Appendix C

Basic and Targeted Fauna Survey

Basic and Targeted Fauna Survey: Black Cockatoo, Western Ringtail Possum and Carter's Freshwater Mussel

Collie River Bridge, Collie

MAY 2025

SW Environmental

Version control

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Statement of limitations

CONTENTS

Figures

Tables

Abbreviations and acronyms

Organisations	
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Federal Department of Climate Change, Energy, the Environment and Water
DWER	WA Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
Common Terms	
DSA	Desktop Survey Area – Survey Area plus a 10 km buffer
FRTBC	Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii subsp. naso*)
CFM	Carter's Freshwater Mussel (*Westralunio carteri*)
WRP	Western Ringtail Possum (*Pseudocheirus occidentalis)*
CBP	Common Brushtail Possum (*Trichosurus vulpecula*)
MNES	Matters of National Environmental Significant
Project	The proposed action
SW	Southwest
SLK	Straight Line Kilometres
Survey Area	A 4.68 ha area surrounding the Collie River Bridge, approximately 8.4 km east of Burekup (Shires of Dardanup and Harvey), of which circa 3.31 ha is vegetation, 1.17 ha is cleared and 0.20 ha is riverbed.
WA	Western Australia
Legislation	
BC Act	*Biodiversity Conservation Act 2016* (WA)
BC Regs	*Biodiversity Conservation Regulations 2018* (WA)

EP Act	*Environmental Protection Act 1986* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Federal)
Measurements	
ha	Hectare
km	Kilometre
m	Metre

Executive Summary

GHD, on behalf of the Shire of Dardanup, are working towards replacing the Collie River Bridge, on the Collie River Road (SLK 0.01), within the Shires of Dardanup and Harvey. The bridge is located approximately 8.4 km east of Burekup (Figure A.1, Appendix A). Construction works for the bridge replacement on Collie River Road are scheduled to commence in late 2025. The Survey Area is approximately 3.7 ha, surrounding the current Collie River Bridge. The actual impact area will be considerably less but is yet to be finalised.

SW Environmental were engaged to conduct a Basic and Targeted fauna survey to inform and support the works, identifying habitat values and risk to conservation significant fauna. The Targeted survey component targeted three Black Cockatoo species (Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii* subsp. *naso*) (Vulnerable), Baudin's cockatoo (*Zanda baudinii*) (Endangered) and Carnaby's cockatoo (*Zanda latirostris*) (Endangered)), Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) (Critically Endangered). Preliminary Carter's Freshwater Mussel (*Westralunio carteri*l) (CFM) (Vulnerable) (SW Environmental 2025) and threatened Fish (Murdoch University, in prep. 2025) were surveyed for separately to this survey report.

Field work consisted of a diurnal site visit on the 7th of February 2025 and nocturnal spotlighting across non-consecutive nights the 7th and 10th of February 2025. Four fauna habitat types were recorded within the Survey Area (presented in Figure A.3, Appendix A):

1. Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (1.42 ha)
2. Marri (*Corymbia calophylla*) woodland (0.80 ha)
3. Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.44 ha)
4. Marri (*Corymbia calophylla*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.18 ha)
5. Box Elder (**Acer negundo*), Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (0.17 ha)
6. Planted exotic *Eucalyptus* and *Corymbia* spp. with occasional Flooded Gum (*Eucalyptus rudis*) (0.14 ha)
7. Riverbed (0.20 ha)
8. Cleared (0.32 ha)

Searches within the Desktop Study Area (10 km) yielded records of 209 relevant vertebrate terrestrial fauna species; 10 amphibians, 151 birds, 18 mammals, and 29 reptiles. Of these, 20 taxa were of conservation significance. Additionally, three aquatic significant fauna taxa were returned; Balston's Pygmy Perch (*Nannatherina balstoni*) (Vulnerable), CFM (*Westralunio carteri*) (Vulnerable), and the Pouched Lamprey (*Geotria australis*) (Priority 3), along with two Priority 3 listed arachnids; Swan Coastal Plain Shield-backed Trapdoor Spider (*Idiosoma sigillatum*) and the Western Pygmy Trapdoor Spider (*Bertmainius opimus*).

Conservation significant fauna recorded during survey consisted of Forest Red-tailed Black Cockatoo (FRTBC) (*Calyptorhynchus banksii* subsp. *naso*) (FRTBC) (Vulnerable), Baudin's Cockatoo (*Zanda baudinii*) (Endangered) and Carter's Freshwater Mussel (*Westralunio carteri*l) (CFM) (Vulnerable). Quenda (*Isoodon obesulus* subsp. *fusciventer*) (Priority 4), Peregrine Falcon (*Falco peregrinus*) (Other Specially Protected) and South-western Brush-tailed Phascogale (*Phascogale tapoatafa* subsp. *wambenger*) (Conservation Dependent) have the potential to occur within the Survey Area, along with

Carnaby's cockatoo (*Zanda latirostris*) (Endangered). No (active or probable) breeding hollows were recorded during the survey. Two black cockatoo roosts were recorded within the Survey Area. One Baudin's cockatoo roost was recorded in habitat type 6, and one FRTBC roost was recorded in habitat type 3. There are no known black cockatoo breeding records nearby to the Survey Area; however, six black cockatoo roost sites have been recorded within 12 km of the site. The closest external roost site record occurs ~920 m southwest of the Survey Area (DBCA, 2024b).

There were 84 trees of suitable DBH recorded within the Survey Area (presented in Figure A.4, Appendix A), twelve of which contained hollows. One hollow in tree ID 15, located in habitat type 3 approximately eight metres north of the road, was technically of suitable size for black cockatoos, however considered unlikely to be used due to its low height and the marginal internal dimensions. The hollow did not have any signs of use. All twelve hollow bearing trees present within the Survey Area may still be utilised by other target fauna (WRP).

There were no Carnaby's cockatoo, Quenda, Woylie, Chuditch, South-western Brush-tailed Phascogale, Western False Pipistrelle, Western Brush Wallaby or Quokkas recorded within the Survey Area. Two probable WRP dreys were observed in Peppermint (*Agonis flexuosa*) trees within habitat type 1 (presented in Figure A.5, Appendix A), however no WRP individuals were recorded during nocturnal surveys. Twenty-seven CBP were observed.

The following recommendations should be considered:

- Once the final impact area (proposed action) is known, the proposal should be assessed against the DAWE (2022) Foraging quality scoring tool (template in Table 2-5, Section 2.2.2 of this report) and Referral guideline for 3 WA threatened black cockatoo species (DAWE, 2022) for potential impacts to roosts and breeding habitat.
- Potential impacts to WRP and CFM should be assessed against the Commonwealth Matters of National Environmental Significance – *Significant impact guidelines 1.1* (DEWHA, 2009).
- Clearing of native vegetation should be minimised.
- Clearing schedules should be planned to avoid spring breeding peaks.
- An authorised fauna spotter should be present during clearing of hollow bearing trees to manage hollow dependant fauna and WRP, should they occur.
- Weed management and infill planting could be considered in adjacent degraded areas.
- Artificial hollow installation should be considered if any existing hollows are to be cleared, to mitigate potential impacts.
- The site, although having been subject to degradation, is considered important from a connectivity perspective. An axis line runs in a southwestern direction through the Survey Area (WALGA, 2022). It is therefore recommended that efforts are made to maintain connectivity during bridge construction, allowing fauna safe passage between areas to the north and south of the bridge.

1 Introduction

1.1 Project Overview

GHD, on behalf of the Shire of Dardanup, are working towards replacing the Collie River Bridge, on the Collie River Road (SLK 0.01), within the Shires of Dardanup and Harvey, approximately 8.4 km east of Burekup (Figure A.1, Appendix A). Construction works for the bridge replacement on Collie River Road are scheduled to commence in late 2025. The Survey Area is approximately 3.7 ha, surrounding the current Collie River Bridge. SW Environmental were engaged to conduct Basic and Targeted fauna surveys to inform and support the works, identifying habitat values and conservation significant fauna risk.

1.2 Survey Area

The Survey Area includes 3.67 ha comprising a section of Collie River (0.20 ha), vegetation (3.16 ha) and cleared area (0.32 ha). The Desktop Survey Area (DSA) defined for this project consisted of the Survey Area with a 10 km buffer. The DSA was utilised to compile relevant information to inform the desktop assessment, field survey and subsequent reporting. Figure A.1 (Appendix A) presents the Survey Area location and Figure A.2 (Appendix A) presents the Survey Area and DSA.

1.3 Scope of Work

SW Environmental was commissioned to carry out a Basic[1] survey, comprising of a basic terrestrial vertebrate fauna species inventory, habitat assessment, likelihood of occurrence assessment for conservation significant fauna (inclusive of significant invertebrate and aquatic vertebrate fauna), along with a Targeted Black Cockatoo[2], Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) (Critically Endangered) and preliminary Carter's Freshwater Mussel (*Westralunio carteri*l) (CFM) (Vulnerable) Survey. The Targeted Black Cockatoo[2]. survey component was required to identify black cockatoo habitat values, including potential and actual breeding habitat, foraging habitat and roost sites. The WRP Survey investigated habitat values, identifying the presence or absence of WRP scat, dreys and hollows. The CFM survey component aimed to identify the presence or absence of CFM and the potential suitability of the Survey Area for supporting CFM.

[1] Environmental Protection Authority 2020, Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment, EPA, Western Australia.

[2] Black cockatoos collectively refer to

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii subsp. naso*) (Vulnerable)
- Baudin's cockatoo (*Zanda baudinii*) (Endangered)
- Carnaby's cockatoo (*Zanda latirostris*) (Endangered)

Detailed Carter's Freshwater Mussel (*Westralunio carteri*l) (CFM) (Vulnerable) (SW Environmental, in prep. 2025) and threatened Fish (Murdoch University, in prep. 2025) were surveyed for separately to this scope of work.

The Basic fauna survey was restricted to terrestrial vertebrate fauna. Conservation significant aquatic fauna and invertebrates were considered through desktop assessment only.

The survey is in accordance with EPA Technical Guidance (EPA, 2020) and other relevant State and Commonwealth guidelines and includes:

- Desktop study,
- Field survey - validation of the desktop study and habitat assessment,
- Consultation, reporting, mapping, and recommendations.

1.4 Regulatory Context

1.4.1 Key Legislation

Fauna in WA may be afforded protection under the WA BC Act and/or federal EPBC Act. Species listed as threatened or migratory under the above legislation are referred to collectively as 'conservation significant' or 'target' species. These terms include species listed under the DBCA Priority lists refer to Appendix B for further detail and conservation code descriptions.

Key environmental legislation that may be relevant to the fauna survey is outlined in Table 1-1.

Table 1-1 Environmental legislation that may be relevant to the Project

Legislation	Responsible Government Department	Aspect
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Matters of National Environmental Significance including threatened fauna and environmental offsets.
Biodiversity Conservation Act 2016 (BC Act)	WA Department of Biodiversity, Conservation and Attractions (DBCA)	Threatened species habitats, threatening processes, environmental pests and weeds.
Environmental Protection Act 1986 (EP Act)	Environmental Protection Authority or DWER	Environmental impact assessment and management and offsets.

1.4.2 Guidelines

Black cockatoo habitat is typically assessed by considering breeding, roosting and foraging habitat. The black cockatoo and WRP survey methodologies were developed with consideration of:

- Commonwealth Matters of National Environmental Significance – *Significant impact guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*, Department of the Environment, Water, Heritage and the Arts (2009).
- Commonwealth *Referral guideline for 3 WA threatened black cockatoo species Carnaby's Cockatoo (Zanda latirostris), Baudin's Cockatoo (Zanda baudinii) and the Forest Red-tailed*

Black-cockatoo (Calyptorhynchus banksii naso) Department of Agriculture, Water and the Environment (2022).

- Commonwealth *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered), Zanda latirostris, Baudin's cockatoo (vulnerable), Zanda baudinii, and Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso* (SEWPaC, 2012)
- Department of Parks and Wildlife (2013). Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia.
- Department of Environment and Conservation (2008) Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan
- Department of Parks and Wildlife (2017). Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan. Wildlife Management Program No. 58. Department of Parks and Wildlife, Perth, WA.
- Environmental Protection Authority (2002). Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3.
- Environmental Protection Authority (2020). Technical Guidance – Terrestrial Guidance for Fauna Surveys for Environmental Impact Assessment. Perth, Western Australia.

1.4.3 EPBC Act Considerations

The Commonwealth of Australia (DAWE, 2022) guideline applies to the three black cockatoo species listed as threatened species under the EPBC Act. The guideline provides guidance on what actions are likely or unlikely to require referral to the Minister for the Environment regarding significant impact on black cockatoos (SEWPaC, 2012):

- Currently, the overall population trend for all three black cockatoo species is declining and is expected to continue to decline.
- The loss of breeding habitat is likely to require a referral.
- The loss of one or more known or suitable nesting trees is likely to require a referral.
- The loss of a known night roosting site is likely to require a referral.
- The loss of equal to or greater than one ha of high-quality foraging habitat is likely to require a referral (as determined using the foraging quality scoring tool in Table 2-5, Section 2.2.2).
- The loss of one or more hectares of predominantly exotic habitat (e.g. pines) known to be utilised by black cockatoos is likely to require a referral.
- The loss of under 10 ha of low-quality foraging habitat is unlikely to require a referral (as determined using the foraging quality scoring tool in Table 2-5, Section 2.2.2).
- Light pruning or trimming of a night roosting site is unlikely to require a referral.

Once the final impact area (proposed action) is known, the proposal should be assessed against the DAWE (2022) Foraging quality scoring tool (template in Table 2-5, Section 2.2.2 of this report). The scoring tool includes consideration of the three components used in the EPBC Act Offsets Assessment Guide (SEWPaC, 2012) in the calculation of habitat quality (site condition, site context and species stocking rate) by considering contextual factors relating to habitat quality to give a final habitat quality score.

Proposed impacts to WRP and CFM should be assessed against the Commonwealth Matters of National Environmental Significance – *Significant impact guidelines 1.1* (DEWHA, 2009).

2 Methods

2.1 Desktop Review

A desktop study of fauna within and near the Survey Area (within the DSA) was undertaken to determine the likelihood of any species of conservation significance (target species) occurring within the Survey Area. A species list including common (non-target) species was prepared for the DSA (10 km) (Appendix C.1) based on:

- Atlas of Living Australia (ALA, 2025),
- Birdata (BirdLife Australia, 2025),
- Dandjoo (DBCA, 2025a)
- Protected Matters Database (DCCEEW, 2025), and
- Department of Biodiversity, Conservation and Attraction's Threatened, Specially Protected and Priority Fauna Database and black cockatoo breeding and roosting records (DBCA, 2025b).

Data from the Government of WA's Shared Land Information Platform (SLIP) (Landgate, 2024) was queried, along with relevant management plans, recovery plans, books, scientific journals and other publications, previous survey reports (Index of Biodiversity Surveys for Assessments (DWER, 2024)) and expert consultation.

Fauna habitats were derived from flora and vegetation survey mapping undertaken by Ecoedge (2024), and adapted for fauna value context.

A brief review of the ecology, habitat and range of target species were used in an evaluation matrix to determine the likelihood of occurrence of conservation significant fauna (Appendix D). Fauna of conservation significance that may occur locally are listed in Section 3.2.2.

2.2 Field Survey

2.2.1 Survey Area, Timing, and Personnel

Field work consisted of a diurnal site visit on the 7th of February 2025 by SW Environmental Principal, Shane Priddle and Senior Ecologist, Kelly Paterson, and nocturnal spotlighting undertaken on the 6th and 10th of February 2025. The surveys were undertaken to validate the desktop study and ground truth fauna habitat. Fauna habitat types were documented based on structural vegetation and soil mapping where significant changes occurred. Fauna habitat quality was based on the criteria in Tables 2-1 to 2-3. Evidence of fauna (e.g. scat searches, diggings or feed residue), and sightings were noted. Targeted black cockatoo, WRP and preliminary CFM surveys were carried out in line with the methodology outlined in Sections 2.2.2, 2.2.3 and 2.2.4.

Table 2-1 Vegetation structural classes (Keighery, 1994).

Life Form/Height Class	Canopy cover			
	100% to 70%	70%to 30%	30%to 10%	10% to 2%
Trees over 30 m	Tall Closed Forest	Tall Open Forest	Tall Woodland Woodland	Tall Open Woodland
Trees 10-30 m	Closed Forest	Open Forest		Open Woodland
Trees under 10 m	Low erased Forest	Low Open Forest	Low Woodland·	Low Open Woodland
Mallee over 8 m (Tree Mallee)	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree. Mallee
Mallee under 8 m (Shrub Mallee)	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub
Shrubs over 2 m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland Shrubland	Tall Open Shrubland
Shrubs 1-2 m	Closed Heath	Open Heath	Low Shrubland	Open Shrubland
Shrubs under 1 m	Closed Low Heath	Open Low Heath		Very Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland·	Open Sedgeland.	Very Open Sedgeland

Table 2-2 Vegetation condition scale (EPA, 2016).

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

Table 2-3 Fauna habitat quality categories and descriptions (SW Environmental, undated).

Quality	Description
Good	• Native vegetation with intact and diverse habitat structure. Different vegetation age classes present at most stratum levels (ground, understorey, midstory, canopy).

Quality	Description
	• Forest/woodland: abundant hollow-bearing trees, including those with or likely to develop large hollows. Mature trees offer more foraging resources (nectar/seed). • Presence of shelter/refuges at ground level (dense understorey plants, tussock, rocky outcrop, hollow logs). • High habitat complexity (ecotones between vegetation types or habitat mosaic). This increases the range of foraging and shelter opportunities within a habitat. • Presence of key foraging and microhabitat components for target species. • Little to no obvious weed invasion or evidence of grazing. • May be large patch and/or connected to other areas of native vegetation.
Moderate	• Native flora species dominant with moderate habitat structure complexity appropriate to vegetation type. Ground litter intact or slightly disturbed. More than one age class present. • Forest/woodland: low to moderate abundance of hollow-bearing trees or trees likely to develop hollows. • Some shelter and refuge present for ground dwelling fauna. • Some habitat complexity (ecotones between vegetation types or areas forming a habitat mosaic). • Marginal presence of key microhabitat components for target species. • May be small or large in scale, and isolated or well connected.
Poor	• Habitat highly disturbed and simplified with low structural complexity. Ground litter layer absent or highly modified. Complexity reduced by only one age class present. • Little or no shelter and refuge for ground dwelling fauna. • Forest/woodland: not likely to support hollow-bearing trees. • Lack of key foraging and microhabitat components for target species. • May have evidence of weed invasion or grazing. • May be narrow or small area and substantially influenced by edge effects, isolated from other areas of native vegetation.

