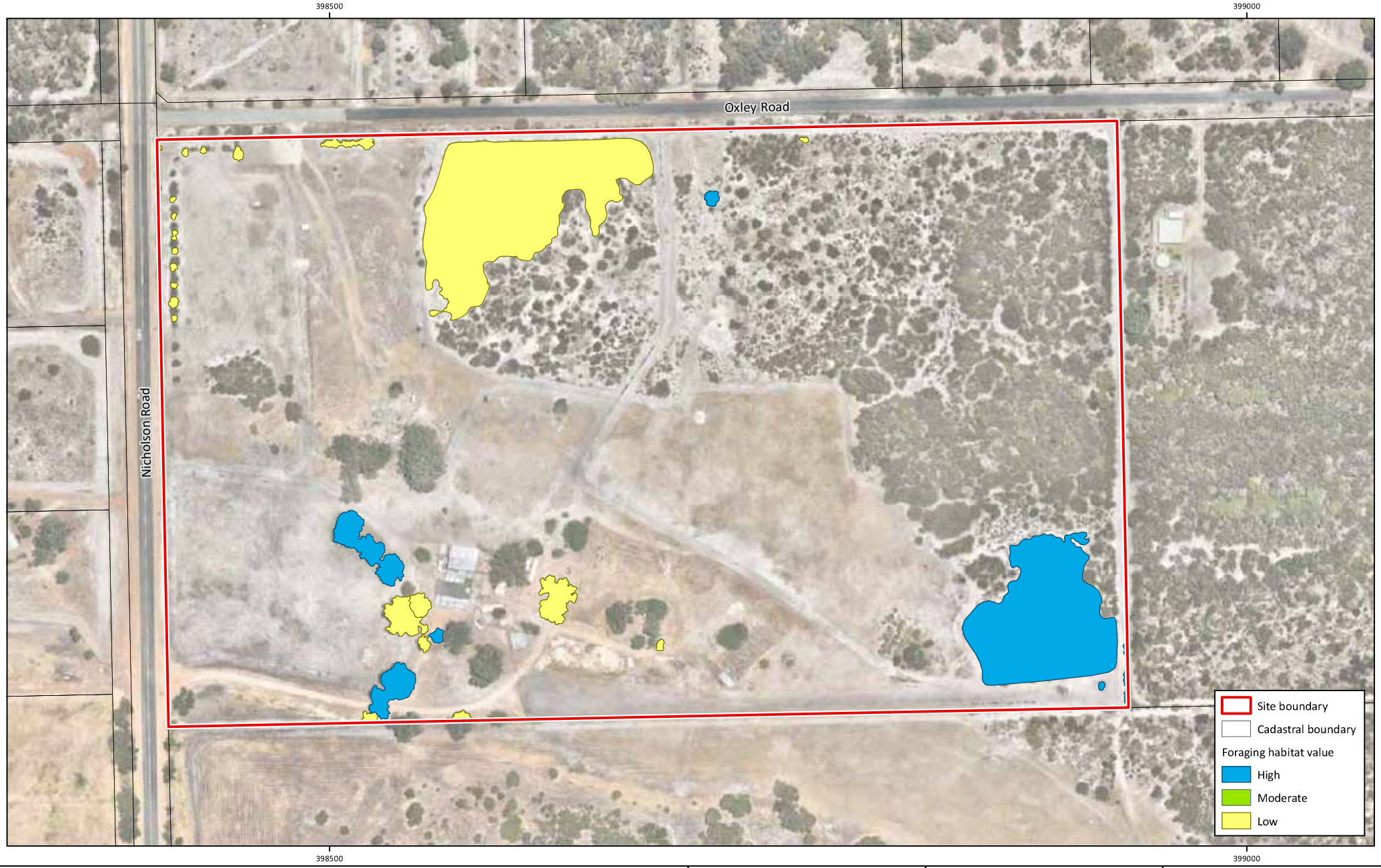

Figure 8: Carnaby's Cockatoo Foraging Habitat

Project: Basic Fauna and Targeted Black Cockatoo Assessment
Lot 15 Nicholson Road, Forrestdale
Client: Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F19a

Drawn:	GAR
Date:	23/08/2021
Checked:	TAA
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Date:	24/08/2021

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emerge ASSOCIATES

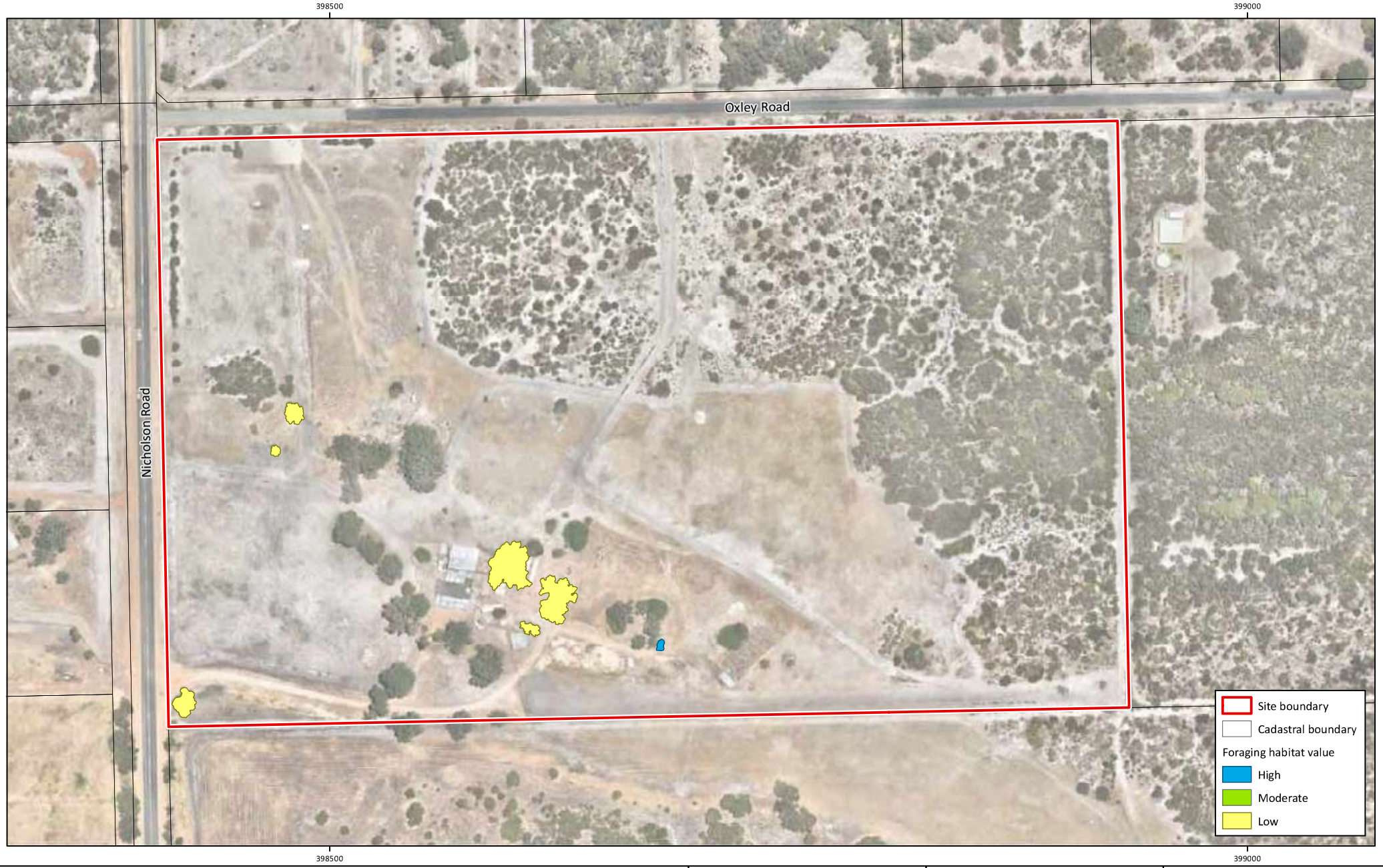

Figure 9: Forest Red-tailed Black Cockatoo Foraging Habitat

Project:	Basic Fauna and Targeted Black Cockatoo Assessment Lot 15 Nicholson Road, Forrestdale
Client:	Australian Islamic College (Perth) Inc.

Plan Number:
EP20-126(06)--F20a

Drawn:	GAR
Date:	23/08/2021
Checked:	TAA
Approved:	TAA
Date:	24/08/2021

N

0 50 100
Metres

Scale: 1:2,750@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

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) as 'threatened', 'migratory' or 'marine' as described in **Table 1**.

Migratory species comprise birds 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).

Fauna species listed as threatened and migratory are protected in Australia as 'matters of national environmental significance' (MNES) under the EPBC Act.

