Black Cockatoo Habitat Assessment

Nanga Road, Dwellingup

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Executive Summary

The Shire of Murray intends to widen a section of Nanga Road in Dwellingup (referred to as the 'site'). Emerge were engaged to conduct a 'targeted' assessment of threatened black cockatoo habitat to provide information on black cockatoo habitat values within the site to inform a clearing permit application.

As part of the assessment a desktop assessment of relevant background information was completed and a field survey was undertaken 11 December 2020. During the field survey an assessment of habitat for threatened black cockatoo species was completed.

Outcomes of the survey include the following:

- The site contains remnant native jarrah/marri forest vegetation with habitat value for all three species of black cockatoo.
- The site occurs within the modeled distribution and breeding range of all three species of black cockatoo.
- Indirect evidence of forest red-tailed black cockatoo was observed across the site. No signs of use by Carnaby's or Baudin's cockatoo was recorded but they are considered likely to occur.
- A total of 75 habitat trees were recorded of which one contained a hollow that was considered potentially suitable for use as breeding habitat by black cockatoos when viewed from the ground.
- No evidence of black cockatoo roosting activity was observed within the site. Roosting habitat for all three species of black cockatoo occurs within the site in the form of tall trees.
- Foraging evidence attributed to forest red-tailed black cockatoo was recorded within the site.
- A total of 1.98 ha of black cockatoo foraging habitat was mapped within the site. The foraging habitat occurs as jarrah/marri forest and comprises primary foraging plants for Carnaby's cockatoo and forest red-tailed black cockatoo and a mixture of primary and secondary plants for Baudin's cockatoo.

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Black Cockatoo Habitat Tree Data

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
VU	Vulnerable

Table A3: Abbreviations –Legislation

Legislation	
EPBC 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

1 Introduction

1.1 Project background

The Shire of Murray intends to widen a section of Nanga Road in Dwellingup. This section (referred to herein as the 'site') is located approximately 102 kilometres (km) south of the Perth Central Business District within the Shire of Murray and is zoned 'state forest' and 'rural' under the *Peel Region Scheme* and 'road' under the Shire of Murray's *Town Planning Scheme No. 4*.

The site is approximately 2.44 hectares (ha) in size and extends from the intersection of Nanga Road and Holmes Road in the north to the intersection of Nanga Road and River Road to the south. The location and extent of the site is shown in **Figure 1**.

1.2 Purpose and scope of work

Emerge Associates (Emerge) were engaged by the Shire of Murray to conduct a black cockatoo habitat survey of the site to inform a clearing permit application and road design and construction. The purpose of this survey is to provide sufficient information on black cockatoo habitat values within the site to inform these processes.

The scope of work was specifically to undertake a 'targeted' black cockatoo habitat assessment within the site to the standard required of the Environmental Protection Authority's (EPA's) technical guidance (EPA 2016) and with reference to the Department of Agriculture, Water and the Environment (DAWE) guidance on the assessment of black cockatoo habitat.

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

- Desktop review of relevant background information pertaining to the site and surrounds, including database and literature searches relating to black cockatoos and black cockatoo habitat.
- Fine scale mapping of black cockatoo habitat including habitat trees (native eucalypt trees ≥50 cm in diameter at breast height (DBH)).
- Documentation of the desktop assessment, survey methodology and results into a report.

2 Background

2.1 Environmental Context

The site occurs in the northern jarrah forest subregion, as defined by the *Interim Biogeographic Regionalisation of Australia* (IBRA) (Environment Australia 2000).

The northern jarrah forest occurs in the south west of Western Australia and approximately extends from Dardanup in the south to Mogumber/ New Norcia in the north on its western side and then down to Williams / Darkan on its eastern side. This region comprises the northern part of the Darling Plateau and generally contains of acidic yellow-mottled soils with ironstone gravel (Beard 1990).

Beard *et al.* (2013) mapping shows the site within the 'West Darling_3' vegetation association which is described as 'mainly jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*)'.

2.2 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**.

2.3 Black cockatoos

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

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

Broad-scale maps are available for the modelled distribution of Baudin's cockatoo, Carnaby's cockatoo and forest red-tailed black cockatoo (DSEWPaC 2011; DoEE 2016a, c). The modelled distribution maps also include 'known breeding areas' and 'predicted breeding range' for Baudin's cockatoo and 'breeding range' and 'non-breeding range' for Carnaby's cockatoo. No breeding range modelling is available for forest red-tailed black cockatoo but the species is known to breed mainly in the jarrah forest region (DBCA 2017) 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).