2.2.2 Black Cockatoo Survey Methodology

Black cockatoo surveys (habitat assessment and tree surveys) were conducted during the diurnal survey. The field survey methodology was based on the Commonwealth referral guidelines for black cockatoos (DAWE, 2022; SEWPaC, 2012) and black cockatoo species profiles in the Desktop review (Section 3.3). The profiles are based on literature review and previous work and consultation with Tony Kirby, a recognised black cockatoo expert. Black cockatoo habitat surveys included an assessment of suitable DBH trees, tree hollow assessment, foraging habitat assessment, and roosting habitat.

Twelve km is referenced as a nominal distance for site context and local vegetation and habitat values and is considered the maximum range that black cockatoos travel from a nesting site to forage (DAWE, 2022).

Suitable DBH tree and hollow survey

Black cockatoos' nest in hollows formed in large, native eucalypt trees, assessed as potential habitat or "Suitable DBH trees". Suitable DBH tree refers to a suitable Diameter at Breast Height measurement. In the Southwest, black cockatoos normally breed in *Corymbia calophylla* (Marri), *Eucalyptus gomphocephala* (Tuart) or Karri (*Eucalyptus diversicolor*). Sometimes *Eucalyptus marginata* (Jarrah),

Eucalyptus rudis (Flooded gum) or other native trees are used. Tree species are discussed further in Section 3.

Notes on tree records: Trees with a suitable DBH include those with a measurement ≥ 50 cm for most trees in the Southwest, ≥ 30 cm DBH for most Wheatbelt species e.g. *Eucalyptus wandoo* (Wandoo) and *Eucalyptus salmonophloia* (Salmon gum), and ≥75 cm for fast growing trees, such as eastern states eucalypts or Karri (*Eucalyptus diversicolor*).

Mallee form or multi-stemmed trees typically have the largest stem measured. If they are multi-stemmed around head height with under sized DBH on the main trunk, they are not recorded. Planted eastern states eucalypts such as blue gums, e.g. *Eucalyptus saligna* or *Eucalyptus globulus,* are unlikely to develop hollows unless they are at an advanced age (S. Priddle, pers obs.). As such, they are not recorded unless they were visibly senescing or large hollows are observed. Trees laying over or considered to have no potential to develop hollows (burnt or close to falling) are not recorded.

Trees were mapped by a handheld Garmin Global Positioning System (GPS) (~2 m accuracy), with notes made on tree species and DBH size class. A ground-based assessment of each tree was made using binoculars. The black cockatoo breeding suitability of a hollow was assessed based on an assessment of attributes such as hollow angle, access, entry (aperture) size, estimate of chamber size, and use by other animals. European honeybee (*Apis mellifera*) hives may render a hollow unsuitable for the short term, so bees were noted. Hollows that were potentially suitable or likely to provide breeding habitat were further assessed by drone or pole camera. Records *confirmed* or *not confirmed* indicate whether pole cam or drone inspection was conducted. Pole camera and/or use of drones was conducted in line with animal ethics and license requirements.

The number of hollows (limited to the most suitable hollows), aperture size, angle, height, breeding suitability, evidence of use was recorded. Assessment criteria are provided in Table 2-4.

Table 2-4 Suitable DBH tree and hollow classes and descriptions

Class	Description
Tree with suitable DBH without hollows	Suitable DBH tree (described above) that do not have hollows or hollows are too small for black cockatoo entry (<10 cm aperture).
Tree with suitable DBH with unsuitable hollow	Suitable DBH tree with a hollow with multiple attributes that would make the hollow unlikely to be suitable for breeding such as unsuitable entry aperture, internal dimensions, height or angle. Unlikely to be used by black cockatoos in current form.
Tree with potentially suitable size hollow with no signs of use	Suitable DBH tree that may have a suitable hollow but with a single attribute that might reduce the suitability of the hollow for breeding, such as the marginal entry aperture size, coned out internal dimensions, low height or oblique angle. The hollow has no evidence of use (chew marks, scarring, eggs, woodchips, etc). Possible but unlikely to be used by black cockatoos in current form.
Tree with suitable size hollow with no signs of use	Suitable DBH tree with a hollow with suitable attributes for breeding (suitable entry size, internal dimensions, height and angle). The hollow has no evidence of use (chew marks, scarring, eggs, woodchips) and whilst not currently used could be used in future.
Tree with potentially suitable size hollow with signs of use	Suitable DBH tree that may have a suitable hollow but with a single attribute that might reduce the suitability of the hollow for breeding, such as marginal entry aperture size, coned out internal dimensions, low height or oblique angle. The hollow has evidence of use (chew marks, scarring, eggs, woodchips). The evidence may be caused by other species, but black cockatoo use could not be ruled out without further survey.
Tree with suitable size hollow with signs of use	Suitable DBH tree with a hollow with suitable attributes for breeding (suitable entry size, internal dimensions, height and angle). The hollow has evidence of use (chew marks, scarring, eggs, woodchips) consistent with black cockatoo use, previous or current. The evidence may be caused by other species, but use of the hollow by black cockatoo is considered likely.
Known nesting tree	Suitable DBH tree with a known nesting hollow (cockatoos observed using the hollow and assumed to be breeding) or previously recorded as a breeding tree.

Foraging habitat assessment

The quality of potential black cockatoo foraging habitat was described based on structural vegetation mapping, with presence or absence of key feed species. Key feed species are defined in the species' profiles in Section 3 and from the plant list classified as primary or secondary foraging plants as assessed in Appendix E. Foraging habitat scores should be used as a high-level guide and be used with consideration of site context, timing and other factors. For example,

- lower quality foraging habitat may be important during breeding periods if it is located near breeding habitat (the closer the foraging resource the more important it may be),
- certain feed species may may be used in some regions but not in others due to a preference for other plants that may be available – the same feed species in the Jarrah Forest may not be used as heavily on the Swan Coastal Plain,
- as primary feed plants may flower or fruit at certain times, secondary plants may become as important as the primary plants when the primary plants resources are not available.

Vegetation mapping compiled by Ecoedge (2025) was ground-truthed and updated for use as a basis for black cockatoo foraging habitat quality. Feed residue was noted if observed. Foraging categories were assigned to the fauna habitats in line with Table 2-5 for each black cockatoo species.

Table 2-5 Foraging habitat category and description as a high-level guide and to be used with consideration of site context, timing and other factors

Category	Description
No foraging habitat	Cleared areas, dead trees, or plant species that are not known to be frequently fed on.
Low quality foraging habitat	Low quality foraging habitat may include one or more of the following • primary feed species that are isolated or disease affected, • some secondary foraging habitat such as trees that are not frequently fed on or are not considered a sustaining resource, • no evidence of foraging, • vegetation in a Completely Degraded or Degraded condition or relatively small areas relative to other higher quality surrounding habitat. Examples include dieback (e.g. *Phytophthora* spp.) affected Jarrah or *Banksia* or severe canker (*Quambalaria coyrecup*) affected Marri or very sparse primary or secondary feed species.
Moderate quality foraging habitat	Moderate quality foraging habitat may include one or more of the following • primary feed species (e.g., *Hakea*, Jarrah, Marri or pine trees) present but patchy or as paddock trees, • habitat dominated by a number of secondary feed species - vegetation communities with very few primary feed species present, • no evidence of recent foraging or some evidence in small amounts, • not near (within 6 km) breeding hollows (known or likely), • native vegetation where few primary or secondary feed species are present in Degraded or Good condition (EPA, 2016).
High quality foraging habitat	High quality foraging habitat may include one or more of the following depending on the site context and surrounding habitat • primary feed species (e.g. *Hakea*, Jarrah, Marri or pine trees) dominant as paddock trees, patches, or components of a larger patch, • within 6 km breeding hollows (known or likely), • evidence of recent foraging, • native vegetation in Good or better condition (EPA, 2016).

Roosting habitat survey

Direct and indirect evidence of black cockatoo roosting within trees on site was noted if observed. Roosting cockatoos were searched for on dusk prior to nocturnal surveys (direct observations), evidence would also be observed during the diurnal surveys (secondary evidence). Secondary evidence that was noted included the presence of moulted or preened feathers or down, clipped branches and whitewash.

2.2.3 Western Ringtail Possum Survey Methodology

WRP targeted surveys included diurnal and nocturnal surveys. The diurnal survey on the 7th of February included general habitat assessment and WRP scat searches broadly across the survey area at the base of trees, on fallen timber and bare ground. The presence or absence of dreys and hollows was noted. Photos were taken within all habitat types.

Nocturnal spotlight surveys were conducted on the 6th and 10th of February to survey the distribution and abundance of WRP within the Survey Area (survey effort shown in Appendix A, ,Figure A.5). Animals just outside of the Survey Area were also recorded, if observed. Surveys were conducted by two experienced surveyors by foot using 1000 lumen LED head torches, following transects approximately 20 m apart over the entire Survey Area. Weather conditions were conducive for spotlighting. If observed, Common brushtail possum (CBP) (*Trichosurus vulpecula*) and South-western Brush-tailed Phascogale (*Phascogale tapoatafa* subsp. *wambenger*) (Conservation Dependent) were also recorded.

2.2.4 Preliminary Carter's Freshwater Mussel Survey Methodology

The Preliminary CFM targeted survey occurred as part of the diurnal survey. A bank survey was conducted, consisting of a visual inspection from the riverbank in accessible areas for the presence or absence of CFM. A visual assessment of the section of Collie River within the Survey Area was also undertaken to identify the potential suitability of the Survey Area to support CFM.

2.3 Survey References

Publications

Publications consulted for general distribution of fauna included, but were not limited to:

- A Complete Guide to Reptiles of Australia (Wilson & Swan, 2021)
- A Field Guide to the Mammals of Australia (Menkhorst & Knight, 2011)
- Field guide to frogs of Western Australia (Tyler & Doughty, 2009)
- Frogs of Western Australia (Johnstone & Storr, 1998)
- Handbook Western Australian Birds Vol I (Johnstone & Storr, 1998)
- Michael Morcombe's Birds of Australia eGuide, (Morcombe, 2011)
- Reptiles and Frogs in the Bush: Southwestern Australia (Bush et al., 2007)
- Scats, Tracks and Other Traces: A field guide to Australian mammals (Triggs, 2004)
- The Field Guide to the Birds of Australia (Pizzey & Knight, 2012)
- Waterbirds of South-West Wetlands (Thomson-Dans & Halse, 2001)

- Numerous online publications, journal articles and other general species references (see References section).

Local Technical Surveys

Technical fauna surveys relevant to the project in a regional habitat context include

- Biota (2020). *Regional Population Assessment of the Western Ringtail Possum* (Unpublished report prepared for Main Roads Western Australia).
- Ecoedge (2025). *Targeted and Detailed Flora and Vegetation Survey, Collie River Road Bridge, Burekup, Shire of Harvey* (Report prepared for GHD, 2025).
- Murdoch University (in preparation, 2025). *Threatened Fish Survey, Collie River Road Bridge, Burekup, Shire of Harvey* (Report prepared for GHD, 2025).
- SW Environmental (in preparation, 2025). *Quantitative Survey of Carter's Freshwater Mussel, Collie River Road Bridge, Burekup, Shire of Harvey* (Unpublished report prepared for GHD, 2025).

Taxonomy and Nomenclature

The taxonomy and nomenclature used in this report follows several sources, depending on the faunal group. It primarily follows Naturemap (2024a) but also the following:

- Amphibians: Bush et al. (2007)
- Aves: Pizzey and Knight (2012)
- Mammals: Menkhorst and Knight (2011)
- Reptiles: Wilson and Swan (2021)

2.4 Animal Ethics

The survey conformed to Section 4 of the *Australian code of practice for the care and use of animals for scientific purposes* (National Health and Medical Research Council, 2004). No animals were captured or collected during the survey. Surveys were also carried out under Scientific Use License *Animal Welfare Act 2002* Licence to use animals for scientific purposes: Licence No: U285/ 2022-2024 and Wildlife Animal Ethics Committee (WAEC) Permit: WAEC 22-08-88. No nesting black cockatoos were directly disturbed during this survey.

2.5 Limitations

In accordance with relevant *Technical Guidance* (EPA 2020) survey limitations are shown below.

Table 2-6 Assessment of survey limitations

Aspect	Constraint	Comment
Competency / experience	No	Shane Priddle (Ba Science; Certified Environmental Practitioner No.310) led the surveys and has nearly 25 years' experience surveying for fauna throughout NSW and WA.
Scope	No	The survey scope is adequate to inform environmental assessment in relation to fauna, including black cockatoos, WRP and CFM.

Aspect	Constraint	Comment
Adequacy of the survey intensity and proportion of survey achieved	No	The survey effort applied was adequate to identify fauna habitat values. A precautionary approach has been adopted.
The proportion of the task achieved and further work	No	The surveys were completed adequately, to a sufficient level with respect to the scope.
Timing/weather/season	No	The surveys were completed in suitable weather conditions in summer 2025.
Disturbances	No	There were no disturbances that affected the survey.
Intensity	No	The survey effort was adequate to meet the project scope.
Completeness	Negligible	The entire Survey Area was assessed.
Resources	No	The surveys were completed adequately.
Access problems	No	The site was within public land and was accessible.
Identification of hollows	Low	Known limitations inherent in the survey of hollows include bias with surveyors, times, differing familiarity with tree types, levels of expertise, survey conditions such as weather and time of day, and survey technique (Gorrod & Keith, 2008; Rayner et al., 2011) Ground counts of hollows are subjective. Some hollows may be missed, obscured, particularly hollows in branches and vertical hollows. As well as providing inaccurate counts of hollow abundance, ground surveys provide incomplete or inaccurate information on hollow dimensions and use of hollows by fauna (Koch, 2008). Generally, ground-based surveys lead to overestimation of hollows (Rayner et al. 2011, S. Priddle pers obs.). This limitation was reduced by checking hollows with a pole camera or drone for suitability where required. Hollow characteristics may change over time. There is some risk, although low, that black cockatoos may breed in a hollow where evidence of use is not visible or hollow characteristics are atypical. Not all active cockatoo hollows show signs of heavy chewing, and active or past breeding hollows may be missed. Also, other animals such as Little corella (*Cacatua sanguinea*) or Galah (*Eolophus roseicapilla*) may use black cockatoo hollows at other times of the year or between years. The survey lead has extensive experience in the identification and assessment of hollows and is considered competent in relation to this skill. The results are provided based on experience and professional judgement though certainty of use cannot be guaranteed without hollow watching during the breeding season.

3 Desktop Review

3.1 Local and Regional Context

3.1.1 Current Land Use and Site Values

The Survey Area consists of road reserve, adjacent lands, including cleared areas, pockets of remnant vegetation and a section of the Collie River. Land surrounding the survey area consists predominantly of cleared agricultural and rural areas, with larger pockets or strips of remnant vegetation. Vegetation Condition across the survey area ranged from Very Good to Completely Degraded (condition scale in Section 2, Table 2-2). Water-inundated areas where the Collie River intersected the Survey Area were not assessed for vegetation condition. Completely cleared areas covered 0.32 ha of the site. Existing vegetation had been subject to disturbances such as edge effects with weed invasion. There was also evidence of extensive planting throughout the site, including *Eucalyptus* and *Corymbia* spp. that are not native to the area.

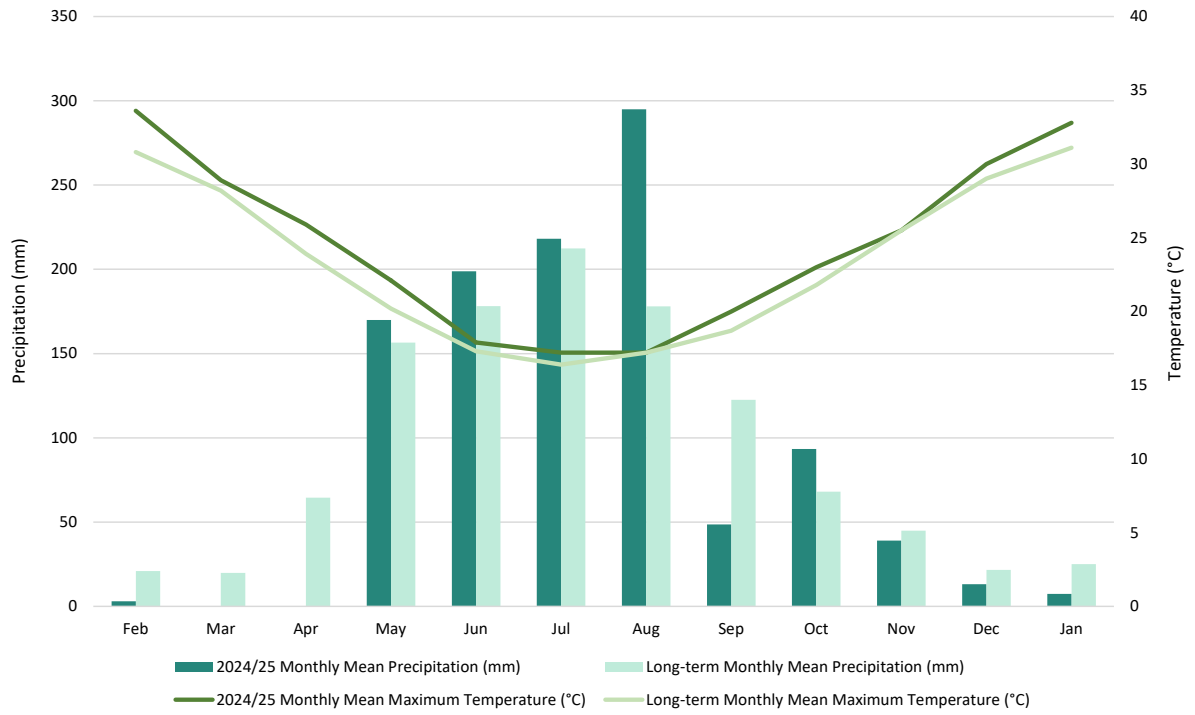
3.1.2 Interim Biogeographic Regionalisation of Australia (IBRA) and climate

The Survey Area is located within the Jarrah Forest Interim Biogeographic Regionalisation for Australia (IBRA) bioregion, specifically within the Northern Jarrah Forest (JAF01) IBRA subregion (DCCEEW, 2022, 2023). The JAF01 IBRA subregion is typically of a warm, Mediterranean climate, experiencing an average annual rainfall of 1,300 millimeters (mm) on the scarp to ~700 mm in the east and north (Williams & Mitchell, 2001).

