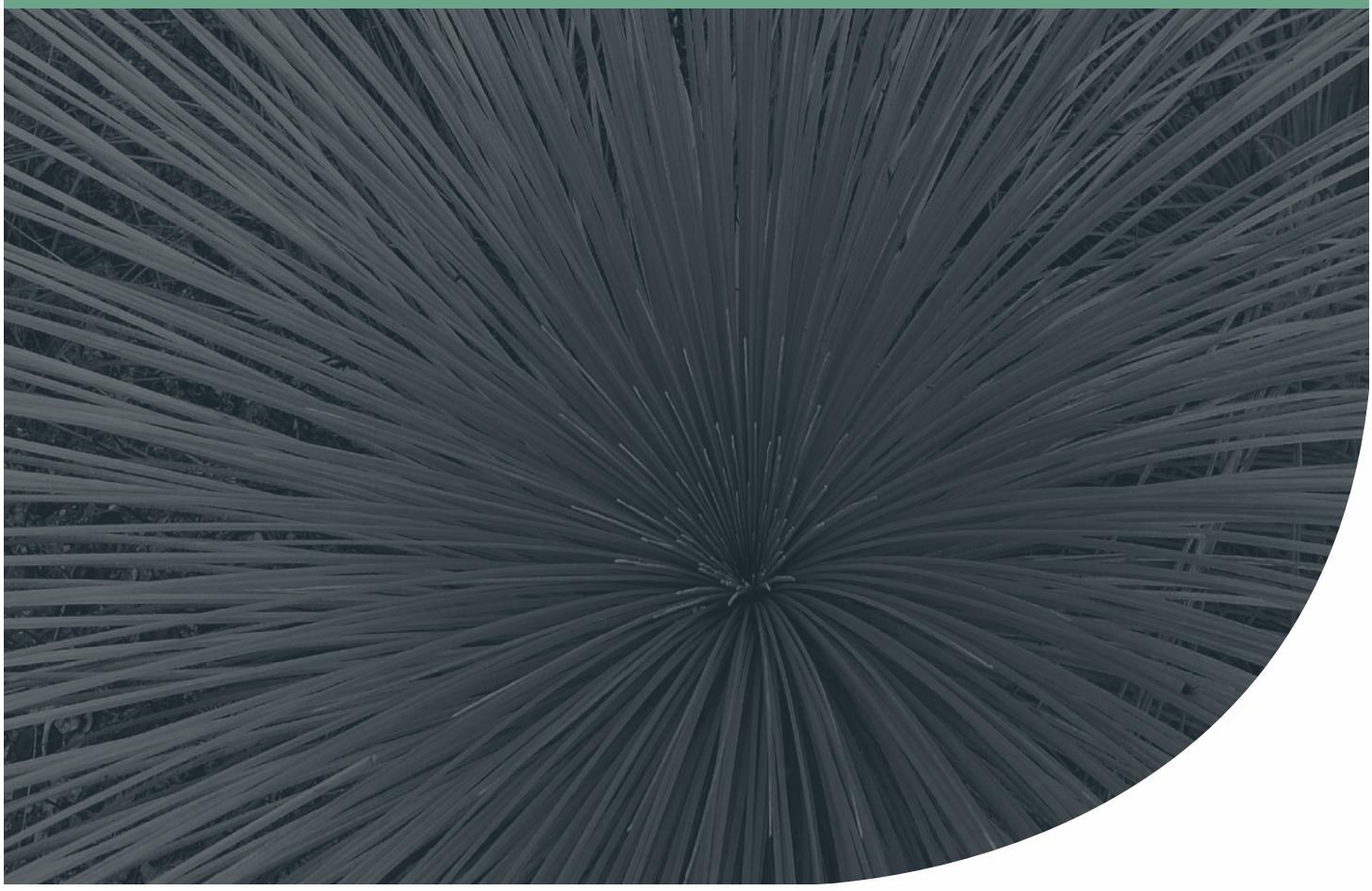
Basic and Targeted Fauna Assessment

Part Ferguson Road, Ferguson

Project No: EP22-044(02)

Prepared for Shire of Dardanup
April 2023



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Executive Summary

The Shire of Dardanup engaged Emerge Associates to conduct a basic fauna, targeted black cockatoo and targeted western ringtail possum assessment within a portion of the Ferguson Road reserve between Ferguson and Wellington Mill (referred to herein as the 'site').

As part of the assessment a desktop review of relevant background information was completed and a field survey was undertaken on 25 and 26 May 2022. During the field survey opportunistic sightings of fauna were recorded and an assessment was made on the fauna habitat within the site and its suitability to provide habitat for conservation significant fauna. A targeted black cockatoo and western ringtail possum survey was also undertaken to determine the presence of habitat for these species. A subsequent hollow inspection was undertaken on 15 August 2022.

Outcomes of the basic fauna survey include the following:

- The majority of the site (approximately 56.87%) supports highly disturbed **cleared area** habitat which provides limited value to fauna species of conservation significance and is likely to primarily be used by common and widespread native and non-native fauna with non-specific habitat requirements. The highest fauna habitat values are associated with the **forest** habitat which occurs over approximately 3.44% of the site. The remainder of the site comprises the **forest no understorey** and **scattered trees and shrubs** habitats (approximately 39.69%).
- A total of 14 native fauna species were recorded within the site, including two species of conservation significance: Carnaby's black cockatoo and forest red-tailed black cockatoo.
- While not recorded during the field survey, Baudins's black cockatoo (listed as endangered) and south-western brush tailed phascogale (conservation dependant) are likely to occur in the site. Four other species of conservation significance not recorded during the field survey may possibly occur in the site: Pacific swift, peregrine falcon, Australian masked owl and western false pipistrelle.

Outcomes of the targeted black cockatoo survey include the following:

- The site occurs within the modelled distribution of Carnaby's black cockatoo, Baudin's black cockatoo and forest red-tailed black cockatoo. Carnaby's black cockatoo and forest red-tailed black cockatoo were recorded in the site during the field survey.
- The site contains 246 habitat trees, of which three contain hollows potentially suitable for use by black cockatoos for breeding.
- No roosts or evidence of roosting by any species of black cockatoo was recorded within the site during the field survey. Tall native and non-native trees within the site represent suitable roosting habitat for species of black cockatoo.
- A total of 6 ha of foraging habitat for Carnaby's black cockatoo was mapped within the site of which 5.52 ha (91.85%) provides a high value resource, 0.22 ha (3.66%) provides a moderate value resource and 0.27 ha (4.49%) provides a low value resource.
- A total of 5.73 ha of foraging habitat for Baudin's black cockatoo was mapped in the site of which 5.49 ha (95.81%) provides a high value resource, 0.22 ha (3.84%) provides a moderate value resource and 0.02 ha (0.35%) provides a low value resource.

- A total of 5.74 ha of foraging habitat for forest red-tailed black cockatoo was mapped in the site of which 5.52 ha (96.17%) provides a high value resource and 0.22 ha (3.83%) provides a moderate value resource.
- Additional areas of foraging habitat of similar or higher value occur adjacent to the site and in the wider local area.

Outcomes of the targeted western ringtail possum survey include the following:

- Western ringtail possum was not observed within the site.
- No secondary evidence such as dreys, scats, claw marks or skeletal remains were recorded within the site.
- The site contains four trees that contain suitable hollows for western ringtail possum.
- The site contains suitable foraging habitat for western ringtail possum.

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Abbreviation Tables

Table A1: Abbreviations – Organisations

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

Table A2: Abbreviations – General terms

General terms	
EN	Endangered
IBRA	*Interim Biogeographic Regionalisation of Australia*
MI	Migratory
P1	Priority 1
P2	Priority 2
P3	Priority 3
P4	Priority 4
UFI	Unique feature identifier
VU	Vulnerable

Table A3: Abbreviations –Legislation

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

Table A4: Abbreviations – units of measurement

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

1 Introduction

1.1 Project background

Emerge Associates (Emerge) were engaged by the Shire of Dardanup to characterise the fauna values within a portion of the Ferguson Road reserve between Ferguson and Wellington Mill (referred to herein as the 'site'). The site is located approximately 168 kilometres (km) south of the Perth Central Business District within the Shire of Dardanup.

The site comprises a linear corridor approximately 14.26 hectares (ha) in size. The western portion bounded by rural landholdings to the north and south. The central portion of the site is bounded by the Wellington State Forest, consisting of a pine plantation to the north, and remnant native vegetation and a pine planation to the south. The eastern portion of the site is bounded by rural landholdings to the north and south. The location and extent of the site is shown in **Figure 1**.

1.2 Purpose and scope of works

The scope of work was specifically to undertake a terrestrial vertebrate fauna assessment to the standard required of a 'basic' fauna survey, 'targeted' black cockatoo survey and 'targeted' western ringtail possum survey with reference to the Environmental Protection Authority's (EPA's) technical guidance (EPA 2020), *Environment Protection and Biodiversity Conservation Act* black cockatoo referral guidelines (DCCEEW 2022) and survey guidelines for Australia' threatened mammals (DSEWPaC 2011).

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

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

2 Environmental context

2.1 Climate

Climate has a strong influence on the fauna habitat and species present in a region and a site. The south-west of Western Australia experiences a Mediterranean climate of hot dry summers and cool wet winters.

A total of 47 millimetres (mm) of rainfall was recorded during the month prior to the survey (April 2022) from the Ferguson Valley weather station (no. 9912) which is the closest weather station located at the western end of the site (BoM 2022). This is slightly lower than the average rainfall of 50.3 mm for the same period and weather station (BoM 2022).

Temperatures recorded in April 2022 ranged from a mean maximum of 23.9°C to a mean minimum of 10.9°C, as recorded by the Donnybrook weather station (no. 9534) which is the closest temperature recording weather station located approximately 13 km south-west of the site (BoM 2022). This is similar to the average maximum temperature of 24.1°C and average minimum temperature of 10.5°C for the same period and weather station (BoM 2022).

On the days of the survey temperatures at the Donnybrook weather station ranged from a daily maximum of 21.5°C to a daily minimum of 7°C (BoM 2022). The Ferguson Valley weather station recorded a total of 1.4 mm of rainfall on the days of the survey by (BoM 2022).

2.2 Geomorphology and soils

Landform and soils influence fauna habitat and species at regional and local scales.

The site occurs on the Darling Plateau and Darling Scarp which lies east of Perth CBD. The Darling Plateau is an ancient erosion surface capped with laterite and dissected by drainage channels (Beard 1990). The eastern part of the Plateau is characterised by flat-topped hills bound by breakaways and more prominent hills (monadnocks) which protrude above the general level of the plateau, while the western part comprises valleys with steep, rocky slopes and narrow, flat floors (Gozzard 2011). The Darling Scarp forms the western edge of the Darling Plateau and comprises former shoreline deposits and colluvial slopes (Gozzard 2007).

The site is not known to contain any restricted landforms or unique geological features.

2.3 Topography

The elevation of the site ranges from 100 m in relation to the Australian height datum (mAHD) on the western side of the site to 238 mAHD in the central portion of the site (DPIRD 2020) (**Figure 2**).

2.4 Hydrology and wetlands

Wetlands are areas of seasonally, intermittently or permanently waterlogged land such as poorly drained soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries

(Wetlands Advisory Committee 1977). Many wetlands provide important fauna habitat and support high levels of fauna biodiversity and endemism.

Wetlands of national or international significance may be afforded special protection under Commonwealth or international agreements. The following lists of important wetlands were checked as part of this assessment:

- *Ramsar List of Wetlands of International Importance* (DBCA 2017)
- *A Directory of Important Wetlands in Australia* (DBCA 2018*)*.

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

Examination of the Department of Water and Environmental Regulation (DWER) hydrography dataset (DWER 2018) shows five minor drainage channels traverse the site.

The Department of Biodiversity, Conservation and Attractions (DBCA) has developed the *Geomorphic Wetlands of the Swan Coastal Plain* dataset (DBCA 2021a). This dataset maps geomorphic wetland features and classifies them based on their landform shape and water permanence.

A review of the *Geomorphic Wetlands, Swan Coastal Plain* dataset indicated that one artificial wetland feature (unique feature identifier (UFI) 2963) occurs adjacent to the northern side of the site (DBCA 2021a). The location of wetland and water related features are shown in Error! Reference source not found..

2.5 Regional vegetation

Vegetation types and resulting fauna habitats strongly influence the diversity and composition of fauna taxa present within an area. Native vegetation is described and mapped at different scales in order to illustrate patterns in its distribution. At a continental scale the *Interim Biogeographic Regionalisation of Australia* (IBRA) divides the landscape into unique floristic regions (Environment Australia 2000). The site is contained within the jarrah forest region and within the 'JF2' or southern jarrah forest subregion. The southern jarrah forest subregion is characterised by *Eucalyptus marginata* (jarrah) – *Corymbia calophylla* (marri) forest on laterite gravels with *Eucalyptus wandoo* – marri woodlands on clayey soils in the eastern part (DEC 2002).

Variations in native vegetation can be further classified based on regional vegetation mapping. Heddle (1980) mapping shows the site as comprising the 'Lowden' complex which is described as a 'mixture of open forest of *Eucalyptus marginata* - *Corymbia calophylla* and low open forest of *Agonis flexuosa* on the lower valley slopes, fringing woodland of *Eucalyptus rudis* - *Melaleuca rhaphiophylla* in the gullies and a woodland of *Eucalyptus wandoo* on slopes'.

2.6 Historic land use

Review of historical images available from 1996 onwards shows that the site has remained unchanged (WALIA 2022) . The majority of the site and surrounding area was cleared of native vegetation prior to 1966, excepting the central portion of the site which appears to support native vegetation. A pine plantation is situated adjacent to the central portion of the site.

2.7 Significant fauna

2.7.1 Threatened fauna

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

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

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

2.7.1.1 Black cockatoos

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

- *Zanda*[1] *latirostris* (Carnaby's black cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Zanda*[2] *baudinii* (Baudin's black cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which is listed as 'vulnerable' under the EPBC Act and the BC Act.

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

- Black cockatoos nest in hollows that form in trees which are usually more than ~200 years old. 'Breeding habitat' comprises 'habitat trees' which are trees of a species known to support black cockatoo breeding and which either have a suitably large enough nest hollow or have a large enough diameter at breast height (DBH) to indicate that a suitable nest hollow could develop in time (DSEWPaC 2012). A minimum DBH for a habitat tree is defined as ≥50 centimetres (cm) for most tree species used by black cockatoos and ≥30 cm for *Eucalyptus wandoo* (wandoo) and *Eucalyptus salmonophloia* (salmon gum) (DSEWPaC 2012). Breeding habitat is also generally expected to be located within 6 km of food and water resources (DPaW 2013).
- Roosting refers to black cockatoos congregating in a tree or group of trees to rest overnight. 'Roosting habitat' consists of groups or individual tall trees used for roosting. Roosts generally comprise the tallest trees in an area and can include native and non-native trees (DSEWPaC 2012). They are often located within 6 km of water and food resources, with additional foraging ranges within 12 km (Shah 2006; DSEWPaC 2012; Le Roux 2017). The use of a particular roost may vary depending on availability of food and water resources.

[1] Previously *Calyptorhynchus*
[2] Previously *Calyptorhynchus*

- Black cockatoos feed on the fruit and seeds of a range of native and non-native plant species. 'Foraging habitat' is vegetation that contains plant species known to be foraged on by black cockatoos.

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

2.7.1.2 Western ringtail possum

The western ringtail possum is listed as critically endangered under the Commonwealth EPBC Act and under the Western Australian BC Act.

The western ringtail possum is an arboreal marsupial species that is endemic to the south-west of Western Australia. The species has a fragmented distribution but approximately follows the coastline from Dawesville in the north to Waychinicup National Park in the east. Inland populations occur near Collie, Perup and Manjimup (DPaW 2017).

Western ringtail possums occur in a range of habitats, including *Agonis flexuosa* (peppermint) woodlands, near-coastal heath and forests comprised of *Eucalyptus gomphocephala* (tuart), *Corymbia calophylla* (marri), *Eucalyptus marginata* (jarrah) or *Eucalyptus diversicolor* (karri). Habitat critical to the species survival within the Swan Coastal Plain management zone (in which the site lies) is defined as 'long unburnt mature remnant peppermint woodlands with high canopy continuity and high nutrient foliage with minimal periods of summer moisture stress, and habitat connecting patches of remnants' (DPaW 2017).

Western ringtail possums are nocturnal and forage at night. Their diet comprises almost exclusively upper and mid-storey myrtaceous plants such as peppermint, marri and jarrah. Additionally, western ringtail possums may also forage on some non-native plant species (DPaW 2017).

During the day, western ringtail possums utilise diurnal refuge sites which may include dreys (nests built from plant material), platforms, tree hollows, hollow logs, *Xanthorrhoea* spp. (grasstree) skirts, sedges, forest debris, disused rabbit warrens and roof spaces (DPaW 2017).

2.7.2 Priority fauna

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

2.7.3 Migratory fauna

Some fauna species that migrate to Australia and its external territories or pass though or over Australian waters during their annual migrations are protected under Commonwealth and State legislation. At a Commonwealth level, migratory fauna taxa may be listed as 'migratory' under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any action likely to have a significant impact on a taxon listed under the EPBC Act requires Ministerial approval. Further information on migratory species is provided in **Appendix A**.

2.7.4 Specially protected fauna

In Western Australia, fauna species that are of special conservation interest, including migratory species and cetaceans, species subject to international agreement or species otherwise in need of special protection may be listed as 'specially protected' under the BC Act. Further information on specially protected species and their categories is provided in **Appendix A**.

2.8 Pest fauna

The term 'pest fauna' can refer to any animal that requires some form of action to reduce its effect on the economy, the environment, human health and amenity. Pest fauna species are generally not native but some Australian or Western Australian fauna may also be considered pests.

A particularly invasive or detrimental pest species may be listed as a 'declared pest' pursuant to Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act), indicating that it warrants special management to limit its spread. Current pest status and control categories for Western Australia are provided in the *Western Australian Organism List* (DPIRD 2022). Further information on categories of declared pests is provided in **Appendix A**.

2.9 DBCA managed or legislated land

DBCA has tenure of or interests in numerous areas of land across the state for a range of purposes. Tenure categories include national parks, nature reserves, conservation parks, marine parks, marine nature reserves, marine management areas, section 5(1)(g) reserves, state forest and timber reserves. These areas are mapped within the *Legislated Lands and Waters* (DBCA 2021d) and *Lands of Interest* (DBCA 2021b) datasets. The *Legislated Lands and Waters* (DBCA 2021d) dataset includes lands subject to the following legislation; the *Conservation and Land Management Act 1984* (CALM Act 1984), *Swan and Canning Rivers Management Act 2006* (SCRM Act) and lands identified under the *Land Administration Act 1997* (LA Act). The *Lands of Interest* (DBCA 2021b) dataset includes all other lands of which DBCA is recognised as the manager but is not vested under any act. These lands comprise of crown land and freehold land which DBCA has been acknowledged by the Department of Lands as the responsible agency.

The central portion of the site bisects the Wellington State Forest, which is managed under the CALM Act (DBCA 2021c). While the road reserve is not considered DBCA managed or legislated land, the border of the Wellington State Forest slightly overlaps with the site boundary several times (DBCA 2021d).

2.10 Ecological linkages

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

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

No ecological linkages occur within or adjacent to the site. One regional ecological linkage (No. 203) occurs approximately 430 m east of the site running north-west to south-east. Review of aerial imagery indicates that the site is connected to extensive areas of vegetation within the local area.

2.11 Previous surveys

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

3 Methods

3.1 Desktop assessment

3.1.1 Basic fauna

A search was conducted for fauna species that have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DAWE 2022a), *NatureMap* (DBCA 2022), Atlas of Living Australia (Atlas of Living Australia 2022), DBCA's conservation significant fauna database (reference no. FAUNA#7144) and literature references.

3.1.2 Black cockatoo

A search was conducted for records of black cockatoos and potential black cockatoo habitat mapping occurring within 12 km of the site using a range of publicly available regional studies and datasets. Detailed information on each dataset considered as part of the desktop review is provided in **Appendix A**.

3.2 Field survey

Two ecologists from Emerge visited the site on the 25 and 26 May 2022 during the day to conduct the basic fauna survey, targeted black cockatoo and targeted western ringtail possum field survey. The survey was conducted from approximately 11:00 am until 5:00 pm on the first day and 7:30 am to 2:30 pm on the second day. Two ecologists from Emerge also visited the site on 15 August 2022 during the day to conduct hollow inspections from approximately 12:30 pm to 5 pm.

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

3.2.1 Basic fauna

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

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

3.2.2 Targeted black cockatoo

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

3.2.2.1 Breeding habitat

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

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

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

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

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

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

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

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

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

Table 2: Habitat tree categories

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

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

3.2.2.2 Roosting habitat

The presence of active or historical roosts was determined through evidence of roosting activity, such as branch clippings, droppings or moulted feathers.

If present, groups of tall native and non-native trees were assumed to provide roosting habitat.

3.2.2.3 Foraging habitat

Foraging habitat was identified by assessing vegetation in the site for plant species known to provide food for black cockatoos (Davies 1966; Saunders 1980; Johnstone and Storr 1998; Johnstone and Kirkby 1999; Groom 2011; Johnstone *et al.* 2011; DSEWPaC 2012).

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

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

Table 3: Foraging value categories

Value	Definition
High	Greater than 50% primary food plants
Moderate	Greater than 10% to 50% primary food plants
Low	10% or less primary food plants

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

Evidence of black cockatoo foraging, such as chewed fruits, was searched for within the site and allocated to a species where possible.

3.2.3 Targeted western ringtail possum

Transects were traversed across the site and the presence of western ringtail possum breeding habitat (dreys and suitable hollows) were recorded. Active searches for evidence of possum activity such as claw marks and scats were conducted. Hollows suitable for black cockatoos were also considered to be suitable for western ringtail possum.

3.3 Data analysis

3.3.1 Desktop assessment

A total number of species that occur or potentially occur within the desktop assessment search area was calculated by adding the total count of non-conservation significant species provided by *NatureMap* to the combined number of conservation significant species provided by *NatureMap* and *Protected Matters Search Tool*. The habitat requirements of conservation significant vertebrate fauna were specifically reviewed to verify they did in fact have potential to occur in the site (that is, marine mammals and fish were omitted).

3.3.2 Fauna habitat

Fauna habitats were described according to the dominant flora species and vegetation type present, as determined from observations made during the field survey and information provided in the '*Reconnaissance Flora and Vegetation Assessment'* (Emerge Associates 2022).

The identified fauna habitats were mapped on aerial photography with the boundaries interpreted from aerial photography, Emerge Associates (2022) plant communities and notes taken in the field.

3.3.3 Likelihood of occurrence

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

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

Table 4: Likelihood of occurrence assessment categories and definitions

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

3.3.4 Black cockatoo habitat

3.3.4.1 Habitat trees

Habitat trees were classified according to the scheme outlined in **Table 2** and mapped on aerial imagery. A complete summary of the recorded attributes of habitat trees was compiled in a tabular format.

3.3.4.2 Foraging habitat value

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

3.3.5 Western ringtail possum habitat

Habitat trees were mapped on aerial imagery. A complete summary of the recorded attributes of habitat trees was compiled in a tabular format.

3.4 Nomenclature and sources of information

Taxonomy and nomenclature of scientific and common names for mammals, reptiles and amphibians follow *the Western Australian Museum* (WAM) *Checklist of the Terrestrial Vertebrate Fauna of Western Australia* (WAM 2021). For birds taxonomy and nomenclature of scientific and common names follows the Australian Faunal Directory (AFD) (DoEE 2021). Where common names were not provided by the WAM or the AFD, these have been derived from other sources as noted.

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

3.5 Survey limitations

It is important to note the specific constraints imposed on surveys and the degree to which these may have limited survey outcomes. An evaluation of the survey methodology against standard constraints outlined in the EPA's document *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020) is provided in **Table 5**.

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

Constraint	Degree of limitation	Details
Level of survey	No limitation	A basic survey (desktop study and field survey) in combination with a targeted black cockatoo and targeted western ringtail possum survey was undertaken. The level of survey and survey effort are considered adequate to assess the fauna, black cockatoo and western ringtail possum habitat values within the site.
Scope	No limitation	The survey focused on vertebrate fauna and habitat values, with particular focus on black cockatoos, western ringtail possum and other conservation significant taxa with potential to occur within the site.
Proportion of fauna identified, recorded and/or collected.	No limitation	All observed vertebrate fauna were identified.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data.	No limitation	Adequate information was available from database searches, previous surveys and literature references.
The proportion of the task achieved and further work which might be needed.	No limitation	The task was achieved in its entirety.
Experience level of personnel	No limitation	This fauna and black cockatoo assessment was undertaken by qualified ecologists with over three years of zoological experience in Western Australia. Technical review was undertaken by a senior environmental consultant with over 12 years' experience in environmental science in Western Australia.
Suitability of timing, weather and season	No limitation	Survey timing is not considered to be of great importance for basic fauna assessments but the weather conditions during the survey were ideal for detecting fauna species. Hollow inspections were undertaken during the breeding season for all three species of black cockatoo.
Completeness	No limitation	The desktop assessment, field survey and targeted components of the survey were completed comprehensively.
Spatial coverage and access	No limitation	Site coverage was comprehensive (track logged).
	No limitation	Some areas of the site were unable to be accessed due to being located within private landholdings. These landholdings consisted of agricultural lots and could be assessed from the adjacent road reserve. Given that these areas did not contain native vegetation there is no limitation in being unable to access these lots.

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

Constraint	Degree of limitation	Details
Survey intensity	No limitation	The intensity of the survey was adequate given the size of the site and the relatively low habitat value present.
Influence of disturbance	No limitation	The site is highly modified due to historical disturbance. However, no recent disturbance was noted that may have affected outcomes of the survey.
Adequacy of resources	No limitation	All resources required to perform the survey were available. The guidance currently available from Commonwealth and State agencies on the assessment of black cockatoo habitat is limited and relies heavily on technical experts preparing their own methodology. This assessment applies an internally developed methodology that is considered to provide a systematic and balanced characterisation of black cockatoo habitat.
Compliance with EPA (2020) guidance	Minor limitation	The EPA guidance requires that a full list of all fauna species with potential to occur within the site is compiled. As part of this assessment a comprehensive list of fauna species of conservation significance was compiled. Non-conservation taxa with potential to occur within the site were not compiled into a list but are provided as raw data in **Appendix B**. Given that all species with potential to occur within the site are still identified within the relevant appendices this is not considered to affect the outcomes of this assessment.