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

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

2.4 Black cockatoo habitat

2.4.1 Breeding habitat

Black cockatoos' nest in hollows that form in large trees and so 'breeding habitat' is typically assessed as 'habitat' trees. Generally, habitat trees are native eucalypts with a hollow that is suitable for a black cockatoo to nest within or that are of sufficient size that a suitable nest hollow could develop in time (DSEWPaC 2012). Any tree that has a suitable hollow may provide breeding habitat for black cockatoos. However, as a tree may need to be more than 200 years old before it develops a suitable hollow, remnant native eucalypts are most likely to be recorded as habitat trees.

The suitability of a tree hollow for use by black cockatoos is principally contingent on its physical dimensions and orientation. Local studies indicate that to be suitable a hollow must generally:

- have an entrance opening of at least 10 cm but preferably 20-30 cm (Saunders *et al.* 1982; Groom 2010; Johnstone *et al.* 2013) (Groom 2010; Saunders et al. 1982; 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).

The minimum size for a habitat tree is typically determined through measurement of trunk 'diameter at breast height' (DBH). For most native eucalypts minimum DBH is defined as ≥50 centimetres (cm). However, for some eucalypts such as *Eucalyptus wandoo* (wandoo) and *Eucalyptus salmonophloia* (salmon gum) that are known to form suitable hollows at smaller size a DBH of ≥30 cm is applied (DSEWPaC 2012).

Breeding habitat is also generally expected to be located within 7 km of food and water resources (Saunders 1990).

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

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

While this dataset only applies to Carnaby's cockatoo, the information it contains is also applicable for Baudin's cockatoo and forest red-tailed black cockatoo as they have similar breeding habitat requirements. That is, breeding habitat that is suitable for Carnaby's cockatoo is likely to also be suitable for Baudin's cockatoo and forest red-tailed black cockatoo, if located within the latter species respective breeding range.

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

The Carnaby's cockatoo recovery plan also identifies 13 'important bird areas' for Carnaby's cockatoo, which are identified as 'sites of global bird conservation importance' (DPaW 2013b). 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.

2.4.2 Roosting habitat

Roosts are trees that black cockatoos reside and rest within during the day and overnight. Generally, roosting habitat comprises taller trees which may be native or non-native species (DSEWPaC 2012). Roosts are often located near a water source and within 6 km to 12 km of foraging resources (Shah 2006; DSEWPaC 2012; Le Roux 2017). The use of a particular roost site may vary over time depending on the local availability of water and food.

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 records of black cockatoo numbers (Peck *et al.* 2019).

2.4.3 Foraging habitat

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

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

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

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

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

Emerge Associates (2020b) have used a similar methodology to Glossop et al. (2011) to define potential foraging habitat for forest-red tailed cockatoos. Specifically, DBCA (2019) regional vegetation complex mapping has been used to determine which areas of remnant vegetation support plant species known to be foraged upon by forest red-tailed cockatoos, including *Allocasuarina fraseriana* (sheoak), *Corymbia calophylla* (marri), *Eucalyptus gomphocephala* (tuart) and *Eucalyptus marginata* (jarrah). Where these vegetation complexes intersect remnant vegetation mapped by DPIRD (2019b) they were considered to represent potential foraging habitat for forest red-tailed cockatoos.

2.5 Previous surveys

No previous fauna surveys are known to have been undertaken specifically over the site. Numerous studies have been completed over the south west of Western Australia in relation to the status of black cockatoo species (refer **Section 2.4** and **Section 7.1**). Current information on the occurrence and habitat of all three species of black cockatoo within the Shire of Murray is provided in Johnstone (2017).

3 Methods

3.1 Desktop assessment

A search was conducted of publicly available regional studies and spatial datasets that provide information on black cockatoo records and potential habitat mapping (Glossop *et al.* 2011; DPaW 2013a; DoEE 2016a, c, b; Emerge Associates 2020a, b).

3.2 Field survey

Two ecologists from Emerge visited the site on the 11 December 2020 during the day to conduct the targeted black cockatoo habitat assessment.

The weather conditions prior to and during the survey were hot and dry with temperatures ranging from a minimum of 20.3°C to maximum of 31.1°C according to the Dwellingup weather station (009538) (BoM 2021).

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

3.2.1 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) (Groom 2010; Saunders et al. 1982; 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).

Habitat trees were individually identified and the attributes outlined in **Table 1** were recorded for each tree. Note habitat trees located within and adjacent to the site were recorded as in the absence of physical markers the boundary of the site could not be accurately defined in the field.

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

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

Habitat trees that appeared to have hollows potentially suitable for use by a black cockatoo from the ground were also tagged with a unique identifier on a metal tag. Where safe to do so, the hollows in these trees 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, feathers or the presence of birds within the hollow.

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 such that they could contain a suitable hollow. These trees were not recorded as habitat trees as the likelihood they would ever form a suitable hollow was low.