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[#]	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[#]	Threatened Fauna – Critically Endangered Taxa which are considered to be facing an extremely high risk of extinction in the wild.
EN[#]	Threatened Fauna – Endangered Taxa which are considered to be facing a very high risk of extinction in the wild.
VU[#]	Threatened Fauna – Vulnerable Taxa which are considered to be facing a high risk of extinction in the wild.
Migratory[#]	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

[#]matters of national environmental significance (MNES) under the EPBC Act

In Western Australia, fauna taxa may be classed as 'threatened', 'extinct', or 'specially protected' under the *Biodiversity Conservation Act 2016* (BC Act), which is enforced by Department of Biodiversity Conservation and Attractions (DBCA) (DBCA 2019a). The definitions of these categories are provided in **Table 2**.

Table 2: Definitions of specially protected fauna schedules under the BC Act (DBCA 2019a)

Category	Conservation Code	Definition
Threatened	CR	Critically endangered Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future.
	EN	Endangered Threatened species considered to be facing a very high risk of extinction in the wild in the near future.
	VU	Vulnerable Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future.
Extinct	EX	Extinct Species where there is no reasonable doubt that the last member of the species has died.
	EW	Extinct in the wild Species that is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form. Note that no species are currently listed as EW.
Specially protected	MI	Migratory species Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth Includes birds that 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	Species of special conservation interest (conservation dependent fauna) Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
	OS	Other specially protected species Fauna otherwise in need of special protection to ensure their conservation.

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 2018b). Species listed under priorities 1-3 comprise possible threatened species that do not meet survey criteria or are otherwise data deficient. Species listed under priority 4 are those that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons (DBCA 2019a).

Priority fauna species are considered during State approval processes. Priority fauna categories and definitions are listed in **Table 3** (DBCA 2019a).

Table 3: Definitions of priority fauna categories on DBCA's Priority Fauna List (DBCA 2019a)

Conservation Code	Category
P1	Priority 1 – Poorly known 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.
P2	Priority 2 – Poorly known 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.
P3	Priority 3 – Poorly known 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.
P4	(a) Priority 4 – Rare species Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Priority 4 – Near Threatened Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Priority 4 – Other Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Black cockatoos

Three threatened species of black cockatoo occur on the Swan Coastal Plain (referred to herein collectively as 'black cockatoos'):

- *Calyptorhynchus latirostris* (Carnaby's cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus baudinii* (Baudin's cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which is listed as 'vulnerable' under the EPBC Act and the BC Act.

There are a range of regional studies and spatial datasets available which provide information on black cockatoo records and potential habitat mapping. These are detailed below.

Species distribution and breeding range

Broad-scale maps are available for the modelled distribution of Baudin's cockatoo, Carnaby's cockatoo and forest red-tailed black cockatoo (DSEWPaC 2011; DoEE 2016a, b).

The modelled distribution maps also include 'known breeding areas' and 'predicted breeding range' for Baudin's cockatoo and 'breeding range' and 'non-breeding range' for Carnaby's cockatoo.

No breeding range modelling is available for forest red-tailed black cockatoo but the species is known to breed mainly in the jarrah forest region (DBCA 2017a) and in small populations on the Swan Coastal Plain within the Baldivis, Stake Hill, Lake McLarty and Capel area and increasingly in the Perth metropolitan area (DAWE 2020).

Breeding habitat

Department of Environment and Conservation (DEC, now Department of Biodiversity, Conservation and Attractions (DBCA)) and fauna experts, have identified and mapped Carnaby's cockatoo habitat on the Swan Coastal Plain and Jarrah Forest regions (Glossop *et al.* 2011). This dataset includes mapping of Carnaby's cockatoo breeding sites based on point records of breeding from a range of sources. Breeding sites were classified as 'confirmed' where eggs or chicks were recorded and 'possible' where observations relating to Carnaby's cockatoo breeding that did not include actual records of eggs or chicks (e.g. chewed hollows or records of breeding or nesting behaviour by an expert observer).

A 12 km buffer applies to each site to 'reflect the flexible use of these areas by cockatoos and to indicate the important zone for access to potential feeding habitat' (Glossop *et al.* 2011). Glossop *et al.* (2011) state that the areas mapped in the dataset are not a comprehensive record of Carnaby's cockatoo breeding and that many nesting sites are not known.

While this dataset only applies to Carnaby's cockatoo, the information it contains is also applicable for Baudin's cockatoo and forest red-tailed black cockatoo as they have similar breeding habitat requirements. That is, breeding sites that are suitable for Carnaby's cockatoo may also be suitable for

Baudin's cockatoo and forest red-tailed black cockatoo, if located within their distribution/breeding ranges.

BirdLife Australia also maintain a database of confirmed black cockatoo breeding sites which is accessible via a paid search system. BirdLife Australia have advised that their database is comprised of data collected during surveys by staff and volunteers of which most (>99%) surveys are of Carnaby's cockatoo. They have also advised that the dataset is not comprehensive and that an absence of known nests does not necessarily indicate a lack of breeding activity.

The Carnaby's cockatoo recovery plan also identifies 13 'important bird areas' for Carnaby's cockatoo, which are identified as 'sites of global bird conservation importance' (DPaW 2013). These 'important bird areas' comprise sites supporting at least 20 breeding pairs or 1% of the population regularly utilising an area in the non-breeding part of the range.

Confirmed roost sites

BirdLife Australia undertakes annual monitoring of black cockatoo overnight roost sites as part of the annual 'Great Cocky Count' community-based survey. Information gathered from these monitoring events provides roost locations and recorded black cockatoo numbers (Peck *et al.* 2019).

Native foraging habitat

Glossop et al. (2011) also mapped 'areas requiring investigation as Carnaby's cockatoo feeding habitat' for the Swan Coastal Plain and Jarrah Forest regions, based on regional vegetation mapping that may contain plant species known to be foraged upon by Carnaby's cockatoo. Note that this dataset does not include observations or point records of Carnaby's cockatoo feeding. This dataset represents areas of vegetation that may potentially provide foraging habitat for Carnaby's cockatoo.

Given this dataset was created in 2011 and in order to account for clearing of native vegetation that has occurred since this time, Emerge have updated this dataset using the current native vegetation extent as provided by DPIRD (2019a) to only show potential foraging habitat that currently exists (Emerge Associates 2020a).

Pine plantations also provide an important food source for Carnaby's cockatoo, but were not included in the Glossop et al. (2011) dataset. Mapping of pine plantations is available from the Forest Products Commission (Forest Products Commission 2020).

The Glossop et al. (2011) dataset is broadly applicable to other black cockatoos as many plant species that are foraged upon by Carnaby's cockatoo are also consumed by Baudins' cockatoo (e.g. fruit of *Banksia* spp., *Corymbia calophylla* (marri) and *Eucalyptus marginata* (jarrah)) and forest red-tailed black cockatoo (e.g. jarrah and marri fruit). However, using the Glossop et al. (2011) potential foraging habitat dataset for forest red-tailed cockatoos likely overestimates available foraging habitat as it includes multiple plant species that are not consumed by this species (e.g. *Banksia* spp.), and to a lesser extent the foraging value is also over-estimated for Baudin's cockatoo.

Emerge Associates (2020b) have used a similar methodology to Glossop et al. (2011) to define potential foraging habitat for forest-red tailed cockatoos. Specifically, DBCA (2019b) regional vegetation complex mapping has been used to determine which areas of remnant vegetation

support plant species known to be foraged upon by forest red-tailed cockatoos, including *Allocasuarina fraseriana* (sheoak), *Corymbia calophylla* (marri), *Eucalyptus gomphocephala* (tuart) and *Eucalyptus marginata* (jarrah). Where these vegetation complexes intersect remnant vegetation mapped by DPIRD (2019b) they were considered to represent potential foraging habitat for forest red-tailed cockatoos.

Pest fauna

A number of legislative and policy documents exist in relation to pest fauna management at state and national levels. The *Biosecurity and Agriculture Management Act 2007* (BAM Act) is the principle legislation guiding pest fauna management in Western Australia and lists declared pest species.

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 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.

Wetland Habitat

Geomorphic wetland types

On the Swan Coastal Plain DBCA (2017b) have used the geomorphic wetland classification system developed by Semeniuk (1987) and Semeniuk and Semeniuk (1995) to classify wetlands based on the landform shape and water permanence (hydro-period) as outlined in **Table 7**. DBCA maintains a dataset of the *Geomorphic Wetlands of the Swan Coastal Plain* (DBCA 2018a).

Table 7: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017b)

Level of inundation	Geomorphology			
	Basin	Flat	Channel	Slope
Permanently inundated	Lake	-	River	-
Seasonally inundated	Sumpland	Floodplain	Creek	-
Seasonally waterlogged	Dampland	Palusplain	-	Paluslope

Literature

The main literature used for identifying fauna and fauna habitats is listed in **Table 8** below.