4 Results

4.1 General site conditions

The majority of the site comprises sealed road surfaces and road reserves. These areas support hard stand, bare ground, non-native vegetation and native vegetation.

Some private lots adjacent to the road reserve fell within the site boundary due to fence placement inconsistencies with the cadastral boundary. However, no private lots were accessed due to the low ecological values present. Where needed, assessment of fauna values was made from the road reserve.

4.2 Fauna habitat

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

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

Table 6: Fauna habitats identified within the site

Fauna habitat	Description	Area (ha)^
Forest	Open forest comprising predominantly *Corymbia calophylla* over mixed native shrubs (**Plate 1**)	0.49
Forest - no understorey	Open forest comprising predominantly *Corymbia calophylla* over sparse shrubs and non-native grassland and weeds (**Plate 2**)	4.58
Scattered trees and shrubs	Scattered native and non-native trees and shrubs over non-native grasses (**Plate 3**)	1.08
Cleared	Heavily disturbed areas comprising bare ground and weeds with occasional native vegetation (**Plate 4**).	4.75

^remainder of the site supports bitumen road surface which comprises 3.36 ha.

*Plate 1: **Forest** habitat*

*Plate 2: **Forest - no understorey** habitat*

*Plate 3: **Scattered trees and shrubs** habitat*

*Plate 4: **Cleared** habitat*

4.3 Fauna

4.3.1 Desktop assessment

A total of 217 fauna species were identified from database searches as occurring or potentially occurring within 10 km of the site[3] as listed in **Appendix B.**

Of these species, 34 are conservation significant, including 15 threatened, nine priority, 10 migratory fauna and two other specially protected species as listed in **Appendix D**.

4.3.2 Species inventory

A total of 14 native species, including two fauna species of conservation significance (Carnaby's black cockatoo and forest red-tailed black cockatoo), were recorded during the field survey. No introduced fauna species were recorded during the survey.

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

4.3.3 Conservation significant fauna

Two conservation significant fauna species were recorded within the site during the field survey: Carnaby's black cockatoo and forest red-tailed black cockatoo. A small group of Carnaby's black cockatoo was observed foraging on marri fruit in the site. Forest red-tailed black cockatoos were observed flying over the site on one occasion.

Additionally, seven fauna species of conservation significance were considered to possibly occur in the site based on habitat requirements, species distribution and site conditions, as shown in **Table 7**.

The remainder of the conservation significant fauna species identified in the desktop assessment (25 species) are considered unlikely to occur in the site due to lack of suitable habitat or because the site lies outside of the species known distribution. Fauna species classed as unlikely to occur are listed in **Appendix D**.

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

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
Birds					
Apus pacificus	Pacific swift	MI	MI	Aerial, migratory species that is most often seen over inland plains and sometimes above open areas, foothills or in coastal areas. Sometimes occurs over settled areas, including towns, urban areas and cities (Johnstone and Storr 1998).	**Possible**: May opportunistically occur in or fly over the site on commute but only for short periods of time.

[3] Includes native and non-native species

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

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU	*Eucalypt* and *Corymbia* forests, often in hilly interior. More recently also observed in more open agricultural and suburban areas including Perth metropolitan area. Attracted to seeding *Corymbia calophylla*, *Eucalyptus marginata*, introduced *Melia azedarach* and *Eucalyptus* spp. trees (Johnstone and Storr 1998).	**Recorded**: Observed flying over site. Suitable breeding, roosting and foraging habitat present.
Falco peregrinus	Peregrine falcon	MI	MI	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	**Possible**: May opportunistically occur in or fly over the site on commute or while searching for prey but only for short periods of time.
Tyto novaehollandiae novaehollandiae	Australian masked owl	P3	-	Forests, open woodlands, farmlands with large trees. E.g. river red gums, adjacent cleared country, timbered watercourses, paperbark woodlands and caves (Pizzey & Knight 2012).	**Possible:** Suitable habitat occurs in the site.
Zanda baudinii	Baudin's black cockatoo	EN	EN	Mainly eucalypt forests. Attracted to seeding *Corymbia calophylla, Banksia* spp., *Hakea* spp., and to fruiting apples and pears (Johnstone and Storr 1998).	**Possible**: Suitable breeding, roosting and foraging habitat present.
Zanda latirostris	Carnaby's black cockatoo	EN	EN	Mainly proteaceous scrubs and heaths and adjacent eucalypt woodlands and forests; also plantations of *Pinus* spp. Attracted to seeding *Banksia* spp., *Dryandra* spp., *Hakea* spp., *Eucalyptus* spp., *Corymbia calophylla*, *Grevillea* spp., and *Allocasuarina* spp. (Johnstone and Storr 1998).	**Recorded**: Observed foraging within the site. Suitable breeding, and roosting habitat present.
Mammal					
Falsistrellus mackenziei	Western false pipistrelle	P4	-	High rainfall forests dominated by jarrah, karri, marri, and tuart. Occupies hollow logs for breeding and resting (Van Dyck and Strahan 2008). Also known to utilise Banksia woodland on the Swan Coastal Plain (Hosken and O'Shea 1995).	**Possible:** Suitable habitat occurs in the site.

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

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence within the site
		BC Act	EPBC Act		
Phascogale tapoatafa wambenger	South-western brush-tailed phascogale	CD	-	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover (Triggs 2003).	**Likely**: Suitable habitat present and recent records (2018) of this species occur in the site.
Pseudocheirus occidentalis	Western ringtail possum	CR	CR	On the Swan Coastal Plain in *Agonis flexuosa* woodlands and *Agonis flexuosa/ Eucalyptus gomphocephala* forests. Also *Eucalyptus marginata* forests (DBCA 2017).	**Possible:** Suitable habitat occurs in the site

4.4 Declared pests

No species listed as a declared pest (C3) pursuant to the BAM Act were recorded within the site.

4.5 Black cockatoos

4.5.1 Desktop assessment

The site is located within the distribution range of Carnaby's black cockatoo, Baudin's black cockatoo and forest red-tailed black cockatoo (DoEE 2016c, b, a).

The site is located within the Carnaby's black cockatoo and Baudin's black cockatoo modelled breeding range (DoEE 2016b, a). No breeding range information for forest red-tailed black cockatoo is provided in DoEE (2016c). However, breeding often occurs within areas that contain a high number of marri trees (DAWE 2022b).

No known roosts occur within 1km of the site. A roost associated with forest red-tailed black cockatoos occurs approximately 4.5km west of the site and a roost site-associated with both white-tailed black cockatoos and forest red-tailed black cockatoos occurs approximately 9 km southwest of the site.

The results of the black cockatoo desktop assessment are summarised in **Table 8** and shown in **Figure 5**.

Table 8: Summary of black cockatoo background review

Category		Site context	Source
Species distribution		• Site is located within the modelled distribution range of Carnaby's black cockatoo and within its breeding range. • Site is located within the modelled distribution range of Baudin's black cockatoo and within its breeding range. • Site is located within the modelled distribution range of forest red-tailed black cockatoo and within its likely breeding range.	(DoEE 2016a, b, c)
Carnaby's black cockatoo breeding areas (12 km radius surrounding breeding sites)		• No confirmed breeding areas intersect the site. • One possible breeding area intersects the site.	(Glossop *et al.* 2011)
Important bird areas for Carnaby's black cockatoo		• The site is not located within an important bird area for Carnaby's black cockatoo and none occur nearby.	(DPaW 2013; BirdLife International 2022)
Roost site		• None within the site • Five roost sites within 12 km of the site (**Table 9** and **Table 10)**: ◦ One associated with white-tailed^ black cockatoos only. ◦ Three associated with forest red-tailed black cockatoos only. ◦ One associated with white^ and red-tailed black cockatoos.	(Peck *et al.* 2019)
Foraging habitat	Carnaby's black cockatoo	• Potential native foraging habitat is mapped in several portions of the site. • Additional areas of potential native foraging habitat mapped within the wider local area, including the Wellington State Forest.	(Emerge Associates 2021)
		• No pine plantations mapped within the site • Wellington pine plantation is located adjacent to site.	(Forest Products Commission 2020)
	Baudin's black cockatoo	• Potential native foraging habitat is mapped in several portions of the site. • Additional areas of potential native foraging habitat mapped within the wider local area, including the Wellington State Forest.	(Emerge Associates 2021)
	Forest red-tailed black cockatoo^	• Potential native foraging habitat is mapped in several portions of the site. • Additional areas of potential native foraging habitat mapped within the wider local area, including the Wellington State Forest.	(Emerge Associates 2021)

^Carnaby's and/or Baudin's black cockatoo

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

Roost ID	Year and number of individuals									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CAPGWIR001	194	NS	14	0	119	175	216	48	193	181
DONDONR001	NS	NS	NS	11	0	0	NS	0	NS	NS

NS = not surveyed

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

Roost ID	Year and number of individuals					
	2014	2015	2016	2017	2018	2019
CAPBOYR001	NS	15	10	0	17	5
CAPFERR001	NS	NS	NS	2	NS	34
DONDONR001	14	6	NS	0	NS	NS
DONLOWR001	NS	NS	3	7	NS	NS

NS = not surveyed

4.5.2 Habitat

4.5.2.1 Breeding

A total of 246 black cockatoo habitat trees were recorded within the site as shown in **Figure 6**.

The habitat trees comprised 219 marri, 13 jarrah, three *Eucalyptus patens* (blackbutt) and 11 stag (dead) trees.

An internal hollow inspection was undertaken for 20 habitat trees that were determined to potentially contain suitable hollows based on the initial inspection from ground level. Of the 20 trees inspected, three were determined to each contain one potentially suitable hollow (Tree IDs 156, 434 and 3355). The three trees categorised as containing potentially suitable hollow(s) were deemed as such because the base of the hollows were not visible. The remaining trees contained no suitable hollows for breeding by black cockatoos.

A summary of the habitat trees recorded within the site is provided in **Table 11** and an inventory in **Appendix F**. Details of habitat trees with potentially suitable hollows is provided in **Appendix G.**

Table 11: Habitat trees recorded within the site

Category	No. trees
Nest	0
Suitable hollow(s) with signs of use	0
Suitable hollow(s)	0
Potentially suitable hollow(s)	3
No suitable hollow(s)	243

4.5.2.2 Roosting

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

Native and non-native trees within the site have the potential to provide roosting habitat for black cockatoos.

4.5.2.3 Foraging

A total of 6.01 ha of foraging habitat for Carnaby's black cockatoo, 5.73 ha for Baudin's black cockatoo and 5.74 ha for forest red-tailed black cockatoo were recorded in the site as shown in **Figure 7** to **Figure 9**.

The majority of the foraging habitat occurs as areas of forest vegetation and comprises a combination of primary, secondary and non-food plants. Dominant primary food plants are marri and jarrah. Dominant secondary food plants include *Agonis flexuosa* (peppermint tree) and *Xanthorrhoea preissii* (grass tree).

A summary of the dominant primary foraging plant species that occur in the site is provided in **Table 12**. The extent of foraging habitat by value category is detailed in **Table 13**.

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

Common name	Black cockatoo species and foraging habitat category		
	Carnaby's	Baudin's	Forest red-tailed
Marri	Primary	Primary	Primary
Jarrah	Primary	Secondary	Primary

Table 13: Foraging habitat values recorded within the site

Foraging value	Black cockatoo species and area of foraging habitat (ha)		
	Carnaby's	Baudin's	Forest red-tailed
High	5.52	5.49	5.52
Moderate	0.22	0.22	0.22
Low	0.27	0.02	0.00
Total	**6.01**	**5.73**	**5.74**

4.6 Western ringtail possum

Four trees containing hollows suitable for western ringtail possum were recorded within the site as shown in **Figure 10**. The habitat trees comprised three marri and one stag (dead) trees and included the black cockatoo trees with potentially suitable hollows (refer **Section 4.5.2.1**). An inventory of habitat trees is provided in **Appendix F**. Details of habitat trees with suitable hollows recorded in the current survey is provided in **Appendix G.**

The vegetation within the site provides suitable foraging habitat for western ringtail possum consisting of predominantly marri and supported by jarrah and peppermint trees. No secondary evidence of western ringtail possum presence (dreys, scats, claw marks or skeletal remains) were recorded during the survey.

5 Discussion

5.1 Fauna and fauna habitat

The 14 native fauna species recorded within the site are mostly common and widespread across the southwest of Western Australia and therefore records for these species were not unexpected. This included two conservation significant species, Carnaby's black cockatoo and forest red-tailed black cockatoo.

Habitat values in the site are greatest with respect to areas of **forest** habitat, which covers approximately 3.44% of the site. This habitat provides a contiguous cover of predominantly native trees and shrubs. However, the extent of this habitat within the site is small and it is more likely that fauna will utilise the extensive areas of equivalent or better-quality forest habitat beyond the site.

Approximately 39.69% of the site contains **forest - no understorey** and **scattered trees or shrubs** habitats. These habitats are likely to be predominantly used by common and widespread native and non-native fauna with non-specific habitat requirements, which enable them to persist in highly modified environments.

The remainder of the site (approximately 56.87%) comprises cleared area or hardstand which contains no to minimal vegetation and may be used occasionally by common and widespread native and non-native fauna species, likely when crossing Ferguson Road.

While the habitat within the site is generally poor, ground dwelling fauna could temporarily enter the site while traversing between sections of higher quality forest situated either side of the site, particularly in the central portion.

5.2 Conservation significant fauna

Carnaby's black cockatoo and forest red-tailed black cockatoo were recorded within the site. Both species and Baudin's black cockatoo are discussed further in **Section 5.3**. Western ringtail possum is discussed in **Section 5.4.**

Five additional fauna species of conservation significance were considered to possibly occur in the site. Pacific swift and peregrine falcon are highly mobile species that may opportunistically fly over or forage in the site for short periods of time as part of a much larger home range. Neither of these species would breed within the site. Any occurrence in the site would likely be in the air space and largely independent from terrestrial habitat.

Australian masked owl and western false pipistrelle could both possibly occur as the site is situated within their known distributions and contains suitable habitat (tree hollows). These species would likely use the site temporarily as part of a wider home range including the adjacent forest.

South-western brush-tailed phascogale has been recorded recently within the site (2018) and the site contains suitable habitat. However, it would likely only be an occasional visitor as a larger area of suitable habitat occurs adjacent to the site.

5.3 Black cockatoo habitat values

Carnaby's black cockatoo was observed foraging on marri fruit and forest red-tailed black cockatoo was recorded flying over the site. Records for these species were not unexpected as the site is located within their modelled distribution range and suitable habitat occurs within the site and the local area.

Although not recorded within the field survey, Baudin's black cockatoo is likely to occur within the site as it lies within the species modelled distribution range and records of this species are known from the local area (DBCA 2022).

5.3.1 Breeding

The site currently provides breeding habitat with three habitat trees containing hollows potentially suitable for use by black cockatoos for breeding. The hollows were deemed only potentially suitable as the bases were not visible and could not confirm if flat for black cockatoos. All other hollow attributes such as branch diameter, entry angle and height were suitable. The remaining habitat trees within the site have the potential to form suitable hollows in the future. However, it will likely take many decades for hollows to form that are large enough to be suitable for use by black cockatoos for breeding.

5.3.2 Roosting

A dusk roost survey was not undertaken but no secondary evidence of roosting such as branch clippings, droppings or feathers were observed within the site. Therefore, there is no reason to suspect that roosting by black cockatoos has recently occurred in the site. Nevertheless, the site contains many tall trees and groups of tall trees that may provide roosting habitat for black cockatoos.

5.3.3 Foraging

The site contains high, moderate and low value foraging habitat for Carnaby's black cockatoo, Baudin's black cockatoo and forest red-tailed black cockatoo.

The highest value foraging resource in the site for black cockatoos is associated with the stands of marri trees found in abundance along the road reserve and the occasional jarrah. This vegetation extends over 5 ha. While not insignificant, a 5 ha patch of foraging habitat is a relatively small resource in comparison to extensive areas of similar value foraging resource that occur adjacent to site and in the wider local area.

The moderate and low value foraging habitat for Carnaby's black cockatoo and Baudin's black cockatoo cockatoo is predominantly associated with peppermint trees or grass trees in the understory. While there are records of black cockatoos consuming the fruit of these plants (Groom 2011; DoEE 2017), they are secondary options and not as important food sources compared to marri and jarrah.

5.4 Western ringtail possum

No western ringtail possum individuals or secondary evidence of the species was recorded within the site, suggesting that western ringtail possum is not a regular inhabitant. The majority of trees within the site lack understorey vegetation which would leave possums exposed to predation. Tree canopy in parts is considered average in quality due to poor connectivity. Given the poor connectivity of the canopy and absence of understorey in the majority of vegetation, the habitat within the site would be considered marginal for the western ringtail possum. However, the site contains potential western ringtail possum breeding and foraging habitat. It is possible that western ringtail possums utilize the habitat within the site as part of a larger home range with more suitable habitat available in the local area, particularly in the dense stands of peppermint trees adjacent to the eastern end of the site.

5.4.1 Breeding

Four trees were recorded as containing suitable hollows but no evidence of western ringtail breeding was recorded within these hollows. Similarly, no dreys or other evidence of breeding was recorded within the site.

5.4.2 Foraging

The marri, jarrah and peppermint trees within the site provide foraging habitat for western ringtail possum. Vegetation containing suitable foraging species also occurs adjacent to the site particularly towards the eastern side in the Wellington State Forest.

6 Conclusions

6.1 Fauna and fauna habitat

Over half of the site (approximately 56.87%) supports highly disturbed **cleared area** habitat which provides limited value to fauna species of conservation significance and is likely to primarily be used by common and widespread native and non-native fauna with non-specific habitat requirements. The highest fauna habitat values are associated with the **forest** habitat which occurs over approximately 3.44% of the site. The remainder of the site comprises the **forest - no understorey** and **scattered trees and shrubs** habitats (approximately 39.69%).

A total of 14 native fauna species were recorded within the site, including two species of conservation significance, Carnaby's black cockatoo (endangered) and forest red-tailed black cockatoo (vulnerable).

While not recorded during the field survey, Baudins's black cockatoo (listed as endangered) and south-western brush-tailed phascogale (conservation dependant) are likely to occur in the site. Four other species of conservation significance not recorded during the field survey may possibly occur in the site: pacific swift, peregrine falcon, Australian masked owl and western false pipistrelle.

6.2 Black cockatoos

The site occurs within the modelled distribution of Carnaby's black cockatoo, Baudin's black cockatoo and forest red-tailed black cockatoo. Carnaby's black cockatoo and forest red-tailed black cockatoo were recorded in the site during the field survey.

The site contains 246 habitat trees, of which three contain hollows potentially suitable for use by black cockatoos for breeding.

No roosts or evidence of roosting by any species of black cockatoo was recorded within the site during the field survey. Tall native and non-native trees within the site represent suitable roosting habitat for species of black cockatoo.

A total of 6 ha of foraging habitat for Carnaby's black cockatoo was mapped within the site of which 5.52 ha (91.85%) provides a high value resource, 0.22 ha (3.66%) provides a moderate value resource and 0.27 ha (4.49%) provides a low value resource.

A total of 5.73 ha of foraging habitat for Baudin's black cockatoo was mapped in the site of which 5.49 ha (95.81%) provides a high value resource, 0.22 ha (3.84%) provides a moderate value resource and 0.02 ha (0.35%) provides a low value resource.

A total of 5.74 ha of foraging habitat for forest red-tailed black cockatoo was mapped in the site of which 5.52 ha (96.17%) provides a high value resource and 0.22 ha (3.83%) provides a moderate value resource.

Additional areas of foraging habitat of similar or higher value occur adjacent to the site and in the wider local area.

6.3 Western ringtail possum

Western ringtail possum was not observed within the site. No secondary evidence of western ringtail possum such as dreys, scats, claw marks or skeletal remains were recorded within the site.

The site contains four trees that contained suitable hollows for the western ringtail possum. Marri, Jarrah and peppermint trees within the site provide foraging habitat.

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7.2 Online references

The online resources that have been utilised in the preparation of this report are referenced in **Section 7.1**, with access date information provided in **Table R 1**.

Table R 1 Access dates for online references

Reference	Date accessed	Website or dataset name
BirdLife International (2022)	30 May 2022	Important Bird Areas
BoM (2022)	30 May 2022	Climate Data Online
DAWE (2022)	30 May 2022	Species Profile and Threats Database
DAWE (2022)	13 May 2022	Protected Matters Search Tool
DBCA (2022)	19 May 2022	NatureMap
WALIA (2022)	30 May 2022	Landgate Map Viewer

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Figures

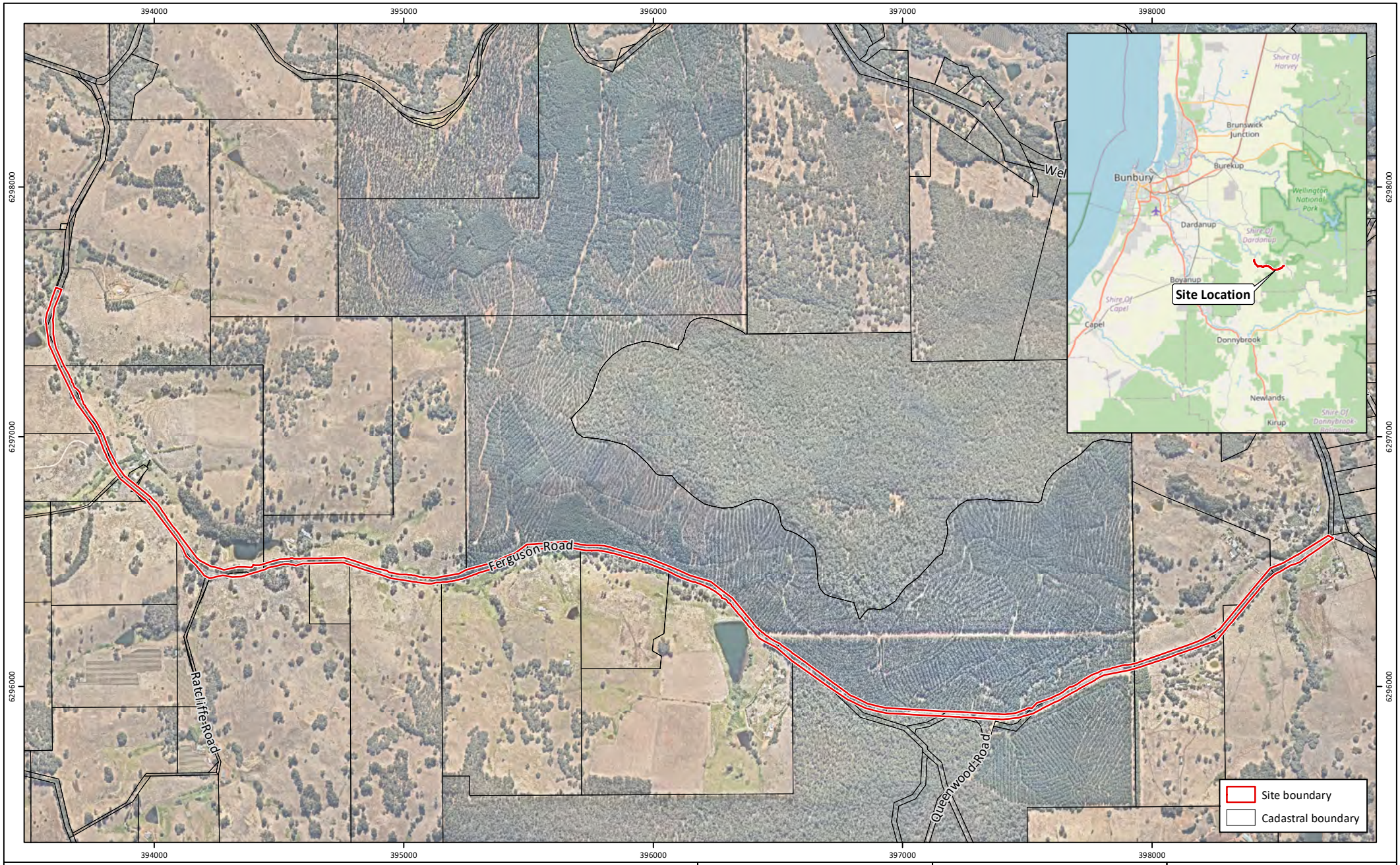

Figure 1: Site Location

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F01a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