All recorded habitat trees were assigned to a category listed in **Table 2**.

Table 2: Habitat tree categories

Category	Specifications
Nest	The tree contains a hollow used by black cockatoos for breeding as confirmed by records of black cockatoos, their eggs or fledglings or other evidence of recent nesting activity by black cockatoos
Potential nest	The tree contains one or more hollows that are suitable for use by black cockatoos as breeding habitat as confirmed by internal hollow inspection^ and evidence of use by an unidentified bird 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 3.1.1**.

3.2.2 Roosting habitat

The site was assessed for the presence of active or historical roosts and its potential to provide roosting habitat for black cockatoos. However, no dusk roost survey was undertaken. Groups of tall native and non-native trees, if present, were assumed to provide potential roosting habitat.

3.2.3 Foraging habitat

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

Foraging habitat was then further classified as primary or secondary foraging habitat. Primary foraging plants were defined as those with historical and contemporary records of regular consumption by black cockatoos. Secondary foraging plants were defined as plants that black cockatoos have been recorded consuming occasionally or that, based on their limited extent or agricultural origin, should not be considered a sustaining resource. Each patch of foraging habitat was assigned a percentage cover value for primary and secondary foraging plants and non-foraging plants (that is the balance of the patch that was neither a primary or secondary foraging option). A list of plant species classified as primary or secondary foraging plants is provided as **Appendix B.**

Secondary evidence of black cockatoo foraging, such as chewed marri, jarrah, tuart or banksia fruits, was searched for within the site and allocated to a species where possible. The locations of black cockatoo foraging evidence within the site were mapped using a hand-held GPS unit.

3.3 Data analysis, presentation and mapping

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

Foraging habitat was mapped on aerial photography with the boundaries interpreted from aerial photography and notes taken in the field.

Foraging habitat was described according to the dominant flora species and vegetation type present, as determined from observations made during the field survey. Primary and secondary foraging habitat was mapped on aerial photography with the boundaries interpreted from aerial photography and notes taken in the field. Patches of vegetation comprising a combination of primary and secondary foraging plants were mapped as ‘mixed’ foraging habitat. As it was not always possible to separate non-foraging plants from foraging plants, some of the mapped foraging habitat also include a proportion of non-foraging plant species.

3.4 Nomenclature and sources of information

Taxonomy and nomenclature of scientific and common names for fauna species follow the *Western Australian Museum* (WAM) *Checklist of the Terrestrial Vertebrate Fauna of Western Australia* (WAM 2020). Where common names were not provided by Western Australian Museum (2019); (WAM 2020), these have been derived from other sources.

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 3**.

Table 3: 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 targeted black cockatoo habitat survey was undertaken. The level of survey and survey effort are considered adequate to assess the black cockatoo habitat values within the site.
Scope	No limitation	The survey focused on black cockatoo habitat within the site.
Proportion of fauna identified, recorded and/or collected.	No limitation	The field survey was competed during the day. Weather conditions on the day were also hot and not conducive to fauna movement. However, the survey was focussed on recording habitat not fauna.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data.	Minor limitation	Adequate information was available from database searches and previous surveys to place habitat in context. Taxonomy and nomenclature of scientific and common names for fauna species follow the *Western Australian Museum* (WAM) *Checklist of the Terrestrial Vertebrate Fauna of Western Australia* (WAM 2020). This is contrary to the recent EPA (2020) advice to follow the Australian Faunal Directory (DAWE 2020b) nomenclature for birds. The guidance currently available from Commonwealth and State agencies on the assessment of black cockatoo habitat lacks detail and relies heavily on technical experts preparing their own assessment methodology.
The proportion of the task achieved and further work which might be needed.	Minor limitation	The entire site was accessible during the survey and the majority of the task was achieved. The one potentially suitable hollow was not able to be internally inspected due to its location on a road reserve and safety reasons. Further inspection of this hollow would be required to determine if it is currently suitable for black cockatoo breeding.
Experience level of personnel	No limitation	This fauna assessment was undertaken by qualified and experienced ecologists with 2-4 years' experience in habitat tree assessment in Western Australia.
Suitability of timing, weather and season	No limitation	Survey timing is not of great importance for a black cockatoo habitat assessment (with exception of detecting active nests). Nevertheless, the survey was undertaken within the main breeding season for all three species of black cockatoo (refer **Section 2.4.1**).
Completeness	No limitation	The desktop assessment, field survey and targeted black cockatoo habitat assessment components of the survey were completed comprehensively.
Spatial coverage and access	No limitation	Site coverage was comprehensive (track logged).

Table 3: 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.
Influence of disturbance	No limitation	The site is highly modified due to historical disturbance (road construction) but this did not limit ability to detect and record habitat.
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. In response this assessment applies an internally developed methodology that is considered to provide a systematic and balanced characterisation of black cockatoo habitat.