Table 8: 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 *et al.* (2003)
Mammals	Menkhorst and Knight (2011), Triggs (2003)
Amphibia	Tyler and Doughty (2009), Bush *et al.* (2002)
Reptiles	Bush *et al.* (2002)

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Appendix B

Black Cockatoo Foraging Plants

		Foraging category as assigned by Emerge			
Species name	**Common name**	**CBC**	**BBC**	**FRTBC**	**Literature references**
Acacia baileyana	Cootamundra wattle	Secondary			Groom 2011
Acacia pentadenia	Karri wattle	Secondary			Groom 2011
Acacia saligna	Orange wattle	Secondary			Groom 2011
Agonis flexuosa	Peppermint tree	Secondary			Groom 2011
Allocasuarina fraseriana	Sheoak		Secondary	Secondary	Johnstone & Storr 1998; Johnstone et al. 2010; Johnstone 2017; DoEE 2017
Allocasuarina spp.		Secondary		Secondary	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Anigozanthos flavidus	Tall kangaroo paw		Secondary		Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Araucaria heterophylla	Norfolk island pine	Secondary			Groom 2011; DoEE 2017
Banksia ashbyi	Ashby's banksia	Primary	Secondary		Saunders 1980; Groom 2011; DoEE 2017
Banksia attenuata	Slender banksia	Primary	Secondary		Saunders 1980; Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia baxteri	Baxter's banksia	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia carlinoides	Pink dryandra	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia coccinea	Scarlet banksia	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia dallanneyi	Couch honeypot dryandra	Primary	Secondary		Groom 2011; DoEE 2017
Banksia ericifolia	Heath-leaved banksia	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia fraseri		Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia gardneri	Prostrate banksia	Primary	Secondary		Groom 2011; DoEE 2017
Banksia grandis	Bull banksia	Primary	Secondary		Saunders 1980; Johnstone & Storr 1998; Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia hookeriana	Hooker's banksia	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia ilicifolia	Holly banksia	Primary	Secondary		Johnstone et al. 2010; Groom 2011; Johnstone & Storr 1998; DoEE 2017
Banksia kippistiana		Primary	Secondary		Groom 2011; DoEE 2017
Banksia leptophylla		Primary	Secondary		Groom 2011; DoEE 2017
Banksia lindleyana	Porcupine banksia	Primary	Secondary		Johnstone et al. 2010; DoEE 2017

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Banksia littoralis	Swamp banksia	Primary	Secondary		Saunders 1980; Groom 2011Johnstone & Storr 1998; Johnstone et al. 2010; DoEE 2017
Banksia menziesii	Firewood banksia	Primary	Secondary		Saunders 1980; Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia mucronulata	Swordfish dryandra	Primary	Secondary		Groom 2011; DoEE 2017
Banksia nivea	Honeypot dryandra	Primary	Secondary		Saunders 1980; Groom 2011; DoEE 2017
Banksia nobilis	Golden dryandra	Primary	Secondary		Saunders 1980; Groom 2011; DoEE 2017
Banksia praemorsa	Cut-leaf banksia	Primary	Secondary		Saunders 1980; Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia prionotes	Acorn banksia	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia prolata		Primary	Secondary		Johnstone et al. 2010; DoEE 2017
Banksia quercifolia	Oak-leaved banksia	Primary	Secondary		Johnstone & Storr 1998; Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia sessilis	Parrot bush	Primary	Secondary		Saunders 1980; Johnstone & Storr 1998; Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia speciosa	Showy banksia	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia spp.		Primary	Secondary		Saunders 1979; DSEWPaC 2012; DoEE 2017
Banksia squarrosa	Pingle	Primary	Secondary		Johnstone et al. 2010; Groom 2011; DoEE 2017
Banksia tricuspis	Pine banksia	Primary	Secondary		Groom 2011; DoEE 2017
Banksia undata	Urchin dryandra	Primary	Secondary		Groom 2011; DoEE 2017
Banksia verticillata	Granite banksia	Primary	Secondary		Saunders 1980; Groom 2011; DoEE 2017
Brassica campestris	Canola	Secondary			Groom 2011; DoEE 2017
Callistemon spp.		Secondary	Secondary		Johnstone et al. 2010; DoEE 2017
Callistemon viminalis	Captain cook bottlebrush	Secondary			Groom 2011
Callitris sp.		Secondary			Johnstone et al. 2010; Groom 2011
Carya illnoinensis	Pecan	Primary	Secondary		Johnstone et al. 2010; Groom 2011; Groom 2014; DoEE 2017
Casuarina cunninghamiana	River sheoak	Secondary			Groom 2011
Citrullus lanatus	Pie or afghan melon	Secondary			Johnstone et al. 2010; Groom 2011

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Corymbia calophylla	Marri	Primary	Primary	Primary	Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017; Johnstone 2017; Saunders 1979; Johnstone & Kirkby 2008
Corymbia citriodora	Lemon scented gum	Secondary	Secondary	Secondary	Johnstone et al. 2010; DSEWPaC 2012; Groom 2011; Johnstone 2017
Corymbia ficifolia	Red flowering gum	Secondary			Groom 2011
Corymbia haematoxylon	Mountain marri	Secondary		Secondary	Groom 2011; DoEE 2012; DoEE 2017
Corymbia maculata	Spotted gum	-	-	-	-
Darwinia citriodora	Lemon-scented darwinia	Secondary	Secondary		Groom 2011; Johnstone et al. 2010
Diospryros sp.	Sweet persimmon	Secondary	Secondary		Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Eremophila glabra	Tarbush	Secondary			Groom 2011
Erodium aureum		Secondary			Groom 2011
Erodium botrys	Long storksbill	Secondary	Secondary		Groom 2011; Johnstone & Storr 1998; Johnstone et al. 2010
Erodium spp.		Secondary	Secondary		Johnstone et al. 2010; DoEE 2017
Eucalyptus accedens	Powderbark	-	-	-	-
Eucalyptus caesia	Silver princess	Secondary		Secondary	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017; Johnstone 2017
Eucalyptus camaldulensis	River red gum			Secondary	DoEE 2012; DoEE 2017
Eucalyptus decipiens	Red heart/moit			Secondary	Johnstone 2017
Eucalyptus diversicolor	Karri			Primary	Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017; Johnstone & Storr 1998
Eucalyptus erythrocorys	Illyarrie	Secondary		Secondary	DSEWPaC 2012; DoEE 2017; Johnstone 2017, Johnstone et al. 2010
Eucalyptus globulus	Tasmanian blue gum	-	-	-	-
Eucalyptus gomphocephala	Tuart	Secondary		Secondary	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Eucalyptus grandis	Flooded gum, rose gum			Secondary	DoEE 2012; DoEE 2017

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Eucalyptus lehmannii	Bushy yate			Secondary	Johnstone 2017
Eucalyptus leucoxylon	Yellow gum	Secondary			Groom 2014
Eucalyptus longicornis	Red morrell	-	-	-	-
Eucalyptus loxophleba	York gum	Secondary			Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Eucalyptus marginata	Jarrah	Primary	Secondary	Primary	Saunders 1980; Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017; Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone 2017
Eucalyptus megacarpa	Bullich	-	-	-	-
Eucalyptus occidentalis	Swamp yate	-	-	-	-
Eucalyptus patens	Blackbutt	Primary		Primary	Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017; Johnstone 2017; Groom 2011
Eucalyptus pleurocarpa	Tallerack	Secondary			Groom 2011
Eucalyptus preissiana	Bell-fruited mallee	Secondary			Groom 2011
Eucalyptus robusta	Swamp mahogany	Secondary			Johnstone et al. 2010; Groom 2011
Eucalyptus rudis	Flooded gum	-	-	-	-
Eucalyptus salmonophloia	Salmon gum	Primary			Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DSEWPaC 2012; DoEE 2017
Eucalyptus salubris	Gimlet	-	-	-	-
Eucalyptus staeri	Albany blackbutt			Secondary	Johnstone & Storr 1998
Eucalyptus todtiana	Coastal blackbutt	Secondary			Saunders 1980; Johnstone et al. 2010; Groom 2011; Johnstone & Kirkby 2008
Eucalyptus wandoo	Wandoo	Primary	Secondary	Primary	Saunders 1980; Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Ficus sp.	Fig	Secondary			Groom 2011
Grevillea armigera	Prickly toothbrushes	Primary			Groom 2011
Grevillea bipinnatifida	Fuschia grevillea	Primary			Groom 2011