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Scale: 1:20,000@A4

GDA 1994 MGA Zone 50

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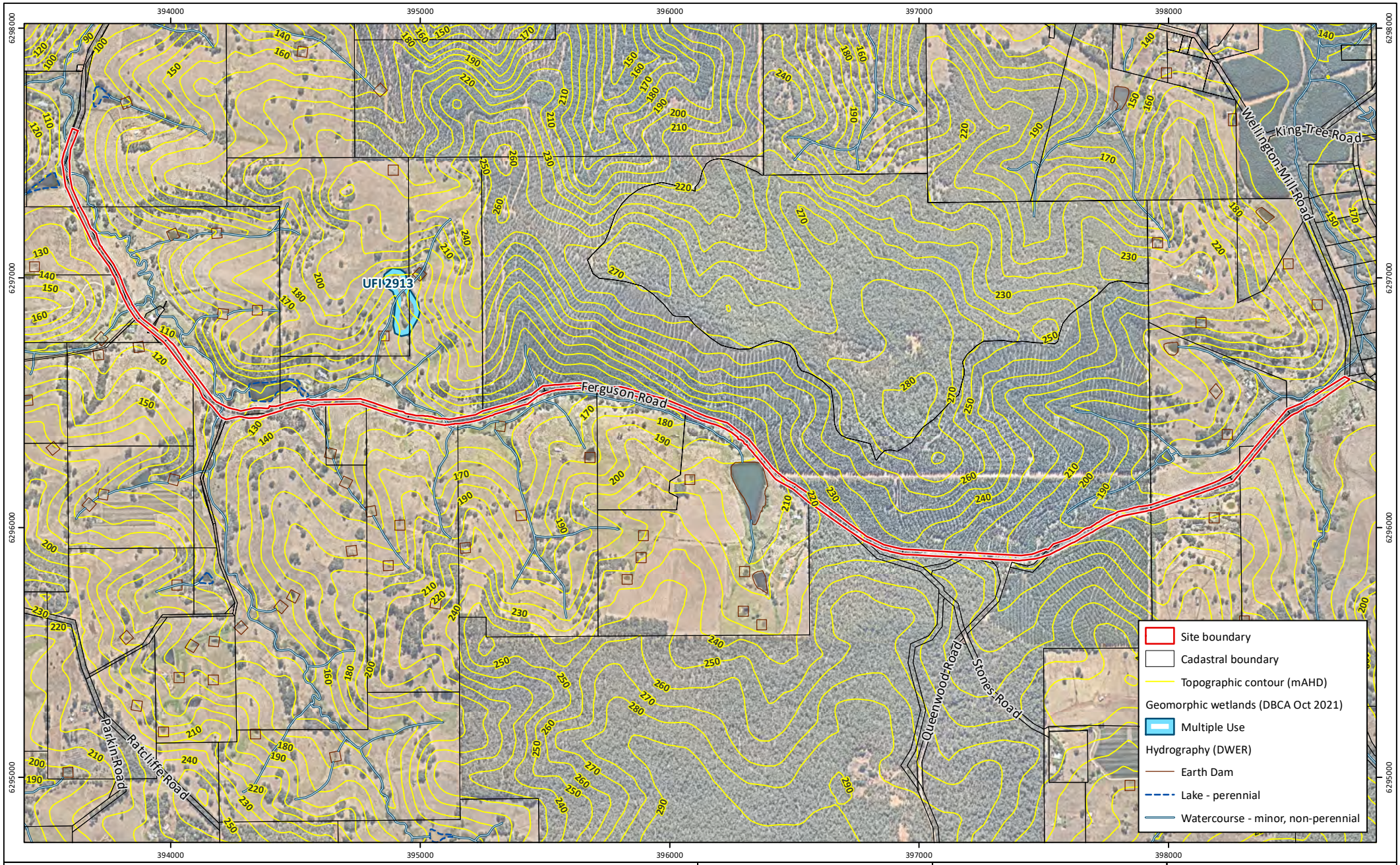

Figure 2: Hydrography and Topography

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Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F02a

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Approved:	TAA
Date:	03/04/2023

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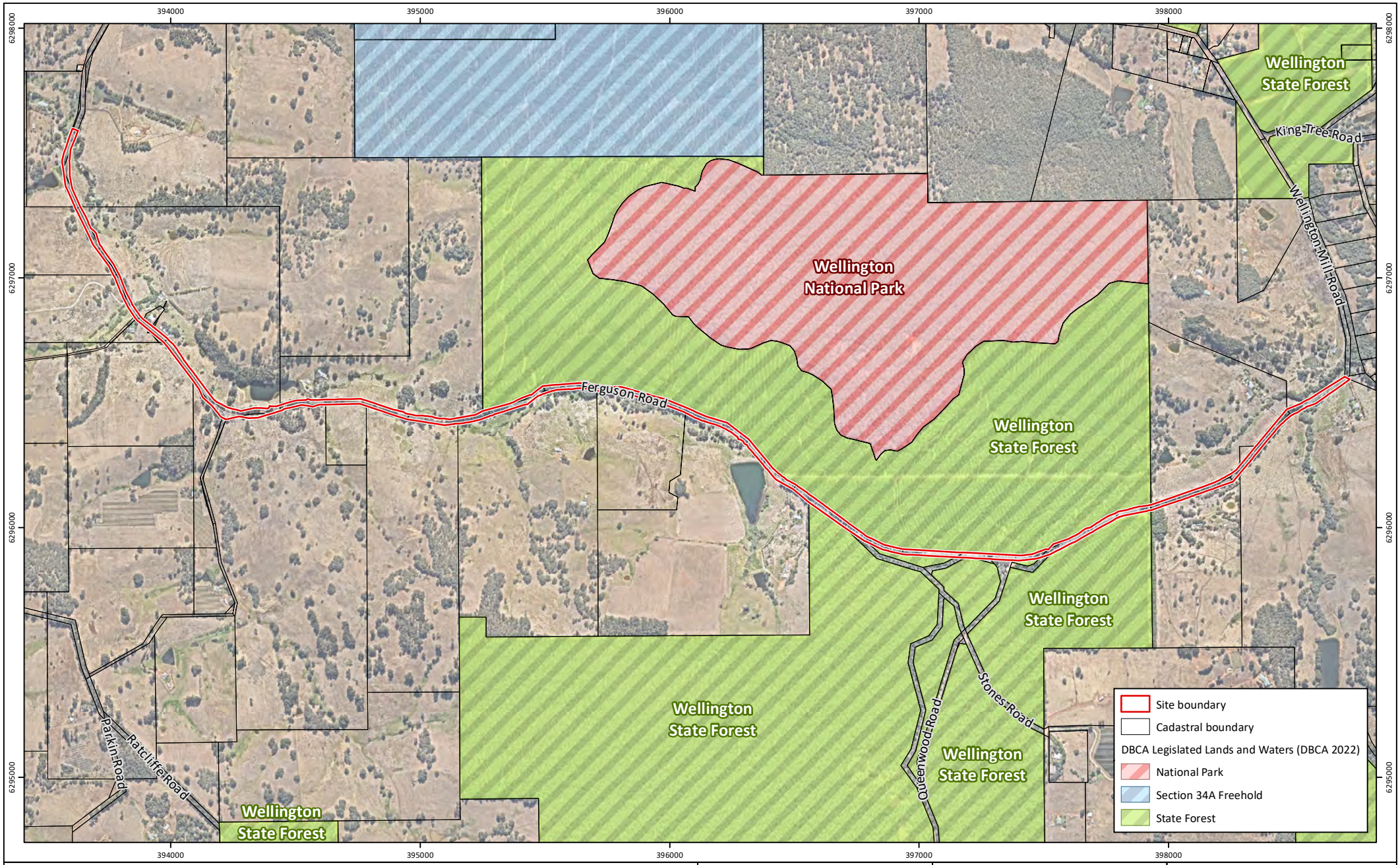

Figure 3: Environmental Features

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F03a

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Approved:	TAA
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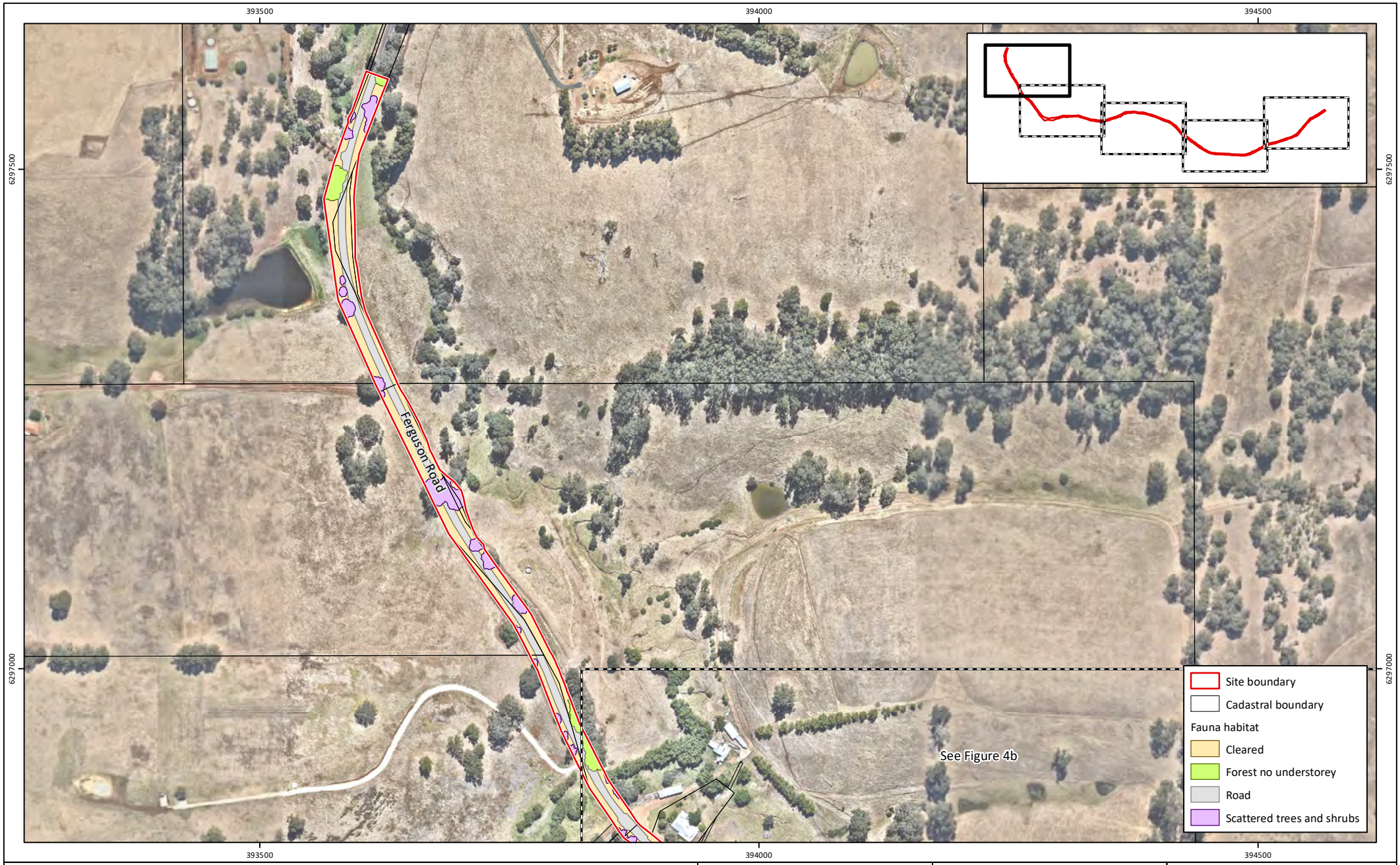

Figure 4a: Fauna Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F05a

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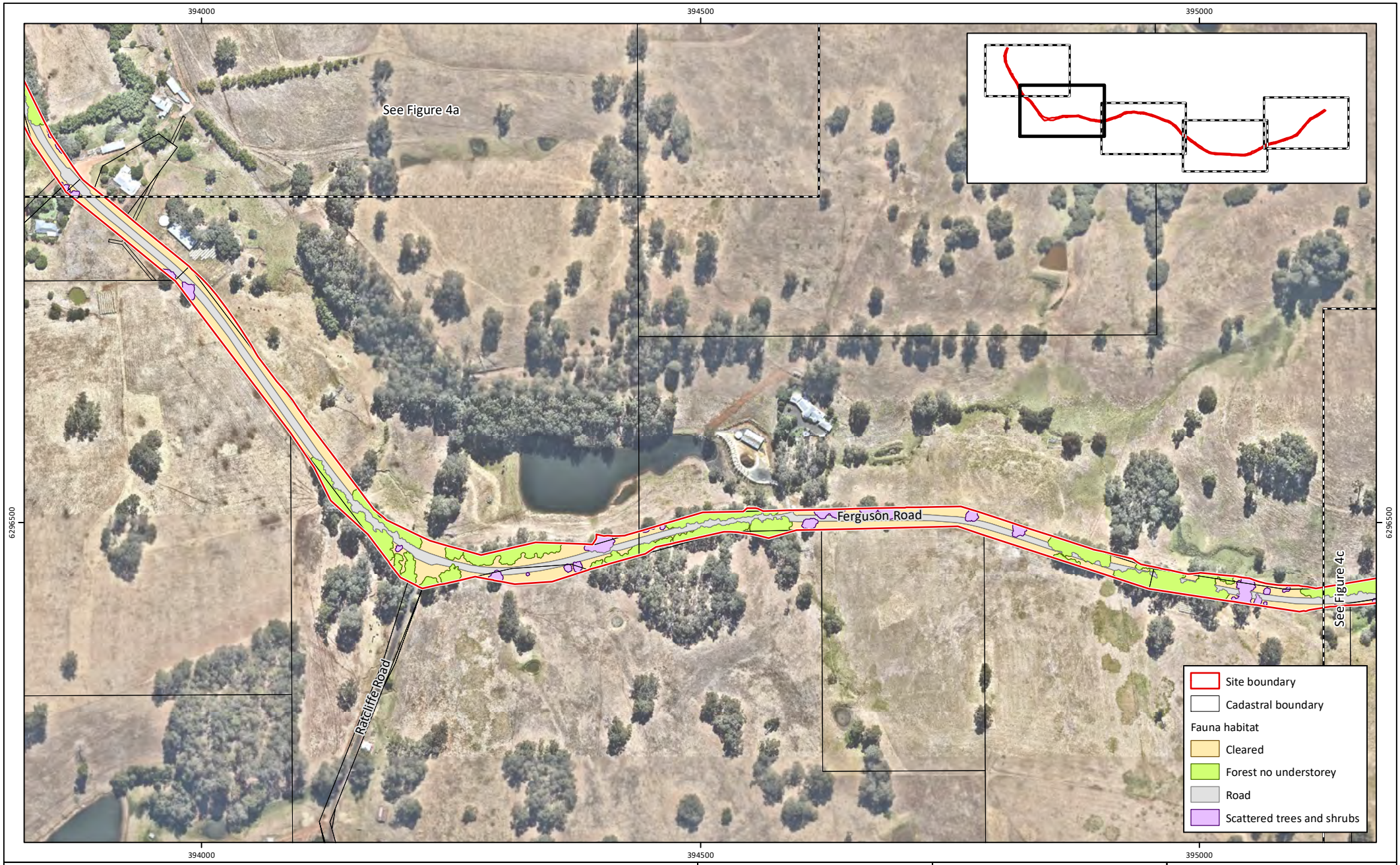

Figure 4b: Fauna Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F05a

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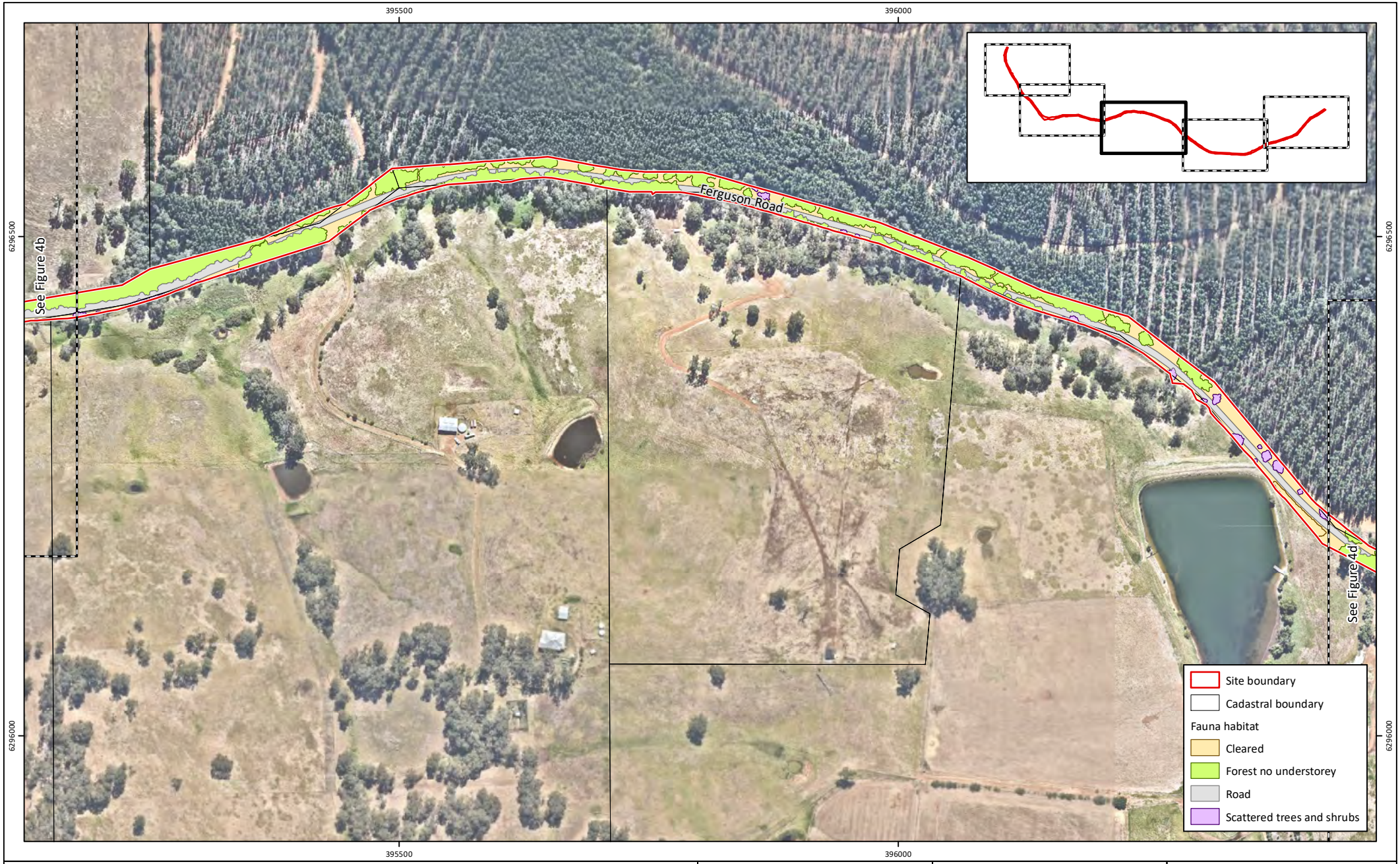

Figure 4c: Fauna Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F05a

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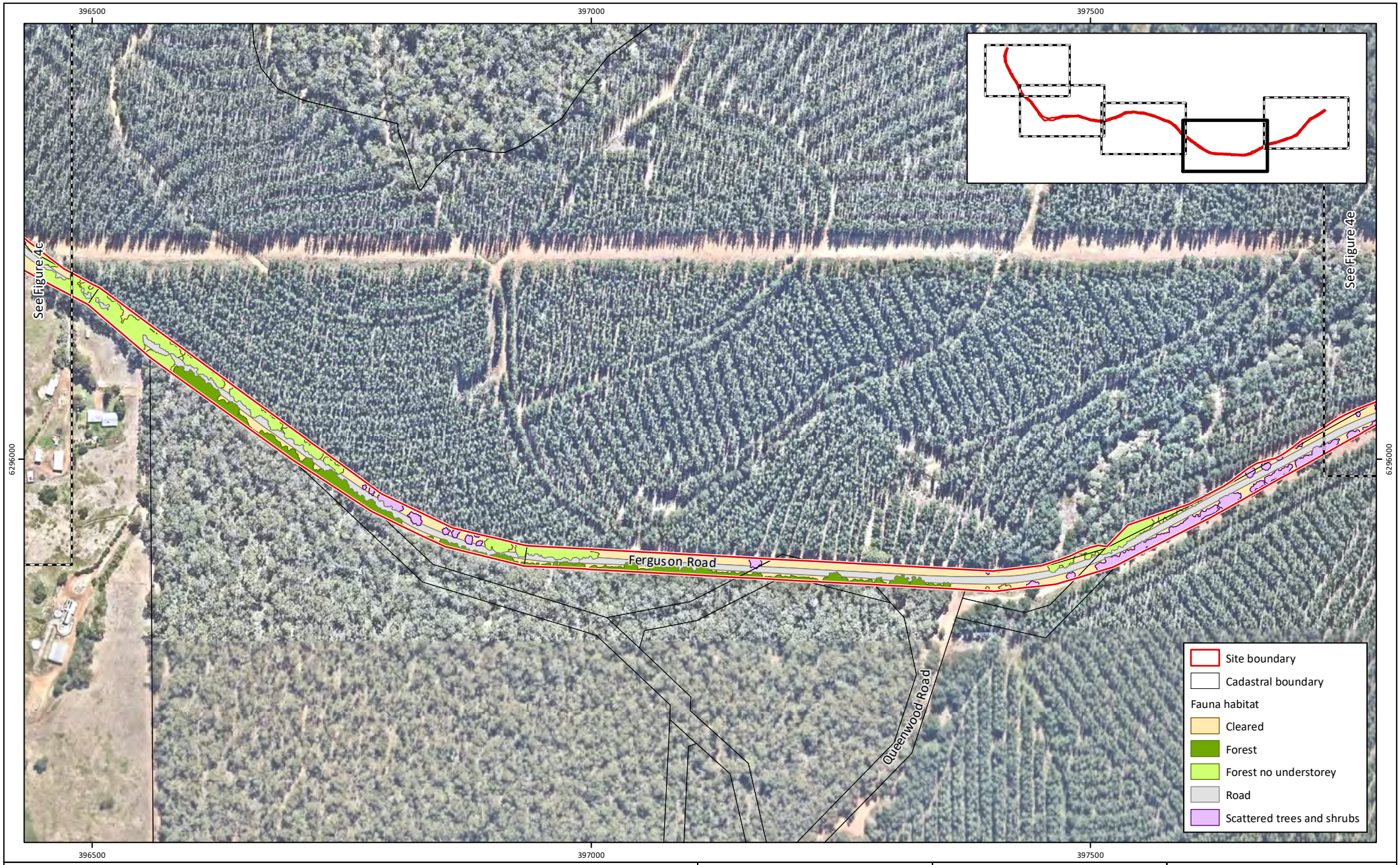

Figure 4d: Fauna Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F05a

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Date:	03/04/2023
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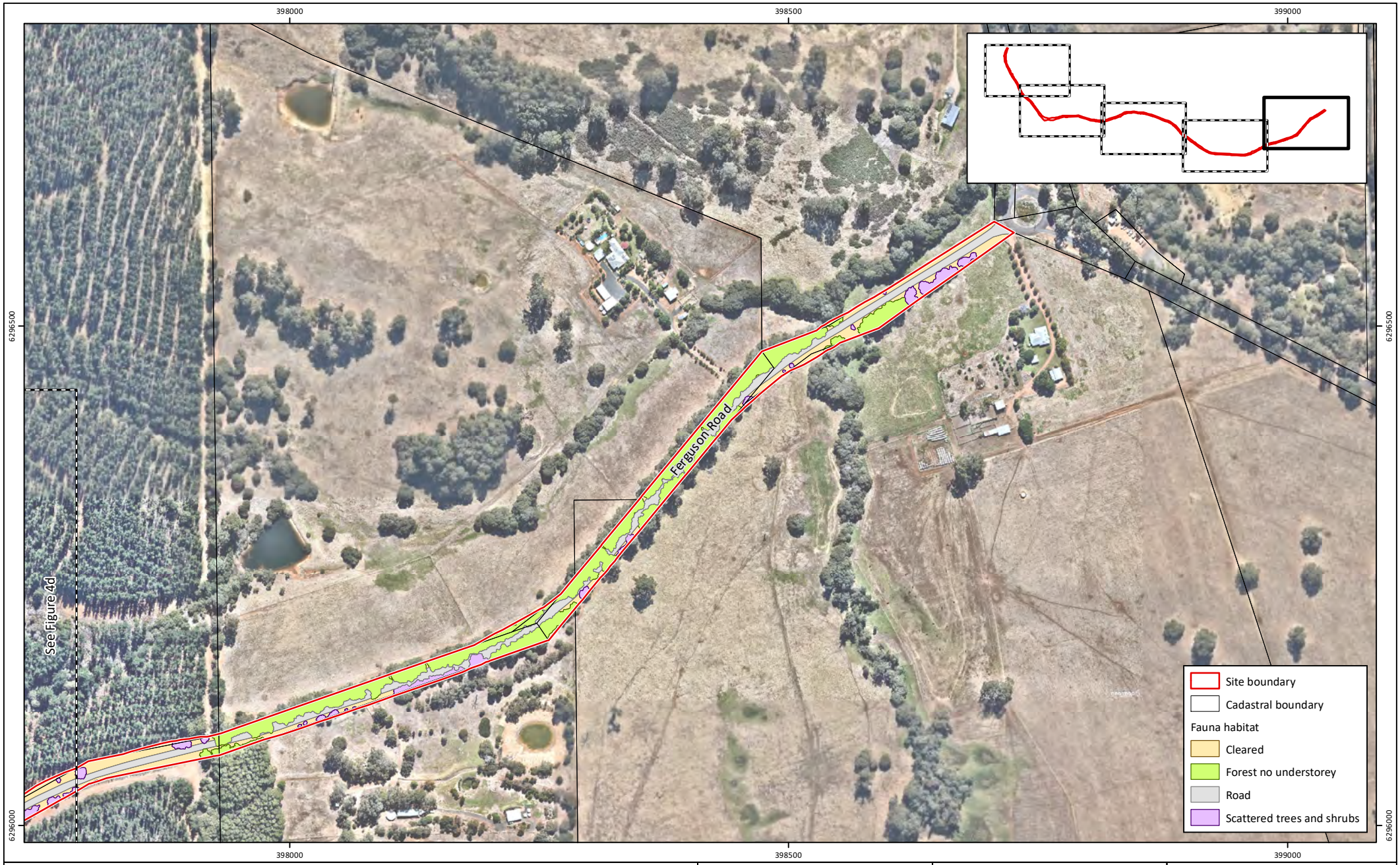