4 Results

4.1 Desktop information

Publicly available regional datasets relating to black cockatoo distribution, records and extent of habitat types were reviewed in relation to the site and surrounding area, as summarised in **Table 4** and shown in **Figure 2.** Detailed information on each dataset considered as part of the desktop review is provided in **Appendix A**.

Table 4: Summary of black cockatoo background review

Category		Site context	Source
Species distribution		• Site is in the modelled distribution and known breeding range of all three species of black cockatoo	(DoEE 2016a, c, b)
Carnaby's cockatoo breeding areas (12 km radius surrounding breeding sites)		• No confirmed breeding areas intersect the site. • No possible breeding areas intersect the site.	(Glossop *et al.* 2011)
Important bird areas for Carnaby's cockatoo		• None within the site • None within 12 km of the site	DPaW (2013a)
Roost site		• None within the site • Three roost sites within 6km of the site (refer **Figure 2**): o 2 associated with white-tailed^ black cockatoos o 1 associated with white^ and red-tailed black cockatoos	{Peck, 2019 #4199}
Foraging habitat	White-tailed black cockatoo^	• Native foraging habitat is mapped within the south-western, south-eastern and north-eastern portions of the site. • Extensive areas of native foraging habitat mapped within the wider local area of the site (Refer **Figure 2**).	(Glossop *et al.* 2011)(Emerge Associates 2020a)
	White-tailed black cockatoo^	• A large pine plantation is mapped within 6 km of the site to the south east (Refer **Figure 2**).	(Forest Products Commission 2020)
	Forest red-tailed black cockatoo	• Native foraging habitat is mapped within the south-western, south-eastern and north-eastern portions of the site. • Extensive areas of native foraging habitat mapped within the wider local area of the site (Refer **Figure 2**).	(Emerge Associates 2020a)

^Carnaby's and/or Baudin's cockatoo

4.2 General site conditions

The site comprises a linear section of road reserve inclusive of bitumen hard stand, compacted road shoulder and native soils and vegetation at the margins. The native vegetation is predominantly *Corymbia calophylla* (marri) and *Eucalyptus marginata* (jarrah) forest with understory in varying levels of intactness.

4.3 Species inventory

No black cockatoos were observed within the site during the survey. Indirect evidence of forest red-tailed black cockatoo was recorded in the form of feathers at one location in the north of the site and foraging evidence throughout the site.

4.4 Habitat trees

A total of 75 black cockatoo habitat trees were recorded within the site as shown in **Figure 3**.

The habitat trees comprised 15 *Corymbia calophylla* (marri), 3 *Eucalyptus patens* (Swan River blackbutt), 56 *Eucalyptus marginata* (jarrah) and 1 stag (dead tree).

One jarrah tree was determined to have a 'potentially suitable hollow(s)' (tree ID 282). No hollow inspection was undertaken for this tree as it was located close to the road and use of the pole camera was considered unsafe without traffic management. The hollow in tree ID 282 did not exhibit any signs of use when viewed from the ground. The remaining trees were determined to not contain hollows suitable for black cockatoos.

A summary of the habitat trees recorded within the site is provided in **Table 5** and an inventory in **Appendix C.**

Table 5: Habitat trees recorded within the site

Category	No. trees	No. hollows
Confirmed nest	-	-
Potential nest	-	-
Suitable hollow(s)	-	-
Potentially suitable hollow(s)	1	1
No suitable hollow(s)	74	N/A
Total	**75**	**1**

4.5 Roosting habitat

No roosts or secondary evidence of roosting was 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.

4.6 Foraging habitat

No black cockatoos were observed foraging within the site during the field survey.

Foraging evidence in the form of chewed marri fruits attributed to forest red-tailed black cockatoos was observed throughout the site.

A total of 1.98 ha of black cockatoo foraging habitat occurs within the site that consists of marri and jarrah trees. The location of the foraging habitat mapped within the site is shown **Figure 3**.

Marri is a primary foraging plant for all three species of black cockatoo and jarrah is a primary foraging plant for Carnaby's cockatoo and forest red-tailed black cockatoo and a secondary foraging plant for Baudin's cockatoo All of the mapped foraging habitat comprises a mixture of marri and jarrah and so was classified as comprising primary or a mix of primary and secondary foraging plants by species as outlined in **Table 6**.