Graph 3-1 presents climatic information for the 12 months preceding the survey period, along with long-term climate data at the most relevant Bureau of Meteorology climate stations (BoM, 2025). The Worsley Downs climate station (number 9923) contained the most comprehensive rainfall data relevant to the Survey Area. The Worsley Downs climate station is situated ~12 km northeast of the Survey Area. In the absence of temperature data at the Worsley Downs climate station, data from the Collie East (station number 9994, situated ~24 km from the Survey Area) was instead analysed (BoM, 2025).

Long-term mean maximum temperatures range from 31.1°C in the hottest month of January, to 16.4°C in the coolest month of July. Temperatures exceeded or remained the same as the long-term average over the 12 months preceding the survey period. (Graph 3-1).

The long-term average annual rainfall was 568.5 mm. Annual precipitation recorded between February 2024 and January 2025 was recorded at 712 mm, a measurement ~143.5 mm above average (BoM, 2025). The greatest difference between 2024/25 data and long-term average precipitation was experienced in August 2024, where monthly rainfall exceeded the average by 117 mm. Contrarily, between February and April 2024, rainfall was substantially below average, dropping to 64.5 mm below the long-term mean in April. (Graph 3-1).



Graph 3-1 Precipitation and temperature data from the Worsley Downs and Collie East Bureau weather stations, respectively (BoM, 2025)

3.1.3 Landforms and Soils

The JAF01 IBRA subregion overlies Archaean granite and metamorphic rocks, capped by lateritic duricrust, dissected by drainage and broken by occasional granite hills (Williams & Mitchell, 2001). The subregion consists of laterite gravels and, in the eastern part, clayey soils (Williams & Mitchell, 2001). Soils within the Survey Area are situated on the Western Darling Range soil landscape zone (DPIRD, 2022a). The Western Darling Range Zone is associated with moderately dissected lateritic plateau on granite with deeply incised valleys, includes the Darling Scarp on the western margin (DPIRD, 2022a).

Soil landscape mapping by the Department of Agriculture (now the Department of Primary Industries and Regional Development (DPIRD)), has been prepared across the southwest of WA as a compilation of a variety of soil and soil-landscape survey results (DPIRD, 2022b; Schoknecht et al., 2004). Soils within the Survey Area occur across three landscape subsystems:

- **255LvBTf – Bridgetown footslopes Phase:** Relief 10-40 m, slopes 3-15%, soils are loamy earths with some clays and gravels.
- **255LvBT5 – Bridgetown steep slopes Phase:** Relief 100-180 m, slopes 15-50%, soils are loamy earths.
- **255LvBTr – Bridgetown rocky slopes Phase:** Steep slopes (20-50%) with prominent areas of rock outcrop, soils are stony loamy earths and shallow loamy duplex soils.

3.1.4 Wetlands and Watercourses

The Collie River intersects the Survey Area from the northern to southern boundary (Landgate, 2024). No wetlands exist within the Survey Area.

3.1.5 Local Habitat Remaining

Within 6 and 12 km of the Survey Area (similar to the extent typically travelled by breeding black cockatoos), native vegetation remaining, along with DBCA-managed reserve areas are presented in Table 3-2. In a local context, the Jarrah Forest and particularly, the Swan Coastal Plain (intersected by 6 km and 12 km buffers of the Survey Area) have been subject to historical, clearing disturbances.

The area of native vegetation remaining within six km of the Survey Area is just over 60 % of the total area. The area remaining within 12 km is slightly less, at 52 % of the total area. Of the 43 % and 36 % of land reserved by the State within six km and 12 km of the site (respectively), the majority of reserved land is associated with the Wellington National Park, occurring ~1.6 km east of the Survey Area at the closest point (Landgate, 2024).

Table 3-1 Areas of DBCA reserves and native vegetation remaining within the foraging distances (6-12 km) from the survey area (Landgate, 2024)

Foraging range	Total area (ha)	Reserved (DBCA) %, Area (ha)	Native vegetation (including regrowth) remaining % of total area, Area (ha)
6 km	11,872	43 % (5,054 ha)	61 % (7,317 ha)
12 km	46,335	36 % (16,520 ha)	52 % (23,963 ha)

3.1.6 Habitat Connectivity

The South West Regional Ecological Linkages (SWREL) project (Molloy et al., 2009) identifies regional scale ecological linkages and aims to respond to the issues of fragmentation and climate change through land use planning policy and procedures. It also seeks to retain native vegetation and fauna habitat and reduce the loss of biodiversity and ecological function in the southwest.

The SWREL axis lines can be summarised as a series of vegetation patches which, due to their proximity, act as habitat stepping stones, thereby facilitating ecological processes and movement of organisms within and across the landscape (i.e. at the landscape scale).

The capacity for fauna to move is generally related to size; the larger the animal generally the greater the ability for the animal to cover a greater area (Molloy et al., 2009). Studies referred to in the SWREL Technical Report generally indicate (simplified) that

- Small mammals may cross widths of up to 100 m while dispersing,
- Small insectivorous passerines may cross gaps up to 20 m but not over 80 m,
- Arthropods and small lizards are generally sedentary in nature and unlikely to move between patches,
- Small invertebrates (as pollinators) will generally not disperse over 100 m,
- Frogs will generally disperse over 150m.

The above indicates that while vegetation gaps will, to some degree, compromise the capacity of fauna to persist, gaps of <100 m will not bring about a significant barrier to the dispersal of many fauna species. A gap of 1000 m between patches of remnant vegetation is recognised as a major barrier to the movement of many fauna species and represents a threshold, of which once crossed, presents a major decline in biotic interaction. An axis line runs through the Survey Area in a southwestern direction. The Survey Area is therefore comprised of vegetation with linkage mapped as 1a (with an edge touching or <100 m from a linkage).

3.2 Fauna Records

3.2.1 Fauna Recorded Locally

Desktop searches for fauna that may occur or have been recorded within Survey Area (10 km) yielded 209 vertebrate terrestrial fauna species (Appendix C.1):

- 10 amphibians,
- 151 birds,
- 18 mammals,
- 29 reptiles,

Several fauna taxa that were returned in desktop searches are introduced or naturalised. Invertebrates and fully aquatic species were excluded from the above summary. Some wetland bird taxa are/may be relevant based on the presence of the Collie River watercourse intersecting the Survey Area, as per desktop results discussed in Section 3.1.4. Multiple coastal shorebirds and marine migratory species (such as various plovers, petrels, sandpipers and terns) were excluded from desktop search results, given that the Survey Area was in an inland, in a terrestrial setting.

Some taxa that were associated with watercourses but not exclusively aquatic were included in the above summary, being the Northern Snake-necked Turtle and Rakali. Freshwater aquatic taxa returned locally within desktop searches included Balston's Pygmy Perch, CFM, and the Pouched Lamprey.

3.2.2 Fauna of Conservation Significance

Twenty relevant conservation significant terrestrial vertebrate fauna taxa were returned from desktop database searches, consisting of ten birds and ten mammals (Appendices C, D). This count excluded some taxa that were not relevant to the proposal or would not be impacted, as caveated in Appendix D. Additionally, three aquatic significant fauna taxa were returned; Balston's Pygmy Perch (*Nannatherina balstoni*) (Vulnerable), CFM (*Westralunio carteri*) (Vulnerable), and the Pouched Lamprey (*Geotria australis*) (Priority 3), along with two Priority 3 listed arachnids; Swan Coastal Plain Shield-backed Trapdoor Spider (*Idiosoma sigillatum*) and the Western Pygmy Trapdoor Spider (*Bertmainius opimus*).

3.3 Black Cockatoos

3.3.1 Profiles

The Survey Area falls within the Region 3 Jarrah Forest (DAWE, 2022), characterised by the dominant presence of Jarrah and Marri forest, with Marri-Wandoo woodlands towards the eastern edge. All three black cockatoo species breed within Region 3, which also exists as the main breeding area for Baudin's cockatoo and FRTBC. The region provides key foraging and wintering areas for Baudin's cockatoo, and primary foraging species for all three black cockatoo species (Appendix E). There are scattered records for all three black cockatoo species locally, (ALA, 2025; BirdLife Australia, 2025; DBCA, 2025b). Species profiles are provided below for further context.

Baudin's cockatoo (*Zanda baudinii*)
EN (EPBC Act), EN (BC Act)

Baudin's cockatoo is a large forest cockatoo endemic to the southwest of WA. Depending on the region of origin, Baudin's cockatoo is a resident, a post nuptial nomad or migrant, with the bulk of the population vacating the coldest parts of their range (the Karri Forest) in the autumn and migrating northwards during the non-breeding season. Small numbers also appear resident in a few places including Leeuwin – Naturaliste Ridge and Manjimup (Johnstone & Kirkby, 2008). Flock sizes vary from small family groups to large aggregations at roosting sites.

Breeding mainly takes place in forested areas from August to November (egg laying dates) (Tony Kirkby, pers comm.) (DAWE, 2022). Baudin's cockatoo breeds in remnant woodland or forest, but may also breed in partially cleared areas, including isolated trees. Nests are in hollows in live or dead trees particularly Karri, Marri, Jarrah, Wandoo, Bullich and Tuart (DAWE, 2022).

In the non-breeding season, Baudin's cockatoo is mainly an inhabitant of Jarrah Marri Forest but also farmland and orchards. Its main food is Marri from which it takes seeds, flowers, grubs, and nectar. Its long bill is adapted to removing seeds from Marri nuts. It feeds on a variety of other foods, including nectar and seeds from *Hakea* and *Banksia* spp., rarely Jarrah, the pith of Kangaroo Paw (*Anigozanthos flavidus*), tips of *Pinus* spp.; *Macadamia* spp., almonds and pecans, seeds and fruit of apples and pears (DAWE, 2022). Refer to Appendix E.

Roost sites are usually in or near riparian environments or other permanent water sources in tall trees; any tree may provide roosting habitat, but particularly Jarrah, Flooded Gum, Blackbutt, Tuart and introduced *Eucalyptus* spp. (Blue Gum, Lemon Scented Gum) (DAWE, 2022; Johnstone & Kirkby, 2008).

Carnaby's cockatoo (*Zanda latirostris*)
EN (EPBC Act), EN (BC Act)

Carnaby's cockatoo mainly occurs in or near eucalypt woodlands, especially those dominated by Wandoo or Salmon Gum, and sometimes in forests of Marri, Jarrah, Karri and Tuart. It is a postnuptial nomad, moving west after breeding. Nesting occurs mainly in the Wheatbelt but is increasingly occurring on the west and south coast. This species is currently expanding its breeding range westward and south into the Jarrah Marri Forests of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain along with the Capes Region (S. Priddle pers obs.). This may be due to climate change (Cale, 2003; SPRAT, n.d.; WA Museum, 2010).

Breeding occurs mainly from early July to mid-December normally in remnant woodland or forest, but also in partially cleared areas, including isolated trees. Nests are in hollows in live or dead trees, particularly Salmon Gum, Wandoo, Tuart, Jarrah, Flooded Gum, York Gum, Powderbark, Karri and Marri (DAWE, 2022). Breeding success is largely dependent on suitable feeding habitat near the nest site to provide food necessary for the survival of the chick (Johnstone et al., 2011).

The species forages in native shrubland, kwongan heathland and woodland dominated by proteaceous plant species, on seeds, flowers and nectar of *Banksia* spp., *Hakea* spp. and *Grevillea* spp., as well as *Callistemon* spp. and Marri, and in eucalypt woodland and forest that contains foraging species, individual trees and small stands of these species. It also feeds on seeds of introduced species including *Pinus* spp., *Erodium* spp., wild radish, canola, almonds, macadamia and pecans; insects and insect larvae; occasionally apples and persimmons; and liquidambar (DAWE, 2022). Refer to Appendix E.

Carnaby's cockatoos roost near riparian environments or other natural or artificial permanent water sources. Any tall trees may provide roosting habitat, but particularly Flat-topped Yate, Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced *Eucalyptus* spp. and introduced *Pinus* spp. (DAWE, 2022).

Forest Red-tailed Black Cockatoo (FRTBC) (*Calyptorhynchus banksii naso*)
VU (EPBC Act), VU (BC Act)

The FRTBC is a large forest cockatoo, endemic to the Southwest. FRTBC occurs throughout the Jarrah Marri Karri forested areas and more recently on the Swan Coastal Plain. Group sizes vary from small family groups and pairs to larger gatherings at roost sites.

FRTBC generally breed in remnant woodland or forest but may also breed in partially cleared areas, including isolated trees. They nest in hollows in live or dead trees particularly Marri, Karri, Wandoo, Bullich, Blackbutt, Tuart and Jarrah (DAWE, 2022; Johnstone et al., 2013). FRTBC have been recorded breeding in all months, but with peaks in Spring and Autumn following Marri (or Jarrah) fruit flushes. There are also years when very little breeding takes place (Johnstone and Kirkby, unpublished data).

FRTBC diet is mostly (90%) seeds of Jarrah and Marri in woodlands and forest, and in the edges of Karri forests, with the remainder made up of Blackbutt, *E. staeri* (Albany Blackbutt), Bullich, *Hakea* spp, Tuart, Western Sheoak *(Allocasuarina fraseriana)*, Snottygobble (*Persoonia longifolia*) and the non-indigenous Australian native *Melia azederach* (Cape Lilac) (Johnstone & Kirkby, 1999). The species forage on cones, the fruits of Snottygobble and Mountain Marri. On the Swan Coastal Plain, the species often feed on introduced *Corymbia maculata* (Spotted Gum), Cape Lilac, *Eucalyptus caesia*, *E. erythrocorys*, Lemon-scented Gum and Kaffir Plum (DAWE, 2022). Refer to Appendix E.

FRTBC are known to roost within any tall trees that may provide roosting habitat, particularly tall Jarrah, Marri, Blackbutt, Tuart and introduced *Eucalyptus* spp. trees or large trees on the edges of forests (DAWE, 2022).

3.3.2 Breeding Requirements

All three black cockatoos rely on large hollows for breeding which take many years to form. The onset of hollow formation is dependent on damage to the tree, from animals (normally termites) or snapped / dropped branches, then further rotting. Fire does not appear to be a hollow-forming process; it may reduce the quality and number of hollows over time (S. Priddle pers obs.). Young and healthy trees can quickly heal after damage and trees less than 100 years old are unlikely to contain large hollows. For nesting, black cockatoos show a preference for:

- Large senescing trees,
- Hollows not angled more than 45 degrees from vertical,
- Entrances of at least 12 cm but usually much larger (20-40 cm),
- Deep or well-sheltered hollows in main trunks, or large branches which can provide a floor space of at least 30 cm diameter or more.

All three species of black cockatoo are of similar size and utilise similar hollows when breeding. The actual species of tree is likely unimportant. For example, Carnaby's cockatoo nest in Marri trees in the Marri Forest and Wandoo in the Wheatbelt. All three species may use the same individual hollows when not occupied in the breeding season by other black cockatoo species (Kirkby pers comm, 2019). Suitable hollows may also be used interchangeably with other medium sized birds such as corellas, Galah, ducks and owls. Marri and Jarrah trees are considered by Commonwealth of Australia (DAWE, 2022; SEWPaC, 2012) to be large enough to develop hollows once they are >50 cm DBH. Wheatbelt species such as Wandoo and Salmon Gum may develop hollows at 30 cm DBH (DAWE, 2022). Planted eastern states *Eucalyptus* spp. such as blue gums are generally unlikely to develop hollows unless they are at an advanced age (at least 75cm DBH but usually much larger).

Hollows suitable for use by black cockatoos are usually in trees that are at least 100 years old but usually much older. Supporting literature identifies suitable breeding hollows as occurring in

- Trees over 150 years old (Koch, 2008),
- Marri trees aged ~200 years and Jarrah (~300 years), with an average tree being inhabited at ~400 years for Marri and ~500 years for Jarrah (Inions et al., 1989),
- Marri trees aged between 140 and 410 years of age (Johnstone et al., 2015),
- Jarrah trees aged between 120 and 150 years (Whitford, 2002),

- Marri trees aged at ~450 years, utilised by the medium sized Long-billed Corella (smaller than black cockatoos) (Mawson & Long, 1994), and
- Jarrah trees aged at over 1000 years (as stags) (Wayne, 2005).

While breeding, black cockatoos will generally forage within a 6–12 km radius of their nesting site. Following breeding, birds assemble into flocks and move through the landscape searching for food, usually within six kms of a night roost (SEWPaC, 2012). Black cockatoos rely on access to watering points in selecting night roost sites, with roost sites usually within two kms of a watering point where they often drink in the afternoon following daytime feeding (DAWE, 2022).

3.3.3 Roosting Behaviour

Most roosts are in a large stand of tall trees, with a dense canopy and close to permanent water. Roosting trees need to be a suitable height, have a leafy canopy to shield the birds and help retain body heat. Smaller roost sites up to eight km away from the main roosts are sometimes used, when foraging distances from the main roost become too great (e.g. Carnaby's cockatoo and FRTBC when Jarrah fruit has been exhausted locally) (S. Priddle pers obs., Johnstone et al., 2010).

Baudin's and Carnaby's cockatoos often roost as individuals (about 30 cm or more apart) in the outermost thin branches of the canopy, often among a clump of dense leaves, and generally in positions that are wind affected. FRTBC however roost side-by-side in family groups and on thick, protected perches under the canopy of tall trees (Johnstone et al., 2011).