Figure 4e: Fauna Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F05a
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Date: 03/04/2023
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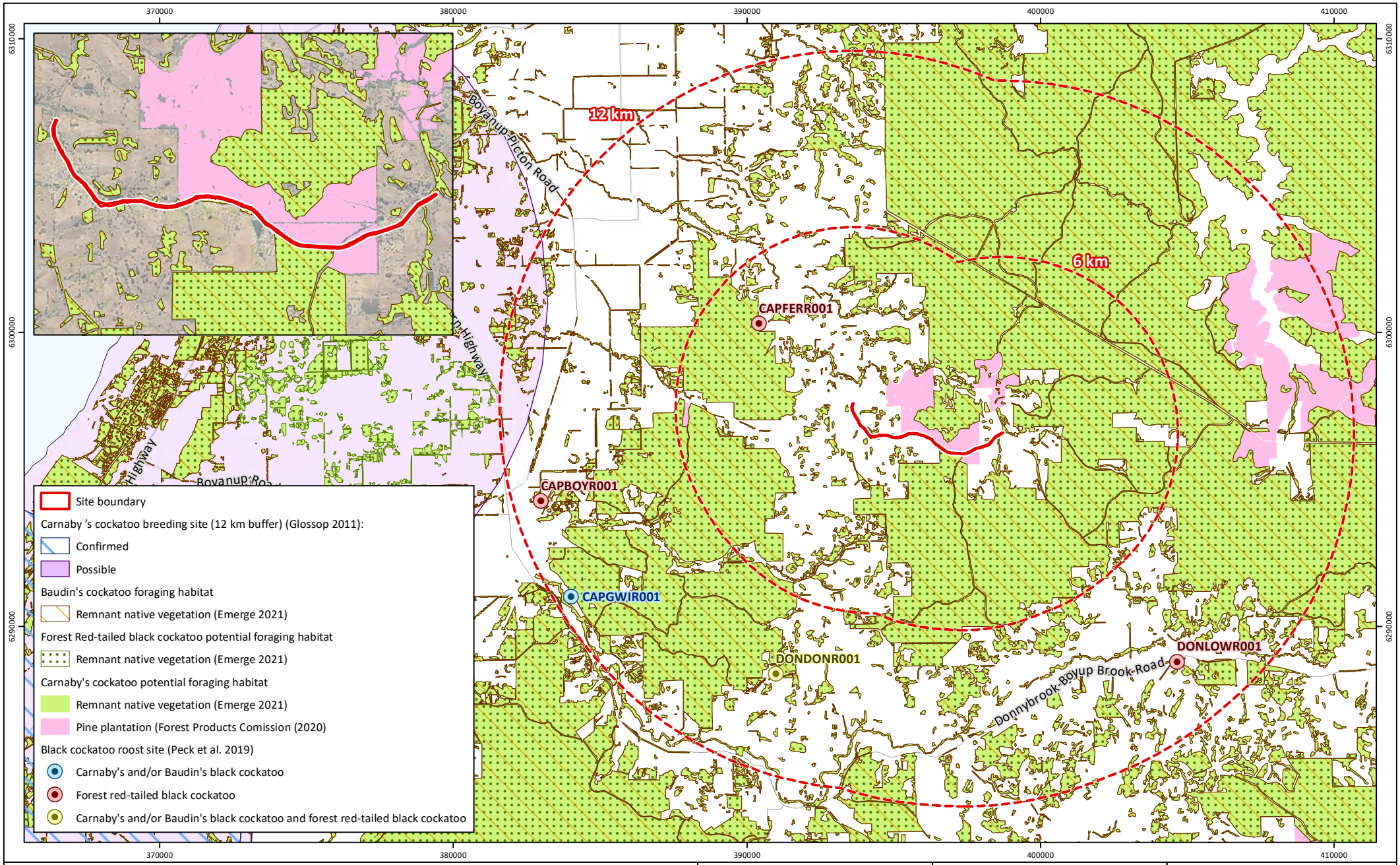

Figure 5: Black Cockatoo Habitat Context

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F04b

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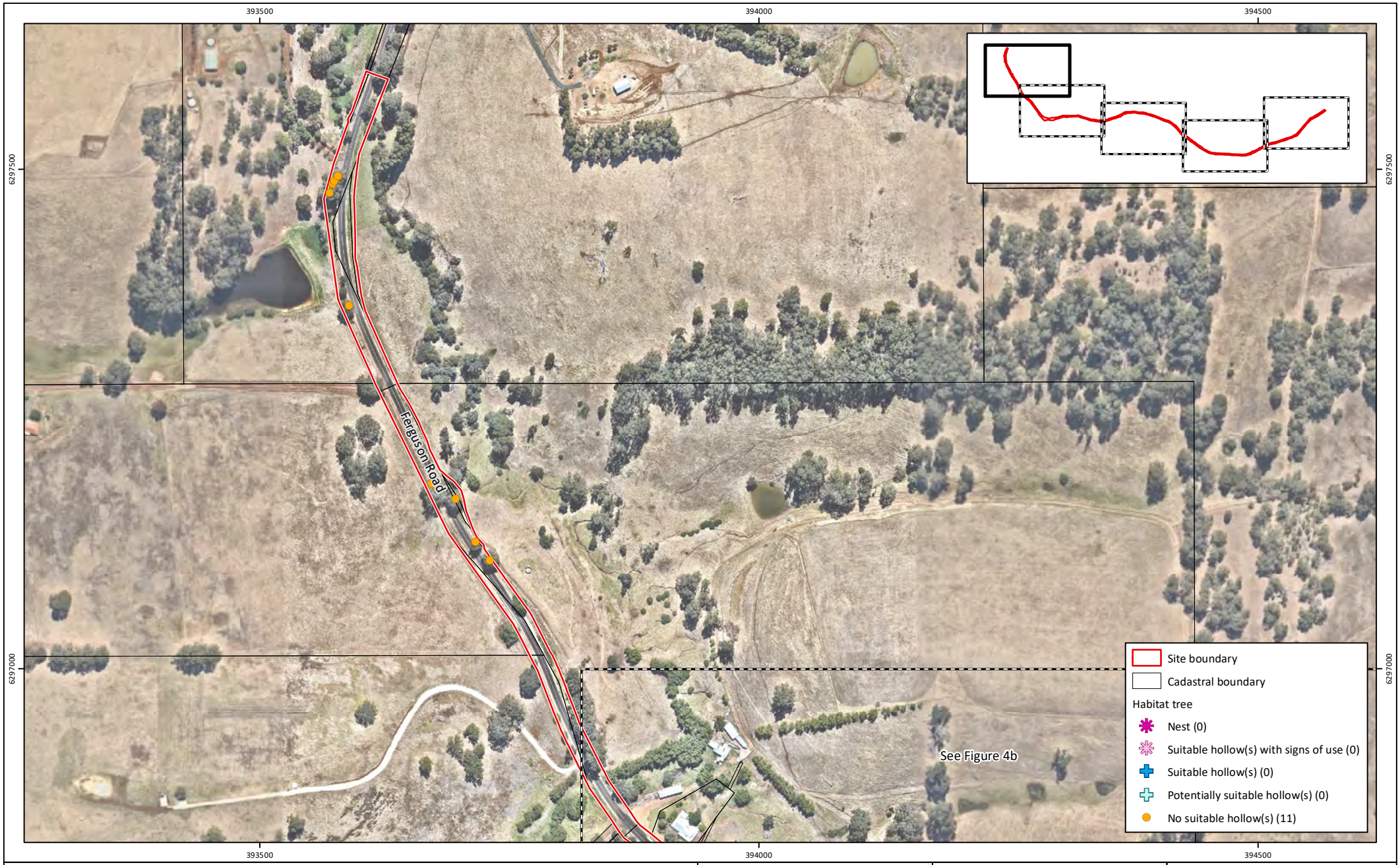

Figure 6a: Black Cockatoo Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F06a

Drawn:	SCM
Date:	03/04/2023
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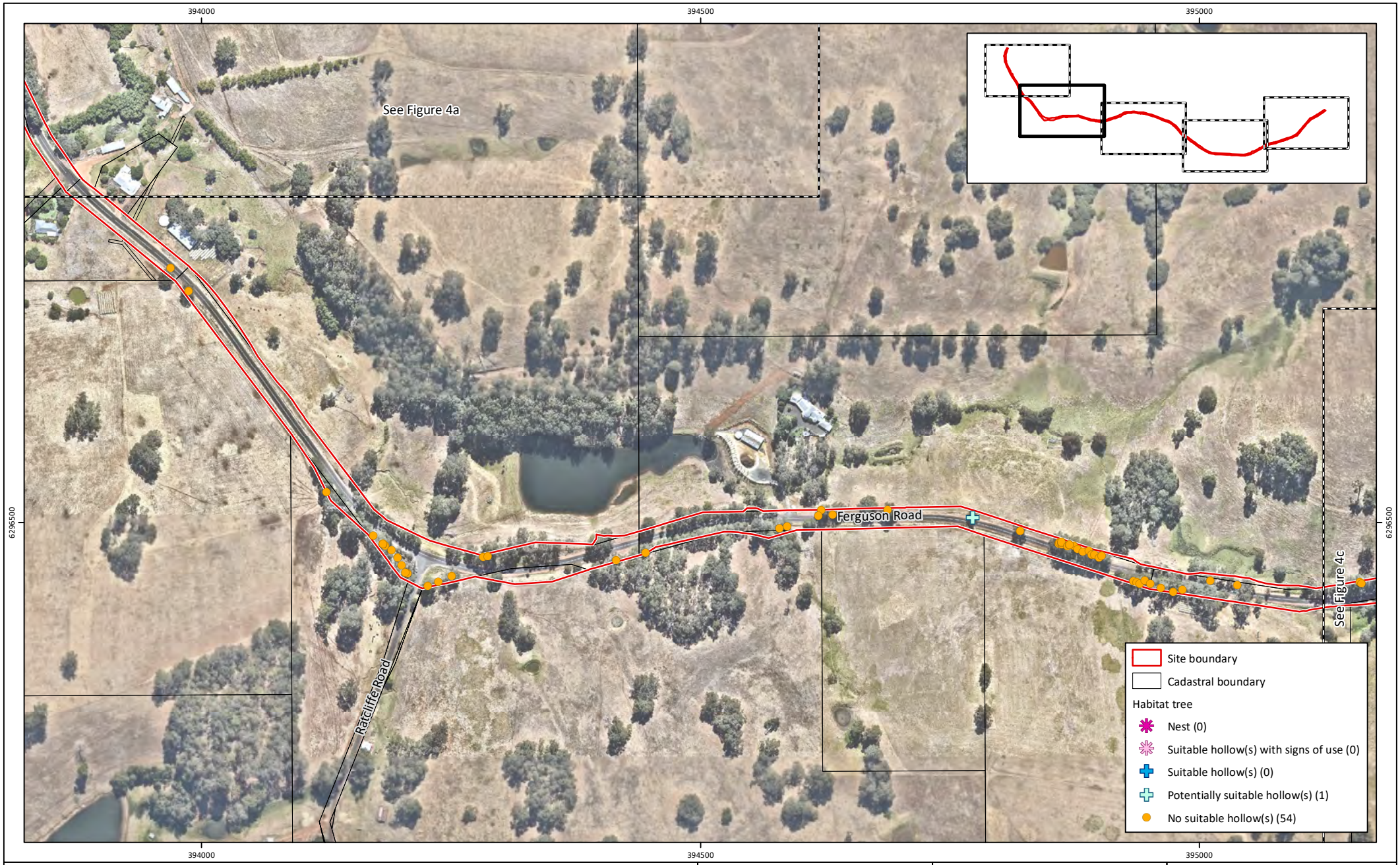

Figure 6b: Black Cockatoo Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F06a

Drawn:	SCM
Date:	03/04/2023
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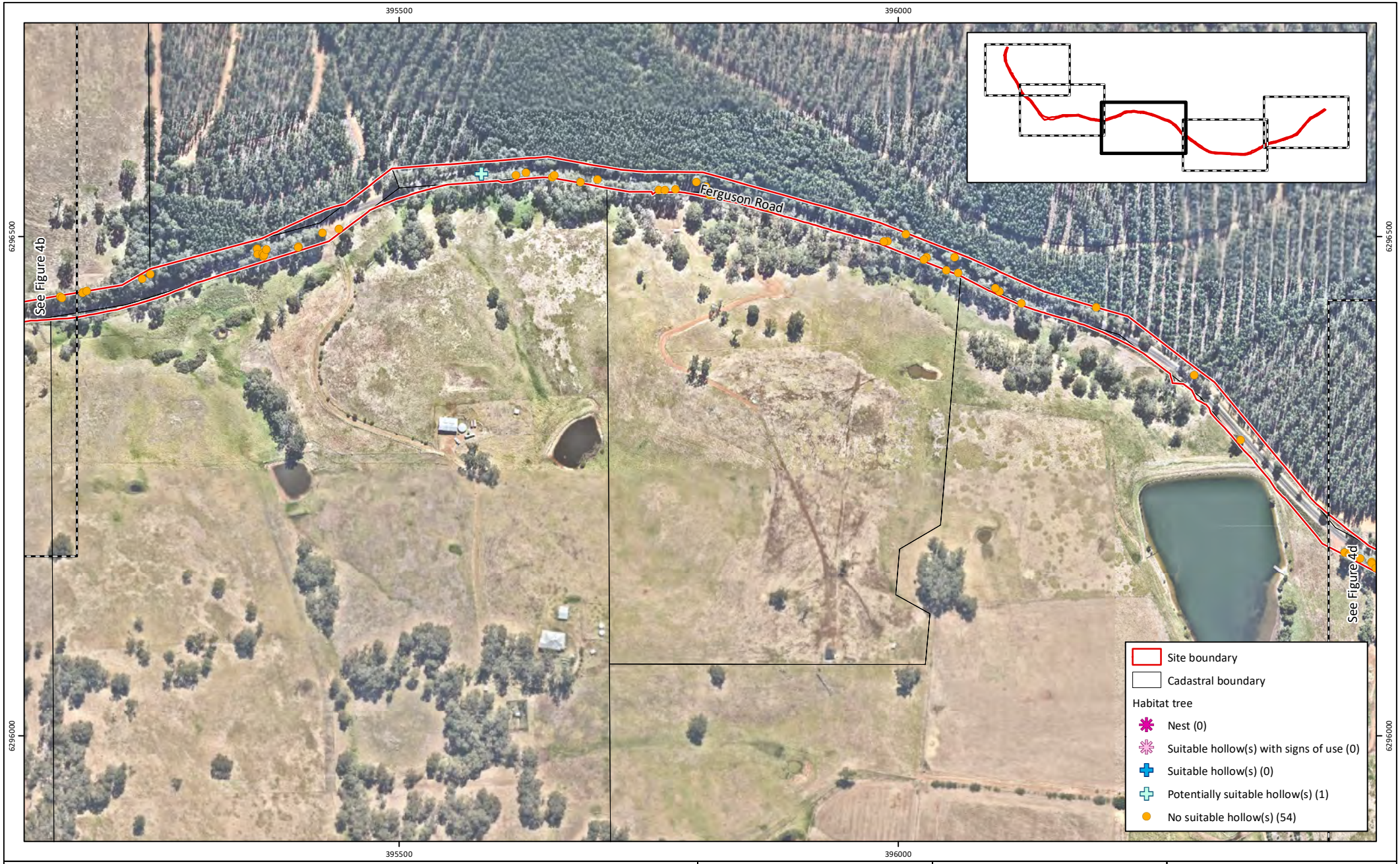

Figure 6c: Black Cockatoo Habitat Trees

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F06a

Drawn:	SCM
Date:	03/04/2023
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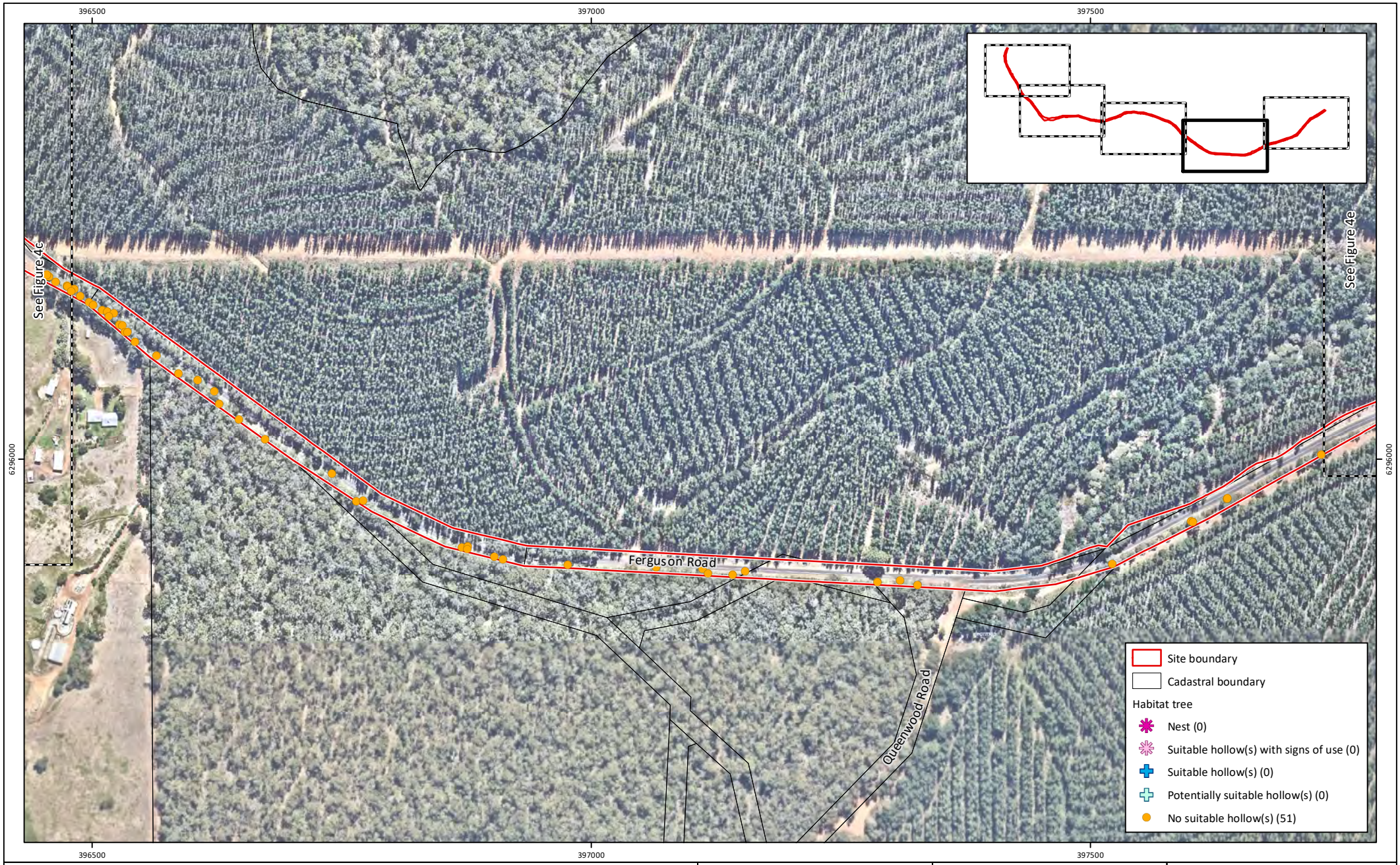

Figure 6d: Black Cockatoo Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F06a

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GDA 1994 MGA Zone 50

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Figure 6e: Black Cockatoo Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
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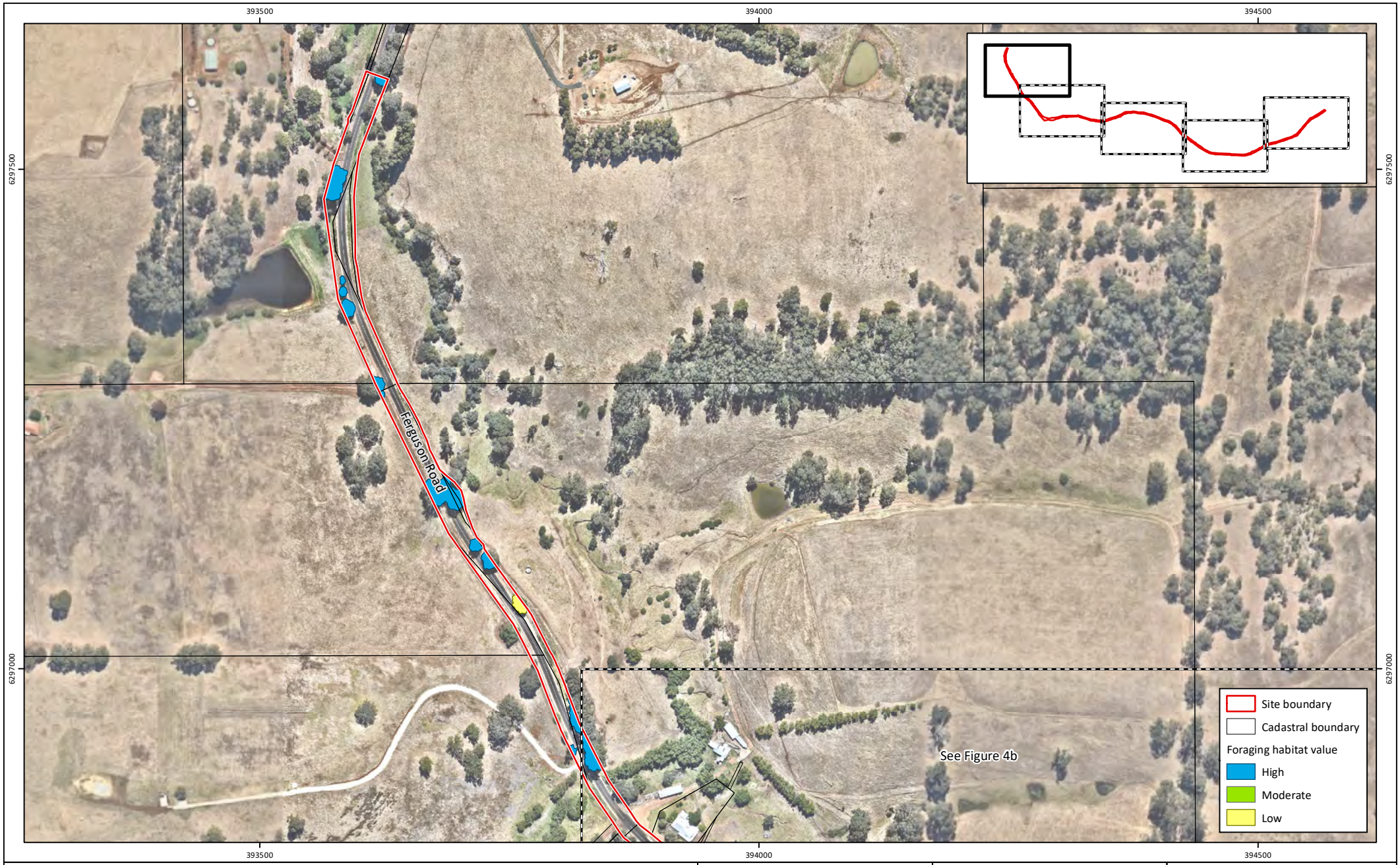

Figure 7a: Carnaby's Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
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Client: Shire of Dardanup

Plan Number:
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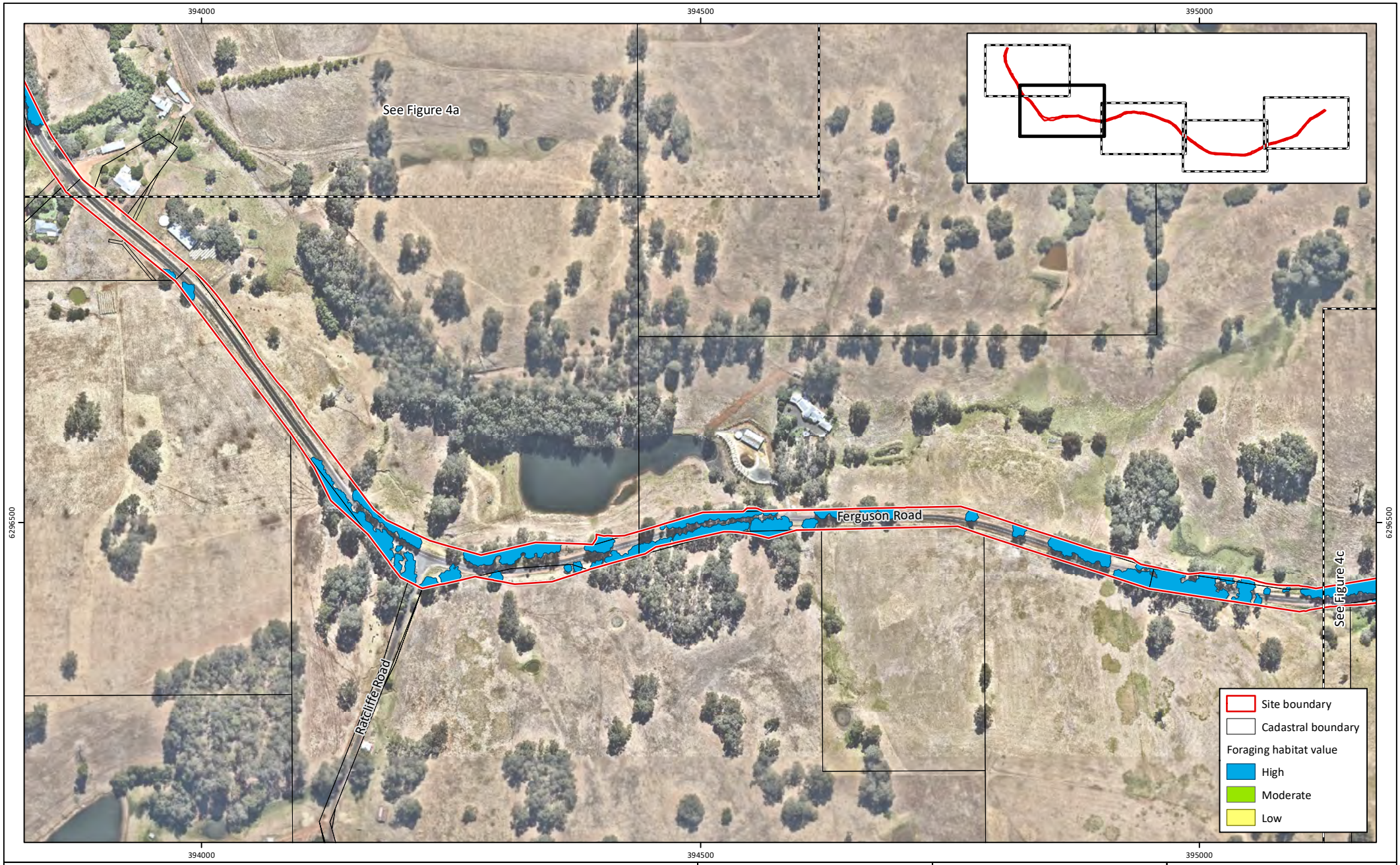