Table 6: Proportion of primary, secondary and non-foraging plants within patches of foraging habitat

	Carnaby's	Baudin's	Forest red-tailed
	ha	ha	ha
Primary foraging plants	1.98	0.39	29.68
Secondary foraging plants	0	1.58	0
Non-foraging plants	**0**	**0**	**0**
Total	1.98	1.98	29.68

5 Discussion

Evidence of one species of black cockatoo was recorded and the other two species are considered likely to occur as the site lies within their expected range and suitable habitat occurs within the site. The site is located within the jarrah forest region which provides extensive areas of generally well reserved black cockatoo habitat, which the site is contiguous with. Therefore, the black cockatoo habitat within the site represents a small portion of a much larger resource.

The precise boundary of the site was somewhat difficult to interpret on the ground due to lack of physical markers and spatial error associated with handheld GPS receivers. A total of 75 habitat trees were recorded within the site and additional adjacent habitat trees were noted. The number of habitat trees that are truly within the site may be different. However, survey pick up of trees and demarcation of the site boundary would be required to determine this. The habitat trees recorded within the site are nonetheless considered to provide a reliable indication of the potential black cockatoo breeding habitat within the site.

6 Conclusions

The site contains remnant native jarrah/marri forest vegetation with habitat for all three species of black cockatoo.

The site occurs within the modeled distribution and breeding range of all three species of black cockatoo.

Indirect evidence of forest red-tailed black cockatoo was observed across the site. No signs of use by Carnaby's or Baudin's cockatoo was recorded but they are considered likely to occur.

A total of 75 habitat trees were recorded of which one contained a hollow that was considered potentially suitable for use as breeding habitat by black cockatoos when viewed from the ground. Internal inspection of this hollow would be required to confirm whether it is suitable for black cockatoo breeding.

No evidence of black cockatoo roosting activity was observed within the site. Roosting habitat for all three species of black cockatoo occurs within the site in the form of tall trees.

Foraging evidence attributed to forest red-tailed black cockatoo was recorded within the site. A total of 1.98 ha of black cockatoo foraging habitat was mapped within the site. The foraging habitat occurs as jarrah/marri forest and comprises primary foraging plants for Carnaby's cockatoo and forest red-tailed black cockatoo and a mixture of primary and secondary plants for Baudin's cockatoo.

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Figures

Figure 1: Site Location

Figure 2: Black Cockatoo Context

Figure 3: Black Cockatoo Habitat Trees

Figure 4: Black Cockatoo Foraging Habitat

Figure 1: Site Location

Project:	Black Cockatoo Habitat Assessment Nanga Road, Dwellingup
Client:	Shire of Murray

Plan Number:
EP20-146(01)--F01

Drawn:	GAR
Date:	22/01/2021
Checked:	TAA
Approved:	TAA
Date:	22/01/2021

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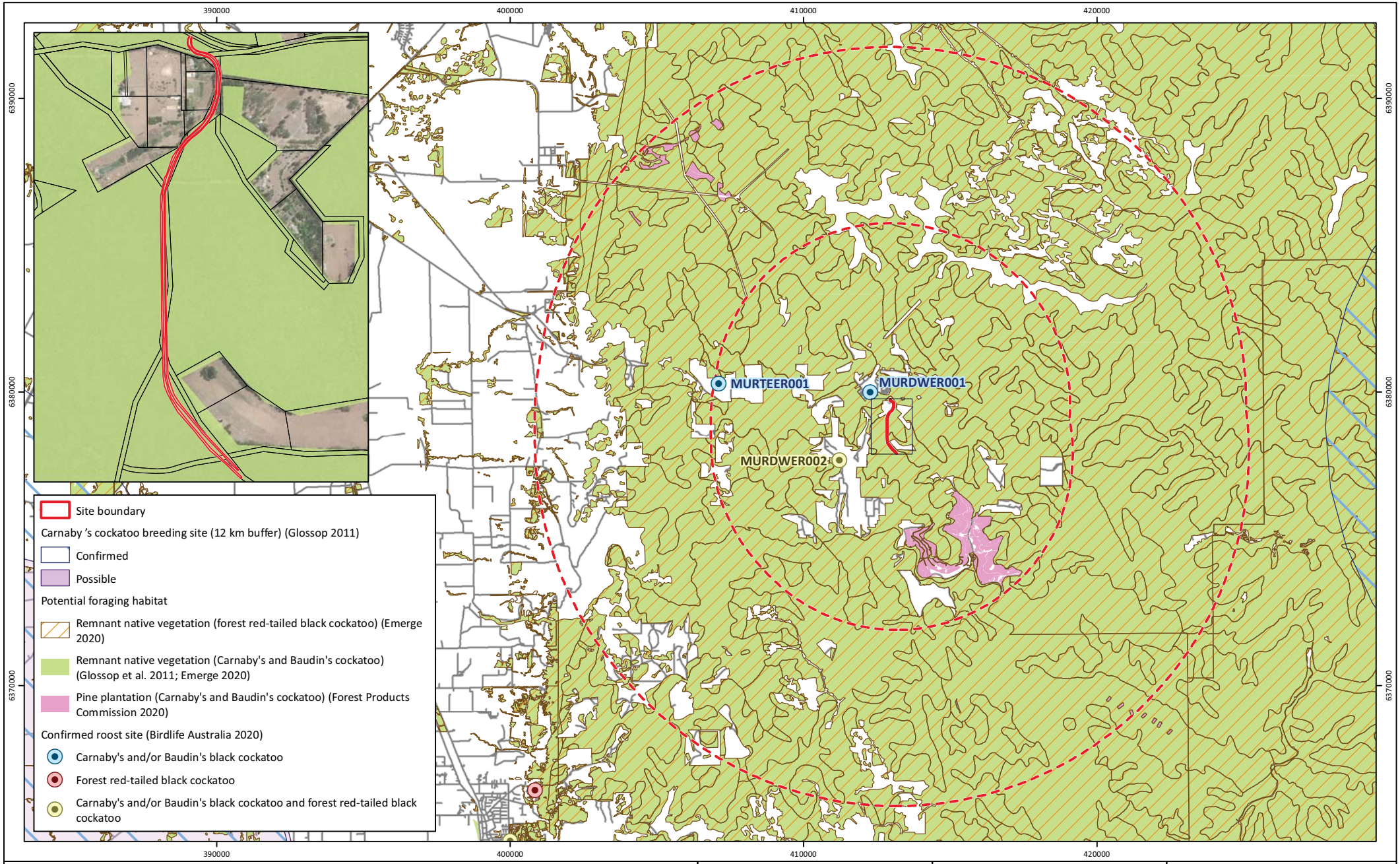