3.3.4 Local Context and Records

The closest Important Bird Area (IBA) occurrence, defined as conservation priority by BirdLife International (BirdLife International, 2025b, 2025a), is the Benger Swamp, located ~17 km NNW of the Survey Area. DBCA database records included the following within 12 km of the Survey Area:

- a total of 131 black cockatoo records (29 FRTBC, 95 Baudin's cockatoos, 7 Carnaby's cockatoos and 34 general white-tailed black cockatoo (WTBC) records),
- no known breeding hollows,
- six roosts, identified over 15 surveys, mostly Baudin's or Carnaby's cockatoos, from just north of Brunswick Junction extending southwards (Table 3-3).

Table 3-2 DBCA roosts within 12 km

Site code	WTBC total count	WTBC max count	FRTBC total count	FRTBC max count	No. of surveys
DARHENR001	0	0	0	0	2
DARBURR001	105	101	2	2	3
HARROER001	0	0	0	0	1
HARROER003	0	0	5	3	4
HARBRUR003	0	0	0	0	2
HARBRUR002	0	0	38	29	3

3.4 Western Ringtail Possum

3.4.1 Profile

Western ringtail possum (WRP) (*Pseudocheirus occidentalis*)

CE (EPBC Act), CE (BC Act)

WRP mostly inhabit Peppermint and Peppermint-Tuart associations from Bunbury to Albany but also occur in Jarrah Marri forest in lower densities. The highest densities of WRP occur in the Swan Coastal Plain and South Coast (Biota, 2020; Shedley & Williams, 2014). Peppermint leaves form the basis of the WRP diet in coastal areas, but when unavailable, the dominant myrtaceous species are preferred. In the inland forest, Jarrah and Marri are the main food source. Garden plant varieties are also exploited in urban areas. WRP also feed on new shoots, flowers, leaves and/or fruiting bodies from a range of flora including *Nuytsia floribunda, Acacia saligna, Hardenbergia comptoniana, Allocasuarina fraseriana, E. gomphocephala, E. rudis, Melaleuca viminea, M. cuticularis, M. rhaphiophylla, Kunzea glabrescens* and *Xylomelum occidentale* (Shedley & Williams, 2014).

WRP use a range of nest and shelter sites to avoid predators and exposure to the weather. Dreys are constructed in the canopy if hollows are not available. Adequate nest and shelter sites are necessary components of good quality habitat (Jones et al., 1994; Shedley & Williams, 2014).

Fox predation is one of the main threats and causes of mortality to WRP (Wayne, 2005) along with the loss and fragmentation of native vegetation. This is due to their high dependence on midstorey and overstorey vegetation for food, shelter and protection from predators. In the Jarrah Marri forests, for example around Margaret River, the highest relative abundance occurs in areas with limited anthropogenic disturbance (unlogged or lightly logged, and a low intensity and low frequency fire history), that are intensively fox-baited and have low indices of fragmentation(DSEWPaC, 2010).

Critical habitat for the species as outlined in the Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan (DPaW, 2017) is as follows:

> Habitat critical to survival for WRP is not well understood, and is therefore based on the habitat variables observed where WRP possums are most commonly recorded. These appear to vary between key management zones. The common themes however are high nutrient foliage availability for food, suitable structures for protection/nesting, and canopy continuity to avoid/escape predation and other threats. Long-term survival of the species requires linkages between suitable habitat patches and as such habitat critical to survival incorporates this. Vegetation communities critical to the species include long unburnt mature remnants of peppermint (*Agonis flexuosa*) woodlands with high canopy continuity and high foliage nutrients (high in nitrogen and low toxin levels); Jarrah (*Eucalyptus marginata*)/Marri (*Corymbia calophylla*) forests and woodlands with limited anthropogenic disturbance (unlogged or lightly logged, and a low intensity and low frequency fire history), that are intensively fox-baited and have low indices of fragmentation; coastal heath, Jarrah/Marri woodland and forest, peppermint woodlands, myrtaceous heaths and shrublands, Bullich (*Eucalyptus megacarpa*) dominated riparian zones and karri forest. Any habitat where WRP occur naturally are considered critical and worthy of protection.

The Survey Area is located just east of the Swan Coastal Plain Management Zone in the Recovery Plan (DPaW, 2017).

3.4.2 Local Context and Records

Three key management zones have been established in DPaW (2017), comprising areas known to currently, or previously support large numbers of WRP. These management zones include the Swan Coastal Plain zone, Southern Forest zone and South Coast zone. Biota (2020) undertook a regional

survey of WRP which estimated a combined number of over 20,000 WRP within the areas surveyed from the three regional populations. Population estimates within the survey areas included the Swan Coastal Plain zone at 9,270 individuals, the Southern Forest zone at 7,500 individuals and the South Coast zone at 3,340 WRP.

The Survey Area falls outside of the three key management zones. If WRP are present within the Survey Area, they may be likely to occur in low numbers. The closest management area is the Swan Coastal Plain Management Zone, occurring just east of the Survey Area.

3.5 Carter's Freshwater Mussel

Carter's Freshwater Mussel has been considered further in SW Environmental (in prep. 2025) in relation to species profile, local context and records. Further information regarding CFM Targeted survey results is presented in Section 4.2.5.

4 Field Survey Results

4.1 Fauna Habitats

4.1.1 General Fauna Habitats

Four fauna habitat types and their corresponding vegetation descriptions are listed in Table 4-1 and mapped in Figure A.3 (Appendix A):

1. Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (1.42 ha)
2. Marri (*Corymbia calophylla*) woodland (0.80 ha)
3. Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.44 ha)
4. Marri (*Corymbia calophylla*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.18 ha)
5. Box Elder (**Acer negundo*), Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (0.17 ha)
6. Planted exotic *Eucalyptus* and *Corymbia* spp. with occasional Flooded Gum (*Eucalyptus rudis*) (0.14 ha)
7. Riverbed (0.20 ha)
8. Cleared (0.32 ha)

General fauna habitat quality ranged from Low to High, with High quality habitat occurring within types one and two (Table 4-1). Vegetation within the Survey Area had been subject to degradation through historical clearing, edge effects and weed invasion.

Table 4-1 Fauna habitat type summary occurring within the Survey Area

Type	Fauna habitat type description	Fauna habitat quality	Area (ha)	Photo
1	**Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland**	**General Fauna:** High **Baudin's cockatoo:** Nil **Carnaby's cockatoo:** Low **FRTBC:** Nil	1.42 ha	

2	**Marri *(Corymbia calophylla)* woodland**	**General Fauna:** Low to Moderate **Baudin's cockatoo:** High **Carnaby's cockatoo:** High **FRTBC:** High	0.80 ha	
3	**Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp.**	**General Fauna:** Moderate **Baudin's cockatoo:** Low **Carnaby's cockatoo:** Low **FRTBC:** Low	0.44 ha	

4	**Marri (*Corymbia calophylla*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp.** Note: Marris consisted of patchy, isolated young trees within this habitat type.	**General Fauna:** Low **Baudin's cockatoo:** Low **Carnaby's cockatoo:** Low **FRTBC:** Low	0.18 ha	*No photo available*
5	**Box Elder (**Acer negundo*), Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland**	**General Fauna:** Moderate **Baudin's cockatoo:** Nil **Carnaby's cockatoo:** Nil – Low **FRTBC:** Nil	0.17 ha	

6	**Planted exotic *Eucalyptus* and *Corymbia* spp. with occasional Flooded Gum (*Eucalyptus rudis*)**	**General Fauna:** Moderate **Baudin's cockatoo:** Nil – Low **Carnaby's cockatoo:** Nil – Low **FRTBC:** Nil – Low	0.14 ha	
7	**Riverbed**	**General Fauna:** Low (terrestrial fauna) **Baudin's cockatoo:** Nil **Carnaby's cockatoo:** Nil **FRTBC:** Nil	0.20 ha	

8	**Cleared**	**General:** Low **Baudin's cockatoo:** Nil **Carnaby's cockatoo:** Nil **FRTBC:** Nil	0.32 ha

Species prefixed with a * indicates that the taxa is not native to the area.

4.1.2 Suitable DBH Trees and Hollows

Within the Survey Area, 84 trees with DBH measuring over 50 cm were recorded. Twelve of these contained hollows, with only one containing a hollow that is potentially large enough for black cockatoos (10-15 cm aperture, Flooded gum, ID 15, 60 cm DBH) (Photo 4-1, Photo 4-2). The hollow was less than 10 m high, and no fauna were observed to be utilising the hollow at the time of survey. No signs of hollow use were evident. Suitable DBH tree locations (*Trees with suitable DBH without hollows*) are presented in Figure A.4 (Appendix A).

Photo 4-1 Tree ID 15, Flooded gum. external hollow profile

Photo 4-2 Tree ID 15, Flooded gum. hollow internal cavity

4.2 Fauna Results

4.2.1 General

Twenty-two fauna taxa were observed within the Survey Area during the surveys (Table 4-2). Recorded taxa included 14 birds, six mammal, one frog and one bivalve. Of the taxa observed, FRTBC and CFM are listed as Vulnerable and Baudin's Cockatoo is listed as Endangered. Numerous other animals are likely to occur but are cryptic or would not have been detected during the surveys undertaken (such as bats, many reptiles and additional frogs which may not have been calling). In addition, many species may only use the site as a part of a larger area of occupancy, for example, birds.

Table 4-2 Fauna recorded within the Survey Area

Class	Family	Scientific Name	Vernacular Name
Amphibia	Pelodryadidae	*Litoria moorei*	Western Green and Golden Bell Frog
Aves	Acanthizidae	*Acanthiza inornata*	Western Thornbill
Aves	Acanthizidae	*Gerygone fusca*	Western Gerygone
Aves	Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra
Aves	Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo
Aves	Cacatuidae	*Eolophus roseicapilla*	Galah
Aves	Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo

Class	Family	Scientific Name	Vernacular Name
Aves	Corvidae	*Corvus coronoides*	Australian Raven
Aves	Maluridae	*Malurus elegans*	Red-winged Fairy-wren
Aves	Meliphagidae	*Anthochaera carunculata*	Red Wattlebird
Aves	Psittacidae	*Barnardius zonarius*	Australian Ringneck
Aves	Psittacidae	*Purpureicephalus spurius*	Red-capped Parrot
Aves	Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
Aves	Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail
Aves	Zosteropidae	*Zosterops lateralis*	Silvereye
Bivalvia	Hyriidae	*Westralunio carteri*	Carter's Freshwater Mussel
Mammalia	Canidae	**Vulpes vulpes*	Fox
Mammalia	Canoidea	**Canus lupus*	Dog
Mammalia	Leporidae	**Oryctolagus cuniculus*	Rabbit
Mammalia	Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo
Mammalia	Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum
Mammalia	Suidae	**Sus scrofa*	Pig

*Introduced or naturalised

4.2.2 Conservation Significant Fauna Post-Survey Likelihood of Occurrence

A threatened fauna evaluation table was prepared for conservation significant fauna based on the desktop assessment and site survey (Appendix D). It excludes aquatic, invertebrate, marine, marine migratory, and regionally extinct species. Aquatic taxa are considered in further survey works completed by Murdoch University (in prep. 2025). Fauna of conservation significance that may occur are summarised in Table 4-3.

Of the twenty-three terrestrial vertebrate fauna of conservation significance returned in desktop database searches, two taxa were recorded at the site: FRTBC and Baudin's Cockatoo. The target aquatic conservation significant taxa of CFM were also recorded. Carnaby's Cockatoo and WRP may occur within the survey area, with Black Cockatoos considered further in Section 4.2.3 and WRP in Section 4.2.4. Eight additional vertebrate fauna of conservation significance may occur within the Survey Area at times, as presented in Table 4-3 and discussed below.

Table 4-3 Conservation significant fauna that may occur within the Survey Area, based on habitat suitability and field observations.

Genus species	Vernacular	Status Federal	Stat. WA	Presence of habitat	Likelihood of occurrence
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	VU	VU	Present – core	Present
Zanda baudinii	Baudin's Cockatoo	EN	EN	Present – core	Present
Westralunio carteri	Carter's Freshwater Mussel	VU	VU	Present – core	Present
Zanda latirostris	Carnaby's Cockatoo	EN	EN	Present – core	Possible
Hydromys chrysogaster	Rakali	–	P4	Present – core	Possible
Isoodon obesulus fusciventer	Quenda, Southern Brown Bandicoot	–	P4	Present – core	Possible

Genus species	Vernacular	Status Federal	Stat. WA	Presence of habitat	Likelihood of occurrence
Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	EN	CR	Present – supporting	Possible
Dasyurus geoffroii	Chuditch, western quoll	VU	VU	Present – supporting	Possible
Phascogale tapoatafa wambenger	South-western brush-tailed phascogale, wambenger	–	CD	Present – supporting	Possible
Pseudocheirus occidentalis	Western ringtail possum	CR	CR	Present – supporting	Possible
Falsistrellus mackenziei	Western false pipistrelle	–	P4	Marginal	Possible
Notamacropus irma	Western brush wallaby	–	P4	Marginal	Possible
Setonix brachyurus	Quokka	VU	VU	Marginal	Possible

Quenda, Southern Brown Bandicoot

There was no evidence of Quenda observed during the survey, however, given the presence of suitable habitat and the fact that the Survey Area exists as a linkage corridor between larger patches of habitat outside of the Survey Area, Quenda may potentially occur. The small area of habitat at any one location within the Survey Area would only form a small part of a larger habitat patch if a population of this species was to occur. The closest Quenda record occurs ~1 km from the Survey Area (DBCA, 2025b).

Woylie

Multiple translocation sites for Woylies exist in the southwest, including within Wellington National Park, located to the east of the Survey Area. Multiple monitoring records of Woylies occur within 6 km of the Survey Area due to the proximity of the translocation site, with the closest being ~3 km from the Survey Area (DBCA, 2025b). The Survey Area does not contain habitat consistent with current Woylie occurrences, consisting of dense myrtaceous shrubland. The Survey Area does provide Eucalypt woodland, however the understorey has been subject to degradation, and predators are not excluded from the site. Where predators have not been excluded, Woylies have previously been associated with locations containing *Gastrolobium* thickets, providing protection from predators such as foxes through secondary poisoning of naturally occurring monofluroacetic acid, which woylies are highly tolerant to (Christensen & Leftwich, 1980; Short et al., 2005; Yeatman & Groom, 2012). Thickets of this species were not evident within the Survey Area. The site may contain supporting habitat but is unlikely to form an area of important habitat for the species. The site does, however, provide linkage between other areas that may contain suitable habitat.

Chuditch

Chuditch have historically occupied a variety of habitats, without specific critical habitat requirements (DEC, 2012). Adequate den and prey resources are however crucial for the species (DEC, 2012). Chuditch also have large home ranges, requiring sizeable areas >20 000 ha (DEC, 2012). No abundance of suitable denning habitat was available for Chuditch at the Survey Area. The species may periodically pass through the site as part of a larger range, however the Survey Area is not considered core habitat for the species, and is not critical to the species survival. The closest record occurs ~2.2 km from the Survey Area (DBCA, 2025b).

South-western Brush-tailed Phascogale, Wambenger

There was no evidence of South-western Brush-tailed Phascogales observed during the survey, however suitable habitat does occur within habitat types 2 and 4 (Marri woodland). At least one hollow-bearing Marri tree was evident that may be utilised by phascogales. The closest record is located ~1.6 km from the Survey Area (DBCA, 2025b).

Western False Pipistrelle

Western False Pipistrelle are often associated with areas where Marri and Peppermint trees are co-dominant (Churchill, 2009). Marris and Peppermints are prevalent across the Survey Area, providing potential habitat for the species. Western False Pipistrelle individuals may utilise the area for hunting and roosting or pass through the area periodically. The closest record is located ~1.6 km from the Survey Area (DBCA, 2025b).

Western Brush Wallaby

The Western Brush Wallaby requires large areas of habitat. Optimum habitat for the species inclusive of open Jarrah forest or woodland, seasonally wet flats, mallee and heathland were not observed within the Survey Area. The species may pass through the Survey Area to access a wider range of habitats outside of the site, as the site occurs along an ecological linkage. Multiple monitoring records occur within proximity to the Survey Area, with the closest being under 2 km away (DBCA, 2025b).

Quokka

Quokkas require dense, low understorey vegetation for predator evasion (Hayward, 2002). They are found in swordgrass-dominated understorey, a habitat type present in isolated patches of the Survey Area (being *Lepidosperma effusum* sedgeland occurring along areas of the riverbank). These microhabitats within the site have generally been subject to degradation, however, and whilst they may provide some supporting habitat, they occur marginally in relation to the extent of the site. They are unlikely to contain sufficient areas of refuge and cover to support a population of Quokkas. The closest record occurs ~1 km from the Survey Area (DBCA, 2025b).

4.2.3 Black Cockatoos

Foraging

Both FRTBC and likely Baudin's cockatoo foraging residue was observed during the survey (Photo 4-2, Photo 4-2). Baudin's cockatoo (Photo 4-3) and FRTBC were observed within the Survey Area. Although Carnaby's cockatoos were not observed, it is likely that they would utilise the site for foraging due to the habitat values present. Foraging residue was dispersed broadly across the Survey Area. The overall Survey Area contains (from Appendix E):

- One primary and one secondary foraging plant taxa for Baudin's cockatoo,
- Three primary and one secondary foraging plant taxa for Carnaby's cockatoo, and
- Three primary foraging plant taxa for FRTBC.

Fauna habitat across the Survey Area ranged from Nil to High across the three local black cockatoo species. Fauna habitat types 2 and 4 contain Marri as they key structural species, a taxa generally associated with High quality foraging habitat for black cockatoos. Habitat type 2 was considered to be High-quality foraging for all three species, due to the extent of Marris present. Habitat type 4 only

contained isolated, young regrowth Marri in a small patch, and was considered as Low-quality foraging habitat. Despite the presence of the secondary foraging species, Lemon-scented Gum (**Corymbia citriodora*), occurring across multiple habitat types (4 and 6), the trees were only present in low numbers. Where planted exotic *Eucalyptus* and *Corymbia* spp. were evident, Blue Gums (**Eucalyptus globulus*) was observed in higher numbers, a taxa that has not been associated with black cockatoo foraging. Habitat types 1 – 6 were all considered to be Nil to Low quality foraging across all three black cockatoo species. Fauna habitat types 7 and 8 (Cleared and Riverbed areas) were not included in Table 4-4 as they contained no potential foraging species for black cockatoos.