Figure 7b: Carnaby's Cockatoo Foraging Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
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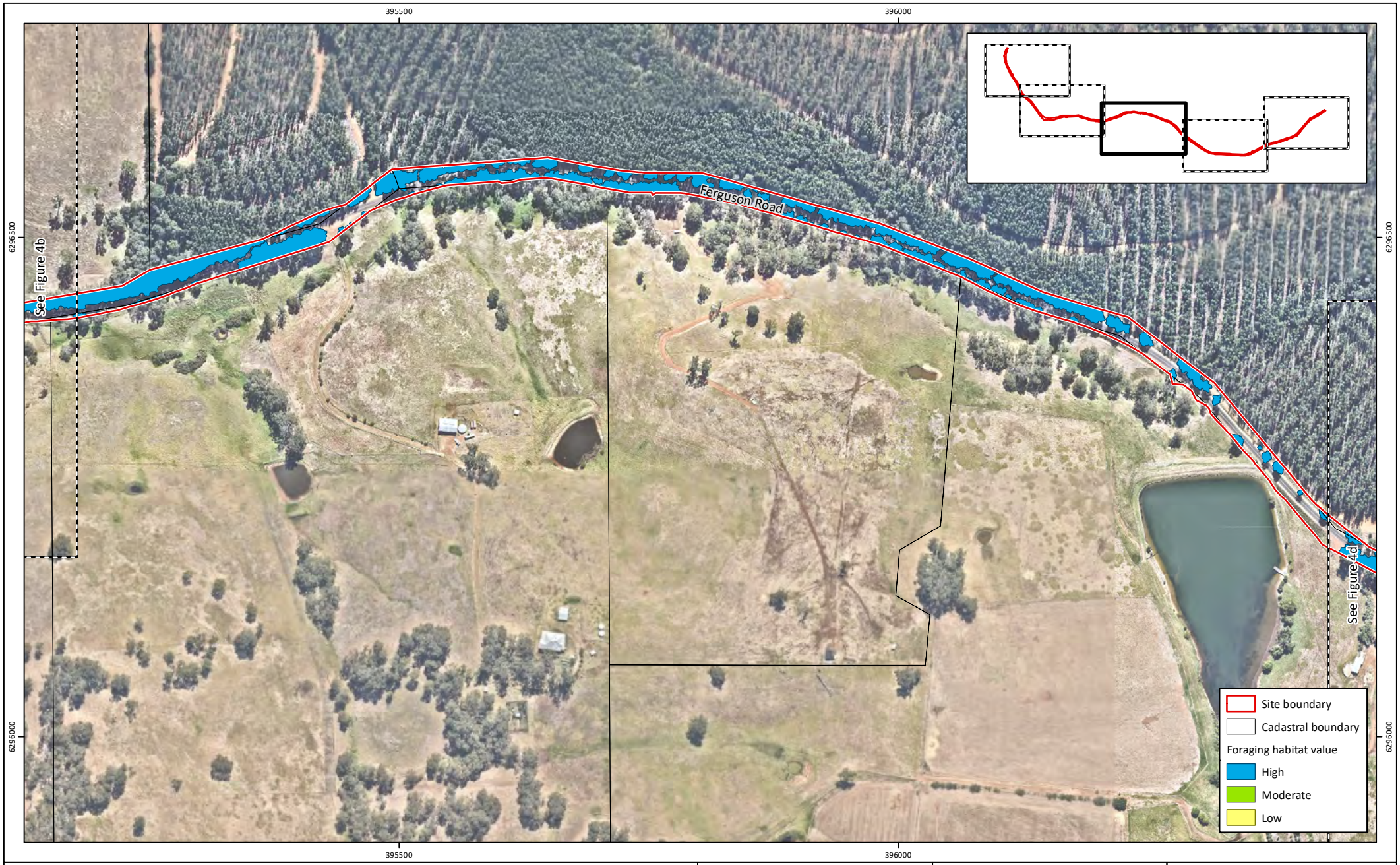

Figure 7c: Carnaby's Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F07a

Drawn:	SCM
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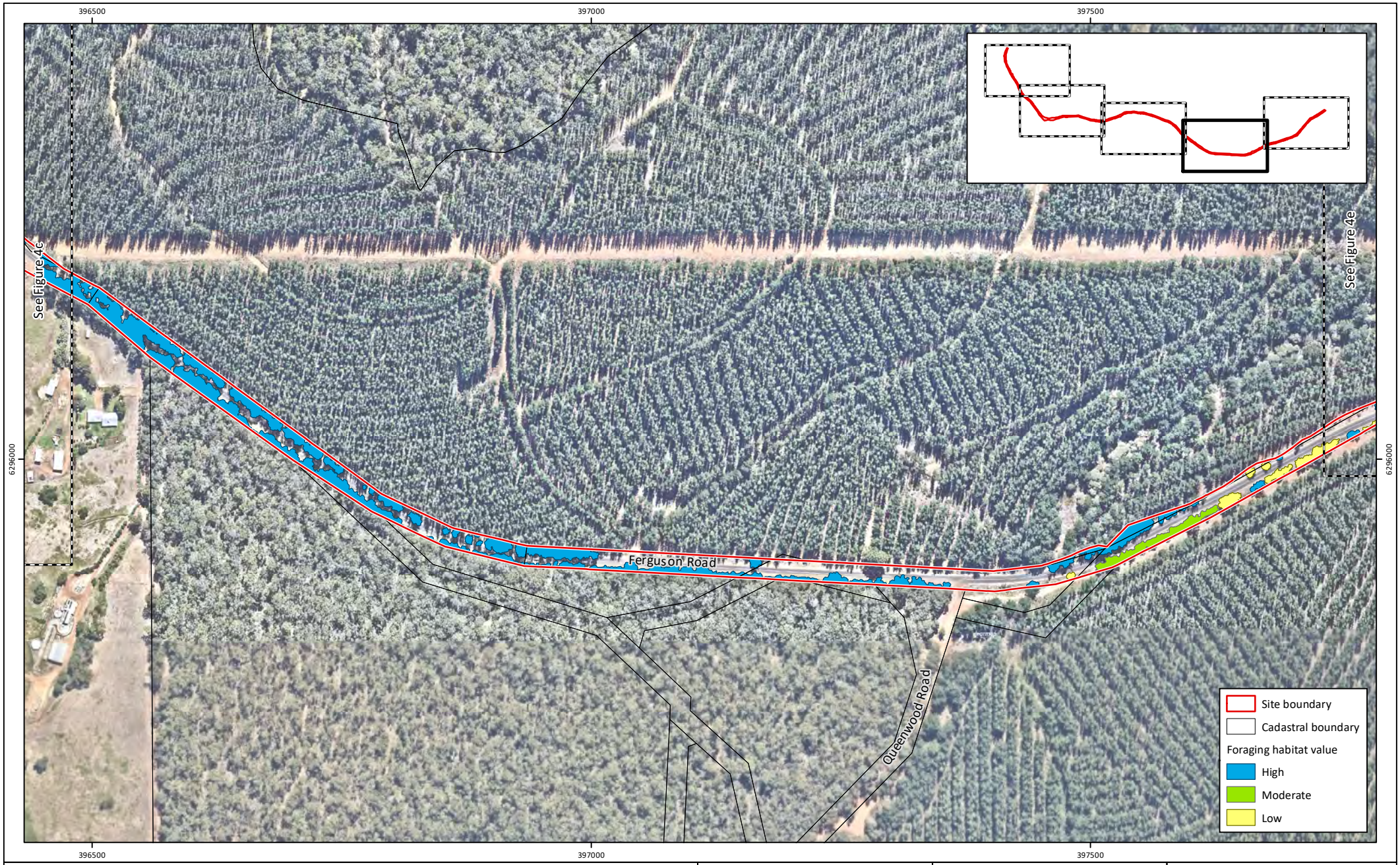

Figure 7d: Carnaby's Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F07a

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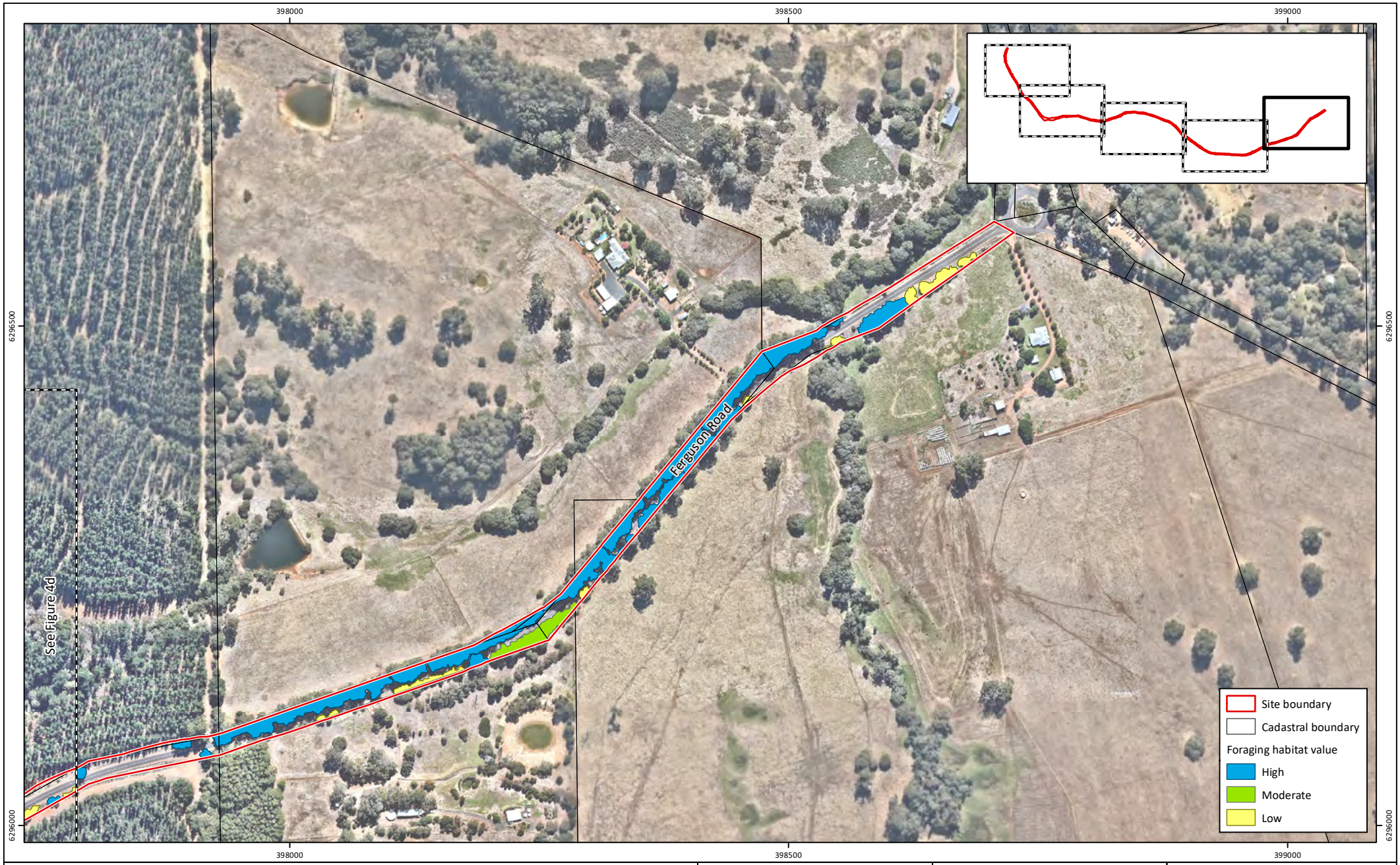

Figure 7e: Carnaby's Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
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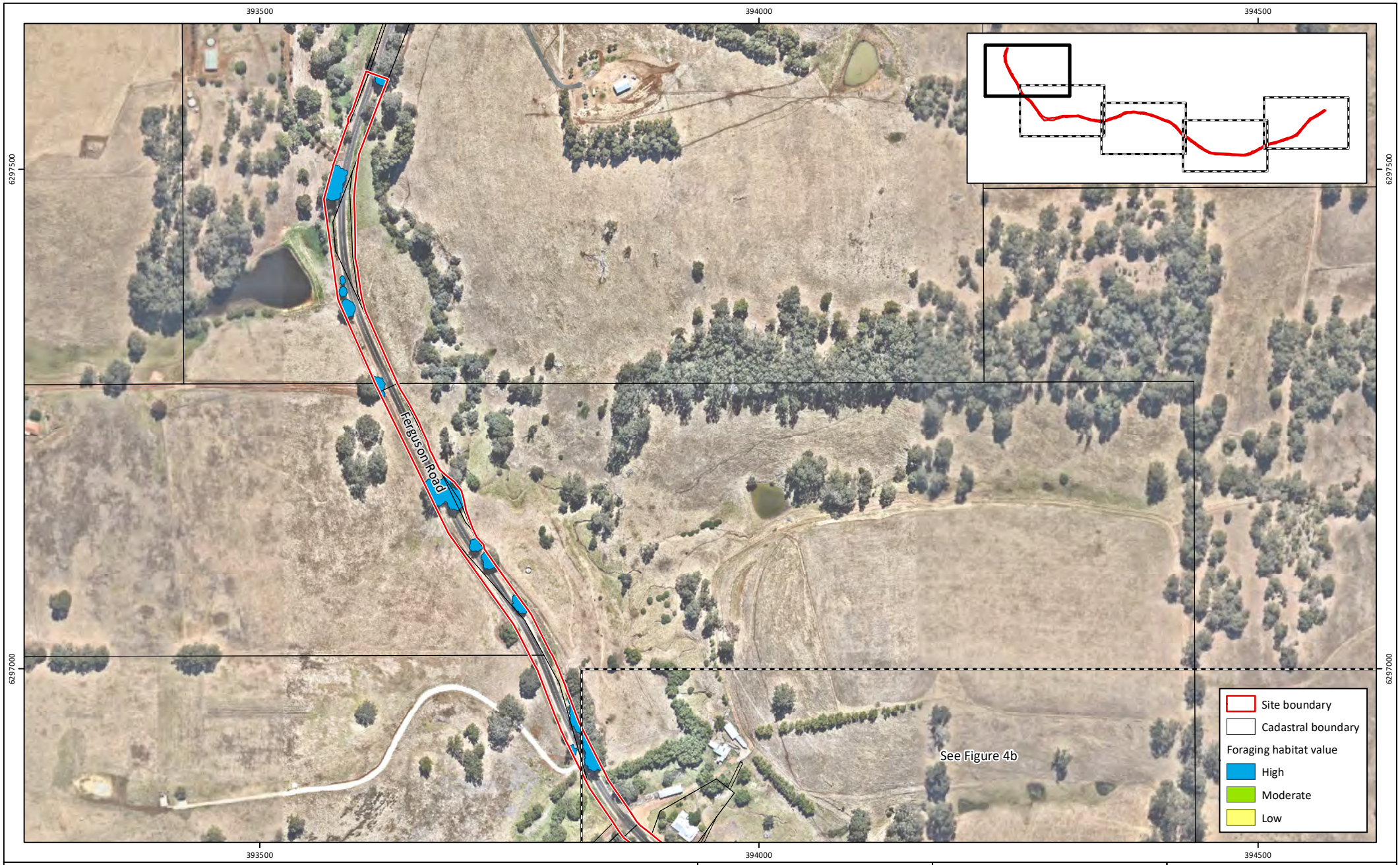

Figure 8a: Forest Red-tailed Black Cockatoo Foraging Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F08a

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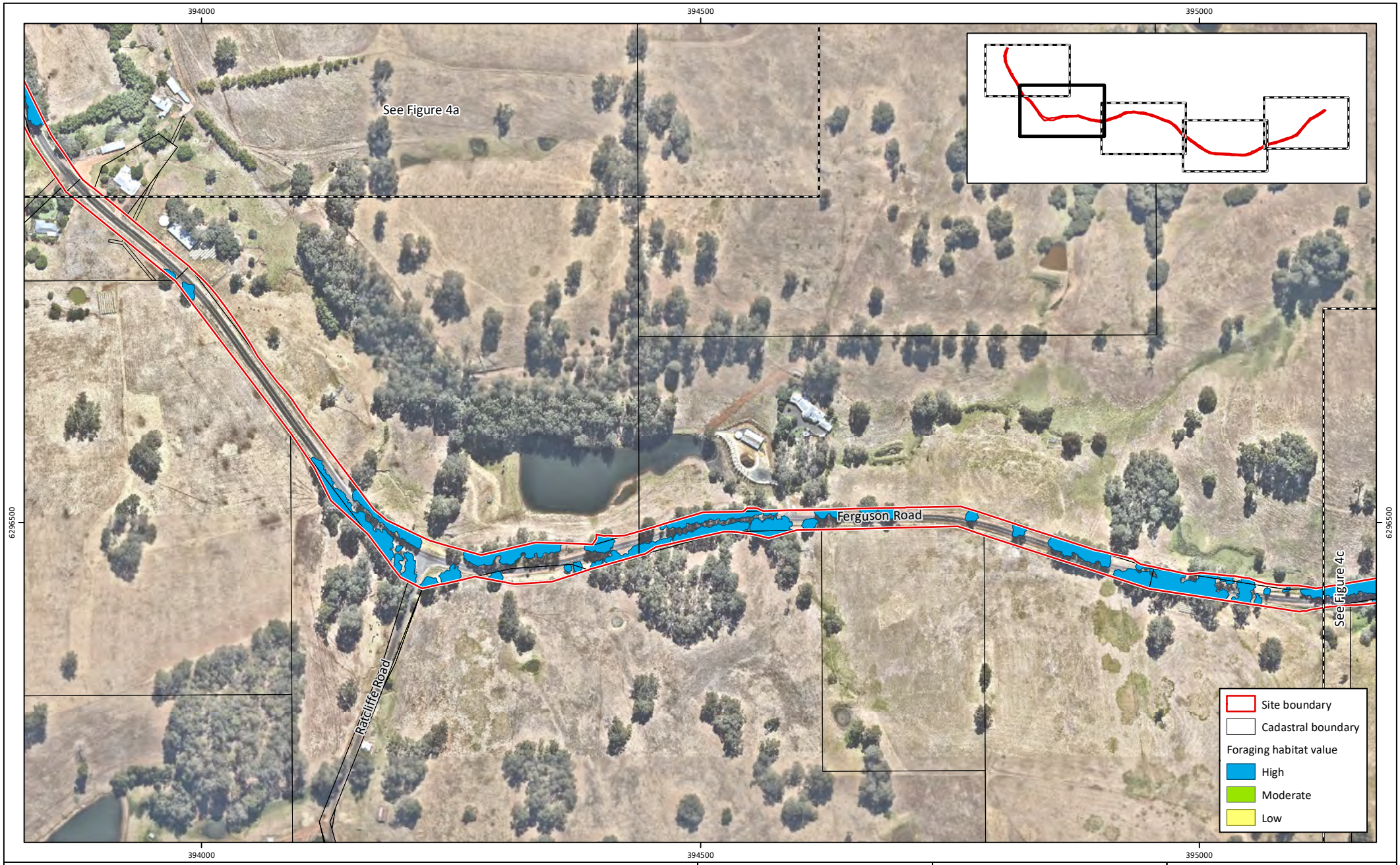

Figure 8b: Forest Red-tailed Black Cockatoo Foraging Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F08a

Drawn:	SCM
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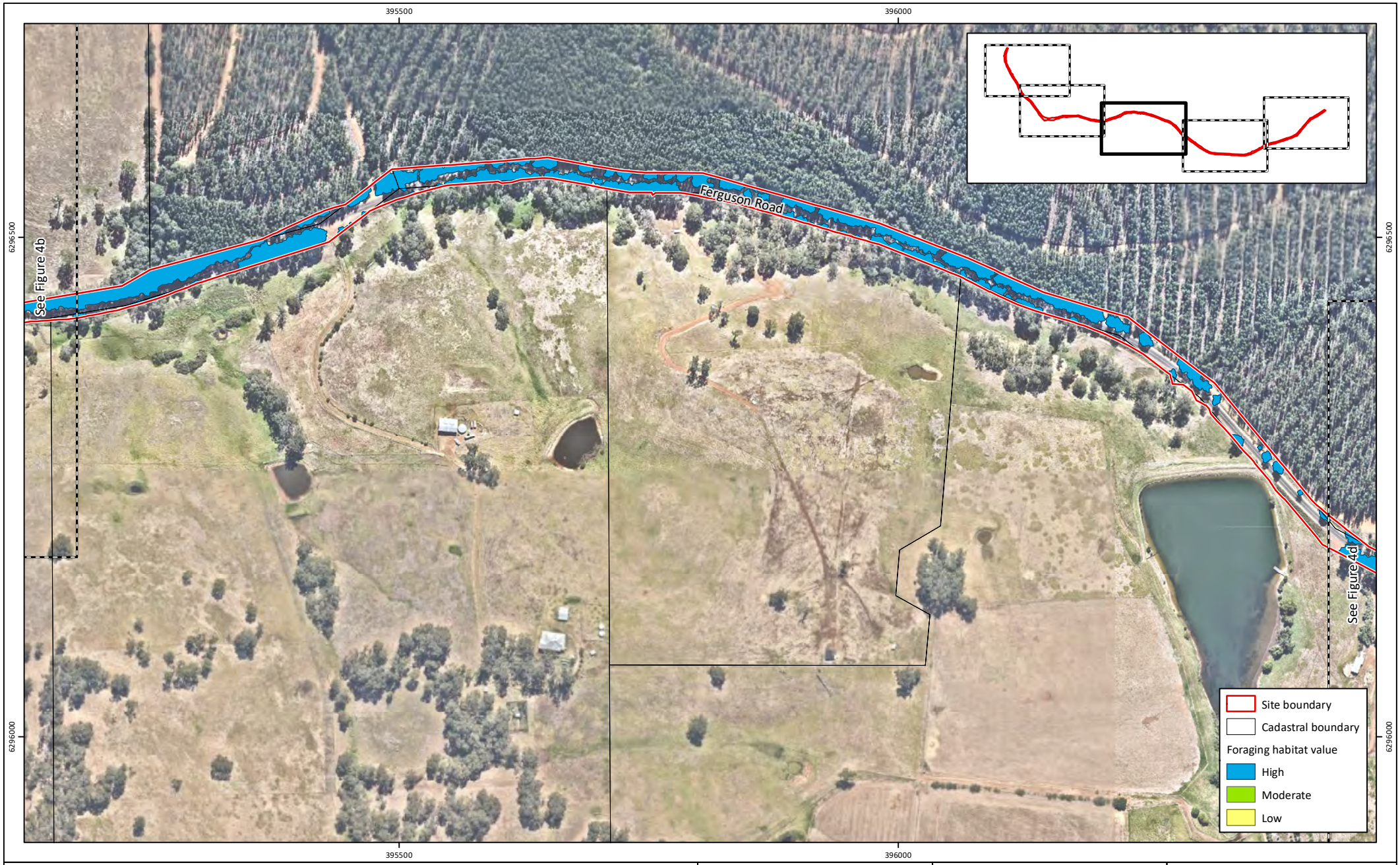

Figure 8c: Forest Red-tailed Black Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F08a

Drawn:	SCM
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GDA 1994 MGA Zone 50

emerge ASSOCIATES

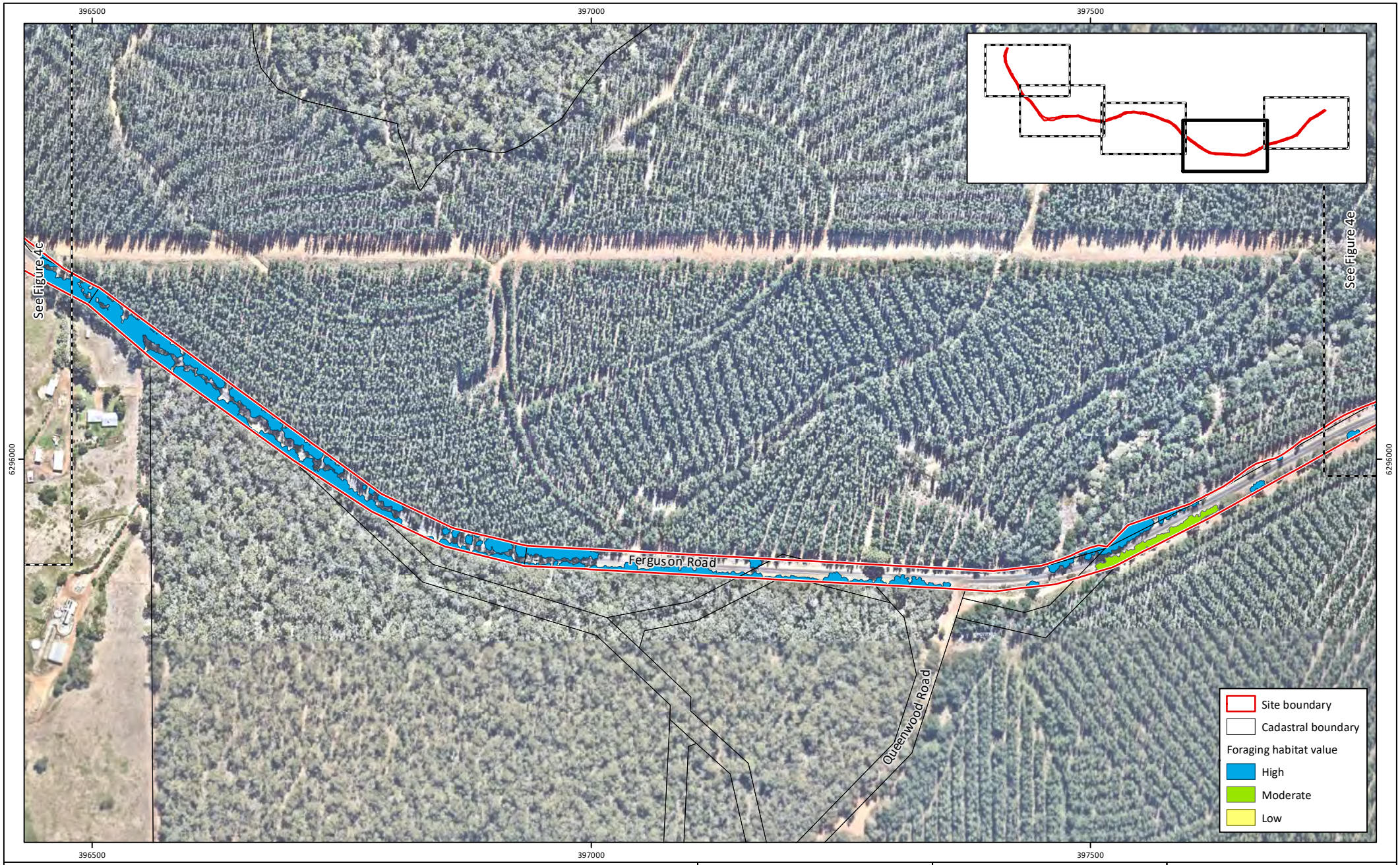

Figure 8d: Forest Red-tailed Black Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F08a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 60 120 180
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Figure 8e: Forest Red-tailed Black Cockatoo Foraging Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F08a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 60 120 180
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