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Grevillea hookeriana	Red toothbrushes	Primary			Groom 2011
Grevillea hookeriana subsp. apic	Black toothbrushes	Primary			Groom 2011
Grevillea paniculata	Kerosene bush	Primary			Groom 2011
Grevillea paradoxa	Bottlebrush grevillea	Primary			Groom 2011
Grevillea petrophiloides	Pink poker	Primary			Groom 2011
Grevillea robusta	Silky oak	Primary			Johnstone et al. 2010; Groom 2011
Grevillea spp.		Primary			Saunders 1979; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Grevillea wilsonii	Native fuchsia		Secondary		Johnstone et al. 2010
Hakea auriculata		Primary			Saunders 1980; Groom 2011
Hakea candolleana		Primary			Groom 2011
Hakea circumalata	Coastal hakea	Primary			Groom 2011
Hakea commutata		Primary			Groom 2011
Hakea conchifolia	Shell-leaved hakea	Primary			Groom 2011
Hakea costata	Ribbed hakea	Primary			Groom 2011
Hakea cristata	Snail hakea	Primary	Secondary		Groom 2011; Johnstone et al. 2010
Hakea cucullata	Snail hakea	Primary			Groom 2011
Hakea cyclocarpa	Ramshorn	Primary			Saunders 1980; Groom 2011
Hakea eneabba		Primary			Groom 2011
Hakea erinacea	Hedgehog hakea	Primary	Secondary		Johnstone et al. 2010; Groom 2011
Hakea falcata	Sickle hakea	Primary			Groom 2011
Hakea flabellifolia	Fan-leaved hakea	Primary			Groom 2011
Hakea gilbertii		Primary			Saunders 1980; Groom 2011
Hakea incrassata	Golfball or marble hakea	Primary			Johnstone et al. 2010; Groom 2011
Hakea lasiantha	Woolly flowered hakea	Primary			Johnstone et al. 2010; Groom 2011
Hakea lasianthoides		Primary	Secondary		Johnstone et al. 2010; Groom 2011
Hakea laurina	Pin-cushion hakea	Primary			Johnstone et al. 2010; Groom 2011
Hakea lissocarpha	Honeybush	Primary	Secondary		Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea marginata			Secondary		Johnstone et al. 2010

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Hakea megalosperma	Lesueur hakea	Primary			Groom 2011
Hakea multilineata	Grass leaf hakea	Primary			Groom 2011
Hakea neospathulata		Primary			Groom 2011
Hakea obliqua	Needles and corks	Primary			Saunders 1980; Groom 2011
Hakea oleifolia	Dungyn	Primary			Groom 2011
Hakea pandanicarpa subsp. crassifolia	Thick-leaved hakea	Primary			Groom 2011
Hakea petiolaris	Sea urchin hakea	Primary			Groom 2011
Hakea polyanthema		Primary			Groom 2011
Hakea preissii	Needle tree	Primary			Groom 2011
Hakea prostrata	Harsh hakea	Primary	Secondary		Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea psilorrhyncha		Primary			Groom 2011
Hakea ruscifolia	Candle hakea	Primary	Secondary		Saunders 1980; Groom 2011; Johnstone et al. 2010
Hakea scoparia	Kangaroo bush	Primary			Groom 2011
Hakea smilacifolia		Primary			Groom 2011
Hakea spp.		Primary	Secondary		Saunders 1979; DSEWPaC 2012; DoEE 2017
Hakea stenocarpa	Narrow-fruited hakea	Primary	Secondary		Johnstone et al. 2010; Groom 2011
Hakea sulcata	Furrowed hakea	Primary			Groom 2011
Hakea trifurcata	Two-leaved hakea	Primary	Secondary		Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea undulata	Wavy-leaved hakea	Primary	Secondary		Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea varia	Variable-leaved hakea	Primary	Secondary		Saunders 1980; Groom 2011
Harpephyllum caffrum	Kaffir plum			Secondary	Johnstone 2017
Helianthus annuus	Sunflower	Secondary			Johnstone et al. 2010; Groom 2011
Hibiscus sp.	Hibiscus	Secondary			Groom 2011
Isopogon scabriusculus		Secondary			Groom 2011
Jacaranda mimosifolia	Jacaranda	Secondary	Secondary		Johnstone et al. 2010; Groom 2011

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Jacksonia furcellata	Grey stinkwood	Secondary			Groom 2011
Kingia australis	Kingia		Secondary		Johnstone et al. 2010
Lambertia inermis	Chittick	Secondary			Johnstone & Storr 1998; Groom 2011
Lambertia multiflora	Many-flowered honeysuckle	Secondary			Saunders 1980; Groom 2011
Liquidamber styraciflua	Liquid amber	Primary		Secondary	Johnstone et al. 2010; Groom 2011; Groom 2014; Personal observation
Lupinus sp.	Lupin	Secondary			Saunders 1980; Groom 2011
Macadamia integrifolia	Macadamia	Primary	Secondary		Johnstone et al. 2010; Grooms 2011; Groom 2014
Malus domestica	Apple	Secondary	Secondary		Johnstone et al. 2010; Johnstone & Storr 1998; DSEWPaC 2012; DoEE 2017; Groom 2011
Melaleuca leuropoma		Secondary			Saunders 1980; Groom 2011
Melia azedarach	Cape lilac or white cedar	Secondary		Primary	Johnstone et al. 2010; Groom 2011
Mesomeleana spp.		Secondary			Johnstone et al. 2010; Groom 2011
Olea europea	Olive			Secondary	Johnstone 2017
Persoonia longifolia	Snottygobble			Secondary	Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Pinus canariensis	Canary island pine	Primary			Johnstone et al. 2010; Groom 2011
Pinus caribea	Caribbean pine	Primary			Johnstone et al. 2010; Groom 2011
Pinus pinaster	Pinaster or maritime pine	Primary			Groom 2011
Pinus radiata	Radiata pine	Primary	Secondary		Johnstone et al. 2010; Groom 2011
Pinus spp.		Primary	Secondary		Johnstone & Storr 1998; Saunders 1979; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Protea 'Pink Ice'		Secondary			Groom 2011
Protea repens		Secondary			Groom 2011
Protea spp.		Secondary			Johnstone et al. 2010

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Prunus amygdalus	Almond tree	Secondary			Johnstone & Storr 1998; Johnstone et al. 2010; Groom 2011; DoEE 2017
Pyrus communis	European pear		Secondary		Johnstone & Storr 1998; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Quercus spp.	Oak		Secondary		Johnstone et al. 2010
Raphanus raphanistrum	Wild radish	Secondary			Groom 2011; DoEE 2017
Reedia spathacea			Secondary		Johnstone et al. 2010
Rumex hypogaeus	Doublegee	Secondary			Saunders 1980
Stenocarpus sinuatus		Secondary			Johnstone et al. 2010
Syzygium smithii	Lilly pilly	Secondary			Groom 2014
Tipuana tipu	Tipu or rosewood tree	Primary			Groom 2011, Groom 2014
Xanthorrhoea preissii	Grass tree	Secondary	Secondary		Groom 2011; Johnstone et al. 2010
Xylomelum occidentale	Woody pear	Secondary			Groom 2014

CBC=Carnaby's cockatoo, BBC=Baudin's cockatoo and FRTBC=Forest red-tailed black cockatoo

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Appendix C

Database Search Results

NatureMap Species Report

Created By Guest user on 10/03/2021

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115° 55' 31" E,32° 10' 10" S
Buffer	10km
Group By	Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	381	53428
Other specially protected fauna	1	39
Priority 1	1	4
Priority 2	1	1
Priority 3	6	218
Priority 4	11	439
Protected under international agreement	21	547
Rare or likely to become extinct	14	2337
TOTAL	**436**	**57013**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
2.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
3.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
4.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)*		T	
5.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
6.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
7.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		T	
8.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
9.	33983	*Leioproctus douglasiellus (a short-tongued bee)*		T	
10.	24146	*Myrmecobius fasciatus (Numbat, Walpurti)*		T	
11.	33984	*Neopasiphae simplicior (a short-tongued bee)*		T	
12.	48237	*Rostratula australis (Australian Painted Snipe)*		T	
13.	24145	*Setonix brachyurus (Quokka)*		T	
14.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Protected under international agreement					
15.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
16.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
17.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
18.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
19.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
20.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
21.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
22.	25574	*Charadrius dubius (Little Ringed Plover)*		IA	
23.	41332	*Chlidonias leucopterus (White-winged Black Tern, white-winged tern)*		IA	
24.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
25.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
26.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
27.	24802	*Philomachus pugnax (Ruff, reeve)*		IA	
28.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
29.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
30.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
31.	24516	*Stercorarius longicaudus (long-tailed jaeger, long-tailed skua)*		IA	
32.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
33.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
34.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
35.	41351	*Xenus cinereus (Terek Sandpiper)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Other specially protected fauna					
36.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
Priority 1					
37.	33994	*Throscodectes xiphos (Stylet Bush Cricket, Stylet Throsco (Jandakot))*		P1	Y
Priority 2					
38.	33971	*Austroconops mcmillani (McMillan's biting midge (Swan Coastal Plain), biting midge (southwest))*		P2	
Priority 3					
39.	25242	*Acanthophis antarcticus (Southern Death Adder)*		P3	
40.	48579	*Euoplos inornatus (inornate trapdoor spider (northern Jarrah Forest))*		P3	
41.	48935	*Idiosoma sigillatum (Swan Coastal Plain shield-backed trapdoor spider)*		P3	
42.	33982	*Leioproctus contrarius (a short-tongued bee)*		P3	
43.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
44.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	
Priority 4					
45.	25035	*Ctenotus delli (Dell's skink, Darling Range southwest Ctenotus)*		P4	
46.	24189	*Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)*		P4	
47.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
48.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
49.	47975	*Ixobrychus dubius (Australian Little Bittern)*		P4	
50.	48024	*Notamacropus eugenii subsp. derbianus (Tammar Wallaby, Tammar)*		P4	
51.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
52.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
53.	24663	*Phaethon rubricauda (Red-tailed Tropicbird)*		P4	
54.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
55.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
Non-conservation taxon					
56.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
57.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
58.	24262	*Acanthiza inornata (Western Thornbill)*			
59.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
60.		*Acariformes sp.*			
61.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
62.	24281	*Accipiter cirrocephalus subsp. cirrocephalus (Collared Sparrowhawk)*			
63.	25536	*Accipiter fasciatus (Brown Goshawk)*			
64.	24283	*Accipiter fasciatus subsp. didimus (Brown Goshawk)*			
65.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
66.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
67.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
68.	24831	*Acrocephalus australis subsp. gouldi (Australian Reed Warbler)*			
69.	24301	*Aegotheles cristatus subsp. cristatus (Australian Owlet-nightjar)*			
70.		*Aeshnidae sp.*			
71.		*Akamptogonus novarae*			
72.		*Amblyomma triguttatum*			
73.		*Aname mainae*			
74.		*Aname tepperi*			
75.	24310	*Anas castanea (Chestnut Teal)*			
76.	24312	*Anas gracilis (Grey Teal)*			
77.	24313	*Anas platyrhynchos (Mallard)*			
78.		*Anas platyrhynchos subsp. domesticus*			
79.	24315	*Anas rhynchotis (Australasian Shoveler)*			
80.	24316	*Anas superciliosa (Pacific Black Duck)*			
81.		*Ancylidae sp.*			
82.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
83.	44629	*Anilios australis*			
84.		*Anser anser*			
85.	24088	*Antechinus flavipes subsp. leucogaster (Yellow-footed Antechinus, Mardo)*			
86.	24561	*Anthochaera carunculata (Red Wattlebird)*			
87.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
88.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
89.	24285	*Aquila audax (Wedge-tailed Eagle)*			
90.		*Araneus senicaudatus*			
91.	24337	*Ardea garzetta subsp. nigripes (Little Egret)*			
92.	25558	*Ardea ibis (Cattle Egret)*			
93.	41324	*Ardea modesta (great egret, white egret)*			
94.	24340	*Ardea novaehollandiae (White-faced Heron)*			
95.	24341	*Ardea pacifica (White-necked Heron)*			
96.	25566	*Artamus cinereus (Black-faced Woodswallow)*			