Photo 4-3 FRTBC feeding residue

Photo 4-4 Likely Baudin's cockatoo feeding residue

Photo 4-5 Baudin's cockatoo

Table 4-4 Black cockatoo foraging species across habitat types that contained Primary or Secondary foraging spp. In line Table 2-5.

	Primary Foraging Species	Secondary Foraging Species	Habitat Quality
Habitat Type 1 – Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (1.42 ha)			
Baudin's cockatoo	–	–	**Nil**
Carnaby's cockatoo	–	*Agonis flexuosa*	**Low**

FRTBC	–	–	**Nil**
Habitat Type 2 – Marri (*Corymbia calophylla*) woodland (0.80 ha)			
Baudin's cockatoo	*Corymbia calophylla*	–	**High**
Carnaby's cockatoo	*Corymbia calophylla*	–	**High**
FRTBC	*Corymbia calophylla*	–	**High**
Habitat Type 3 – Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.44 ha)			
Baudin's cockatoo	–	*Corymbia citriodora	**Low**
Carnaby's cockatoo	–	*Agonis flexuosa* *Corymbia citriodora	**Low**
FRTBC	–	*Corymbia citriodora	**Low**
Habitat Type 4 – Marri (*Corymbia calophylla*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.18 ha)			
Baudin's cockatoo	*Corymbia calophylla*	*Corymbia citriodora	**Low**
Carnaby's cockatoo	*Corymbia calophylla*	*Corymbia citriodora	**Low**
FRTBC	*Corymbia calophylla*	*Corymbia citriodora	**Low**
Habitat Type 5 – Box Elder (*Acer negundo*), Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (0.17 ha)			
Baudin's cockatoo	–	–	**Nil**
Carnaby's cockatoo	–	*Agonis flexuosa*	**Nil – Low**
FRTBC	–	–	**Nil**
Habitat Type 6 - Planted exotic *Eucalyptus* and *Corymbia* spp. with occasional Flooded Gum (*Eucalyptus rudis*) (0.14 ha)			
Baudin's cockatoo	–	*Corymbia citriodora	**Nil – Low**
Carnaby's cockatoo	–	*Corymbia citriodora	**Nil – Low**
FRTBC	–	*Corymbia citriodora	**Nil – Low**

Species prefixed with * indicate that the taxa is not native to the area.

Breeding

Habitat types 1-6 contained potential breeding habitat for black cockatoos (consisted of at least one suitable DBH tree), with Habitat 3 being most suitable due to the greater quantity of suitable DBH trees and Marri-Jarrah dominated canopy. Habitat types 7 and 8 did not contain potential breeding habitat, due to the lack of suitable DBH trees available. Black cockatoo foraging habitat quality across the Survey Area is presented in Figure A.4 (Appendix A).

A total of twelve hollows-bearing trees were observed within the Survey Area (as outlined in Appendix F). Eighty-four trees with DBH measuring over 50 cm were recorded. Eleven of these were *Trees with suitable DBH with unsuitable hollows*), and only one was a *Tree with suitable size hollow with no signs of use* (10-15 cm aperture, Flooded gum, ID 15, 60 cm DBH). The hollow was less than 10 m high, and no fauna were observed to be utilising the hollow at the time of survey. No evidence of use was identified. Suitable DBH trees (*Trees with suitable DBH without hollows*) are presented in Figure A.4 (Appendix A).

The DBCA (2025b) compiled WTBC breeding site locations dataset returned no breeding tree records known from within 12 km of the Survey Area. Two roosts, identified over 15 surveys, occur within 6 km of the Survey Area, with the closest occurring ~920 m to the southwest (DBCA, 2025b).

Although hollows identified during the survey were deemed as unlikely to be suitable for black cockatoo breeding, they may still be utilised by other target fauna (WRP) or other taxa. Two black cockatoo roosts were observed within the Survey Area, one being Baudin's and one FRTBC, with locations presented

in Figure A.4 (Appendix A). The importance of the roosts is unknown, though the number of birds at each appeared to be less than five each, and the amount of whitewash beneath the roosts was low. This may indicate that the roosts were temporary or of relatively low importance. No active breeding trees were recorded.

4.2.4 WRP

The nocturnal surveys, completed on the 6th and 10th of February 2025, did not identify any WRP within the Survey Area. A total of 27 Common Brushtail Possums (CBP) (*Trichosurus vulpecula*) were observed across the two evenings, with 18 identified on the first night, and nine on the second night (Photo 4-5). Locations are presented in Figure A.5 (Appendix A). No Phascogales were observed during the nocturnal survey. Two dreys were observed in *Agonis flexuosa* within Habitat type 1, however no WRP scat was found.

WRP are likely to occur within and surrounding the Survey Area in low densities, utilising the drainage line for dispersal linking areas of suitable habitat. Peppermints were one of the key structural species within the Survey Area, one of the taxa forming the basis of WRP diet and characteristic within habitat critical to WRP survival (DPaW, 2017; Jones et al., 1994). There is a potential that the high number of CBP within the Survey Area may be a factor inhibiting the establishment of WRP populations, due to interspecific competition factors such as territorial disputes or competition for hollows.

Photo 4-6 CBP observed during spotlighting

4.2.5 Carter's Freshwater Mussel

Multiple CFM were observed to be inhabiting the Collie River watercourse during the diurnal survey (Photo 4-6, Photo 4-7). Multiple occurrences have been recorded across numerous desktop database sources within the Desktop Survey Area (ALA, 2025; DBCA, 2024a, 2025b; DCCEEW, 2025). A quantitative survey of CFM within the Survey Area has been completed by SW Environmental (in prep.

2025). A detailed assessment of CFM presence at the site is presented in the SW Environmental (in prep. 2025) report, as opposed to in this Targeted survey.

Photo 4-7 CFM in Collie River

Photo 4-8 CFM remains within Survey Area

5 Conclusions

The following points summarise the fauna values of the Survey Area:

- The Survey Area includes ~4.68 ha of area surrounding the current Collie River Bridge, on the Collie River Road (SLK 0.01) within the Shires of Daradanup and Harvey.
- Four fauna habitat types occur within the Survey Area:
    1. Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (1.42 ha)
    2. Marri (*Corymbia calophylla*) woodland (0.80 ha)
    3. Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.44 ha)
    4. Marri (*Corymbia calophylla*) woodland with planted exotic *Eucalyptus* and *Corymbia* spp. (0.18 ha)
    5. Box Elder (**Acer negundo*), Flooded Gum (*Eucalyptus rudis*) and Peppermint (*Agonis flexuosa*) woodland (0.17 ha)
    6. Planted exotic *Eucalyptus* and *Corymbia* spp. with occasional Flooded Gum (*Eucalyptus rudis*) (0.14 ha)
    7. Riverbed (0.20 ha)
    8. Cleared (0.32)
- Searches within the DSA yielded 209 relevant vertebrate terrestrial fauna species; 10 amphibians, 151 birds, 18 mammals and 29 reptiles.
- Twenty relevant terrestrial vertebrate fauna of conservation significance were returned in desktop searches Additionally, conservation significant taxa returned in desktop searches included Balston's Pygmy Perch (*Nannatherina balstoni*) (Vulnerable), CFM (*Westralunio carteri*) (Vulnerable), Pouched Lamprey (*Geotria australis*) (Priority 3), and two Priority 3 listed arachnids; Swan Coastal Plain Shield-backed Trapdoor Spider (*Idiosoma sigillatum*) and the Western Pygmy Trapdoor Spider (*Bertmainius opimus*).

- Significant fauna observed during survey consisted of FRTBC (*Calyptorhynchus banksii* subsp. *naso*) (FRTBC) (Vulnerable), Baudin's cockatoo (*Zanda baudinii*) (Endangered) and CFM (Vulnerable).
- Carnaby's cockatoo, Quenda, Woylie, Chuditch, South-western Brush-tailed Phascogale, Western False Pipistrelle, Western Brush Wallaby and Quokkas have the potential to occur. Further black cockatoo taxa are likely to utilise the site for foraging.
- Vegetation within fauna Habitat type 1 was of high value for general fauna taxa. Habitat types 2 and 4 contained Marri, a key structural species associated with High-quality black cockatoo habitat. Habitat type 2 was considered High quality for black cockatoo foraging. Habitat type 4 only contained isolated, young regrowth Marris in a small patch, and were therefore considered as Low-quality foraging habitat.
- No current black cockatoo breeding hollows were recorded during the survey.
- Two black cockatoo roosts were recorded within the Survey Area, one being a Baudin's cockatoo roost and the other being FRTBC. The roosts only appeared to utilised by small family groups and had low amounts of whitewash, indicating they might be temporary.
- Of the 84 trees with DBH measurements exceeding 50 cm, one tree contained a suitable size hollow with no signs of use (tree ID 15) was. Although technically suitable based on dimensions, the hollow in tree ID 15 was considered unlikely to be used by black cockatoos due to the low height and marginal internal dimensions.
- Available hollows may be utilised by target fauna other than black cockatoos (WRP).

The following recommendations should be considered:

- Once the final impact area (proposed action) is known, the proposal should be assessed against the DAWE (2022) Foraging quality scoring tool (template in Table 2-5, Section 2.2.2 of this report) and Referral guideline for 3 WA threatened black cockatoo species (DAWE, 2022) for potential impacts to roosts and breeding habitat.
- Potential impacts to WRP and CFM should be assessed against the Commonwealth Matters of National Environmental Significance – *Significant impact guidelines 1.1* (DEWHA, 2009).
- Clearing of native vegetation should be minimised.
- Clearing schedules should be planned to avoid spring breeding peaks.
- An authorised fauna spotter should be present during clearing of hollow bearing trees to manage hollow dependant fauna and WRP, should they occur.
- Weed management and infill planting could be considered in adjacent degraded areas.
- Artificial hollow installation should be considered if any existing hollows are to be cleared, to mitigate potential impacts.
- The site, although having been subject to degradation, is considered important from a connectivity perspective. An axis line runs in a southwestern direction through the Survey Area (WALGA, 2022). It is therefore recommended that efforts are made to maintain connectivity during bridge construction, allowing fauna safe passage between areas to the north and south of the bridge.

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Appendix A Figures

FIGURE 1. SURVEY AREA

COLLIE RIVER BRIDGE, COLLIE

Survey Area
Road
Major watercourse

A3 @ 1:1200

0 5 10 20 m

N

SW Environmental
www.swenvironmental.com.au

Ref: SW612
Date: 12/05/2025 Author: SP

Source: Base map © Esri and its data suppliers. SLIP Landgate (2025)

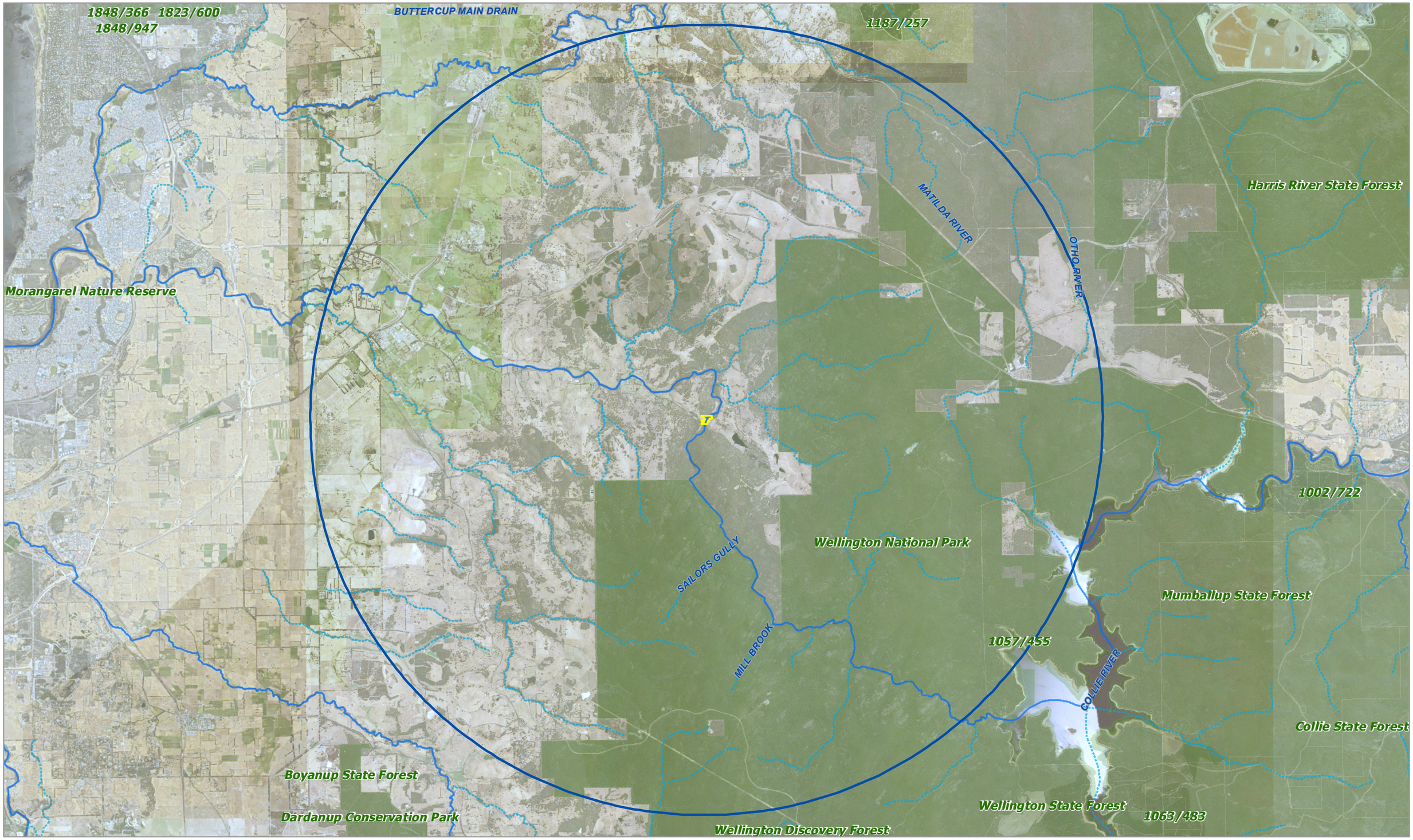

FIGURE 2. DESKTOP STUDY AREA

COLLIE RIVER BRIDGE, COLLIE

Desktop Study Area
Survey Area
Major watercourse
Minor drainage line
DBCA managed land

A3 @ 1:90000

0 0.5 1 2 km

N

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Ref: SW612
Date: 19/05/2025 Author: SP

FIGURE 3. FAUNA HABITATS

COLLIE RIVER BRIDGE, COLLIE

Survey Area

Fauna habitat

1. Flooded Gum and Peppermint woodland
2. Marri woodland
3. Flooded Gum and Peppermint woodland with planted exotic Eucalyptus spp.
4. Marri woodland with planted exotic Eucalyptus spp.
5. Box Elder (*Acer negundo*), Flooded Gum and Peppermint woodland
6. Planted exotic Eucalyptus and Corymbia spp. with occasional Flooded Gum
7. Riverbed
8. Cleared

Road

Major watercourse

A3 @ 1:1200

0 5 10 20 m

N

SW Environmental
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Ref: SW612
Date: 12/05/2025 Author: SP

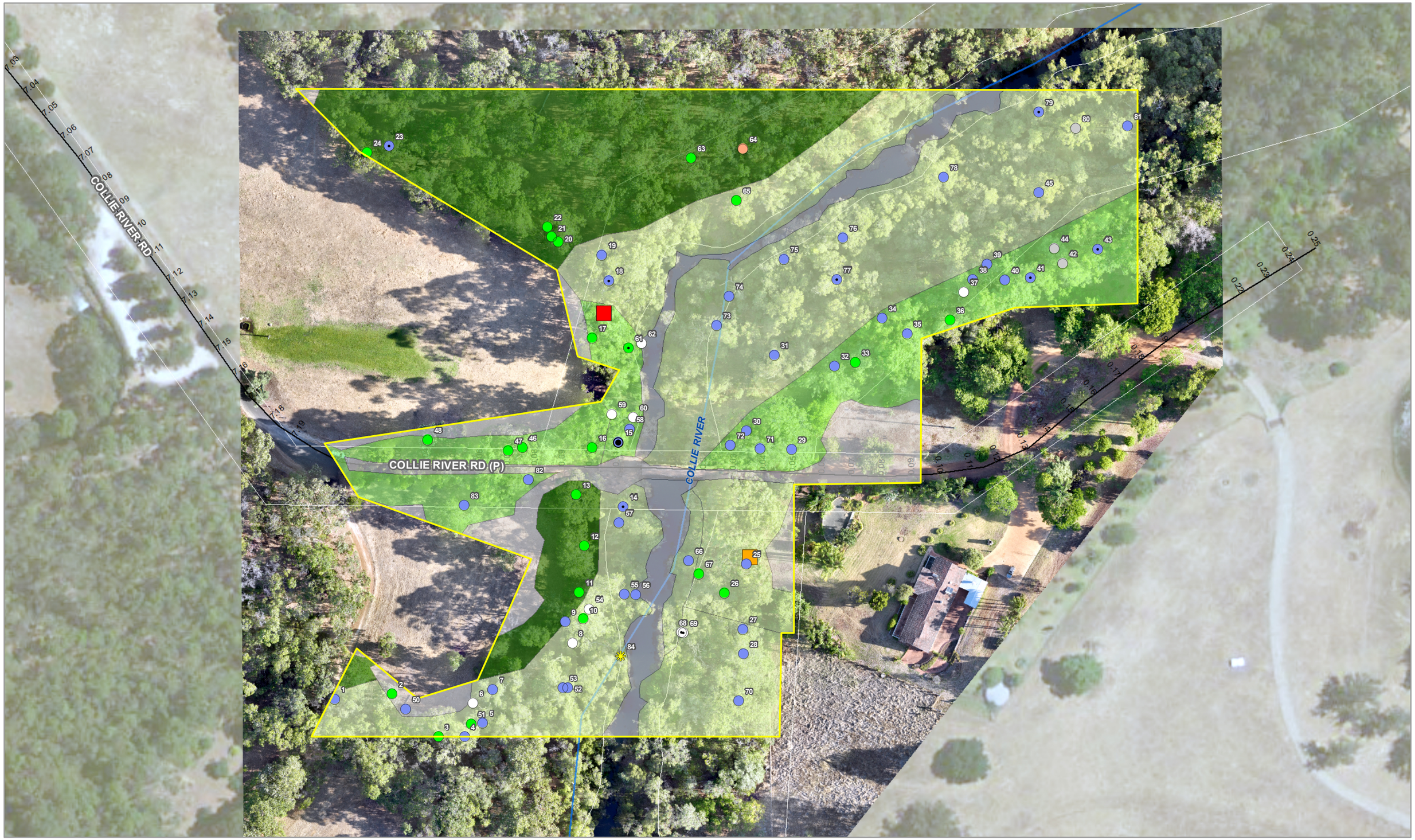

FIGURE 4. SUITABLE DBH TREES, OBSERVED ROOSTS AND BLACK COCKATOO FORAGING HABITAT QUALITY

COLLIE RIVER BRIDGE, COLLIE

Ref: SW612
Date: 12/05/2025 Author: SP

- Survey Area
- Blackbutt.Yarri, Suitable DBH no hollows
- Dead, Suitable DBH no hollows
- Dead, Unsuitable hollow
- Flooded gum, Suitable DBH no hollows
- Flooded gum, Unsuitable hollow
- Flooded gum, Potential size no signs Confirmed
- Jarrah, Suitable DBH no hollows
- Marri, Suitable DBH no hollows
- Marri, Unsuitable hollow
- Peppermint, WRP drey
- Baudin's cockatoo roost
- FRTBC roost
- High quality black cockatoo foraging habitat
- Low quality black cockatoo foraging habitat
- Nil to low quality black cockatoo foraging habitat
- Nil black cockatoo foraging
- Road
- Major watercourse