Figure 2: Black Cockatoo Habitat Context

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup
Client: Shire of Murray

Plan Number:
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Checked: TAA
Approved: TAA
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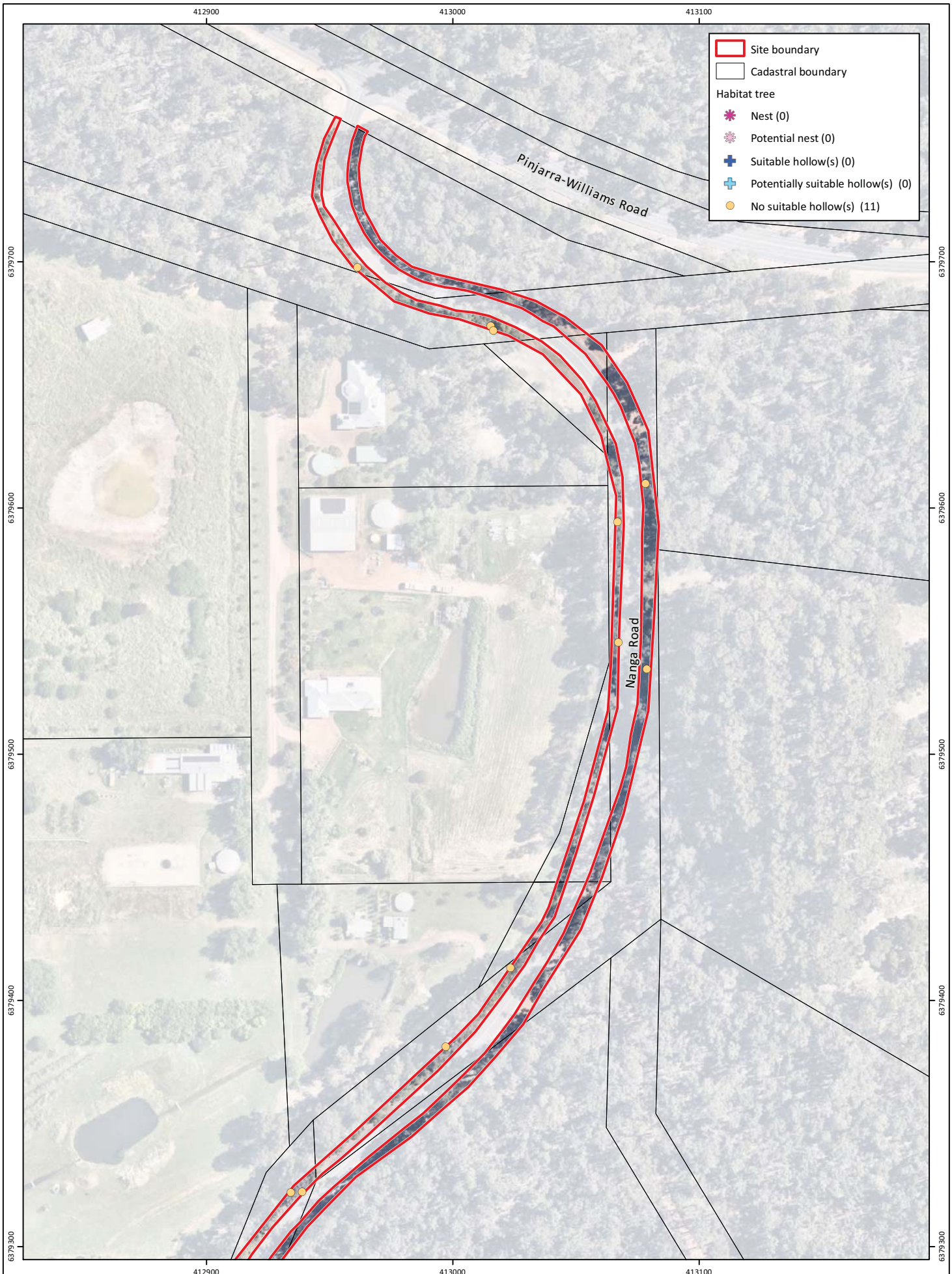