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97.	24352	*Artamus cinereus subsp. melanops (Black-faced Woodswallow)*			
98.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
99.		*Artamus sordidus*			
100.		*Artoria flavimana*			
101.		*Artoria linnaei*			
102.		*Artoria taeniifera*			
103.		*Asadipus kunderang*			
104.	47713	*Austronomus australis (White-striped Free-tailed Bat)*			
105.	24318	*Aythya australis (Hardhead)*			
106.		*Baetidae sp.*			
107.		*Ballarra longipalpus*			
108.		*Barnardius zonarius*			
109.	24319	*Biziura lobata (Musk Duck)*			
110.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
111.	24359	*Burhinus grallarius (Bush Stone-curlew)*			
112.	25713	*Cacatua galerita (Sulphur-crested Cockatoo)*			
113.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
114.	25715	*Cacatua roseicapilla (Galah)*			
115.	25716	*Cacatua sanguinea (Little Corella)*			
116.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*	Y		
117.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
118.	24427	*Cacomantis flabelliformis subsp. flabelliformis (Fan-tailed Cuckoo)*			
119.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
120.		*Caenidae sp.*			
121.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
122.		*Ceratopogonidae sp.*			
123.	24086	*Cercartetus concinnus (Western Pygmy-possum, Mundarda)*			
124.		*Cercophonius sulcatus*			
125.		*Cethegus fugax*			
126.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
127.	24187	*Chalinolobus morio (Chocolate Wattled Bat)*			
128.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
129.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
130.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
131.	33939	*Cherax cainii (Marron)*			
132.		*Cherax destructor*			
133.		*Cherax preissii*			
134.		*Cherax quinquecarinatus*			
135.		*Cherax sp.*			
136.		*Chironominae sp.*			
137.	24980	*Christinus marmoratus (Marbled Gecko)*			
138.		*Chroicocephalus novaehollandiae*			
139.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
140.	25601	*Chrysococcyx lucidus (Shining Bronze Cuckoo)*			
141.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
142.	24288	*Circus approximans (Swamp Harrier)*			
143.	24289	*Circus assimilis (Spotted Harrier)*			
144.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
145.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
146.	24613	*Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)*			
147.	24399	*Columba livia (Domestic Pigeon)*	Y		
148.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
149.	24362	*Coracina novaehollandiae subsp. novaehollandiae (Black-faced Cuckoo-shrike)*			
150.		*Corixidae sp.*			
151.		*Cormocephalus aurantiipes*			
152.		*Cormocephalus hartmeyeri*			
153.		*Cormocephalus rubriceps*			
154.	24416	*Corvus bennetti (Little Crow)*			
155.	25592	*Corvus coronoides (Australian Raven)*			
156.	24417	*Corvus coronoides subsp. perplexus (Australian Raven)*			
157.	24419	*Corvus splendens (House Crow)*			
158.	24671	*Coturnix pectoralis (Stubble Quail)*			
159.	25701	*Coturnix ypsilophora (Brown Quail)*			
160.	24673	*Coturnix ypsilophora subsp. australis (Brown Quail)*			
161.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
162.	25595	*Cracticus tibicen (Australian Magpie)*			
163.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
164.	24423	*Cracticus tibicen subsp. tibicen (Black-backed Magpie)*			
165.	25596	*Cracticus torquatus (Grey Butcherbird)*			
166.	24424	*Cracticus torquatus subsp. torquatus (Grey Butcherbird)*			

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167.	25398	*Crinia georgiana (Quacking Frog)*			
168.	25399	*Crinia glauerti (Clicking Frog)*			
169.	25400	*Crinia insignifera (Squelching Froglet)*			
170.	30893	*Cryptoblepharus buchananii*			
171.	25020	*Cryptoblepharus plagiocephalus*			
172.		*Cryptoerithus quobba*			
173.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
174.	25027	*Ctenotus australis*			
175.	25039	*Ctenotus fallens*			
176.	25040	*Ctenotus gemmula (Jewelled South-west Ctenotus (Swan Coastal Plain subpop P3), skink)*			
177.	25047	*Ctenotus impar*			
178.	25049	*Ctenotus labillardieri*			
179.	24322	*Cygnus atratus (Black Swan)*			
180.	24323	*Cygnus olor (Mute Swan)*	Y		
181.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
182.		*Daphnia carinata*			
183.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
184.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
185.	24999	*Delma grayii*			
186.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
187.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
188.		*Dingosa serrata*			
189.	24939	*Diplodactylus polyophthalmus*			
190.		*Dolichopodidae sp.*			
191.		*Dytiscidae sp.*			
192.	25251	*Echiopsis curta (Bardick)*			
193.	25096	*Egernia kingii (King's Skink)*			
194.	25100	*Egernia napoleonis*			
195.		*Egretta garzetta*			
196.		*Egretta novaehollandiae*			
197.		*Elanus axillaris*			
198.	25540	*Elanus caeruleus (Black-shouldered Kite)*			
199.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
200.	25250	*Elapognathus coronatus (Crowned Snake)*			
201.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
202.		*Eodelena convexa*			
203.		*Eolophus roseicapillus*			
204.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
205.	24567	*Epthianura albifrons (White-fronted Chat)*			
206.		*Erythracarus decoris*			
207.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
208.		*Eucyrtops latior*			
209.	24368	*Eurostopodus argus (Spotted Nightjar)*			
210.	25621	*Falco berigora (Brown Falcon)*			
211.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
212.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)*			
213.	25623	*Falco longipennis (Australian Hobby)*			
214.	24474	*Falco longipennis subsp. longipennis (Australian Hobby)*			
215.	24041	*Felis catus (Cat)*	Y		
216.	25727	*Fulica atra (Eurasian Coot)*			
217.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
218.	30916	*Funambulus pennanti (Indian Palm Squirrel)*	Y		
219.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
220.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
221.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
222.		*Gallus gallus*			
223.	24959	*Gehyra variegata*			
224.	25404	*Geocrinia leai (Ticking Frog)*			
225.	25530	*Gerygone fusca (Western Gerygone)*			
226.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
227.		*Gomphidae sp.*			
228.	24443	*Grallina cyanoleuca (Magpie-lark)*			
229.		*Gripopterygidae sp.*			
230.		*Gyrinidae sp.*			
231.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
232.	24295	*Haliastur sphenurus (Whistling Kite)*			
233.	25410	*Heleioporus eyrei (Moaning Frog)*			
234.	25115	*Hemiergis initialis subsp. initialis*			
235.	25119	*Hemiergis quadrilineata*			