A3 @ 1:1200

0 5 10 20 m

N

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FIGURE 5. NOCTURNAL SURVEY RESULTS AND DREY LOCATION

COLLIE RIVER BRIDGE, COLLIE

Ref: SW612
Date: 12/05/2025 Author: SP

Western Ringtail Possum drey

Taxon, Abundance

Common Brushtail Possum, 1

Common Brushtail Possum, 2

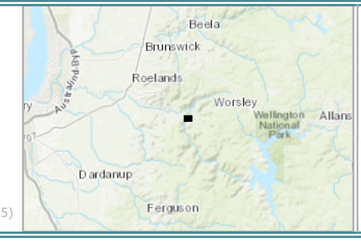
Survey Area

Nocturnal tracks 6/02/2025

Nocturnal tracks 10/02/2025

Road

Major watercourse



A3 @ 1:1200

0 5 10 20 m

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SW Environmental
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Appendix B Conservation Codes

Fauna in WA may be afforded protection under the WA BC Act and or federal EPBC Act. Species listed as threatened or migratory under the above legislation are referred to collectively in this document as being 'conservation significant' or 'target' species. These terms include species and communities listed under the DBCA Priority lists.

BC Act

The WA BC Act and associated Regulations provide for the licensing and management of activities that affect biodiversity. The BC Act provides for the listing of threatened native animals (fauna) that need protection as critically endangered, endangered or vulnerable species because they are under identifiable threat of extinction (species).

The *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2023)* under the *Biodiversity Conservation Regulations 2018* contain the lists of Threatened, Extinct and Specially Protected species under Part 2 of the BC Act. These are described below.

Threatened species and communities

- PD: Presumed totally destroyed (TECs only)
- CR: Critically endangered species
- EN: Endangered species
- VU: Vulnerable species

Extinct species

- EX: Extinct species
- EW: Extinct in the wild species

Specially protected species

- MI: Migratory species
- CD: Species of special conservation interest (conservation dependent fauna)
- OS: Other specially protected species

Priority species and communities

- Priority 1: Poorly-known species
- Priority 2: Poorly-known species
- Priority 3: Poorly-known species
- Priority 4: Rare, Near Threatened and other species in need of monitoring
- Priority Ecological Community (PEC): Where communities are considered rare but not (currently) threatened or there is insufficient information available for the community to be considered a TEC, communities can be listed as priority ecological communities (PECs).

A full description of conservation codes is provided in Appendix B.

EPBC Act

In accordance with Commonwealth legislation, the EPBC Act provides a list of 'Matters of National Environmental Significance' (NES), which includes significant fauna. Under the EPBC Act fauna matters of NES may be listed in any one of the following categories as defined in *Section 179* of the Act:

- Extinct,
- *Extinct in the wild,
- *Critically endangered,
- *Endangered,
- *Vulnerable,
- Conservation dependent.

*Only these categories are matters of NES under the Act.

The EPBC Act also lists migratory species that are recognized under international treaties including the Japan Australia Migratory Bird Agreement (JAMBA), the China Australia Migratory Bird Agreement (CAMBA) and the Bonn Convention (The Convention on the conservation of Migratory Species of Wild Animals). The EPBC Act is regulated by the DCCEEW.

IUCN Red List

The IUCN Red List is an inventory of the global conservation status of species and used to assist DBCA and other agencies in attributing a given threatened species status. It does not have any statutory authority and is not considered in detail in this assessment.

Appendix C Potential Fauna List and Fauna Recorded

Appendix C.1 Fauna that has been recorded or may occur within the DSA (10 km) and fauna recorded

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Actinopterygii	Percichthyidae	*Nannatherina balstoni*	Balston's Pygmy Perch		VU	VU					x
Amphibia	Myobatrachidae	*Crinia georgiana*	Tschudi's Froglet				x		x		
Amphibia	Myobatrachidae	*Crinia glauerti*	Glauert's Froglet				x		x		
Amphibia	Myobatrachidae	*Crinia insignifera*	Sign-bearing Froglet				x		x		
Amphibia	Myobatrachidae	*Crinia pseudinsignifera*	Bleating Froglet				x		x		
Amphibia	Myobatrachidae	*Geocrinia leai*	Lea's Frog				x		x		
Amphibia	Limnodynastidae	*Heleioporus eyrei*	Moaning Frog				x		x		
Amphibia	Limnodynastidae	*Heleioporus inornatus*	Plains Frog				x		x		
Amphibia	Limnodynastidae	*Limnodynastes dorsalis*	Western Banjo Frog				x		x		
Amphibia	Pelodryadidae	*Litoria adelaidensis*	Slender Tree Frog				x		x		
Amphibia	Pelodryadidae	*Litoria moorei*	Western Green and Golden Bell Frog	Y			x		x		
Arachnida	Migidae	*Bertmainius opimus*	Western Pygmy Trapdoor Spider		P3				x		
Arachnida	Idiopidae	*Idiosoma sigillatum*	Swan Coastal Plain Shield-backed Trapdoor Spider		P3		x		x		
Aves	Acanthizidae	*Acanthiza apicalis*	Red-rumped Tit				x	x			
Aves	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill				x	x			
Aves	Acanthizidae	*Acanthiza inornata*	Western Thornbill	Y			x	x			
Aves	Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill				x	x			
Aves	Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk				x	x			
Aves	Accipitridae	*Accipiter fasciatus*	Brown Goshawk				x	x			
Aves	Acrocephalidae	*Acrocephalus australis*	Australian Reed Warbler				x				
Aves	Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar				x				
Aves	Anatidae	*Anas gracilis*	Grey Teal				x	x			
Aves	Anatidae	*Anas platyrhynchos*	Mallard					x			
Aves	Anatidae	*Anas superciliosa*	Pacific Black Duck				x	x			

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Aves	Anhingidae	*Anhinga novaehollandiae*	Australasian Darter				x	x			
Aves	Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	Y			x	x			
Aves	Meliphagidae	*Anthochaera lunulata*	Western Wattlebird				x				
Aves	Motacillidae	*Anthus novaeseelandiae*	Australian Pipit				x	x			
Aves	Apodidae	*Apus pacificus*	Fork-tailed swift		MI	MI	x			x	
Aves	Accipitridae	*Aquila audax*	Wedge-tailed Eagle				x	x			
Aves	Ardeidae	*Ardea alba*	Great Egret				x	x	x		
Aves	Ardeidae	*Ardea pacifica*	White-necked Heron				x	x			
Aves	Artamidae	*Artamus cinereus*	Black-faced Woodswallow				x	x			
Aves	Artamidae	*Artamus cyanopterus*	Dusky Woodswallow				x	x			
Aves	Anatidae	*Aythya australis*	Hardhead				x	x			
Aves	Psittacidae	*Barnardius zonarius*	Australian Ringneck	Y			x	x			
Aves	Anatidae	*Biziura lobata*	Musk Duck				x	x			
Aves	Ardeidae	*Botaurus poiciloptilus*	Australasian bittern		EN	EN	x			x	x
Aves	Cacatuidae	*Cacatua pastinator*	Western Corella				x	x			
Aves	Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo				x	x			
Aves	Cacatuidae	*Calyptorhynchus banksii naso*	Forest red-tailed black cockatoo	Y	VU	VU	x	x	x	x	x
Aves	Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo				x	x			
Aves	Cuculidae	*Chalcites lucidus*	Shining Bronze-cuckoo				x	x			
Aves	Cuculidae	*Chalcites lucidus plagosus*	Shining bronze cuckoo						x		
Aves	Anatidae	*Chenonetta jubata*	Australian Wood Duck				x	x			
Aves	Laridae	*Chlidonias hybrida*	Whiskered Tern				x				
Aves	Locustellidae	*Cincloramphus cruralis*	Brown Songlark				x				
Aves	Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark				x	x			
Aves	Accipitridae	*Circus approximans*	Swamp Harrier				x	x			
Aves	Accipitridae	*Circus assimilis*	Spotted Harrier				x				
Aves	Climacteridae	*Climacteris rufus*	Rufous Treecreeper				x	x			

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Aves	Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush				x	x			
Aves	Columbidae	*Columba livia*	Rock Dove				x				
Aves	Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike				x	x			
Aves	Corvidae	*Corvus coronoides*	Australian Raven	Y			x	x			
Aves	Corvidae	*Corvus splendens*	House Crow				x				
Aves	Phasianidae	*Coturnix pectoralis*	Stubble Quail				x	x			
Aves	Artamidae	*Cracticus torquatus*	Grey Butcherbird				x	x	x		
Aves	Anatidae	*Cygnus atratus*	Black Swan				x				
Aves	Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra	Y			x	x			
Aves	Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella				x	x			
Aves	Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird				x				
Aves	Casuariidae	*Dromaius novaehollandiae*	Emu				x	x			
Aves	Ardeidae	*Egretta garzetta*	Little Egret				x				
Aves	Ardeidae	*Egretta novaehollandiae*	White-faced Heron				x	x			
Aves	Accipitridae	*Elanus axillaris*	Black-shouldered Kite				x	x			
Aves	Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel				x	x			
Aves	Cacatuidae	*Eolophus roseicapilla*	Galah	Y			x	x			
Aves	Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin				x	x	x		
Aves	Meliphagidae	*Epthianura albifrons*	White-fronted Chat				x				
Aves	Falconidae	*Falco berigora*	Brown Falcon				x	x			
Aves	Falconidae	*Falco cenchroides*	Nankeen Kestrel				x	x			
Aves	Falconidae	*Falco hypoleucos*	Grey Falcon		VU	VU					x
Aves	Falconidae	*Falco longipennis*	Australian Hobby				x				
Aves	Falconidae	*Falco peregrinus*	Peregrine falcon		OS		x	x	x	x	
Aves	Rallidae	*Fulica atra*	Eurasian Coot				x	x			
Aves	Rallidae	*Gallinula tenebrosa*	Dusky Moorhen				x				
Aves	Meliphagidae	*Gavicalis virescens*	Singing Honeyeater				x	x			
Aves	Acanthizidae	*Gerygone fusca*	Western Gerygone	Y			x	x			
Aves	Meliphagidae	*Gliciphila melanops*	Tawny-crowned Honeyeater				x				
Aves	Monarchidae	*Grallina cyanoleuca*	Magpie-lark				x	x			

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Aves	Artamidae	*Gymnorhina tibicen*	Australian Magpie				x	x			
Aves	Accipitridae	*Haliastur sphenurus*	Whistling Kite				x	x			
Aves	Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo				x	x			
Aves	Accipitridae	*Hieraaetus morphnoides*	Little Eagle				x	x			
Aves	Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt				x				
Aves	Hirundinidae	*Hirundo neoxena*	Welcome Swallow				x	x			
Aves	Rallidae	*Hypotaenidia philippensis*	Buff-banded Rail				x				
Aves	Ardeidae	*Ixobrychus dubius*	Minute Bittern				x				
Aves	Megapodiidae	*Leipoa ocellata*	Malleefowl		VU	VU					x
Aves	Meliphagidae	*Lichmera indistincta*	Brown Honeyeater				x	x			
Aves	Accipitridae	*Lophoictinia isura*	Square-tailed Kite				x				
Aves	Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck				x				
Aves	Maluridae	*Malurus elegans*	Red-winged Fairy-wren	Y			x	x			
Aves	Maluridae	*Malurus splendens*	Splendid Fairy-wren				x	x			
Aves	Petroicidae	*Melanodryas cucullata*	Hooded Robin				x				
Aves	Meliphagidae	*Melithreptus chloropsis*	Gilbert's Honeyeater				x				
Aves	Meliphagidae	*Melithreptus lunatus*	White-naped Honeyeater				x	x			
Aves	Meropidae	*Merops ornatus*	Rainbow Bee-eater				x	x			
Aves	Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant				x	x			
Aves	Petroicidae	*Microeca fascinans*	Jacky Winter				x				
Aves	Monarchidae	*Myiagra inquieta*	Restless Flycatcher				x	x			
Aves	Estrildidae	*Neochmia temporalis*	Red-browed Finch				x				
Aves	Psittacidae	*Neophema elegans*	Elegant Parrot				x	x			
Aves	Strigidae	*Ninox novaeseelandiae*	Southern Boobook				x	x			
Aves	Ardeidae	*Nycticorax caledonicus*	Nankeen Night-heron				x	x	x		
Aves	Columbidae	*Ocyphaps lophotes*	Crested Pigeon				x	x			
Aves	Anatidae	*Oxyura australis*	Blue-billed duck		P4		x		x	x	
Aves	Pachycephalidae	*Pachycephala pectoralis*	Golden Whistler				x	x			

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Aves	Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler				x	x			
Aves	Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote				x	x			
Aves	Pardalotidae	*Pardalotus striatus*	Striated Pardalote				x	x			
Aves	Psittacidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet				x	x			
Aves	Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican				x	x			
Aves	Hirundinidae	*Petrochelidon ariel*	Fairy Martin				x				
Aves	Hirundinidae	*Petrochelidon nigricans*	Tree Martin				x	x			
Aves	Petroicidae	*Petroica boodang*	Scarlet Robin				x	x			
Aves	Petroicidae	*Petroica goodenovii*	Red-capped Robin				x				
Aves	Petroicidae	*Petroica multicolor*	Pacific Robin				x				
Aves	Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant				x	x			
Aves	Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant				x	x			
Aves	Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant				x	x			
Aves	Columbidae	*Phaps chalcoptera*	Common Bronzewing				x	x			
Aves	Columbidae	*Phaps elegans*	Brush Bronzewing				x				
Aves	Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater				x				
Aves	Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater				x	x	x		
Aves	Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill				x	x			
Aves	Threskiornithidae	*Platalea regia*	Royal Spoonbill				x				
Aves	Psittacidae	*Platycercus icterotis*	Western Rosella				x	x			
Aves	Threskiornithidae	*Plegadis falcinellus*	Glossy ibis		MI	MI	x			x	
Aves	Charadriidae	*Pluvialis fulva*	Pacific Golden Plover		MI	MI	x				
Aves	Charadriidae	*Pluvialis squatarola*	Grey Plover		VU & MI	VU & MI	x				
Aves	Podargidae	*Podargus strigoides*	Tawny Frogmouth				x	x			
Aves	Podicipedidae	*Podiceps cristatus*	Great Crested Grebe				x				
Aves	Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe				x	x			
Aves	Locustellidae	*Poodytes gramineus*	Little Grassbird				x				
Aves	Rallidae	*Porphyrio porphyrio*	Purple Swamphen				x				
Aves	Psittacidae	*Purpureicephalus spurius*	Red-capped Parrot	Y			x	x			
Aves	Petroicidae	*Quoyornis georgiana*	White-breasted Robin				x	x			

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Aves	Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet				x				
Aves	Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail	Y			x	x			
Aves	Rhipiduridae	*Rhipidura fuliginosa*	New Zealand Fantail				x				
Aves	Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	Y			x	x			
Aves	Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren				x	x			
Aves	Acanthizidae	*Smicrornis brevirostris*	Weebill					x			
Aves	Anatidae	*Spatula rhynchotis*	Australasian Shoveler				x	x			
Aves	Columbidae	*Spilopelia senegalensis*	Laughing Dove					x			
Aves	Estrildidae	*Stagonopleura oculata*	Red-eared Firetail				x	x			
Aves	Anatidae	*Stictonetta naevosa*	Freckled Duck				x				
Aves	Maluridae	*Stipiturus malachurus*	Southern Emu-wren				x				
Aves	Artamidae	*Strepera versicolor*	Grey Currawong				x	x			
Aves	Phasianidae	*Synoicus ypsilophorus*	Brown Quail					x			
Aves	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe				x	x			
Aves	Anatidae	*Tadorna tadornoides*	Australian Shelduck				x	x			
Aves	Threskiornithidae	*Threskiornis moluccus*	Australian White Ibis				x	x			
Aves	Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis				x	x			
Aves	Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher				x	x	x		
Aves	Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen				x				
Aves	Turnicidae	*Turnix varius*	Painted Button-quail				x	x	x		
Aves	Tytonidae	*Tyto alba*	Barn Owl					x			
Aves	Tytonidae	*Tyto javanica*	Eastern Barn Owl				x				
Aves	Charadriidae	*Vanellus tricolor*	Banded Lapwing				x				
Aves	Cacatuidae	*Zanda baudinii*	Baudin's cockatoo	Y	EN	EN	x	x	x	x	x
Aves	Cacatuidae	*Zanda latirostris*	Carnaby's cockatoo		EN	EN	x	x	x	x	x
Aves	Rallidae	*Zapornia tabuensis*	Spotless Crake				x				
Aves	Zosteropidae	*Zosterops lateralis*	Silvereye	Y			x	x	x		