Figure 3: Black Cockatoo Habitat Trees - Map 1 of 4

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number: EP20-146(01)--F03

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Approved:	TAA
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GDA 1994 MGA Zone 50

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Figure 3: Black Cockatoo Habitat Trees - Map 2 of 4

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F03

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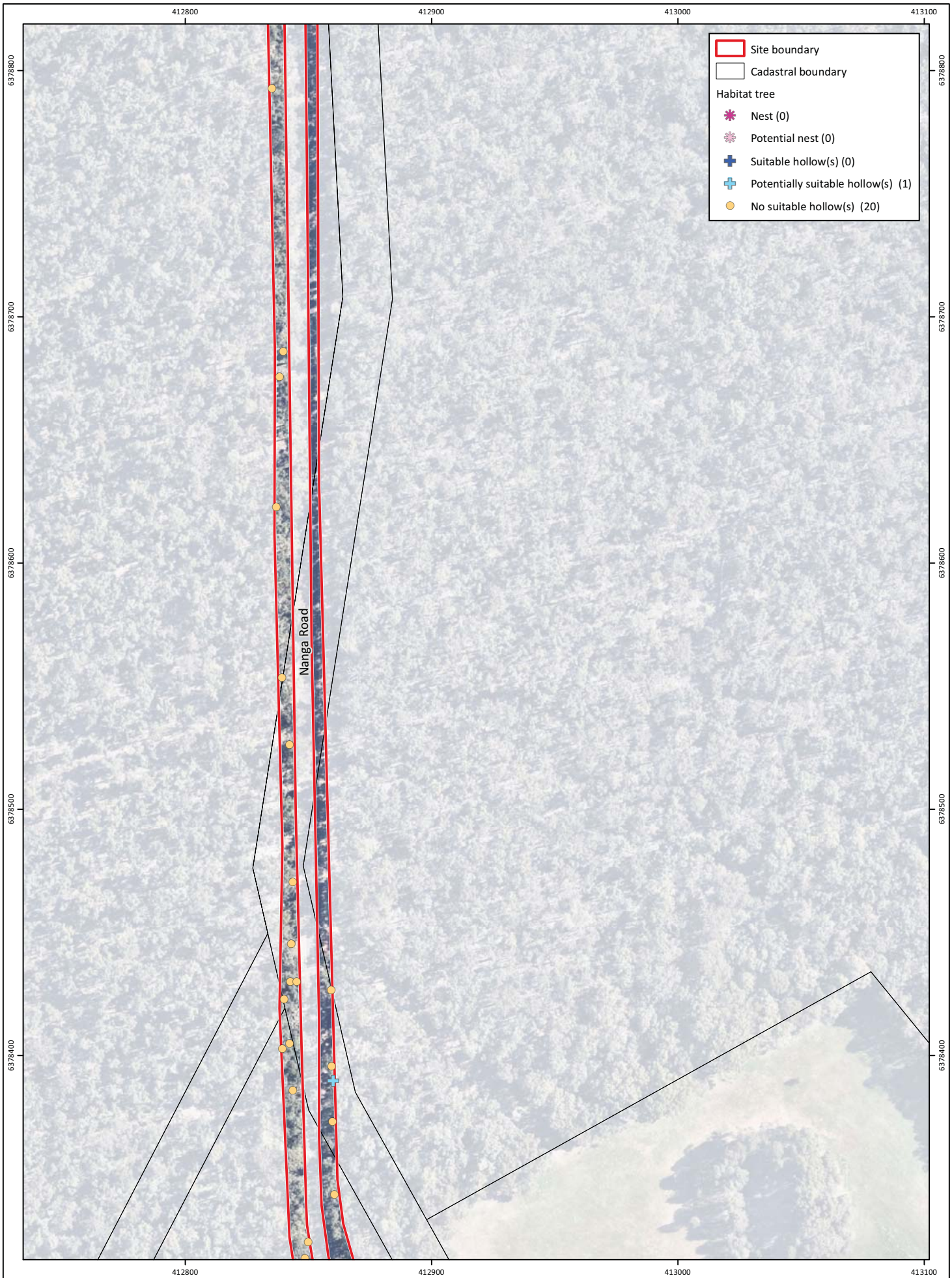