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236.		*Henicops dentatus*			
237.		*Heurodes turritus*			
238.	47965	*Hieraaetus morphnoides (Little Eagle)*			
239.	25734	*Himantopus himantopus (Black-winged Stilt)*			
240.	24491	*Hirundo neoxena (Welcome Swallow)*			
241.		*Holasteron perth*			
242.		*Hydrobiosidae sp.*			
243.		*Hydrophilidae sp.*			
244.		*Hydropsychidae sp.*			
245.		*Hydroptilidae sp.*			
246.		*Idiommata blackwalli*			
247.		*Isometroides vescus*			
248.		*Isopeda leishmanni*			
249.		*Ixodes australiensis*			
250.	24367	*Lalage tricolor (White-winged Triller)*			
251.		*Lampona cylindrata*			
252.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
253.		*Latrodectus hasseltii*			
254.		*Leptoceridae sp.*			
255.		*Leptophlebiidae sp.*			
256.	25131	*Lerista distinguenda*			
257.	25133	*Lerista elegans*			
258.	25005	*Lialis burtonis*			
259.		*Libellulidae sp.*			
260.	25661	*Lichmera indistincta (Brown Honeyeater)*			
261.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
262.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
263.	25388	*Litoria moorei (Motorbike Frog)*			
264.	25683	*Lonchura castaneothorax (Chestnut-breasted Mannikin)*			
265.		*Longepi woodman*			
266.		*Lophoictinia isura*			
267.		*Lycosa ariadnae*			
268.		*Lycosa gilberta*			
269.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
270.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
271.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
272.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
273.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
274.	25654	*Malurus splendens (Splendid Fairy-wren)*			
275.	24552	*Malurus splendens subsp. splendens (Splendid Fairy-wren)*			
276.	24583	*Manorina flavigula (Yellow-throated Miner)*			
277.		*Maratus pavonis*			
278.		*Marsupiopus antechinus*			
279.	25758	*Megalurus gramineus (Little Grassbird)*			
280.		*Megapodagrionidae sp.*			
281.	47997	*Melanodryas cucullata (Hooded Robin)*			
282.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
283.	24586	*Melithreptus brevirostris subsp. leucogenys (Brown-headed Honeyeater)*			
284.	24587	*Melithreptus chloropsis (Western White-naped Honeyeater)*			
285.	24736	*Melopsittacus undulatus (Budgerigar)*			
286.	25184	*Menetia greyii*			
287.	24598	*Merops ornatus (Rainbow Bee-eater)*			
288.		*Microcarbo melanoleucos*			
289.	25693	*Microeca fascinans (Jacky Winter)*			
290.	25542	*Milvus migrans (Black Kite)*			
291.		*Missulena granulosa*			
292.		*Mituliodon tarantulinus*			
293.		*Mitzoruga insularis*			
294.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
295.	25191	*Morethia lineoocellata*			
296.	25192	*Morethia obscura*			
297.	24223	*Mus musculus (House Mouse)*	Y		
298.	24042	*Mustela putorius (European Polecat, Ferret)*	Y		
299.	25610	*Myiagra inquieta (Restless Flycatcher)*			
300.	25420	*Myobatrachus gouldii (Turtle Frog)*			
301.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
302.	24738	*Neophema elegans (Elegant Parrot)*			
303.		*Nephila edulis*			
304.	25252	*Notechis scutatus (Tiger Snake)*			
305.		*Notonectidae sp.*			

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306.		*Nunciella aspera*			
307.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
308.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
309.	41424	*Nyctophilus major (Greater Long-eared Bat)*			
310.	24742	*Nymphicus hollandicus (Cockatiel)*			
311.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
312.		*Oligochaeta sp.*			
313.		*Ommatoiulus moreleti*			
314.		*Ommatoiulus moreletii*			
315.		*Orthocladiinae sp.*			
316.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
317.		*Oxidus gracilis*			
318.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
319.	24624	*Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)*			
320.		*Parastacidae sp.*			
321.	25253	*Parasuta gouldii*			
322.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
323.	24625	*Pardalotus punctatus subsp. punctatus (Spotted Pardalote)*			
324.	24626	*Pardalotus punctatus subsp. xanthopyge (Yellow-rumped Pardalote)*			
325.	25682	*Pardalotus striatus (Striated Pardalote)*			
326.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
327.	24642	*Passer montanus (Eurasian Tree Sparrow)*	Y		
328.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
329.	48060	*Petrochelidon ariel (Fairy Martin)*			
330.	48061	*Petrochelidon nigricans (Tree Martin)*			
331.	48066	*Petroica boodang (Scarlet Robin)*			
332.	24659	*Petroica goodenovii (Red-capped Robin)*			
333.	25697	*Phalacrocorax carbo (Great Cormorant)*			
334.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
335.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
336.	25699	*Phalacrocorax varius (Pied Cormorant)*			
337.	24409	*Phaps chalcoptera (Common Bronzewing)*			
338.	25587	*Phaps elegans (Brush Bronzewing)*			
339.		*Phenasteron longiconductor*			
340.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
341.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
342.		*Pinkfloydia harveii*			
343.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
344.	24842	*Platalea regia (Royal Spoonbill)*			
345.	25720	*Platycercus icterotis (Western Rosella)*			
346.	24745	*Platycercus icterotis subsp. icterotis (Western Rosella)*			
347.	24747	*Platycercus spurius (Red-capped Parrot)*			
348.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
349.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
350.	25509	*Pletholax gracilis (Keeled Legless Lizard)*			
351.	25007	*Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)*			
352.	25703	*Podargus strigoides (Tawny Frogmouth)*			
353.	24679	*Podargus strigoides subsp. brachypterus (Tawny Frogmouth)*			
354.	25704	*Podiceps cristatus (Great Crested Grebe)*			
355.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
356.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
357.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
358.	25722	*Polytelis anthopeplus (Regent Parrot)*			
359.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
360.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
361.	24769	*Porzana fluminea (Australian Spotted Crake)*			
362.	25732	*Porzana pusilla (Baillon's Crake)*			
363.	24771	*Porzana tabuensis (Spotless Crake)*			
364.		*Prionosternum scutatum*			
365.	25511	*Pseudonaja affinis (Dugite)*			
366.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
367.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
368.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
369.	48085	*Psittacula krameri (Indian Ringnecked Parrot, Rose-ringed Parakeet)*	Y		
370.	24702	*Pterodroma brevirostris (Kerguelen Petrel)*			
371.		*Purpureicephalus spurius*			
372.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
373.	24243	*Rattus fuscipes (Western Bush Rat)*			
374.	24245	*Rattus rattus (Black Rat)*	Y		
375.		*Raveniella cirrata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
376.		*Raveniella peckorum*			
377.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
378.	48096	*Rhipidura albiscapa (Grey Fantail)*			
379.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
380.	24454	*Rhipidura leucophrys subsp. leucophrys (Willie Wagtail)*			
381.		*Richardsonianidae sp.*			
382.		*Scolopendra laeta*			
383.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
384.	24279	*Sericornis frontalis subsp. maculatus (White-browed Scrubwren)*			
385.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
386.		*Simuliidae sp.*			
387.	30948	*Smicrornis brevirostris (Weebill)*			
388.	24111	*Sminthopsis gilberti (Gilbert's Dunnart)*			
389.	24645	*Stagonopleura oculata (Red-eared Firetail)*			
390.		*Steatoda grossa*			
391.	24329	*Stictonetta naevosa (Freckled Duck)*			
392.	25597	*Strepera versicolor (Grey Currawong)*			
393.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
394.	30951	*Streptopelia chinensis subsp. tigrina (Spotted Turtle-Dove)*	Y		
395.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
396.	30950	*Streptopelia senegalensis subsp. senegalensis (Laughing Turtle-Dove)*	Y		
397.		*Supunna funerea*			
398.		*Supunna picta*			
399.		*Tabanidae sp.*			
400.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
401.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
402.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
403.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
404.		*Tandanus bostocki*			
405.		*Tanypodinae sp.*			
406.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
407.		*Tasmanicosa leuckartii*			
408.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
409.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
410.	25519	*Tiliqua rugosa*			
411.	25204	*Tiliqua rugosa subsp. aspera*			
412.	25207	*Tiliqua rugosa subsp. rugosa*			
413.		*Tipulidae sp.*			
414.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
415.	24309	*Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)*			
416.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
417.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
418.	24755	*Trichoglossus haematodus subsp. moluccanus (Rainbow Lorikeet)*	Y		
419.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
420.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
421.	48147	*Turnix varius (Painted Button-quail)*			
422.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
423.		*Urodacus novaehollandiae*			
424.		*Urodacus planimanus*			
425.		*Urodacus woodwardii*			
426.	25577	*Vanellus miles (Masked Lapwing)*			
427.	24386	*Vanellus tricolor (Banded Lapwing)*			
428.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
429.	25225	*Varanus rosenbergi (Heath Monitor)*			
430.		*Veliidae sp.*			
431.		*Venator immansueta*			
432.		*Venatrix pullastra*			
433.	24206	*Vespadelus regulus (Southern Forest Bat)*			
434.	24040	*Vulpes vulpes (Red Fox)*	Y		
435.		*Withius piger*			
436.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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