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Bivalvia	Hyriidae	*Westralunio carteri*	Carter's freshwater mussel	Y	VU	VU	x		x	x	x
Mammalia	Dasyuridae	*Antechinus flavipes*	Yellow-footed Antechinus						x		
Mammalia	Potoroidae	*Bettongia penicillata ogilbyi*	Woylie, brush-tailed bettong		CR	EN			x	x	x
Mammalia	Dasyuridae	*Dasyurus geoffroii*	Chuditch, western quoll		VU	VU	x		x	x	x
Mammalia	Vespertilionidae	*Falsistrellus mackenziei*	Western false pipistrelle, western falsistrelle		P4				x	x	
Mammalia	Muridae	*Hydromys chrysogaster*	Rakali		P4				x	x	
Mammalia	Peramelidae	*Isoodon fusciventer*	Quenda, southwestern brown bandicoot		P4				x	x	
Mammalia	Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo	Y			x		x		
Mammalia	Mustelidae	*Mustela putorius*	European Polecat/ferret				x				
Mammalia	Myrmecobiidae	*Myrmecobius fasciatus*	Numbat, walpurti		EN	EN	x		x	x	x
Mammalia	Macropodidae	*Notamacropus irma*	Western brush wallaby		P4		x		x	x	
Mammalia	Leporidae	*Oryctolagus cuniculus*	Rabbit	Y			x				
Mammalia	Dasyuridae	*Phascogale tapoatafa wambenger*	South-western brush-tailed phascogale, wambenger		CD		x		x	x	
Mammalia	Pseudocheiridae	*Pseudocheirus occidentalis*	Western ringtail possum		CR	CR	x		x	x	x
Mammalia	Macropodidae	*Setonix brachyurus*	Quokka		VU	VU			x	x	x
Mammalia	Dasyuridae	*Sminthopsis fuliginosa*	Grey-bellied Dunnart				x		x		
Mammalia	Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna				x				
Mammalia	Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	Y			x		x		
Mammalia	Canidae	*Vulpes vulpes*	Fox	Y			x				
Petromyzontida	Geotriidae	*Geotria australis*	Pouched Lamprey		P3		x				
Reptilia	Scincidae	*Acritoscincus trilineatus*	Western Three-lined Skink				x		x		
Reptilia	Typhlopidae	*Anilios australis*	Southern Blind Snake				x		x		
Reptilia	Typhlopidae	*Anilios pinguis*	Rotund Blind Snake				x				

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Reptilia	Pygopodidae	*Aprasia pulchella*	Western Granite Worm-lizard				x		x		
Reptilia	Chelidae	*Chelodina oblonga*	Northern Snake-necked Turtle				x				
Reptilia	Gekkonidae	*Christinus marmoratus*	Marbled Gecko				x		x		
Reptilia	Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink				x		x		
Reptilia	Scincidae	*Ctenotus impar*	Odd-striped Ctenotus				x		x		
Reptilia	Scincidae	*Ctenotus labillardieri*	Red-legged Ctenotus				x		x		
Reptilia	Diplodactylidae	*Diplodactylus lateroides*	Speckled Stone Gecko				x		x		
Reptilia	Scincidae	*Egernia kingii*	King's Skink				x		x		
Reptilia	Scincidae	*Egernia napoleonis*	South-western Crevice-skink				x		x		
Reptilia	Scincidae	*Hemiergis initialis*	Southwestern Earless Skink				x				
Reptilia	Scincidae	*Hemiergis initialis initialis*	Western Earless Skink						x		
Reptilia	Scincidae	*Hemiergis peronii*	Lowlands Earless Skink				x		x		
Reptilia	Scincidae	*Hemiergis peronii tridactyla*	Four-toed Earless Skink						x		
Reptilia	Scincidae	*Lampropholis guichenoti*	Pale-flecked Garden Sunskink				x				
Reptilia	Scincidae	*Lerista distinguenda*	South-western Orange-tailed Slider				x		x		
Reptilia	Scincidae	*Lerista microtis*	Long-legged Slider				x		x		
Reptilia	Pythonidae	*Morelia imbricata*	Western Carpet Python				x				
Reptilia	Scincidae	*Morethia lineoocellata*	West Coast Morethia Skink				x		x		
Reptilia	Scincidae	*Morethia obscura*	Shrubland Morethia skink				x		x		
Reptilia	Elapidae	*Pseudonaja affinis*	Dugite				x		x		
Reptilia	Elapidae	*Simoselaps bertholdi*	Jan's Banded Snake				x				
Reptilia	Elapidae	*Suta gouldii*	Gould's Hooded Snake				x				
Reptilia	Elapidae	*Suta nigriceps*	Mitchell's Short-tailed Snake				x		x		
Reptilia	Scincidae	*Tiliqua rugosa*	Shingle-back				x		x		
Reptilia	Gekkonidae	*Underwoodisaurus milii*	Barking Gecko				x		x		

Class	Family	Scientific Name	Vernacular Name	Observed	WA Status	EPBC Status	ALA	Birdata	Dandjoo	DBCA	PMST
Reptilia	Varanidae	*Varanus rosenbergi*	Heath monitor						x		

Appendix D Conservation Significant Fauna Evaluation

Table D.1 provides an evaluation of the presence of habitat and the likelihood of occurrence for conservation significant (target) fauna species within the Survey Area. The potential to be impacted depends on the nature of the impacts proposed, habitat utilised by the target species and the likelihood of occurrence. The presence of habitat is broken into four categories:

- **Present - core:** Potential or known habitat present within the Survey Area. Consists of "habitat critical to the survival of a species" which refers to core areas that are necessary for activities such as foraging, breeding, roosting, or dispersal, necessary for the long-term maintenance of the species to maintain genetic diversity and long-term evolutionary development (DoE, 2013) or habitat types recognised in Recovery Plans or guidelines.
- **Present - supporting:** Likely to provide dispersal, transitory or supporting habitat that may support core / critical habitat areas, such as small areas of lesser quality habitat where an animal has a large home range.
- **Marginal:** Habitat present is not typical but may be suitable, or habitat is typical, but condition and microhabitat requirements of species are not present.
- **Absent:** No potential or known habitat is present within the project area.

There are four categories for likelihood of occurrence:

- **Present:** Species was recorded during the field investigations.
- **Possible:** Suitable habitat present and the species could occur in the Survey Area based on the proximity of nearest records.
- **Unlikely:** Species known or predicted within the locality. Suitable habitat may be present in the Survey Area, but the proximity of nearest records suggests it is unlikely to occur.
- **Nil:** Species known or predicted to occur within the locality but no suitable habitat within the Survey Area.

Some fauna have been excluded as they are not relevant to the proposal or would not be impacted:

- Marine (e.g. seals, dolphins, whales, penguins).
- Marine migratory species (e.g. Albatrosses) or where breeding is in the northern hemisphere, e.g. marine Shorebirds and waders, e.g. Hooded plover, crested tern.
- Species considered regionally extinct or misidentified or outside of the animals known distribution (e.g. Coastal Plains Skink and Bilby).

Some taxa associated with water courses were included (e.g. Carter's Freshwater Mussel, Pouched Lamprey, Margaret River Burrowing Crayfish, Blackstriped Dwarf Galaxias and Balston's Pygmy Perch), as the Survey Area was intersected by the Collie River, and did not intersect any geomorphic wetland occurrences.

Conservation status is as per the (federal) EPBC Act and (WA) DBCA Parks and Wildlife Service's Threatened and Priority Fauna List last updated in January 2025. Refer to Appendix B for Conservation Codes.

Table D.1 Evaluation of the presence of habitat and the likelihood of occurrence for conservation fauna significant species within the Survey Area

Class	Family Genus species	Vernacular	Status Federal	Stat. WA	Requirements	Presence of habitat	Likelihood of occurrence
ACTINOPTERYGII	PERCICHTHYIDAE *Nannatherina balstoni*	Balston's Pygmy Perch	VU	VU	Known from a small area of coastal peat flats in south-western Western Australia that extends from Margaret River to Two Peoples Bay. Two additional populations have recently been found to the north of this area in the Collie River and the Moore River (Morgan et al., 1998). In winter and spring Balston's Pygmy Perch is typically found among inundated riparian vegetation where it presumably feeds and spawns. In summer, Balston's Pygmy Perch has been found to be moderately abundant in pools and creeks that often dry up, such as those found between Windy Harbour and Walpole (Morgan et al., 1998). Balston's Pygmy Perch surveys have been conducted at the Survey Area by DWER, as presented on the Healthy Rivers website (DWER, 2025a), with no individuals recorded. Balston's Pygmy Perch may be present within the catchment but in very low numbers, with impacts likely to be negligible (S. Beatty pers comm). The presence or absence of the species within the Survey Area is assessed and presented in Murdoch (in prep. 2025).	Present - supporting	Possible
ARACHNIDA	IDIOPIDAE *Idiosoma sigillatum*	Swan Coastal Plain Shield-backed Trapdoor Spider	–	P3	Lives in remnant woodland on the Swan Coastal Plan, using sheoak needles to make a rim around the burrow (Rix et al., 2018).	Nil	Unlikely
	MIGIDAE *Bertmainius opimus*	Western Pygmy Trapdoor Spider	–	P3	These spiders construct shallow burrows on the bark of tingle trees (*Eucalyptus guilfoylei, E. jacksonii* and *E. brevistylis*) or in soil on the banks of creek lines and gullies. The burrows are capped with a thin lid that serves to retain moisture and keep out predators such as ants. The lids are sealed with silk when the spiders moult, or when eggs or juveniles are in the burrow with the female. The spiders seem to prefer moist, shaded areas. Burrows are often clustered in appropriate microhabitats. Life history information is limited, and the age structure of the populations is unknown. However, most mygalomorph spiders are relatively long lived (>5 years) (Harvey et al., 2015).	Marginal	Possible
AVES	ANATIDAE *Oxyura australis*	Blue-billed duck	–	P4	Almost wholly aquatic. Concealed bays within vegetation if alone, in large exposed rafts on large, deep open freshwater dams and lakes if in a group (Australian Museum, 2024)	Nil	Unlikely

Class	Family Genus species	Vernacular	Status Federal	Stat. WA	Requirements	Presence of habitat	Likelihood of occurrence
	APODIDAE *Apus pacificus*	Fork-tailed swift	MI	MI	Aerial taxa, over open country, sometimes forests and cities (Pizzey & Knight, 2007). Usually in flocks, sometimes with Tree Martins and Masked Woodswallows (Johnstone & Storr, 1998).	Marginal	Unlikely
	ARDEIDAE *Botaurus poiciloptilus*	Australasian bittern	EN	EN	The Australasian Bittern occurs in terrestrial freshwater wetlands and, rarely, estuarine habitats. In the south-west it is found in beds of tall rush mixed with, or near, short fine sedge or open pools. The species also occurs around swamps, lakes, pools, rivers and channels fringed with lignum (*Muehlenbeckia* sp.), canegrass (*Eragrostis* sp.) or other dense vegetation. The species occasionally ventures into areas of open water or onto banks. In the SW WA, it is confined to a relatively small number of regularly occupied locations. These locations probably number less than 70, including: less than five north of Perth; less than 10 in the greater Perth metropolitan area; less than 10 south to Busselton; less than 10 in the Lake Muir district; less than 10 from Augusta to Walpole; less than 10 around Albany; and less than 10 around Esperance and Cape Arid. Most of these sites are discrete basin/sumpland wetlands with local catchments, and many depend on the surface expression of groundwater (SPRAT, n.d.).	Marginal	Unlikely
	CACATUIDAE *Zanda baudinii*	Baudin's cockatoo	EN	EN	Baudin's Cockatoo is mainly found in eucalypt forests, especially Jarrah-Marri Forest, Karri Forest, and less frequently in woodlands of Wandoo, Blackbutt, Flooded Gum Yate, partly cleared farmlands and urban areas including roadside trees and house gardens. This cockatoo forages at all levels of the forest from the canopy to the ground, often feeding in the understorey on proteaceous trees and shrubs, especially Banksia, and in orchards both in trees and on dropped or fallen fruit on the ground (Johnstone et al., 2011). Preferred roosts are in areas with a dense canopy close to permanent sources of water (SPRAT, n.d.). The range of the species during the non-breeding season (breeds in August though to late December) may be determined by the distribution of Marri, and that nesting might be confined to areas in which Karri occurs (SPRAT, n.d.). It is known to nest in hollows of Eucalypts usually at some height (Pizzey & Knight, 2007), often 30-50m above ground (Jupp, 2000). Tree hollows usually have an entrance of 30-40cm, >30cm deep and are mostly vertical (Johnstone et al., 2011; SPRAT, n.d.). Observed on site.	Present -core	Present
	Zanda latirostris	Carnaby's cockatoo	EN	EN	This species is a postnuptial nomad, moving west after breeding. Carnaby's Cockatoo mainly occurs in or near eucalypt woodlands, especially those dominated by Wandoo or Salmon Gum, and	Present - core	Possible

Class	Family Genus species	Vernacular	Status Federal	Stat. WA	Requirements	Presence of habitat	Likelihood of occurrence
					sometimes reported in forests of Marri, Jarrah, Karri and Tuart. Nesting hollows may be located anywhere from 2 m to >10 m from ground, mainly in the Wheatbelt (Cale, 2003; SPRAT, n.d.; WA Museum, 2010). It is known to forage in native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as Banksia spp. (including Dryandra spp.), Hakea spp. and Grevillea spp. Forages in pine plantations, eucalypt woodland and forest that contains foraging species. Also individual trees and small stands of these species (SEWPaC, 2012). Breeding occurs mainly from early July to mid-December. Breeding success is largely dependent on suitable feeding habitat adjacent to the nest site to provide the necessary food for the survival of the chick, for example adjacent pine forest or remnant vegetation (Johnstone et al., 2011).		
	Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU	The Forest Red-tailed Black Cockatoo inhabits the dense Jarrah, Karri and Marri forests receiving more than 600 mm rainfall annually (SPRAT, n.d.). The FRTBC occurs within the same habitat as the Baudin's Cockatoo. FRTBC nest in Jarrah, Karri, Marri and Wandoo favouring large top entry hollows with entrances ranging over 12 cm in diameter and hollow depth one to five metres) (Johnstone et al., 2011; SEWPaC, 2012). It breeds between February to December (with a peak between October and December, also a peak in some years in April–May) probably every two years (Johnson and Kirkby, Undated). The species predominately feeds on seeds from Marri and Jarrah fruits and Blackbutt, Albany Blackbutt, Forest Sheoak, Snottygobble and the non-indigenous native Spotted Gum and Cape Lilac within its home range of about 116-187 ha (SPRAT, n.d.). Observed on site.	Present -core	Present
	FALCONIDAE *Falco hypoleucos*	Grey Falcon	VU	VU	Frequents timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses (Garnett et al., 2011; Ley & Tynan, 2016; Schoenjahn, 2013, 2018; Watson, 2011). Has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter (P. D. Olsen & Olsen, 1986; Schoenjahn, 2018).	Marginal	Unlikely
	Falco peregrinus	Peregrine falcon	–	OS	Peregrine Falcons occur in woodland, plains, gorges, wetlands but tend to breed either in stick-nests in trees or nest on cliff ledges. It appears that hollows and large abandoned nests of other birds may be used where cliff ledges are limited. Breeds Aug-Dec. Where	Marginal	Unlikely

Class	Family Genus species	Vernacular	Status Federal	Stat. WA	Requirements	Presence of habitat	Likelihood of occurrence
					good habitat occurs, and the density of Peregrine Falcons is high, active nests may occur within 2.5km of each other. The diet of the Peregrine Falcon includes wood duck, pigeons and doves, galahs, rosellas and cockatoo, starlings and larks (J. Olsen et al., 2006).		
	MEGAPODIIDAE *Leipoa ocellata*	Malleefowl	VU	VU	It is mostly located to the south and west of a line extending from Cape Farquhar, which lies north of Carnarvon, to the Eyre Bird Observatory in the south-east of Western Australia. Occurs in semi-arid and arid zones of temperate Australia, where it occupies shrublands and low woodlands that are dominated by mallee vegetation. It also occurs in other habitat types including eucalypt or native pine Callitris woodlands, acacia shrublands, Broombush (*Melaleuca uncinata*) vegetation or coastal heathlands. The breeding habitat of the Malleefowl, within its home range, is characterised by light soil and abundant leaf litter (DEC 2010).	Nil	Unlikely
	ROSTRATULIDAE *Rostratula australis*	Australian Painted Snipe	EN	EN	Well-vegetated shallows and margins of wetlands, dams, sewage pons; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, open timber (Pizzey & Knight, 2007).	Marginal	Unlikely
	THRESKIORNITHIDAE *Plegadis falcinellus*	Glossy ibis	MI	MI	Freshwater wetlands, irrigated areas; margins of dams, floodplains, brackish and saline wetlands, mudflats, suburban areas (Pizzey & Knight, 2007).	Marginal	Unlikely
BIVALVIA	HYRIIDAE *Westralunio carteri*	Carter's Freshwater Mussel	VU	VU	Patchily distributed in sandy/muddy sediments of freshwater lakes, rivers and streams with greatest densities associated with woody debris and overhanging riparian vegetation near stream banks and edges of lakes/dams (DAWE, 2017). Adults mostly sessile, but do move through sediments with a muscular foot, creating visual tracks; Juveniles much more mobile, moving in a similar fashion as a caterpillar (DAWE, 2017). When in burrowed, filter-feeding position, siphons extended, mantle and siphons have a mottled red/black appearance; inhalant siphon lined with papillae (DAWE, 2017).	Present -core	Present
MAMMALIA	DASYURIDAE *Phascogale tapoatafa wambenger*	South-western brush-tailed phascogale, wambenger	–	CD	This arboreal species is found in a variety of forest types. Ideal habitat for this species consists of dry sclerophyll forest and open woodland (Jarrah, Marri, and mixed Jarrah Karri) that contain hollow bearing trees and sparse ground cover. Their many nesting sites include hollow tree limbs, rotten stumps and even birds' nests. Lactating females prefer a large tree cavity with a small entrance with a nest made of bark, feathers and fur. A female's home range covers 20 to 70 hectares, a male's home range overlaps females and increases during breeding season. It is predominantly	Present - supporting	Possible