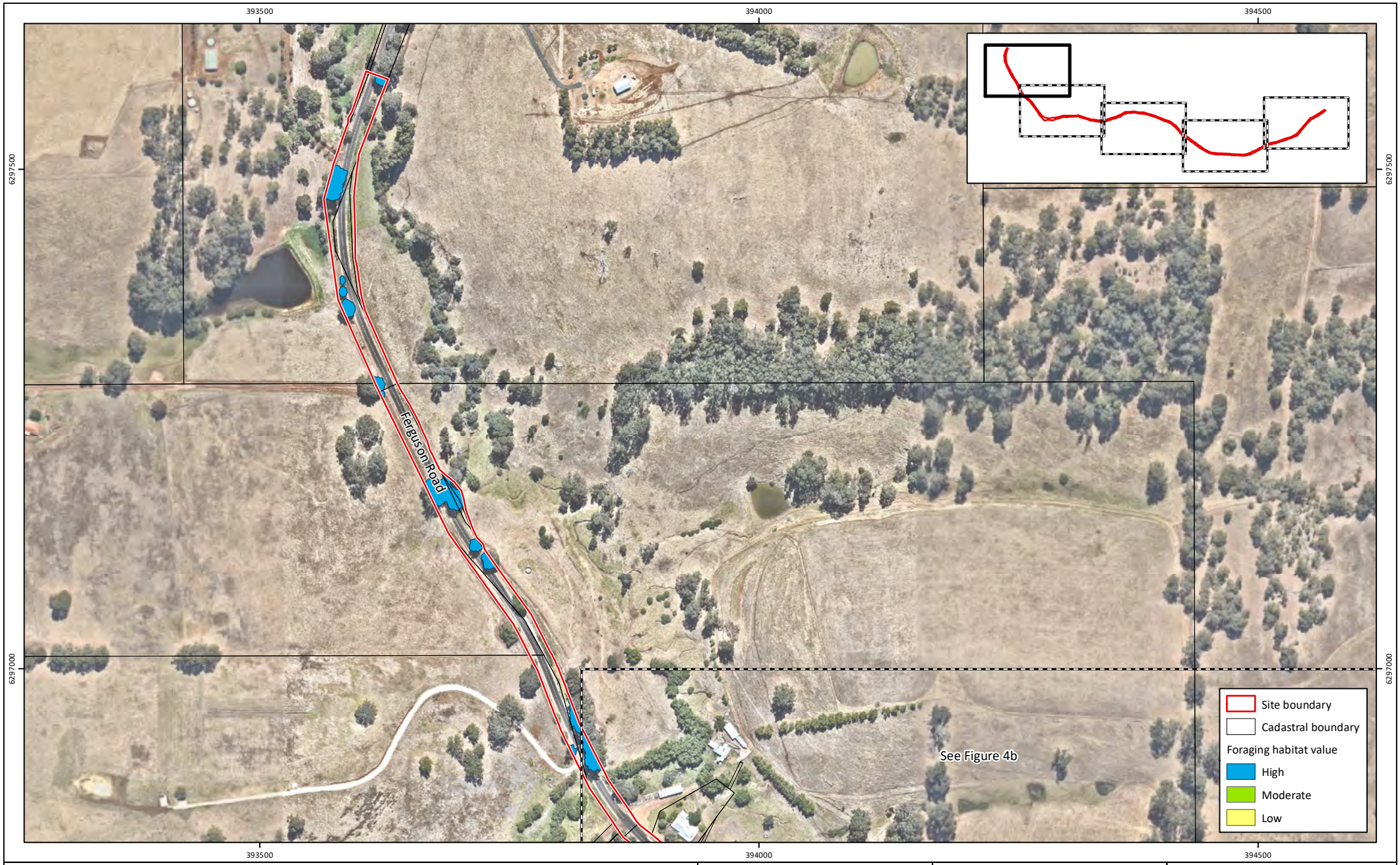

Figure 9a: Baudin's Cockatoo Foraging Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F09a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 60 120 180
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

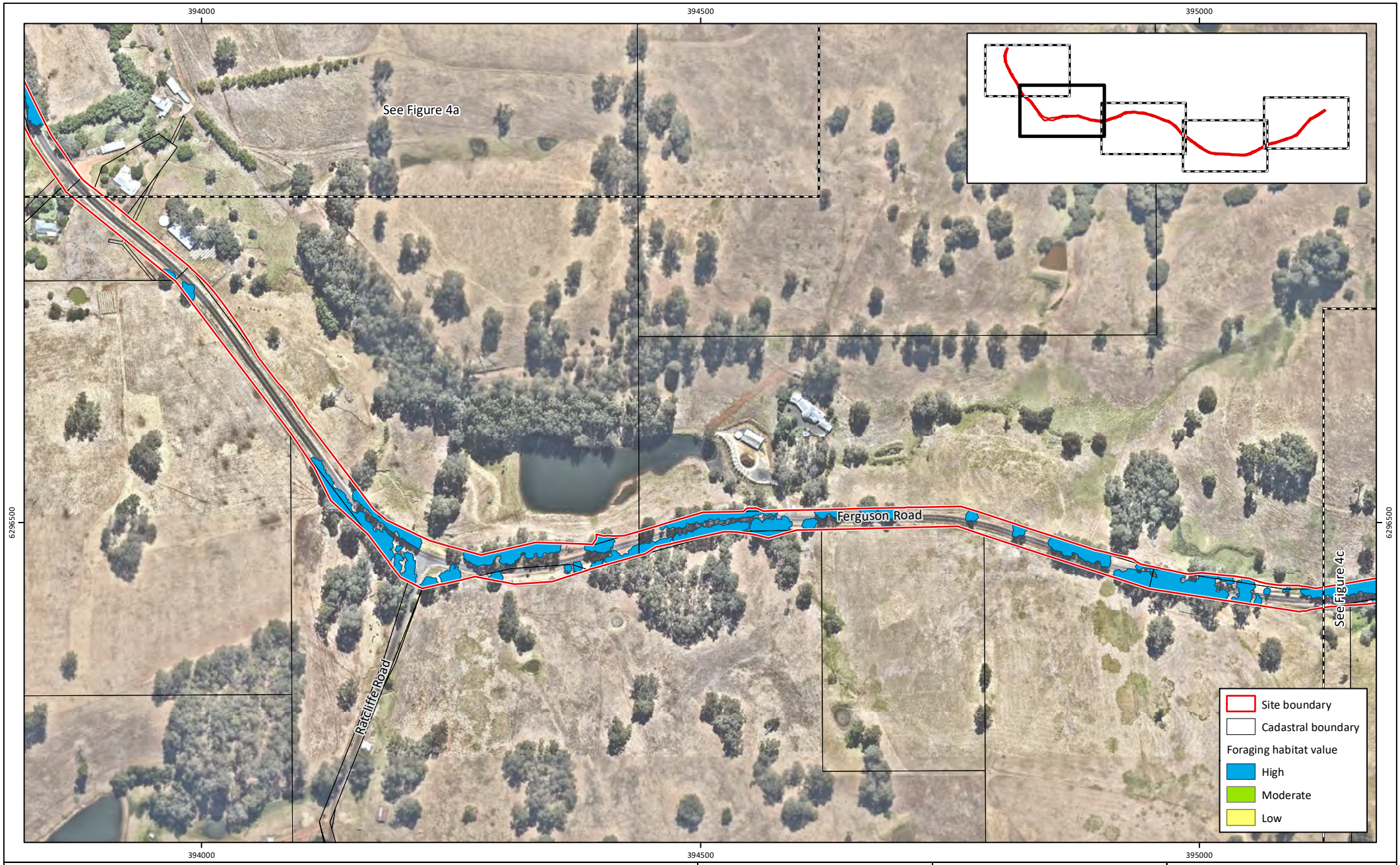

Figure 9b: Baudin's Cockatoo Foraging Habitat

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F09a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 60 120 180
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

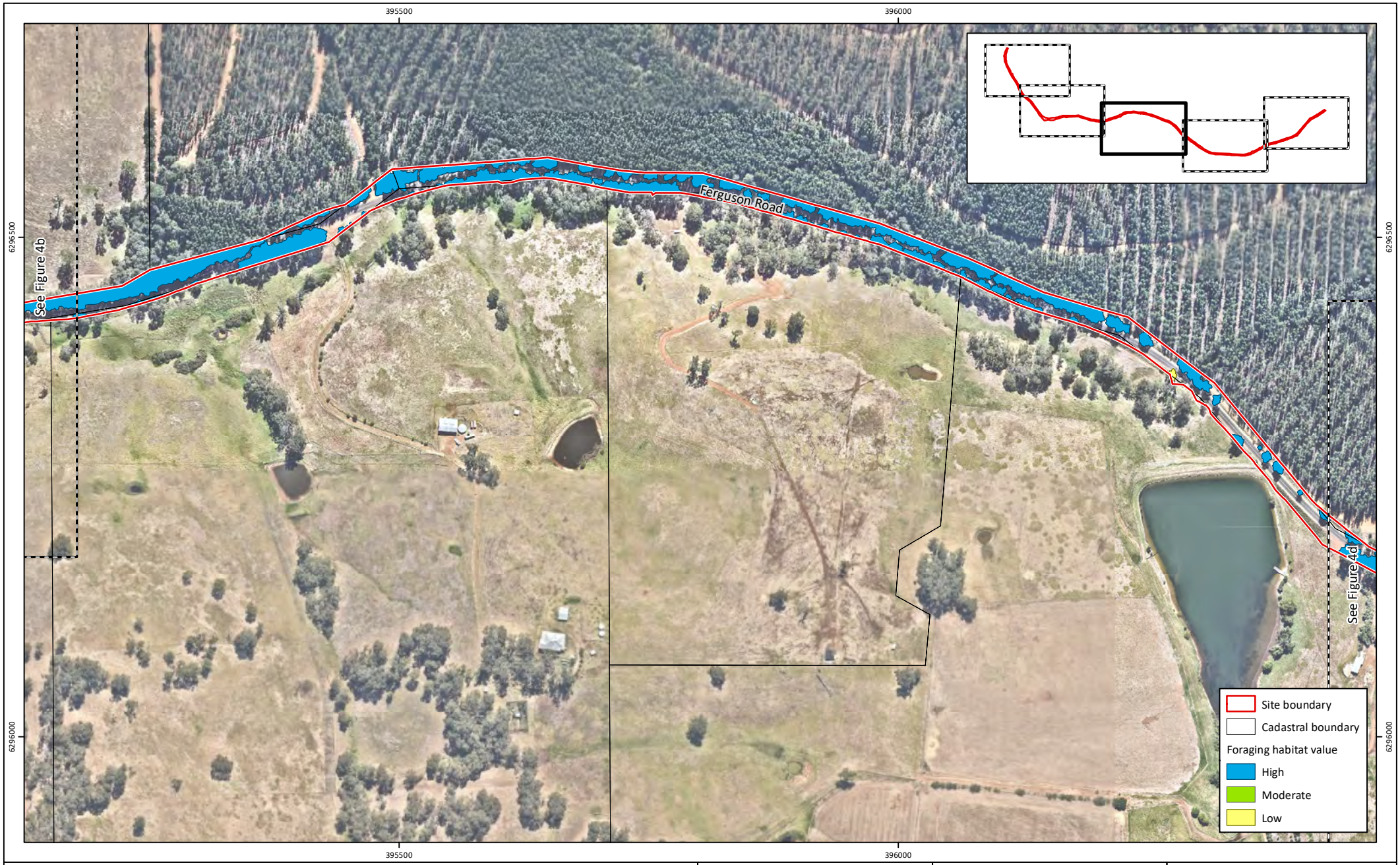

Figure 9c: Baudin's Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F09a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 60 120 180
Metres
Scale: 1:5,000@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

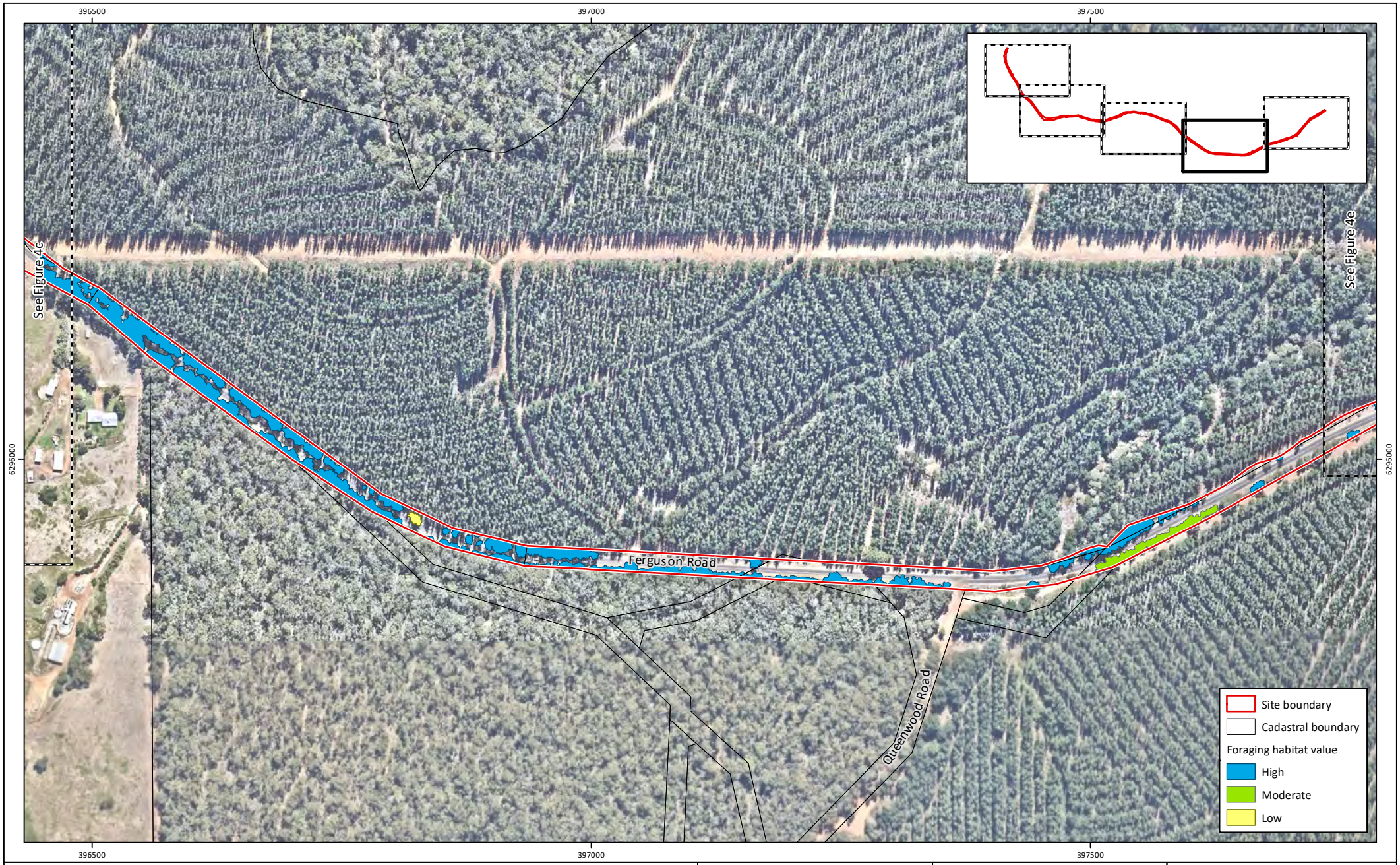

Figure 9d: Baudin's Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F09a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 60 120 180
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Figure 9e: Baudin's Cockatoo Foraging Habitat

Project: Basic and Targeted Fauna Assessment
Part Ferguson Road, Ferguson
Client: Shire of Dardanup

Plan Number:
EP22-044(02)--F09a
Drawn: SCM
Date: 03/04/2023
Checked: NAW
Approved: TAA
Date: 03/04/2023

N

0 60 120 180
Metres
Scale: 1:5,000@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

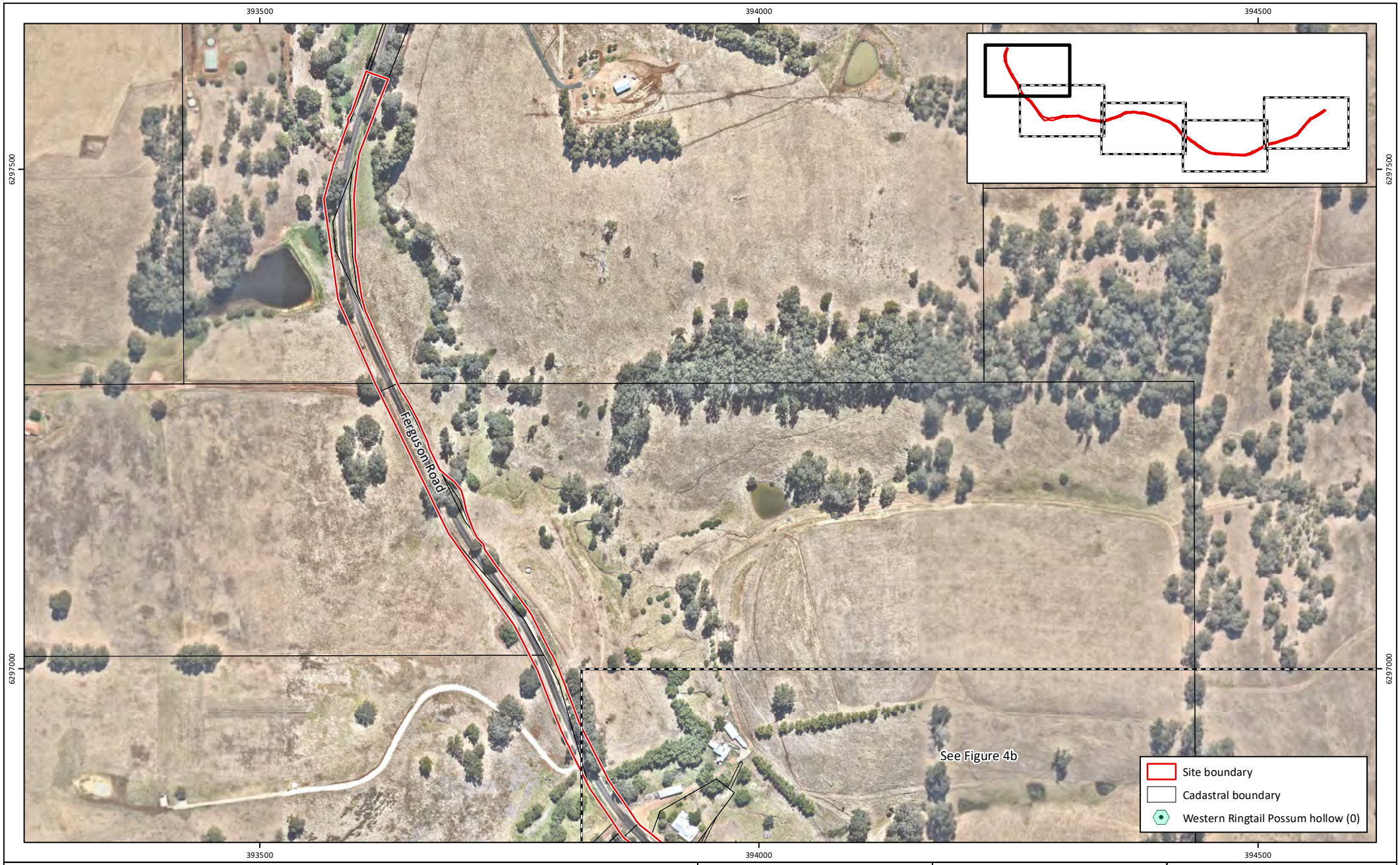

Figure 10a: Western Ringtail Possum Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F10a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 50 100 150
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

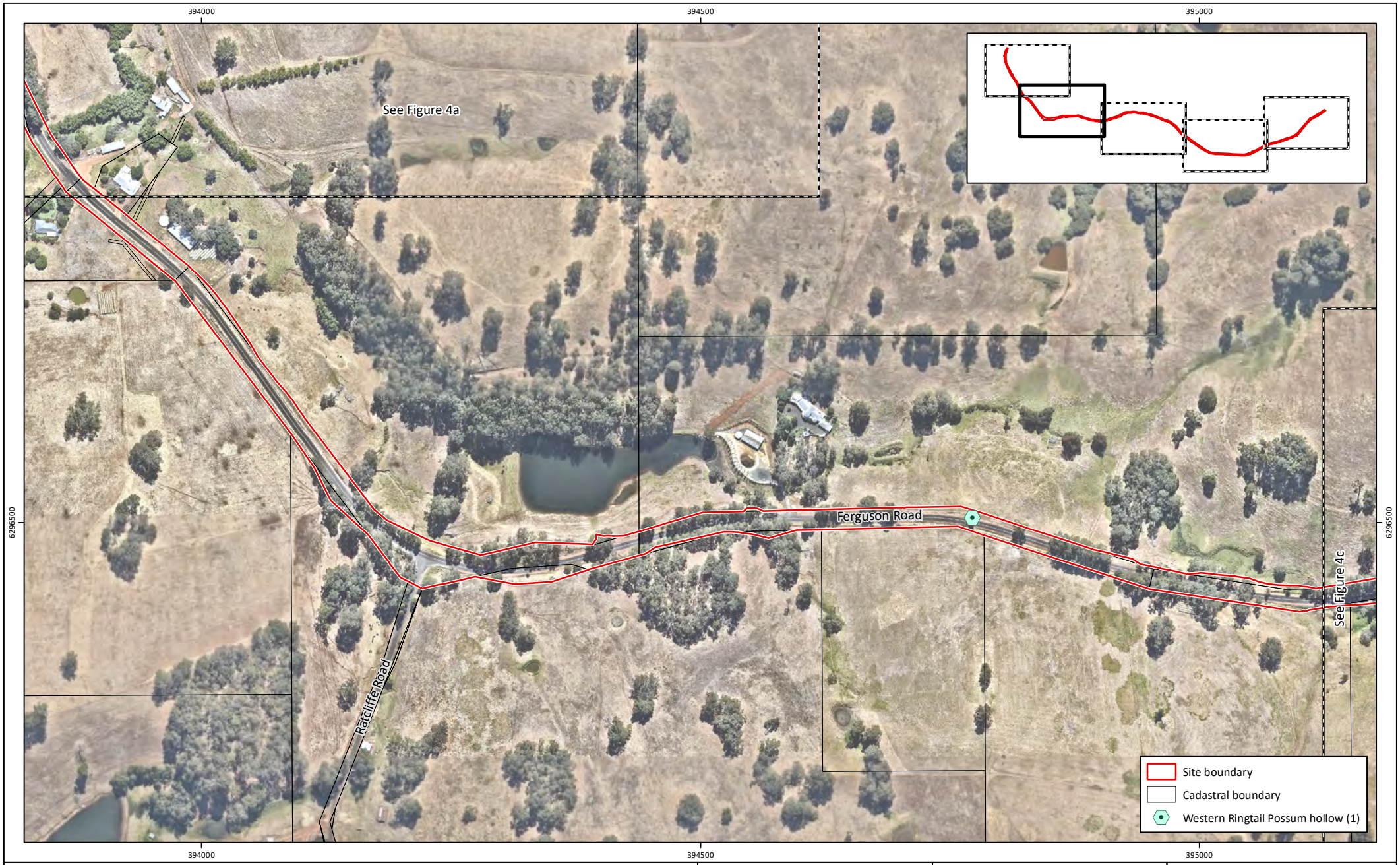

Figure 10b: Western Ringtail Possum Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F10a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 50 100 150
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

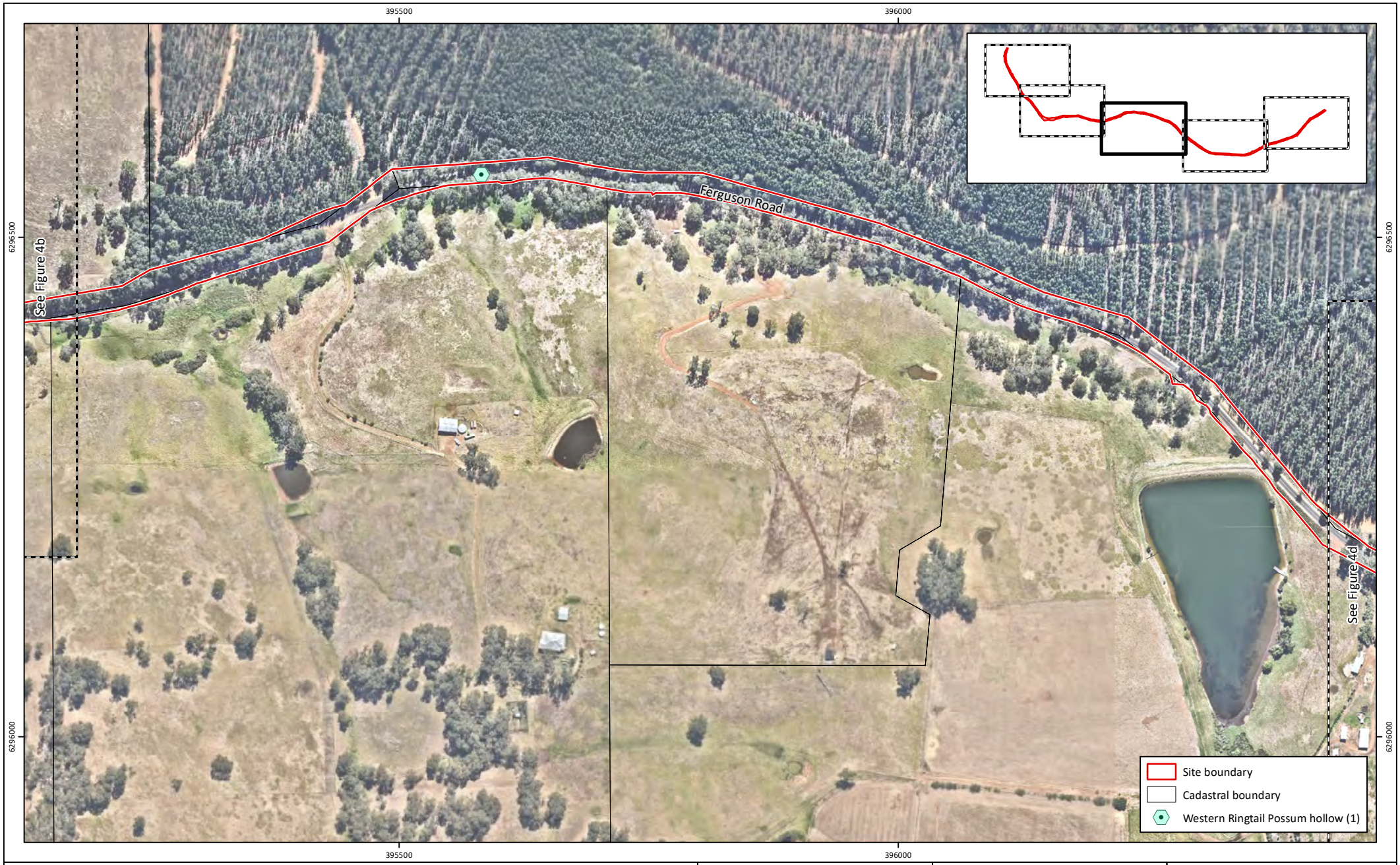

Figure 10c: Western Ringtail Possum Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F10a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 50 100 150
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