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

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

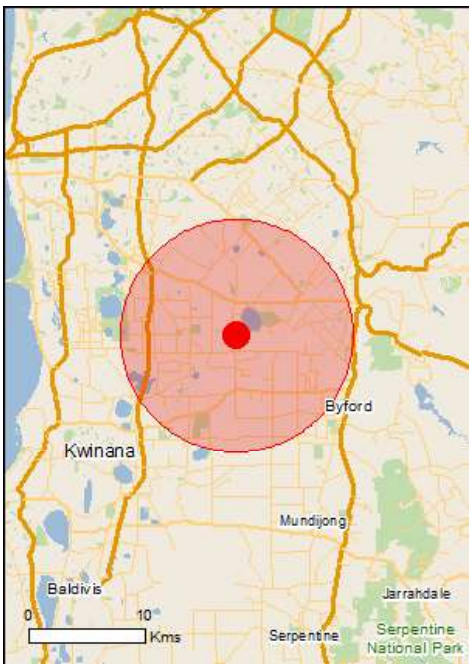
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 10/03/21 12:08:39



Coordinates
Buffer: 10.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	32
Listed Migratory Species:	20

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	29
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	12
Regional Forest Agreements:	None
Invasive Species:	44
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Forrestdale and thomsons lakes	Within Ramsar site
Peel-yalgorup system	30 - 40km upstream

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Insects		
Leioproctus douglasiellus a short-tongued bee [66756]	Critically Endangered	Species or species habitat known to occur within area
Neopasiphae simplicior A native bee [66821]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Austrostipa jacobsiana [87809]	Critically Endangered	Species or species habitat known to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat known to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat known to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Synaphea sp. Pinjarra Plain (A.S. George 17182) [86878]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat known to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Charadrius dubius Little Ringed Plover [896]		Roosting known to occur within area

Name	Threatened	Type of Presence
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Charadrius dubius Little Ringed Plover [896]		Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat likely to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur

Name	Threatened	Type of Presence within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Balannup Lake	WA
Banksia	WA
Forrestdale Lake	WA
Gibbs Road	WA
Harry Waring Marsupial Reserve	WA
Modong	WA
Piara	WA
Thomsons Lake	WA
Unnamed WA42044	WA
Unnamed WA49299	WA
Unnamed WA49561	WA
Wandi	WA

Invasive Species [Resource Information]

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

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

Name	Status	Type of Presence
		habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle,		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		
Tamarix aphylla		
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Forrestdale Lake	WA
Gibbs Road Swamp System	WA
Thomsons Lake	WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.16942 115.92532

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-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
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-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

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Appendix D

Conservation Significant Species and Likelihood of Occurrence Assessment

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Birds					
Apus pacificus	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** May opportunistically occur in or or fly over the site on commute or while searching for prey.
Arenaria interpres	Ruddy turnstone	MI	MI	Tidal mud and reef flats, sheltered rocky coasts, stony and seaweedy beaches and sandpits, dry coral ridges (Abrolhos) and pebbly shores of near-coastal saltlakes (including saltwork ponds) (Johnstone and Storr 1998).	**Unlikely** No suitable habitat
Botaurus poiciloptilus	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.	**Unlikely** No suitable habitat
Calidris acuminata	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** No suitable habitat
Calidris canutus	Red knot	EN	EN (MI)	Mud and sand flats in estuaries and on sheltered coasts. Also near-coastal saltlakes, including saltwork ponds.	**Unlikely** No suitable habitat

		WA	EPBC Act		
Calidris ferruginea	Curlew sandpiper	CR	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** No suitable habitat
Calidris melanotos	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** No suitable habitat
Calidris ruficollis	Red-necked stint	MI	MI	Tidal mudflats, saltmarshes, sandy or shelly beaches, saline and freshwater wetlands (coastal and inland), saltfields, sewage ponds (Pizzey and Knight 2012).	**Unlikely** No suitable habitat
Calidris subminuta	Long-toed stint	MI	MI	Mainly freshwater swamps (especially when drying and where vegetation is short), river pools, lagoons and claypans; also brackish pools, sewage ponds and samphire flats around estuaries and saltlakes.	**Unlikely** No suitable habitat
Calyptorhynchus banksii naso	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.	**Possible** Recent records adjecent to the site and there is limited foraging habitat present within the site. Species call heard in surrounding area.
Calyptorhynchus baudinii	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).	**Possible** Species known to occur within the broader area and there is limited secondary foraging habitat present within the site.

		WA	EPBC Act		
Calyptorhynchus latirostris	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).	**Likely** Recent records adjacent to the site. Areas of primary foraging habitat present within site.
Charadrius dubius	Little ringed plover	MI	MI	Open, muddy or sandy shores of lakes, swamps, tidal areas, sewage ponds or farm dams. Rare but regular summer migrant to Australia (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Charadrius leschenaultii	Great sand plover	VU	VU (MI)	Wide sandy or shelly beaches, sandpits, tidal mudflats, reefs, sand cays, mangroves, saltmarsh, dune wilderness, bare paddocks, seldom far inland (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Chlidonias leucopterus	White-winged black tern	MI	MI	Vegetated and open wetlands, brackish and saline lakes, saltfields, irrigated lands, sewage ponds and occasionally offshore.	**Unlikely** No suitable habitat
Falco peregrinus	Peregrine falcon	OS	-	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	**Possible** May opportunistically occur in or or fly over the site on commute or while searching for prey.
Gallinago megala	Swinhoe's snipe	MI	MI	Wet, grassy ground; edges of reedy swamps (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Gallinago stenura	Pin-tailed snipe	MI	MI	Boggy edges of vegetated wetlands; sewage and other ponds; stubbles, grasslands with shrubs, pastures (Pizzey & Knight 2012).	**Unlikely** No suitable habitat

		WA	EPBC Act		
Ixobrychus dubius	Australian little bittern	P4	-	Dense vegetation surrounding/within freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense beds of Typha spp., Baumea spp. and tall rushes in freshwater swamps around lakes and along rivers (Johnstone and Storr 1998).	**Unlikely** No suitable habitat
Leipoa ocellata	Mallefowl	VU	VU	Scrubs and thickets of Eucalyptus spp., Melaleuca lanceolata and Acacia linophylla; also other dense litter-forming shrublands. Attracted to fallen wheat in stubbles and along roads (Johnstone and Storr 1998).	**Unlikely** Locally extinct
Limosa limosa	Black-tailed godwit	MI	MI	Tidal mudflats, estuaries, sewage ponds, shallow river margins, brackish or saline inland lakes, flooded pastures, airfields (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Motacilla cinerea	Grey wagtail	MI	MI	In Australia mostly near running water in disused quarries, sandy and rocky streams in escarpments and rainforests, sewage ponds, ploughed fields and airfields (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Numenius madagascariensis	Eastern curlew	CR	CR (MI)	Mainly tidal mudflats; also reef flats, sandy beaches and rarely near-coastal lakes (including saltwork ponds) (Johnstone and Storr 1998).	**Unlikely** No suitable habitat
Numenius minutus	Little curlew	MI	MI	Dry grasslands, floodplains, margins of drying swamps; tidal mudflats, airfields, playing fields, crops, commercial saltfields, sewage ponds (Pizzey & Knight 2012).	**Unlikely** No suitable habitat

		WA	EPBC Act		
Oxyura australis	Blue-billed duck	P4	-	Mainly deeper freshwater swamps and lakes; occasionally saltlakes and estuaries freshened by flood waters (Johnstone and Storr 1998).	**Unlikely** No suitable habitat
Pandion haliaetus	Osprey	MI	MI	Coasts, estuaries, bays, inlets, islands, and surrounding waters; coral atolls, reefs, lagoons, rock cliffs, stacks (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Phaethon rubricauda	Red-tailed tropicbird	P4	MI	Spend most of their lives at sea and rarely venture near land. This bird is normally found in tropical and subtropical seas around northern Australia. Though rarely seen in colder areas, a few pairs breed on Sugarloaf Rock, south of Cape Naturaliste (DPAW 2017b).	**Unlikely** No suitable habitat
Philomachus pugnax	Ruff	MI	MI	Fresh, brackish and saline wetlands; tidal mudflats, saltfields, sewage ponds (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Plegadis falcinellus	Glossy Ibis	MI	MI	Well-vegetated wetlands, wet pasture, ricefields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats and occasionally dry grassland (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Pluvialis fulva	Pacific golden plover	MI	MI	Estuaries, mudflats, saltmarshes, mangroves; rocky reefs and stranded seaweed on ocean shores; margins of shallow open inland swamps; sewage ponds, short-grass paddocks, sportsgrounds, airfields, ploughed land (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Pluvialis squatarola	Grey Plover	MI	MI	Mudflats, saltmarsh, tidal reefs and estuaries, rarely inland (Pizzey and Knight 2012).	**Unlikely** No suitable habitat

		WA	EPBC Act		
Rostratula australis	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** No suitable habitat
Stercorarius longicaudus	Long-tailed skua	MI	MI	Marine, migratory species that rarely occurs in south-western Australia (Pizzey & Knight 2012)	**Unlikely** No suitable habitat
Sterna nilotica	Gull-billed tern	MI	MI	Beaches, mudflats; fresh, brackish wetlands, including far inland; grasslands, crops, ploughed fields, airfields (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Sternula nereis nereis	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** No suitable habitat
Thinornis rubricollis	Hooded plover	P4	VU	Margins and shallows of saltlakes, sandy and seaweedy beaches and estuaries; also dams (Johnstone & Storr 1998).	**Unlikely** No suitable habitat
Tringa cinerea	Terek sandpiper	MI	MI	Tidal mudflats, estuaries; shores and reefs of islands; coastal swamps, commercial saltfields (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Tringa glareola	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 (Pizzey & Knight).	**Unlikely** No suitable habitat