Class	Family Genus species	Vernacular	Status Federal	Stat. WA	Requirements	Presence of habitat	Likelihood of occurrence
					carnivorous, foraging on arthropods, invertebrates, small vertebrates and nectar (Strahan, 1995).		
	Dasyurus geoffroii	Chuditch, western quoll	VU	VU	Quolls may occupy a range of habitats including forest, woodland and desert, though in the SW they are largely restricted to Jarrah forest or scattered through the southern and eastern wheat belt (DEC, 2010). Current records indicated that this only represents approximately 5% of their former range. Habitat critical to Western Quoll are large areas of undisturbed habitat which a sufficient variety of key food and other resources such as large hollow logs, burrows or small caves at ground level for denning. To be suitable as den sites, logs must have a diameter of at least 30 cm but usually greater than 50 cm, a hollow diameter of 7–20 cm and generally 1m long (Orell & Morris, 1994). Annually, an adult female Chuditch will utilise an estimated average of 66 logs and 110 burrows within her home range. A large amount of den sites is required for both sexes. They occupy relatively large home ranges, with males utilizing over 15 km2 and females, 3-4 km^2 (Orell & Morris, 1994).	Present - supporting	Possible
	MACROPODIDAE *Notamacropus irma*	Western brush wallaby	–	P4	Optimum habitat for the Western Brush Wallaby includes open Jarrah forest or woodland and seasonally wet flats with low grasses and scrubby thickets, but also areas of mallee and heathland. Common dietary flora includes *Carpobrotus edulis*, *Cynodon dactylon* and *Nuytsia floribunda* (DEC, 2012). Requires large areas of habitat.	Marginal	Possible
	Setonix brachyurus	Quokka	VU	VU	The understorey structure of the habitats currently used by Quokka consist of dense, low vegetation that provides refuge from predation (Hayward, 2002). The mainland habitats include dense riparian vegetation (Hayward et al., 2005), but additionally (from SPRAT (n.d.)) • heath and shrubland, • Swamp Peppermint (*Taxandria linearifolia*) dominated swamps in Jarrah forest, • swampy shrublands, • swordgrass-dominated understorey, • regrowth areas of the Karri forest, • Bullich swamp forest, • Paperbark (*Melaleuca* spp.) swamp.	Marginal	Possible

Class	Family Genus species	Vernacular	Status Federal	Stat. WA	Requirements	Presence of habitat	Likelihood of occurrence
					A low density of near-surface fuel, a complex vegetation structure and a varied fire-age mosaic best predict the probability of occupancy of quokka in the southern forest (DEC, 2013).		
	MURIDAE *Hydromys chrysogaster*	Rakali	–	P4	The Rakali is usually found in permanent fresh or brackish water but can be found in marine environments. Fresh water habitats include swamps, lakes, dams even urban drainage swamps. Typically forages close to the shoreline, restricting its movements to shallow water (up to 2 m in depth) (CSIRO, 2004). Records evident within Survey Area.	Present -core	Possible
	MYRMECOBIIDAE *Myrmecobius fasciatus*	Numbat, walpurti	EN	EN	A termite specialist that once occurred along much of arid and semi –arid southern Australia it is now restricted to a few remnant forests of Wandoo, Powderbark Wandoo or Jarrah in SW Australia, e.g. Dryandra and Perup Forests (Menkhorst & Knight, 2011).	Nil	Unlikely
	PERAMELIDAE *Isoodon fusciventer*	Quenda, southwestern brown bandicoot	–	P4	Bandicoot habitat consists of dense scrubby, often swampy vegetation with a dense cover up to one metre high particularly near watercourses/wetlands. It often feeds in adjacent forest (Jarrah and Wandoo) and woodlands that are burnt on a regular basis. Nests can be concealed next to or under old logs, shrubs or piles of debris and are made up of ground litter piled up over a shallow depression providing internal chambers. Home ranges vary with population density and range from 5-8.6 ha for males and 1-6 ha for females (DEC, 2010). Feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous fungi. Their searches for food often create distinctive conical holes in the soil (DBCA, n.d.). No evidence of diggings were observed.	Present -core	Possible
	POTOROIDAE *Bettongia penicillata ogilbyi*	Woylie, brush-tailed bettong	EN	CR	Current woylie habitat includes tall eucalypt forest and woodland, dense myrtaceous shrubland and kwongan or mallee heath (Christensen & Leftwich, 1980; Sampson, 1971). Habitat requirements that woylies are generally associated with include areas that provide refuge from predation, such as thickets, heath (Yeatman & Groom, 2012), or where predators are excluded, and prior to the introduction of predator management such as 1080 baiting, locations where *Gastrolobium* thickets were naturally present (containing monofluroacetic acid, which woylies are highly tolerant to, causing a reduction in predatory numbers such as foxes through secondary poisoning (Short et al., 2005). Currently, the species distribution is concentrated in the southwest of WA, however many translocated populations are spread as far north as Shark Bay. The remaining natural population include Perup, Kingston, Dryandra woodland and Tutanning nature reserve	Present - supporting	Possible

Class	Family Genus species	Vernacular	Status Federal	Stat. WA	Requirements	Presence of habitat	Likelihood of occurrence
					(Yeatman & Groom, 2012). Opportunistic records recorded between years 1970 to 2010, presented in the National Recovery Plan (Yeatman & Groom, 2012) include locations in proximity to the Survey Area.		
	PSEUDOCHEIRIDAE *Pseudocheirus occidentalis*	Western ringtail possum	CR	CR	In dense, coastal Peppermint forest, home ranges are about 0.5 hectares to 1.5 ha and in eucalypt forests about 2.5 ha. In the northern jarrah forests, home ranges are larger and have been recorded to at least 5.6 ha. Peppermint leaves form the basis of the WRP diet in coastal areas (between 79-100% based on a study of WRP near Busselton by Jones et al. (1994), but when unavailable, the dominant myrtaceous species are preferred. In the inland forest, Jarrah and Marri the main food source. Garden plant varieties are also exploited in urban areas. WRP use a range of nest and shelter sites to avoid predators and exposure to the weather. Dreys are constructed in the canopy if hollows are not available. Adequate nest and shelter sites are necessary components of good quality habitat (Jones et al., 1994; Shedley & Williams, 2014).	Present - supporting	Possible
	VESPERTILIONIDAE *Falsistrellus mackenziei*	Western false pipistrelle	–	P4	It occurs in wet sclerophyll forest dominated by Karri (*Eucalyptus diversicolor*), and in the high rainfall zones of the Jarrah (*E. marginata*) and Tuart (*E. gomphocephala*) forests. It has also been recorded in mixed Tuart-Jarrah tall woodlands on the adjacent coastal plain. Marri (*E. calophylla*), Sheoak (*Allocasuarina heugeliana*) and Peppermint (*Agonis flexuosa*) trees are often co-dominant at its collection localities (Churchill, 2009). This species roosts in tree hollows (Australian Museum, 2020) in colonies of 5 to 30 bats. The species feed on flying insects between below the forest canopy.	Marginal	Possible
PETROMYZONTIDA	GEOTRIIDAE *Geotria australis*	Pouched lamprey	–	P3	The species is anadromous (enters rivers from the ocean to spawn). Sub-adults enter freshwater rivers during winter and spring, moving upstream prior to spawning in the following year. Large numbers of lamprey can sometimes be seen below barriers (natural and artificial), as they are held up during migration. Their oral disc (sectorial) allow them to climb vertical obstacles, such as rock bars, waterfalls and weirs (DWER, 2025b). The Healthy Rivers South-west website (DWER, 2025b) has mapped the Survey Area as a location where the species is likely to be found. Further survey by Murdoch (in prep. 2025) advised that presence of the Pouched Lamprey was possible, but very unlikely to be encountered, and not previously recorded in any surveys.	Present – supporting	Possible

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Appendix E Black Cockatoo Foraging Plants

Table E.1 Flora taxa within the Survey Area with potential for quality black cockatoo foraging value

Species	Common name	Habit	Baudin's cockatoo	Carnaby's cockatoo	FRTBC	Reference
Agonis flexuosa	Peppermint Tree	Tree		Secondary		(Groom, 2011; Valentine & Stock, 2008)
Corymbia calophylla	Marri	Tree	Primary	Primary	Primary	(DoEE, 2017; Johnstone et al., 2010a, 2010b, 2010c, 2011, 2017; Johnstone & Kirkby, 1999, 2008; Johnstone & Storr, 1998; Saunders, 1979; SEWPaC, 2012; Valentine & Stock, 2008)
**Corymbia citriodora*	Lemon-scented Gum	Tree	Secondary	Secondary	Secondary	(Groom, 2011; Johnstone et al., 2010a, 2010b, 2017; SEWPaC, 2012; Valentine & Stock, 2008)
Eucalyptus marginata	Jarrah	Tree	Secondary	Primary	Primary	(Birds Australia, n.d.; DoEE, 2017; Groom, 2011; Johnstone et al., 2010a, 2010b, 2010c, 2011, 2017; Johnstone & Kirkby, 1999; Johnstone & Storr, 1998; Saunders, 1979; SEWPaC, 2012; Valentine & Stock, 2008)
Eucalyptus patens	Blackbutt	Tree		Primary	Primary	(DoEE, 2017; Groom, 2011; Johnstone et al., 2010b; Johnstone & Kirkby, 1999, p. 199; Johnstone & Storr, 1998; SEWPaC, 2012)

*Indicates flora taxa that are introduced/alien to the area.

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Appendix F Tree Survey Results

Tree ID	Species	Comments	DBH (cm)	Hollows	Hollow size	Type	Height	Note	x (GDA2020)	y
1	Flooded gum	Suitable DBH no hollows	50						397415	6311327
2	Marri	Suitable DBH no hollows	60						397435	6311329
3	Marri	Suitable DBH no hollows	55						397451	6311315
4	Flooded gum	Suitable DBH no hollows	55						397460	6311315
5	Flooded gum	Suitable DBH no hollows	55						397466	6311319
6	Dead	Suitable DBH no hollows	60						397463	6311326
7	Flooded gum	Suitable DBH no hollows	55						397469	6311330
8	Dead	Suitable DBH no hollows	50						397497	6311346
9	Flooded gum	Suitable DBH no hollows	55						397494	6311354
10	Marri	Suitable DBH no hollows	65						397500	6311355
11	Marri	Suitable DBH no hollows	60						397499	6311364
12	Marri	Suitable DBH no hollows	95						397501	6311380
13	Marri	Suitable DBH no hollows	70						397498	6311397
14	Flooded gum	Unsuitable hollow	95	2	to 10cm	Spout angle suitable	10 to 15m	Too small	397514	6311393
15	Flooded gum	Potential size no signs Confirmed	60	1	10 to 15cm	Vertical	to 10m	No evidence of use	397512	6311415
16	Marri	Suitable DBH no hollows	55						397503	6311413
17	Marri	Suitable DBH no hollows	95						397503	6311450
18	Flooded gum	Unsuitable hollow	60	3	10 to 15cm	Knot angle suitable	10 to 15m	Too small	397509	6311470
19	Flooded gum	Suitable DBH no hollows	95						397507	6311479
20	Marri	Suitable DBH no hollows	50						397492	6311483
21	Marri	Suitable DBH no hollows	55						397490	6311485
22	Marri	Suitable DBH no hollows	55						397488	6311488
23	Flooded gum	Unsuitable hollow	60	1	10 to 15cm	Vertical	10 to 15m	Cavity insufficient	397434	6311516
24	Marri	Suitable DBH no hollows	50						397427	6311514
25	Flooded gum	Suitable DBH no hollows	130						397556	6311373
26	Marri	Suitable DBH no hollows	95						397548	6311363
27	Flooded gum	Suitable DBH no hollows	50						397555	6311351

28	Flooded gum	Suitable DBH no hollows	55						397555	6311343
29	Flooded gum	Suitable DBH no hollows	60						397571	6311412
30	Flooded gum	Suitable DBH no hollows	50						397556	6311419
31	Flooded gum	Suitable DBH no hollows	100						397565	6311444
32	Flooded gum	Suitable DBH no hollows	60						397586	6311441
33	Marri	Suitable DBH no hollows	95						397593	6311442
34	Flooded gum	Suitable DBH no hollows	55						397602	6311457
35	Flooded gum	Suitable DBH no hollows	100						397611	6311452
36	Marri	Suitable DBH no hollows	80						397625	6311457
37	Dead	Suitable DBH no hollows	60						397630	6311466
38	Flooded gum	Unsuitable hollow	80	1	10 to 15cm	Knot angle suitable	10 to 15m	Bees	397633	6311470
39	Flooded gum	Suitable DBH no hollows	85						397638	6311476
40	Flooded gum	Suitable DBH no hollows	65						397644	6311470
41	Flooded gum	Unsuitable hollow	60	1	to 10cm	Spout angle suitable	15m plus	Bees,Too small	397653	6311471
42	Blackbutt.Yarri	Suitable DBH no hollows	60						397664	6311476
43	Flooded gum	Unsuitable hollow	85	1	to 10cm	Vertical	15m plus	Too small	397676	6311481
44	Blackbutt.Yarri	Suitable DBH no hollows	80						397661	6311481
45	Flooded gum	Suitable DBH no hollows	80						397656	6311500
46	Marri	Suitable DBH no hollows	55						397479	6311413
47	Marri	Suitable DBH no hollows	55						397475	6311412
48	Marri	Suitable DBH no hollows	60						397447	6311416
50	Flooded gum	Suitable DBH no hollows	60						397440	6311324
51	Marri	Suitable DBH no hollows	50						397462	6311319
52	Flooded gum	Suitable DBH no hollows	60						397495	6311331
53	Flooded gum	Suitable DBH no hollows	55						397493	6311331
54	Dead	Suitable DBH no hollows	60						397502	6311358
55	Flooded gum	Suitable DBH no hollows	50						397514	6311363
56	Flooded gum	Suitable DBH no hollows	60						397518	6311363

57	Flooded gum	Suitable DBH no hollows	75						397513	6311387
58	Flooded gum	Suitable DBH no hollows	55						397516	6311419
59	Dead	Suitable DBH no hollows	55						397510	6311424
60	Dead	Suitable DBH no hollows	70						397517	6311423
61	Marri	Unsuitable hollow	50	1	to 10cm	Knot angle suitable	to 10m		397516	6311447
62	Dead	Suitable DBH no hollows	55						397520	6311449
63	Marri	Suitable DBH no hollows	55						397537	6311512
64	Jarrah	Suitable DBH no hollows	50						397555	6311515
65	Marri	Suitable DBH no hollows	50						397553	6311497
66	Flooded gum	Suitable DBH no hollows	60						397536	6311374
67	Marri	Suitable DBH no hollows	60						397540	6311370
68	Dead	Unsuitable hollow	80	1	15 to 20cm	Fissure	10 to 15m	No evidence of use, Blocked Debris	397534	6311350
69	Dead	Unsuitable hollow	50	1	15 to 20cm	Vertical	to 10m		397534	6311350
70	Flooded gum	Suitable DBH no hollows	90						397553	6311327
71	Flooded gum	Suitable DBH no hollows	55						397561	6311413
72	Flooded gum	Suitable DBH no hollows	50						397550	6311414
73	Flooded gum	Suitable DBH no hollows	75						397546	6311455
74	Flooded gum	Suitable DBH no hollows	80						397550	6311465
75	Flooded gum	Suitable DBH no hollows	50						397569	6311477
76	Flooded gum	Suitable DBH no hollows	55						397589	6311484
77	Flooded gum	Unsuitable hollow	60	2	10 to 15cm	Spout angle suitable	15m plus	No evidence of use	397587	6311470
78	Flooded gum	Suitable DBH no hollows	65						397623	6311505
79	Flooded gum	Unsuitable hollow	90	1	to 10cm	Knot angle suitable	10 to 15m	No evidence of use	397656	6311527
80	Blackbutt Yarri	Suitable DBH no hollows	55						397668	6311522
81	Flooded gum	Suitable DBH no hollows	85						397686	6311523
82	Flooded gum	Suitable DBH no hollows	50						397482	6311402
83	Flooded gum	Suitable DBH no hollows	60						397460	6311393
84	Peppermint	WRP drey	0						397513	6311342

	Baudins roost	Baudins roost	0						397557	6311376
	FRTBC roost	FRTBC roost	0						397507	6311459

Note: Only best hollows recorded.

Class	Description
Tree with suitable DBH without hollows	Suitable DBH tree (described above) that do not have hollows or hollows are too small for black cockatoo entry (<10 cm aperture).
Tree with suitable DBH with unsuitable hollow	Suitable DBH tree with a hollow with multiple attributes that would make the hollow unlikely to be suitable for breeding such as unsuitable entry aperture, internal dimensions, height or angle. Unlikely to be used by black cockatoos in current form.
Tree with potentially suitable size hollow with no signs of use	Suitable DBH tree that may have a suitable hollow but with a single attribute that might reduce the suitability of the hollow for breeding, such as the marginal entry aperture size, coned out internal dimensions, low height or oblique angle. The hollow has no evidence of use (chew marks, scarring, eggs, woodchips, etc). Possible but unlikely to be used by black cockatoos in current form.
Tree with suitable size hollow with no signs of use	Suitable DBH tree with a hollow with suitable attributes for breeding (suitable entry size, internal dimensions, height and angle). The hollow has no evidence of use (chew marks, scarring, eggs, woodchips) and whilst not currently used could be used in future.
Tree with potentially suitable size hollow with signs of use	Suitable DBH tree that may have a suitable hollow but with a single attribute that might reduce the suitability of the hollow for breeding, such as marginal entry aperture size, coned out internal dimensions, low height or oblique angle. The hollow has evidence of use (chew marks, scarring, eggs, woodchips). The evidence may be caused by other species, but black cockatoo use could not be ruled out without further survey.
Tree with suitable size hollow with signs of use	Suitable DBH tree with a hollow with suitable attributes for breeding (suitable entry size, internal dimensions, height and angle). The hollow has evidence of use (chew marks, scarring, eggs, woodchips) consistent with black cockatoo use, previous or current. The evidence may be caused by other species, but use of the hollow by black cockatoo is considered likely.
Known nesting tree	Suitable DBH tree with a known nesting hollow (cockatoos observed using the hollow and assumed to be breeding) or previously recorded as a breeding tree.