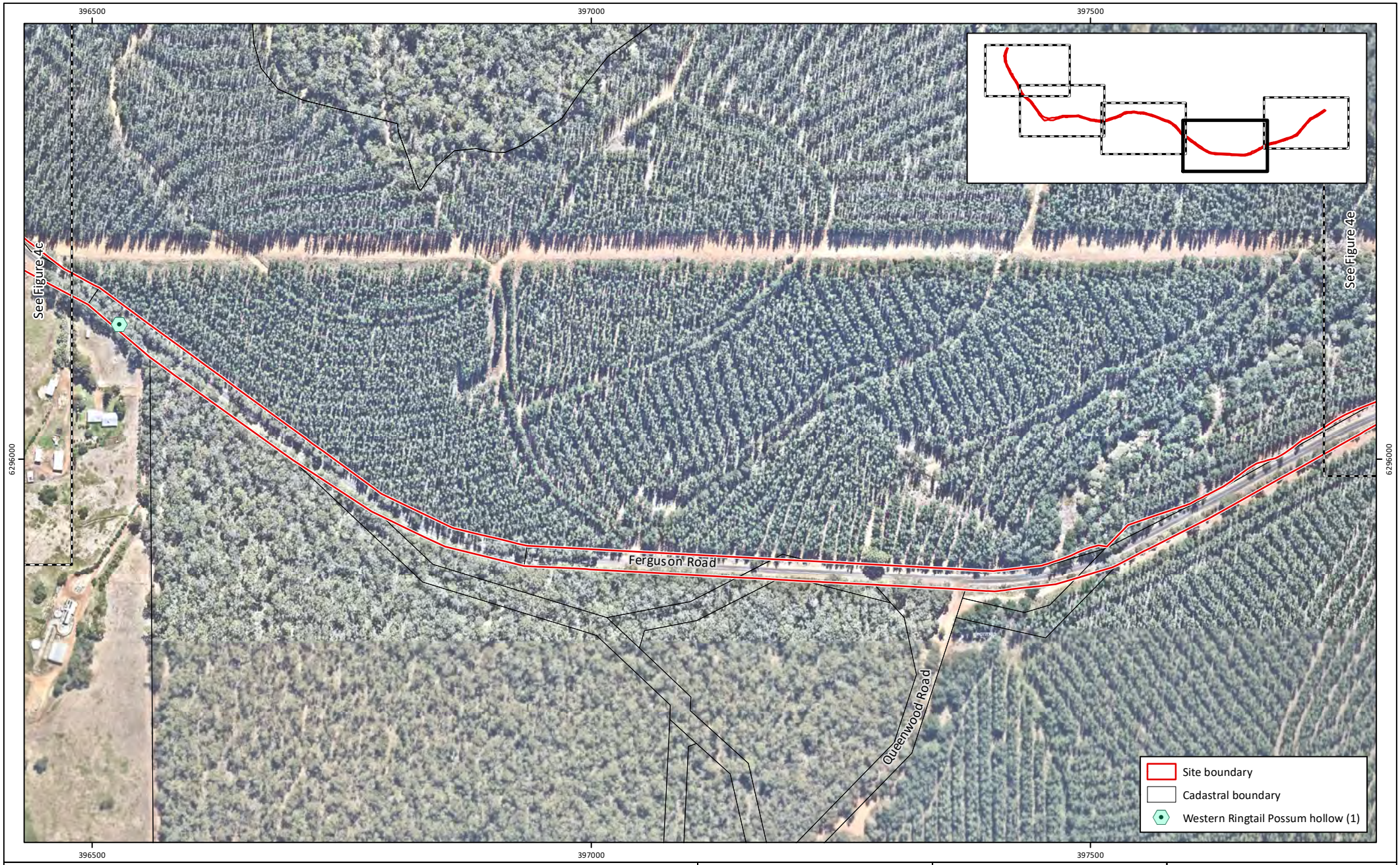

Figure 10d: Western Ringtail Possum Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F10a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 50 100 150
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Figure 10e: Western Ringtail Possum Habitat Trees

Project:	Basic and Targeted Fauna Assessment Part Ferguson Road, Ferguson
Client:	Shire of Dardanup

Plan Number:
EP22-044(02)--F10a

Drawn:	SCM
Date:	03/04/2023
Checked:	NAW
Approved:	TAA
Date:	03/04/2023

N

0 50 100 150
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Appendix A

Additional Information

Conservation Significant Fauna

Threatened and priority fauna

Fauna species considered rare or under threat warrant special protection under Commonwealth and/or State legislation. At the Commonwealth level, fauna species can be listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as 'threatened', 'migratory' or 'marine' as described in **Table 1**.

Migratory species comprise birds recognised under international treaties including:

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

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

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

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

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

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

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

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

Fauna species that may be threatened or near threatened but lack sufficient information to be legislatively listed may be added to the DBCA's *Priority Fauna List* (DBCA 2018b). Species listed under priorities 1-3 comprise possible threatened species that do not meet survey criteria or are otherwise data deficient. Species listed under priority 4 are those that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons (DBCA 2019a).

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

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

Conservation Code	Category
P1	Priority 1 – Poorly known Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
P2	Priority 2 – Poorly known Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
P3	Priority 3 – Poorly known Species that are known from several locations and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
P4	(a) Priority 4 – Rare species Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Priority 4 – Near Threatened Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Priority 4 – Other Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Black cockatoos

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

- *Zanda*[1] *latirostris* (Carnaby's black cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Zanda*[1] *baudinii* (Baudin's black cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which is listed as 'vulnerable' under the EPBC Act and the BC Act.

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

Species distribution and breeding range

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

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

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

Breeding habitat

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

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

While this dataset only applies to Carnaby's black cockatoo, the information it contains is also applicable for Baudin's black cockatoo and forest red-tailed black cockatoo as they have similar

[1] Previously *Calyptorhynchus*

breeding habitat requirements. That is, breeding sites that are suitable for Carnaby's black cockatoo may also be suitable for Baudin's black cockatoo and forest red-tailed black cockatoo, if located within their distribution/breeding ranges.

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

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

Confirmed roost sites

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

Native foraging habitat

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

In order to account for clearing of native vegetation that has occurred since the Glossop et al. (2011) dataset was created and to incorporate updated vegetation mapping and information on foraging behaviour of Carnaby's black cockatoo, Emerge have revised this dataset to represent the most up to date information available. Furthermore, Emerge have used a similar methodology to Glossop et al. (2011) to define potential foraging habitat for Baudin's black cockatoo and forest-red tailed cockatoos.

Specifically, DBCA (2021), DBCA (2019b) and DPIRD (2018) regional vegetation complex mapping was used to determine which areas of remnant vegetation support plant species known to be foraged upon by Carnaby's black cockatoo, Baudin's black cockatoo or forest red-tailed cockatoos. Where these vegetation complexes intersect remnant vegetation mapped by DPIRD (2020) they were considered to represent potential foraging habitat for Carnaby's black cockatoo, Baudin's black cockatoo and/or forest red-tailed cockatoo.

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

Pest fauna

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

Declared Pests

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

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

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

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

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

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

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

Category	Description
C1	Exclusion Not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2	Eradication Present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3	Management Established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

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

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

Wetland Habitat

Geomorphic wetland types

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

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

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

Literature

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

Table 8: Standard literature used for identifying fauna species and habitats.

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

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General references

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Department of Primary Industries and Regional Development (DPIRD) 2018, *Pre-European Vegetation – Western Australia (DPIRD-006)*, South Perth.

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Appendix B

Database Search Results

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 13-May-2022

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	32
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	8
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	12
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community may occur within area	In buffer area only

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Zanda baudinii listed as Calyptorhynchus baudinii			
Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Breeding known to occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris			
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In feature area
FISH			
Nannatherina balstoni			
Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
Bettongia penicillata ogilbyi			
Woylie [66844]	Endangered	Species or species habitat known to occur within area	In feature area
Dasyurus geoffroii			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pseudocheirus occidentalis			
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Setonix brachyurus			
Quokka [229]	Vulnerable	Species or species habitat known to occur within area	In feature area
OTHER			
Westralunio carteri			
Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
PLANT			
Andersonia gracilis			
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area	In buffer area only
Banksia nivea subsp. uliginosa			
Swamp Honeypot [82766]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat may occur within area	In buffer area only
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area	In buffer area only
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area	In buffer area only
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area	In feature area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lambertia echinata subsp. occidentalis			
Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area	In buffer area only
Synaphea sp. Fairbridge Farm (D. Papenfus 696)			
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Synaphea sp. Pinjarra Plain (A.S. George 17182)			
[86878]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Synaphea sp. Serpentine (G.R. Brand 103)			
[86879]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Synaphea stenoloba			
Dwellingup Synaphea [66311]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus			
Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Dotterel, Hooded Plover [87735]		Species or species habitat may occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Dardanup	Conservation Park	WA	In buffer area only
NTWA Bushland covenant (0030)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0107)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0146)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0150)	Conservation Covenant	WA	In buffer area only
Unnamed WA49857	Nature Reserve	WA	In buffer area only
Wellington	National Park	WA	In feature area
Wellington Discovery Forest	5(1)(h) Reserve	WA	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

RFA Name	State	Buffer Status
South West WA RFA	Western Australia	In feature area

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Banksia Road Class III Putrescible Landfill, Crooked Brook, WA	2016/7672	Controlled Action	Assessment Approach	In buffer area only
Dardanup Mine Expansion Southern Extension	2011/6087	Controlled Action	Post-Approval	In buffer area only
Waste management project and quarry, Banksia Road, Dardanup, WA	2018/8270	Controlled Action	Proposed Decision	In buffer area only
Waterloo Heavy Mineral Mining Project, Henty, WA	2013/6879	Controlled Action	Post-Approval	In buffer area only
Yarragadee Water Supply Development	2005/2073	Controlled Action	Completed	In feature area
Not controlled action				
Dardanup Residue Disposal Facility, WA	2015/7448	Not Controlled Action	Completed	In buffer area only
Gravel extraction on Lot 305 Gravel Pit Road Henty, WA	2013/6750	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
Construction of urea production plant and supporting infrastructure	2009/5067	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Donnybrook Kojonup Road (M013) widening and associated works, WA	2015/7605	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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

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Appendix C

Black Cockatoo Foraging Plants

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

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

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Corymbia calophylla	Marri	Primary	Primary	Primary	Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017; Johnstone 2017; Saunders 1979; Johnstone & Kirkby 2008
Corymbia citriodora	Lemon scented gum	Secondary	Secondary	Secondary	Johnstone et al. 2010; DSEWPaC 2012; Groom 2011; Johnstone 2017
Corymbia ficifolia	Red flowering gum	Secondary	-	-	Groom 2011
Corymbia haematoxylon	Mountain marri	Secondary	-	Secondary	Groom 2011; DoEE 2012; DoEE 2017
Corymbia maculata	Spotted gum	-	-	-	-
Darwinia citriodora	Lemon-scented darwinia	Secondary	Secondary	-	Groom 2011; Johnstone et al. 2010
Diospryros sp.	Sweet persimmon	Secondary	Secondary	-	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Eremophila glabra	Tarbush	Secondary	-	-	Groom 2011
Erodium aureum		Secondary	-	-	Groom 2011
Erodium botrys	Long storksbill	Secondary	Secondary	-	Groom 2011; Johnstone & Storr 1998; Johnstone et al. 2010
Erodium spp.		Secondary	Secondary	-	Johnstone et al. 2010; DoEE 2017
Eucalyptus caesia	Silver princess	Secondary	-	Secondary	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017; Johnstone 2017
Eucalyptus camaldulensis	River red gum	-	-	Secondary	DoEE 2012; DoEE 2017
Eucalyptus decipiens	Red heart/moit	-	-	Secondary	Johnstone 2017
Eucalyptus diversicolor	Karri	-	-	Primary	Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017; Johnstone & Storr 1998
Eucalyptus erythrocorys	Illyarrie	Secondary	-	Secondary	DSEWPaC 2012; DoEE 2017; Johnstone 2017, Johnstone et al. 2010
Eucalyptus gomphocephala	Tuart	Secondary	-	Secondary	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Eucalyptus grandis	Flooded gum, rose gum	-	-	Secondary	DoEE 2012; DoEE 2017
Eucalyptus lehmannii	Bushy yate	-	-	Secondary	Johnstone 2017
Eucalyptus leucoxylon	Yellow gum	Secondary	-	-	Groom 2014

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Eucalyptus loxophleba	York gum	Secondary	-	-	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Eucalyptus marginata	Jarrah	Primary	Secondary	Primary	Saunders 1980; Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017; Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone 2017
Eucalyptus patens	Blackbutt	Primary	-	Primary	Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017; Johnstone 2017; Groom 2011
Eucalyptus pleurocarpa	Tallerack	Secondary	-	-	Groom 2011
Eucalyptus preissiana	Bell-fruited mallee	Secondary	-	-	Groom 2011
Eucalyptus robusta	Swamp mahogany	Secondary	-	-	Johnstone et al. 2010; Groom 2011
Eucalyptus salmonophloia	Salmon gum	Primary	-	-	Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DSEWPaC 2012; DoEE 2017
Eucalyptus staeri	Albany blackbutt	-	-	Secondary	Johnstone & Storr 1998
Eucalyptus todtiana	Coastal blackbutt	Secondary	-	-	Saunders 1980; Johnstone et al. 2010; Groom 2011; Johnstone & Kirkby 2008
Eucalyptus wandoo	Wandoo	Primary	Secondary	Primary	Saunders 1980; Johnstone et al. 2010; Groom 2011; DSEWPaC 2012; DoEE 2017
Ficus sp.	Fig	Secondary	-	-	Groom 2011
Grevillea armigera	Prickly toothbrushes	Primary	-	-	Groom 2011
Grevillea bipinnatifida	Fuschia grevillea	Primary	-	-	Groom 2011
Grevillea hookeriana	Red toothbrushes	Primary	-	-	Groom 2011
Grevillea hookeriana subsp. api	Black toothbrushes	Primary	-	-	Groom 2011
Grevillea paniculata	Kerosene bush	Primary	-	-	Groom 2011
Grevillea paradoxa	Bottlebrush grevillea	Primary	-	-	Groom 2011
Grevillea petrophiloides	Pink poker	Primary	-	-	Groom 2011
Grevillea robusta	Silky oak	Primary	-	-	Johnstone et al. 2010; Groom 2011

		Foraging category as assigned by Emerge			
Species name	**Common name**	**CBC**	**BBC**	**FRTBC**	**Literature references**
Grevillea spp.		Primary	-	-	Saunders 1979; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Grevillea wilsonii	Native fuchsia	-	Secondary	-	Johnstone et al. 2010
Hakea auriculata		Primary	-	-	Saunders 1980; Groom 2011
Hakea candolleana		Primary	-	-	Groom 2011
Hakea circumalata	Coastal hakea	Primary	-	-	Groom 2011
Hakea commutata		Primary	-	-	Groom 2011
Hakea conchifolia	Shell-leaved hakea	Primary	-	-	Groom 2011
Hakea costata	Ribbed hakea	Primary	-	-	Groom 2011
Hakea cristata	Snail hakea	Primary	Secondary	-	Groom 2011; Johnstone et al. 2010
Hakea cucullata	Snail hakea	Primary	-	-	Groom 2011
Hakea cyclocarpa	Ramshorn	Primary	-	-	Saunders 1980; Groom 2011
Hakea eneabba		Primary	-	-	Groom 2011
Hakea erinacea	Hedgehog hakea	Primary	Secondary	-	Johnstone et al. 2010; Groom 2011
Hakea falcata	Sickle hakea	Primary	-	-	Groom 2011
Hakea flabellifolia	Fan-leaved hakea	Primary	-	-	Groom 2011
Hakea gilbertii		Primary	-	-	Saunders 1980; Groom 2011
Hakea incrassata	Golfball or marble hakea	Primary	-	-	Johnstone et al. 2010; Groom 2011
Hakea lasiantha	Woolly flowered hakea	Primary	-	-	Johnstone et al. 2010; Groom 2011
Hakea lasianthoides		Primary	Secondary	-	Johnstone et al. 2010; Groom 2011
Hakea laurina	Pin-cushion hakea	Primary	-	-	Johnstone et al. 2010; Groom 2011
Hakea lissocarpha	Honeybush	Primary	Secondary	-	Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea marginata		-	Secondary	-	Johnstone et al. 2010
Hakea megalosperma	Lesueur hakea	Primary	-	-	Groom 2011
Hakea multilineata	Grass leaf hakea	Primary	-	-	Groom 2011
Hakea neospathulata		Primary	-	-	Groom 2011
Hakea obliqua	Needles and corks	Primary	-	-	Saunders 1980; Groom 2011
Hakea oleifolia	Dungyn	Primary	-	-	Groom 2011

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Hakea pandanicarpa subsp. crassifolia	Thick-leaved hakea	Primary	-	-	Groom 2011
Hakea petiolaris	Sea urchin hakea	Primary	-	-	Groom 2011
Hakea polyanthema		Primary	-	-	Groom 2011
Hakea preissii	Needle tree	Primary	-	-	Groom 2011
Hakea prostrata	Harsh hakea	Primary	Secondary	-	Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea psilorrhyncha		Primary	-	-	Groom 2011
Hakea ruscifolia	Candle hakea	Primary	Secondary	-	Saunders 1980; Groom 2011; Johnstone et al. 2010
Hakea scoparia	Kangaroo bush	Primary	-	-	Groom 2011
Hakea smilacifolia		Primary	-	-	Groom 2011
Hakea spp.		Primary	Secondary	-	Saunders 1979; DSEWPaC 2012; DoEE 2017
Hakea stenocarpa	Narrow-fruited hakea	Primary	Secondary	-	Johnstone et al. 2010; Groom 2011
Hakea sulcata	Furrowed hakea	Primary	-	-	Groom 2011
Hakea trifurcata	Two-leaved hakea	Primary	Secondary	-	Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea undulata	Wavy-leaved hakea	Primary	Secondary	-	Saunders 1980; Johnstone et al. 2010; Groom 2011
Hakea varia	Variable-leaved hakea	Primary	Secondary	-	Saunders 1980; Groom 2011
Harpephyllum caffrum	Kaffir plum	-	-	Secondary	Johnstone 2017
Helianthus annuus	Sunflower	Secondary	-	-	Johnstone et al. 2010; Groom 2011
Hibiscus sp.	Hibiscus	Secondary	-	-	Groom 2011
Isopogon scabriusculus		Secondary	-	-	Groom 2011
Jacaranda mimosifolia	Jacaranda	Secondary	Secondary	-	Johnstone et al. 2010; Groom 2011
Jacksonia furcellata	Grey stinkwood	Secondary	-	-	Groom 2011
Kingia australis	Kingia	-	Secondary	-	Johnstone et al. 2010
Lambertia inermis	Chittick	Secondary	-	-	Johnstone & Storr 1998; Groom 2011
Lambertia multiflora	Many-flowered honeysuckle	Secondary	-	-	Saunders 1980; Groom 2011

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Liquidamber styraciflua	Liquid amber	Primary	-	Secondary	Johnstone et al. 2010; Groom 2011; Groom 2014; Personal observation
Lupinus sp.	Lupin	Secondary	-	-	Saunders 1980; Groom 2011
Macadamia integrifolia	Macadamia	Primary	Secondary	-	Johnstone et al. 2010; Grooms 2011; Groom 2014
Malus domestica	Apple	Secondary	Secondary	-	Johnstone et al. 2010; Johnstone & Storr 1998; DSEWPaC 2012; DoEE 2017; Groom 2011
Melaleuca leuropoma		Secondary	-	-	Saunders 1980; Groom 2011
Melia azedarach	Cape lilac or white cedar	Secondary	-	Primary	Johnstone et al. 2010; Groom 2011
Mesomeleana spp.		Secondary	-	-	Johnstone et al. 2010; Groom 2011
Olea europea	Olive	-	-	Secondary	Johnstone 2017
Persoonia longifolia	Snottygobble	-	-	Secondary	Johnstone & Storr 1998; Johnstone & Kirkby 1999; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Pinus canariensis	Canary island pine	Primary	-	-	Johnstone et al. 2010; Groom 2011
Pinus caribea	Caribbean pine	Primary	-	-	Johnstone et al. 2010; Groom 2011
Pinus pinaster	Pinaster or maritime pine	Primary	-	-	Groom 2011
Pinus radiata	Radiata pine	Primary	Secondary	-	Johnstone et al. 2010; Groom 2011
Pinus spp.		Primary	Secondary	-	Johnstone & Storr 1998; Saunders 1979; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Protea 'Pink Ice'		Secondary	-	-	Groom 2011
Protea repens		Secondary	-	-	Groom 2011
Protea spp.		Secondary	-	-	Johnstone et al. 2010
Prunus amygdalus	Almond tree	Secondary	-	-	Johnstone & Storr 1998; Johnstone et al. 2010; Groom 2011; DoEE 2017
Pyrus communis	European pear	-	Secondary	-	Johnstone & Storr 1998; Johnstone et al. 2010; DSEWPaC 2012; DoEE 2017
Quercus spp.	Oak	-	Secondary	-	Johnstone et al. 2010

Species name	Common name	Foraging category as assigned by Emerge			Literature references
		CBC	BBC	FRTBC	
Raphanus raphanistrum	Wild radish	Secondary	-	-	Groom 2011; DoEE 2017
Reedia spathacea		-	Secondary	-	Johnstone et al. 2010
Rumex hypogaeus	Doublegee	Secondary	-	-	Saunders 1980
Stenocarpus sinuatus		Secondary	-	-	Johnstone et al. 2010
Syzygium smithii	Lilly pilly	Secondary	-	-	Groom 2014
Tipuana tipu	Tipu or rosewood tree	Primary	-	-	Groom 2011, Groom 2014
Xanthorrhoea preissii	Grass tree	Secondary	Secondary	-	Groom 2011; Johnstone et al. 2010
Xylomelum occidentale	Woody pear	Secondary	-	-	Groom 2014