		WA	EPBC Act		
Tringa hypoleucos	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 wherelow perches are available (Johnstone & Storr 1998).	**Unlikely** No suitable habitat
Tringa nebularia	Common greenshank	MI	MI	Mudflats, estuaries, saltmarshes, margins of lakes, wetlands, claypans (fresh amd saline), commercial saltfields, sewage ponds (Pizzey & Knight 2012).	**Unlikely** No suitable habitat
Tringa stagnatilis	Marsh sandpiper	MI	MI	Mainly shallow fresh or brackish waters: swamps, lakes, river pools, soaks, sewage ponds and bore overflows. Occasionally estuaries and salt ponds, and rarely coasts.	**Unlikely** No suitable habitat
Invertebrates					
Austroconops mcmillani	McMillan's biting midge	P2	-	Mud and wet fallen leaves, where intact native vegetation including overstorey Banksia spp. and understorey sedges are present (Borkent & Craig 2004)	**Unlikely** No suitable habitat
Euoplos inornatus	Inornate trapdoor spider	P3	-	Has previously been recorded in jarrah forest, including near clay banks and granite outcrop. Most records are from the Darling scarp/Jarrah Forest Region, with limited records from the Swan Coastal Plain (DBCA 2020).	**Unlikely** No suitable habitat
Idiosoma sigillatum	Swan Coastal Plain shield-backed trapdoor spider	P3	-	Widely distributed in sandy areas on the Swan Coastal Plain and on Rottnest Island (Prince 2003).	**Possible** Recent records adjacent to the site. Suitable habitat present within the site.

		WA	EPBC Act		
Leioproctus contrarius	a short-tongued bee	P3	-	Life history and habits are poorly documented/ unknown. It has been recorded only on flowers of Goodeniaceae and possibly Lechenaultia stenosepala (Bamford 2003).	**Possible** Historic records within the broader area. One Goodeniaceae species recorded within site.
Leioproctus douglasiellus	a short-tongued bee	EN	CR	Life history and habits are poorly documented/ unknown. It has been recorded only on the flowers of Goodenia filiformis and Anthotium junctiforme (Houston 2000).	**Possible** Recent record near the site, which is connected to the site via native vegetation surrounding the site.
Neopasiphae simplicior	a short-tongued bee	EN	CR	This species of native bee has been collected on flowers of Goodenia filiformis, Lobelia tenuior, Angianthus preissianus and Velleia sp. (Houston 2000).	**Possible** Recent records within the broader area. *Lobelia tenuior* recorded within site.
Synemon gratiosa	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 Lomandra maritima. Banksia woodland on Spearwood and Bassendean dunes, where the second known host plant L. hermaphrodita is widespread (DEC 2011).	**Possible** Suitable habitat present within the site. *L. hermaphrodita* recorded within the site.
Throscodectes xiphos	Stylet bush cricket	P1	-	Species poorly understood and documented. Known from Jandakot area, where it was originally collected in the axial leaf bases of grass trees (Xanthorrhoea preissei) (Invertebrate Solutions 2019).	**Unlikely** No suitable habitat

		WA	EPBC Act		
Westralunio carteri	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. Also occupies lentic systems including large water supply dams and even on-stream farm dams. Salinity tolerance quite low (Morgan et al. 2011).	**Unlikely** No suitable habitat
Mammals					
Bettongia penicillata ogilbyi	Woylie	CR	EN	Woodlands and adjacent heaths with a dense understorey of shrubs, particularly Gastrolobium spp. (TSSC 2018).	**Unlikely** Locally extinct
Dasyurus geoffroii	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** No suitable habitat
Falsistrellus mackenziei	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** No suitable habitat
Hydromys chrysogaster	Rakali	P4	-	Areas with permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south west (Christensen et al. 1985).	**Unlikely** No suitable habitat
Isoodon fusciventer	Quenda	P4	-	Dense scrubby, often swampy, vegetation with dense cover up to one metre high (DEC 2012)	**Possible** Suitable habitat present within the site.

		WA	EPBC Act		
Myrmecobius fasciatus	Numbat	EN	EN	Generally dominated by Eucalyptus spp. that provide hollow logs and branches for shelter and termites for food (van Dyck & Strahan 2008).	**Unlikely** Locally extinct
Notamacropus eugenii derbianus	Tammar wallaby	P4	-	Dry sclerophyll forest, Banksia spp. woodlands and shrublands, typically favouring dense low vegetation that provides dense cover (Christensen and Strahan 1983).	**Unlikely** No suitable habitat
Notamacropus irma	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).	**Possible** Recent records to north-east and north-west of the site. Marginal habitat present within site. May utilise site occassionally and for short periods of time.
Pseudocheirus occidentalis	Western ringtail possum	CR	CR	On the Swan Coastal Plain in Agonis flexuosa woodlands and Agonis flexuosa/ Eucalyptus gomphocephala forests. Also Eucalyptus marginata forests (DBCA 2017).	**Unlikely** Outside species known range
Setonix brachyurus	Quokka	VU	VU	On the mainland mostly dense streamside vegetation or shrubland and heath areas, particularly around swamps (Cronin 2007).	**Unlikely** Locally extinct
Reptiles					
Acanthophis antarcticus	Southern death adder	P3	-	Mostly in woodlands, grasslands and heaths. In the Darling Range this species is typically found within Eucalyptus marginata woodlands adjacent to granite outcrops and along densely vegetated creeks (Bush et al. 2007).	**Unlikely** No suitable habitat

		WA	EPBC Act		
Ctenotus delli	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).	**Unlikely** No suitable habitat
Lerista lineata	Perth slider	P3	-	Sandy coastal heath and low scrubland. Banksia spp. woodland, Eucalyptus gomphocephala open woodland over deep sands, and coastal dunes immediately adjacent to the beach (Wilson and Swan 2017).	**Possible** Historic records adjacent to the site. Potentially suitable habitat within site.
Neelaps calonotos	Black-striped snake	P3	-	Coastal and near-coastal dunes, sandplains supporting heathlands and Banksia spp. woodlands (Bush et al. 2002).	**Possible** Historic records adjacent to the site. Potentially suitable habitat within site.

Note: CE=critically endangered, EN=endangered, VU=vulnerable, CD=conservation dependent, MI=migratory, OS=other specially protected, P1=Priority 1, P2=Priority 2, P3=Priority 3, P4=Priority 4. Species recorded or considered to potentially occur within the site are shaded green.

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Appendix E

Species List

Fauna List
Lot 15 Nicholson Road, Forrestdale

Category	Status	Species name	Common name	Record type
Birds		*Acanthiza apicalis*	Inland thornbill	Sight
		Acanthiza chrysorrhoa	Yellow-rumped thornbill	Sight
		Anthus australis	Australian pipit	Sight
		Artanus cyanopterus	Dusky woodswallow	Sight
		Coracina novaehollandiae	Black-faced cuckoo-shrike	Sight
		Corvus coronoides	Australian raven	Sight
		Dromaius novaehollandiae	Emu	Scats
		Gerygone fusca	Western gerygone	Sight
		Grallina cyanoleuca	Magpie-lark	Sight
		Hirundo neoxena	Welcome swallow	Sight
		Malurus splendens	Splendid fairywren	Sight
		Ocyphaps lophotes	Crested pigeon	Sight
		Pachycephala rufiventris	Rufous whistler	Sight
		Pardalotus striatus	Striated pardalote	Sight
		Petrochelidon nigricans	Tree martin	Sight
		Phylidonyris novaehollandiae	New Holland honeyeater	Sight
		Platycercus spurius	Red-capped parrot	Sight
		Platycercus zonarius semitorquatos	Twenty-eight parrot	Sight
		Rhipidura leucophrys	Willie wagtail	Sight
		Smicronis brevirostris	Weebill	Call
Mammals		*Macropus fuliginosus*	Western grey kangaroo	Scats
	* DP	*Oryctolagus cuniculus*	Rabbit	Scats
	* DP	*Vulpes vulpes*	Red fox	Scats
Reptiles		*Tiliqua rugosa rugosa*	Bobtail	Sight

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

Appendix F

Black Cockatoo Habitat Tree Data

Black Cockatoo Habitat Tree Inventory
Lot 15 Nicholson Road, Forrestdale

Tag No.	Easting	Northing	DBH (cm)	Species	Category	Notes
-	398886.08	6440184.46	67	*Eucalyptus todtiana*	No suitable hollows	
-	398888.37	6440208.80	87	*Eucalyptus todtiana*	No suitable hollows	
-	398821.02	6440146.28	62	*Eucalyptus todtiana*	No suitable hollows	