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

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Appendix D

Conservation Significant Species and Likelihood of Occurrence Assessment

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Birds					
Actitis hypoleucos	Common sandpiper	MI	MI	Edge of sheltered waters salt or fresh, e.g. estuaries, mangrove creeks, rocky coasts, near-coastal saltlakes (including saltwork ponds), river pools, lagoons, claypans, drying swamps, flood waters, dams and sewage ponds. Preferring situations where low perches are available (Johnstone & Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Apus pacificus	Fork-tailed swift	MI	MI	Aerial, migratory species that is most often seen over inland plains and sometimes above open areas, foothills or in coastal areas. Sometimes occurs over settled areas, including towns, urban areas and cities (Pizzey & Knight 2012).	**Possible** May opportunistically occur in or fly over the site on commute or while searching for prey.
Botaurus poiciloptilus	Australasian bittern	EN	EN	In or over water, in tall reedbeds, sedges, rushes, cumbungi, lignum. Also occurs in ricefields, drains in tussocky paddocks and occasionally in saltmarshes and brackish wetlands.	**Unlikely** No suitable habitat occurs in the site.
Calidris acuminata	Sharp-tailed sandpiper	MI	MI	Occurs in tidal mudflats, saltmarshes and mangroves, as well as, shallow fresh, brackish or saline inland wetlands. It is also known from floodwaters, irrigated pastures and crops, sewage ponds, saltfields.	**Unlikely** No suitable habitat occurs in the site.
Calidris ferruginea	Curlew sandpiper	CR	CR (MI)	Mainly shallows of estuaries and near-coastal saltlakes (including saltwork ponds) and drying near-coastal freshwater lakes and swamps. Also beaches and near-coastal sewage ponds.	**Unlikely** No suitable habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Calidris melanotos	Pectoral sandpiper	MI	MI	Mainly fresh waters (swamps, lagoons, river pools, irrigation channels and sewage ponds); also samphire flats around estuaries and saltlakes (Johnstone & Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU	Eucalypt and Corymbia forests, often in hilly interior. More recently also observed in more open agricultural and suburban areas including Perth metropolitan area. Attracted to seeding Corymbia calophylla, Eucalyptus marginata, introduced Melia azedarach and Eucalyptus spp. trees.	**Recorded** Observed flying over and primary foraging habitat present within site.
Falco hypoleucos	Grey falcon	VU	-	Species occurs in arid and semi-arid Australia, where it inhabits timbered lowland plains. In particular Acacia shrublands and that are crossed by tree-lined water courses. Species has also been observed hunting in treeless areas and frequenting tussock grassland and open woodlands (TSSC 2020).	**Unlikely** No suitable habitat occurs in the site and outside current known range.
Falco peregrinus	Peregrine falcon	OS	-	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	**Possible** May opportunistically occur in or fly over the site on commute or while searching for prey.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Leipoa ocellata	Malleefowl	VU	VU	Scrubs and thickets of Eucalyptus spp., Melaleuca lanceolata and Acacia linophylla; also other dense litter-forming shrublands. Attracted to fallen wheat in stubbles and along roads (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site and outside current known range.
Motacilla cinerea	Grey wagtail	MI	MI	In Australia mostly near running water in disused quarries, sandy and rocky streams in escarpments and rainforests, sewage ponds, ploughed fields and airfields (Pizzey & Knight 2012).	**Unlikely** No suitable habitat occurs in the site.
Numenius madagascariensis	Eastern curlew	CR	CR (MI)	Mainly tidal mudflats; also reef flats, sandy beaches and rarely near-coastal lakes (including saltwork ponds) (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Oxyura australis	Blue-billed duck	P4	-	Mainly deeper freshwater swamps and lakes; occasionally saltlakes and estuaries freshened by flood waters (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Pandion haliaetus	Osprey	MI	MI	Coasts, estuaries, bays, inlets, islands, and surrounding waters; coral atolls, reefs, lagoons, rock cliffs, stacks (Pizzey & Knight 2012).	**Unlikely** No suitable habitat occurs in the site.
Plegadis falcinellus	Glossy Ibis	MI	MI	Well-vegetated wetlands, wet pasture, ricefields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats and occasionally dry grassland (Pizzey & Knight 2012).	**Unlikely** No suitable habitat occurs in the site.
Tringa nebularia	Common greenshank	MI	MI	Mudflats, estuaries, saltmarshes, margins of lakes, wetlands, claypans (fresh and saline), commercial saltfields, sewage ponds (Pizzey & Knight 2012).	**Unlikely** No suitable habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Tyto novaehollandiae novaehollа	Australian masked owl	P3	-	Forests, open woodlands, farmlands with large trees. E.g. river red gums, adjacent cleared country, timbered watercourses, paperbark woodlands and caves (Pizzey & Knight 2012).	**Possible** Suitable habitat occurs in the site.
Zanda baudinii	Baudin's black cockatoo	EN	EN	Mainly eucalypt forests. Attracted to seeding Corymbia calophylla, Banksia spp., Hakea spp., and to fruiting apples and pears (Johnstone and Storr 1998).	**Likely** Areas of primary foraging habitat present within site.
Zanda latirostris	Carnaby's black cockatoo	EN	EN	Mainly proteaceous scrubs and heaths and adjacent eucalypt woodlands and forests; also plantations of Pinus spp. Attracted to seeding Banksia spp., Hakea spp., Eucalyptus spp., Corymbia calophylla, Grevillea spp., and Allocasuarina spp. (Johnstone and Storr 1998).	**Recorded** Observed foraging within the site.
Invertebrates					
Bertmainius opimus	Western pygmy trapdoor spider	P3	-	Mesic habitats including karri and tingle forests in the south west of WA (Main 1991). The species makes shallow burrows in the bark of karri and tingle trees an in the mossy banks of creeks (FPC 2017).	**Unlikely** No suitable habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Bertmainius tingle	Tingle pygmy trapdoor spider	EN	EN	Species constructs shallow burrows in the tree bark of tingle trees (Eucalyptus guilfoylei, E. jacksonii and E. brevistylis) or in soil on the banks of creek lines and gullies in a small area of the high rainfall, closed-forest ecosystem of the Warren bioregion on the far south coast of Western Australia. Species is only known from 2 locations, all within a small area of the Walpole-Nornalup National Park.	**Unlikely** No suitable habitat occurs in the site.
Idiosoma sigillatum	Swan Coastal Plain shield-backed	P3	-	Widely distributed in sandy areas on the Swan Coastal Plain and on Rottnest Island (Prince 2003).	**Unlikely** No suitable habitat occurs in the site and outside of known distribution
Pachysaga strobila	Vasse pachysaga	P1	-	Found near Vasse in heath or mixed woodland.	**Unlikely** No suitable habitat occurs in the site and outside of known distribution
Westralunio carteri	Carter's freshwater mussel	VU	VU	Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots. Also occupies lentic systems including large water supply dams and even on-stream farm dams. Salinity tolerance quite low (Morgan et al. 2011).	**Unlikely** No suitable habitat occurs in the site.
Mammals					

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Bettongia penicillata ogilbyi	Woylie	CR	EN	Woodlands and adjacent heaths with a dense understorey of shrubs, particularly Gastrolobium spp. (TSSC 2018).	**Unlikely** No suitable habitat (dense understorey) occurs in the site.
Dasyurus geoffroii	Chuditch	VU	VU	Wide range of habitats from woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts. Appears to utilise native vegetation along roadsides in the wheatbelt (DEC 2012b).	**Unlikely** No suitable habitat (dense understorey) occurs in the site.
Falsistrellus mackenziei	Western false pipistrelle	P4	-	High rainfall forests dominated by jarrah, karri, marri, and tuart. Occupies hollow logs for breeding and resting (Van Dyck and Strahan 2008). Also known to utilise Banksia woodland on the Swan Coastal Plain (Hosken and O'Shea 1995).	**Possible** Suitable habitat occurs in the site.
Hydromys chrysogaster	Rakali	P4	-	Areas with permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south-west (Christensen et al. 1985).	**Unlikely** No suitable habitat occurs in the site.
Isoodon fusciventer	Quenda	P4	-	Dense scrubby, often swampy, vegetation with dense cover up to one metre high (DEC 2012)	**Unlikely** No suitable habitat (dense understorey) occurs in the site.
Myrmecobius fasciatus	Numbat	EN	EN	Generally dominated by Eucalyptus spp. that provide hollow logs and branches for shelter and termites for food (van Dyck & Strahan 2008).	**Unlikely** No suitable habitat (dense understorey) occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Notamacropus irma	Western brush wallaby	P4	-	Dry sclerophyll forest, Banksia spp. woodlands and shrublands, typically favouring dense low vegetation that provides dense cover (Christensen and Strahan 1983).	**Unlikely** No suitable habitat (dense understorey) occurs in the site.
Phascogale tapoatafa wambenger	South-western brush-tailed phascogale	CD	-	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover (Triggs 2003).	**Likely** Suitable habitat and recent (2018) sightings within site
Pseudocheirus occidentalis	Western ringtail possum	CR	CR	On the Swan Coastal Plain in Agonis flexuosa woodlands and Agonis flexuosa/ Eucalyptus gomphocephala forests. Also Eucalyptus marginata forests (DBCA 2017).	**Possible** Suitable habitat occurs in the site.
Setonix brachyurus	Quokka	VU	VU	On the mainland mostly dense streamside vegetation or shrubland and heath areas, particularly around swamps (Cronin 2007).	**Unlikely** No suitable habitat (dense understorey) occurs in the site.

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

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Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		

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Appendix E

Species List

Fauna List
Part Ferguson Rd, Ferguson

Category	Status	Species name	Common name	Record type
Birds		*Gumnorhina tibicen*	Australian magpie	Sight
		Corvus coronoides	Australian raven	Sight
		Banardius zonarius	Australian ringneck	Sight
	EN	*Zanda latirostris*	Carnaby's black cockatoo	Sight
	VU	*Calyptorhynchus banksii naso*	Forest red-tailed black cockatoo	Sight
		Rhipidura albiscapa	Grey fantail	Sight
		Dacelo novaeguineae	Laughing kookaburra	Call
		Anthochaera carenculata	Red wattlebird	Call
		Purpureicephalus spurius	Red-capped parrot	Foraging evidence
		Malurus elegans	Red-winged fairy wren	Sight
		Petroica boodang	Scarlet robin	Sight
		Smicrornis brevirostris	Weebill	Sight
		Rhipidura leucophrys	Willy wagtail	Sight
Mammals		*Macropus fulignosus*	Western grey kangaroo	Skeletal remains

Note: VU = Vulnerable, EN = Endangered

Appendix F

Black Cockatoo Habitat Tree Data

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
-	394196.73	6296464.88	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394183.85	6296476.71	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394190.54	6296472.44	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394206.38	6296448.58	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394237.28	6296440.64	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394181.78	6296478.64	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394200.61	6296457.33	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394204.18	6296450.14	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394226.89	6296436.37	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394181.78	6296478.64	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
-	394250.75	6296446.18	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
132	394172.01	6296487.02	62	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
133	394415.70	6296461.97	74	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
134	394445.26	6296469.50	59	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
136	394579.48	6296493.92	61	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
137	394586.70	6296496.22	57	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
138	394933.87	6296441.23	103	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
139	394937.42	6296440.16	78	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
140	394940.32	6296438.64	54	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
1401	398406.85	6296393.47	134	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1402	398409.70	6296396.05	79	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1403	398414.06	6296396.87	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1404	398420.23	6296402.03	135	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1405	398421.11	6296406.81	63	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1406	398421.26	6296410.58	87	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1407	398426.39	6296417.29	51	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
141	394945.21	6296441.91	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
1410	398430.61	6296422.21	80	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1412	398438.59	6296432.72	108	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	NAW
1414	398445.24	6296436.34	83	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1415	398455.63	6296447.65	140	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
1417	398464.38	6296463.71	77	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
1418	398464.23	6296460.38	84	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
142	394950.72	6296438.64	89	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
143	394961.27	6296434.54	66	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
144	394973.87	6296430.13	127	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
145	394983.13	6296432.68	94	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
146	395357.73	6296487.86	62	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
147	395358.44	6296482.55	55	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
148	395363.17	6296483.49	63	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
149	395364.86	6296482.06	98	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
150	395364.22	6296480.39	80	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
151	395367.13	6296486.97	70	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
152	395399.35	6296489.65	51	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
153	395398.98	6296489.09	106	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
154	395423.36	6296503.54	68	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
155	395440.04	6296507.83	94	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
156	395582.67	6296562.71	171	*Corymbia calophylla*	Potentially suitable hollow/s	Suitable hollow/s	SCM
157	395627.45	6296564.08	51	Stag	No suitable hollow/s	No suitable hollow/s	SCM
158	395617.16	6296561.53	54	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
160	395653.71	6296559.49	71	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
161	395655.83	6296561.62	83	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
163	395681.83	6296554.80	61	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
164	395698.72	6296557.31	50	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
165	395760.08	6296546.77	96	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
166	395766.77	6296546.85	71	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
167	395777.08	6296547.18	97	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
168	395811.25	6296541.89	57	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
169	395814.78	6296542.04	63	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
170	395872.08	6296529.13	120	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
172	396343.46	6296296.35	83	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
173	396123.68	6296433.04	75	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
174	396101.80	6296444.89	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
175	396097.49	6296448.61	84	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
178	396060.15	6296463.96	51	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
180	396048.50	6296466.50	100	Stag	No suitable hollow/s	No suitable hollow/s	SCM
182	396028.38	6296479.47	55	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
183	396025.90	6296477.12	110	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
184	395989.73	6296495.47	79	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
185	395985.83	6296494.98	86	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
186	396447.36	6296183.80	81	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
187	396452.30	6296182.19	93	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
188	396456.39	6296182.90	64	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
189	396454.23	6296184.65	56	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
190	396463.13	6296177.76	101	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
191	396474.61	6296173.78	71	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
192	396474.99	6296172.90	87	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
193	396481.89	6296170.31	58	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
194	396478.94	6296168.06	59	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
195	396487.82	6296163.61	78	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
196	396496.72	6296157.16	79	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
197	396500.83	6296154.88	52	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
198	396509.81	6296149.32	62	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
199	396514.94	6296147.93	77	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
200	396521.83	6296146.34	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
279	398309.33	6296272.46	76	Stag	No suitable hollow/s	No suitable hollow/s	NAW
283	398112.43	6296155.17	54	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
284	398314.05	6296274.06	55	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
286	398115.68	6296155.31	94	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
287	398123.88	6296153.29	59	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
288	398134.17	6296155.06	110	Stag	No suitable hollow/s	No suitable hollow/s	NAW
289	398135.74	6296156.30	90	Stag	No suitable hollow/s	No suitable hollow/s	NAW
290	398156.08	6296166.27	98	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
291	398163.39	6296169.57	97	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
292	398185.13	6296179.11	95	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
293	398193.87	6296178.65	72	Stag	No suitable hollow/s	No suitable hollow/s	NAW
294	398198.34	6296186.46	70	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
297	398287.08	6296240.62	80	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
298	398292.55	6296250.44	80	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
299	398297.28	6296251.93	95	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
300	398294.87	6296259.77	88	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
3301	396516.66	6296143.18	70	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3302	396527.16	6296134.64	120	Stag	No suitable hollow/s	Suitable hollow/s	SCM
3303	396530.15	6296133.79	63	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3304	396532.63	6296127.50	66	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3305	396535.32	6296127.63	86	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3306	396542.68	6296117.40	99	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3308	396564.20	6296103.77	107	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3311	396586.61	6296085.60	69	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3312	396605.36	6296079.48	55	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3313	396622.39	6296067.80	53	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3314	396626.98	6296055.87	107	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3315	396647.04	6296040.12	92	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3317	396672.99	6296020.33	92	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3319	396740.09	6295985.89	66	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3320	396764.55	6295958.10	63	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3321	396771.14	6295958.72	51	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3324	396870.52	6295911.88	56	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3325	396876.28	6295912.50	56	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3326	396875.75	6295910.28	52	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3327	396902.96	6295902.58	66	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3329	396911.35	6295900.12	130	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3330	396976.56	6295894.39	65	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3335	397065.06	6295891.89	70	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
3337	397111.73	6295890.28	66	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3338	397117.17	6295885.57	84	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3339	397141.44	6295884.50	88	Stag	No suitable hollow/s	No suitable hollow/s	SCM
3340	397154.41	6295888.08	66	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3342	397286.59	6295876.95	53	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	SCM
3343	397309.62	6295878.64	72	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3346	397326.86	6295874.06	93	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3349	397522.16	6295895.43	70	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3350	397601.35	6295938.18	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3351	397602.66	6295937.42	64	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3352	397637.17	6295960.63	98	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3353	397637.63	6295961.41	74	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3354	397731.31	6296004.99	62	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3355	398190.87	6296163.42	150	*Corymbia calophylla*	Potentially suitable hollow/s	Suitable hollow/s	SCM
3356	398213.63	6296172.54	52	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3357	398238.78	6296184.78	102	Stag	No suitable hollow/s	No suitable hollow/s	SCM
3358	398250.18	6296188.45	51	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3359	398257.34	6296196.73	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3360	398322.80	6296263.51	104	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3362	398358.32	6296306.57	112	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3363	398358.40	6296307.57	75	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3364	398361.07	6296310.26	83	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3369	398387.49	6296342.47	53	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3370	398400.90	6296357.92	78	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3371	398418.25	6296378.50	76	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3372	398421.87	6296387.52	112	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3373	398437.85	6296406.21	125	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3374	398591.10	6296503.85	52	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3375	398591.21	6296502.19	53	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3376	398592.82	6296507.53	58	*Eucalyptus patens*	No suitable hollow/s	No suitable hollow/s	SCM
3377	398599.52	6296515.69	97	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
3378	398606.56	6296517.99	53	*Eucalyptus patens*	No suitable hollow/s	No suitable hollow/s	SCM
3379	398611.00	6296520.36	73	*Eucalyptus patens*	No suitable hollow/s	No suitable hollow/s	SCM
3380	398528.56	6296494.21	87	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3381	398529.75	6296495.89	68	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3385	398502.25	6296485.73	114	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
3391	398485.06	6296462.52	51	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
348	393987.44	6296731.29	68	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
357	394125.34	6296530.65	62	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
392	393589.65	6297363.53	103	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
393	393570.28	6297476.54	138	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
394	393573.25	6297485.22	70	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
395	393574.89	6297488.23	57	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
396	393579.21	6297493.27	89	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
397	393578.18	6297493.59	76	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
398	393677.06	6297182.97	150	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
399	393672.02	6297185.24	64	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
400	393969.25	6296754.60	171	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	SCM
416	398101.60	6296150.28	84	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
419	393716.25	6297126.74	90	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
420	393730.30	6297108.48	120	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
423	394282.10	6296465.28	62	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
424	394286.93	6296466.11	82	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
426	394621.20	6296512.12	68	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
427	394618.28	6296506.66	73	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
428	394632.40	6296507.47	77	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
429	398067.90	6296138.29	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
430	398065.33	6296135.60	53	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
431	394687.55	6296512.73	96	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
432	398060.14	6296133.88	58	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
434	394772.86	6296504.68	100	*Corymbia calophylla*	Potentially suitable hollow/s	Suitable hollow/s	NAW
435	394820.40	6296491.67	84	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
436	394859.11	6296479.01	70	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
437	394859.66	6296480.01	87	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
438	394862.56	6296478.05	76	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
439	394861.89	6296479.59	64	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
440	394861.88	6296480.48	58	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
441	394868.06	6296476.44	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
442	394874.38	6296476.73	90	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
443	394869.72	6296478.01	52	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
444	394870.19	6296477.69	66	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
445	394877.86	6296473.22	77	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
446	394883.09	6296470.84	90	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
447	394889.30	6296471.57	74	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
448	394891.86	6296467.61	62	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
449	394895.11	6296467.65	76	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
454	394899.51	6296464.70	67	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
455	394902.37	6296467.06	76	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
456	395010.82	6296441.74	92	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
457	395037.91	6296437.48	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
459	395160.75	6296440.26	56	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
460	398105.68	6296151.44	75	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
462	398317.76	6296283.86	96	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	NAW
463	398390.34	6296372.67	94	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	NAW
464	398377.61	6296354.01	68	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
465	395162.25	6296438.84	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
466	395183.29	6296444.39	76	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
467	395183.20	6296443.83	90	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
468	395187.46	6296445.43	59	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
470	395242.90	6296458.12	100	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
471	395250.85	6296462.42	55	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
475	395798.10	6296554.61	64	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
476	395807.72	6296550.73	58	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW

Tag No.	Easting	Northing	DBH (cm)	Species	BC Hollow Category	WRTP Hollow Category	Recorder
477	396007.68	6296502.76	51	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
478	396056.91	6296479.45	63	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
480	396198.72	6296429.08	81	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
481	396296.66	6296361.60	59	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
485	397934.09	6296093.29	53	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
487	397961.72	6296098.91	59	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
488	397968.21	6296100.08	81	Stag	No suitable hollow/s	No suitable hollow/s	NAW
490	397991.22	6296112.75	100	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
491	398010.25	6296115.17	60	Stag	No suitable hollow/s	No suitable hollow/s	NAW
492	398012.57	6296115.30	64	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
494	398046.92	6296127.86	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
495	398041.14	6296129.46	64	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
499	398335.55	6296297.79	68	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
500	398359.17	6296331.31	142	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
512	398322.72	6296289.56	68	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
566	398321.70	6296288.78	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
585	398383.52	6296358.18	59	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
586	398395.17	6296372.27	55	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
587	398396.39	6296380.27	102	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
588	398397.68	6296381.50	92	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
589	398347.50	6296318.43	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
590	398319.40	6296287.09	75	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
591	398347.36	6296314.77	60	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
592	398373.72	6296353.20	85	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
593	398377.69	6296355.23	99	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
594	398347.27	6296314.11	73	*Eucalyptus marginata*	No suitable hollow/s	No suitable hollow/s	NAW
596	398323.89	6296284.25	166	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
599	398334.43	6296306.65	80	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW
na	393696.35	6297170.10	50	*Corymbia calophylla*	No suitable hollow/s	No suitable hollow/s	NAW

Appendix G

Black Cockatoo Hollow Data

Hollow Data

Part Ferguson Road, Ferguson

Tree ID 156

Project no.: EP22-044 (02)
Inspection date: 15/08/2022
No. hollows: 1
Species: *Corymbia calophylla*

Hollow ID	1
Hollow type:	Top-entry
Inspection type(s):	Ground
	Drone

Determined hollow category (black cockatoo)

Potentially suitable hollow

Determined hollow category (western ringtail possum)

Suitable hollow

Evidence of nesting

Fledglings:	No
Egg/s or egg fragments:	No
Feathers:	No
Nest material	No
Other:	N/A

Evidence of hollow use

Fauna observed:	None
Chew marks:	None
Other	N/A

Justification of hollow categories:

- Internal dimensions suitable for breeding by black cockatoos
- Base of hollow not visible
- Height of hollow is suitable for breeding by black cockatoos
- Internal dimensions suitable for western ringtail possum

Hollow Data

Part Ferguson Road, Ferguson

Tree ID 434

Project no.: #REF!
Inspection date: 15/08/2022
No. hollows: 1
Species: *Corymbia calophylla*

Hollow ID	1
Hollow type:	Top-entry
Inspection type(s):	Ground
	Pole camera

Determined hollow category (black cockatoo)

Potentially suitable hollow

Determined hollow category (western ringtail possum)

Suitable hollow

Evidence of nesting

Fledglings:	No
Egg/s or egg fragments:	No
Feathers:	No
Nest material	No
Other:	N/A

Evidence of hollow use

Fauna observed:	None
Chew marks:	None
Other	N/A

Justification of hollow categories:

- Internal dimensions suitable for breeding by black cockatoos
- Base of hollow not visible
- Height of hollow is suitable for breeding by black cockatoos
- Internal dimensions suitable for western ringtail possum

Hollow Data

Part Ferguson Road, Ferguson

Tree ID 3302

Project no.: #REF! **Inspection date:** 15/08/2022

No. hollows: 1 **Species:** Stag

Hollow ID	1
Hollow type:	Side-entry
Inspection type(s):	Ground
	Drone

Determined hollow category (black cockatoo)

Not suitable hollow

Determined hollow category (western ringtail possum)

Suitable hollow

Evidence of nesting

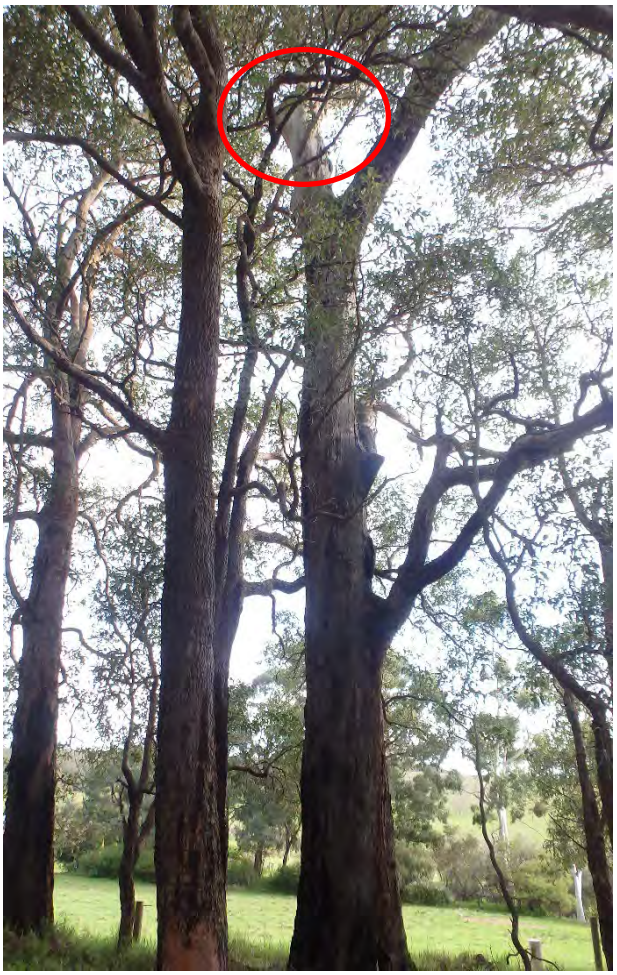
Fledglings:	No
Egg/s or egg fragments:	No
Feathers:	No
Nest material	No
Other:	N/A

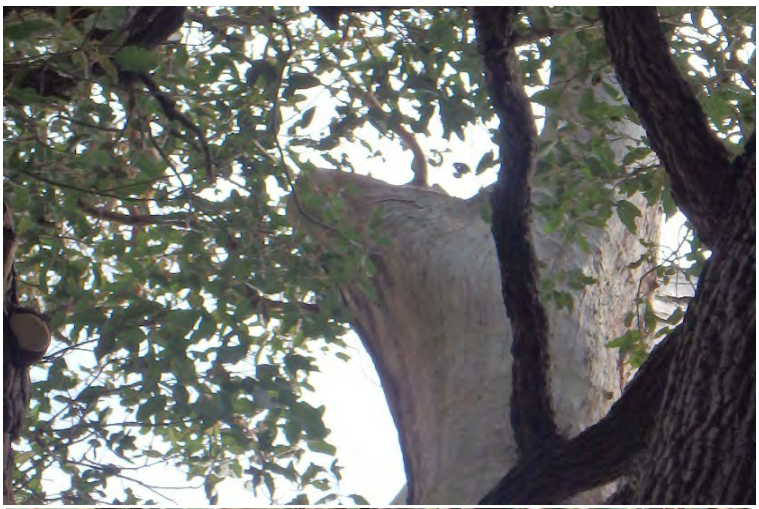
Evidence of hollow use

Fauna observed:	None
Chew marks:	None
Other	N/A

Justification of hollow categories:

- Internal dimensions not suitable for breeding by black cockatoos
- Internal dimensions suitable for western ringtail possum





Hollow Data

Part Ferguson Road, Ferguson

Tree ID 3355

Project no.: #REF!
Inspection date: 15/08/2022
No. hollows: 1
Species: *Corymbia calophylla*

Hollow ID	1
Hollow type:	Top-entry
Inspection type(s):	Ground
	Drone

Determined hollow category (black cockatoo)

Potentially suitable hollow

Determined hollow category (western ringtail possum)

Suitable hollow

Evidence of nesting

Fledglings:	No
Egg/s or egg fragments:	No
Feathers:	No
Nest material	No
Other:	N/A

Evidence of hollow use

Fauna observed:	None
Chew marks:	Possibly
Other	Wear marks

Justification of hollow categories:

- Internal dimensions suitable for breeding by black cockatoos
- Base of hollow not visible
- Height of hollow is suitable for breeding by black cockatoos
- Internal dimensions suitable for western ringtail possum