Figure 3: **Black Cockatoo Habitat Trees - Map 3 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F03

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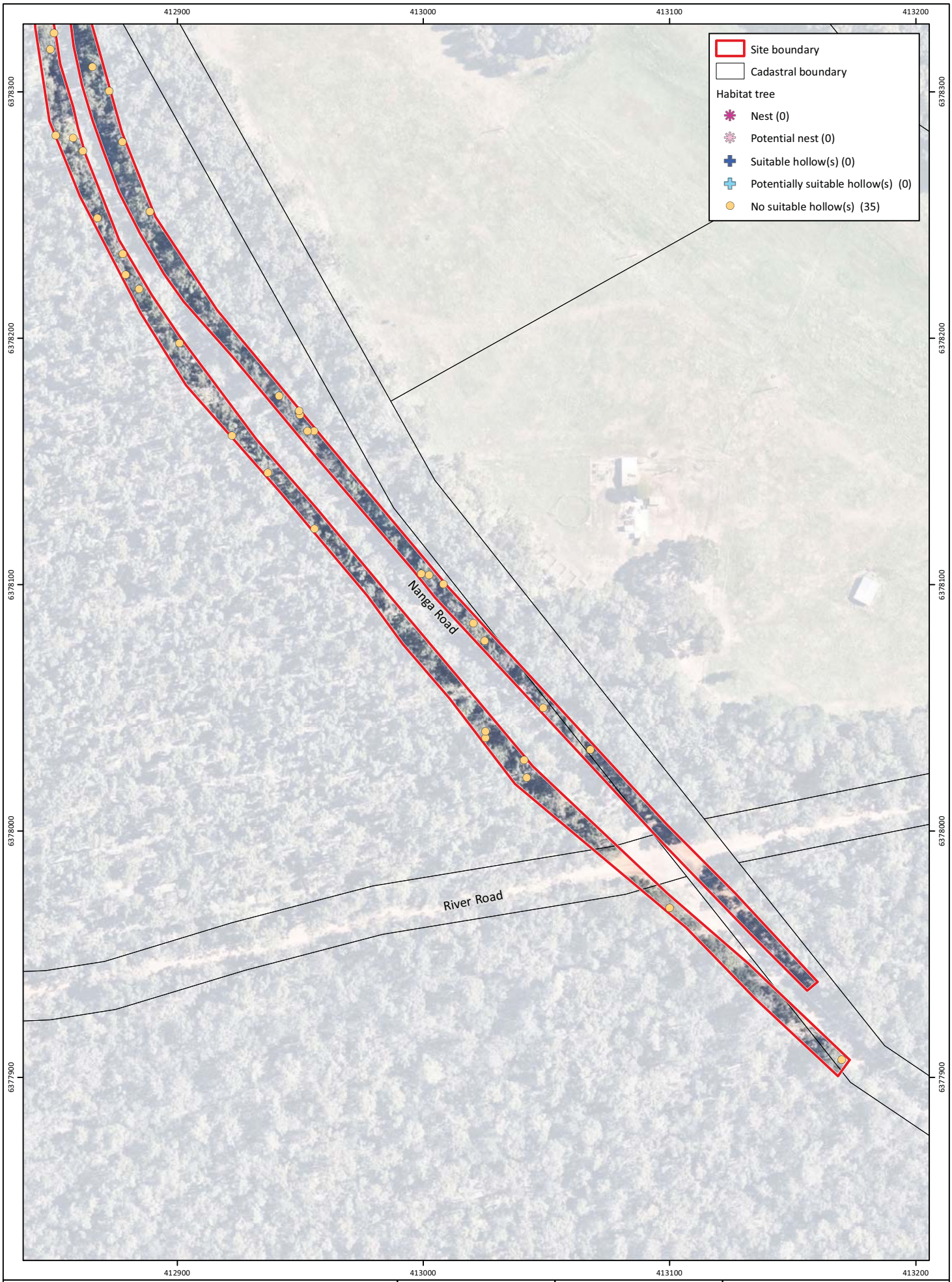

Figure 3: **Black Cockatoo Habitat Trees - Map 4 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number: EP20-146(01)--F03

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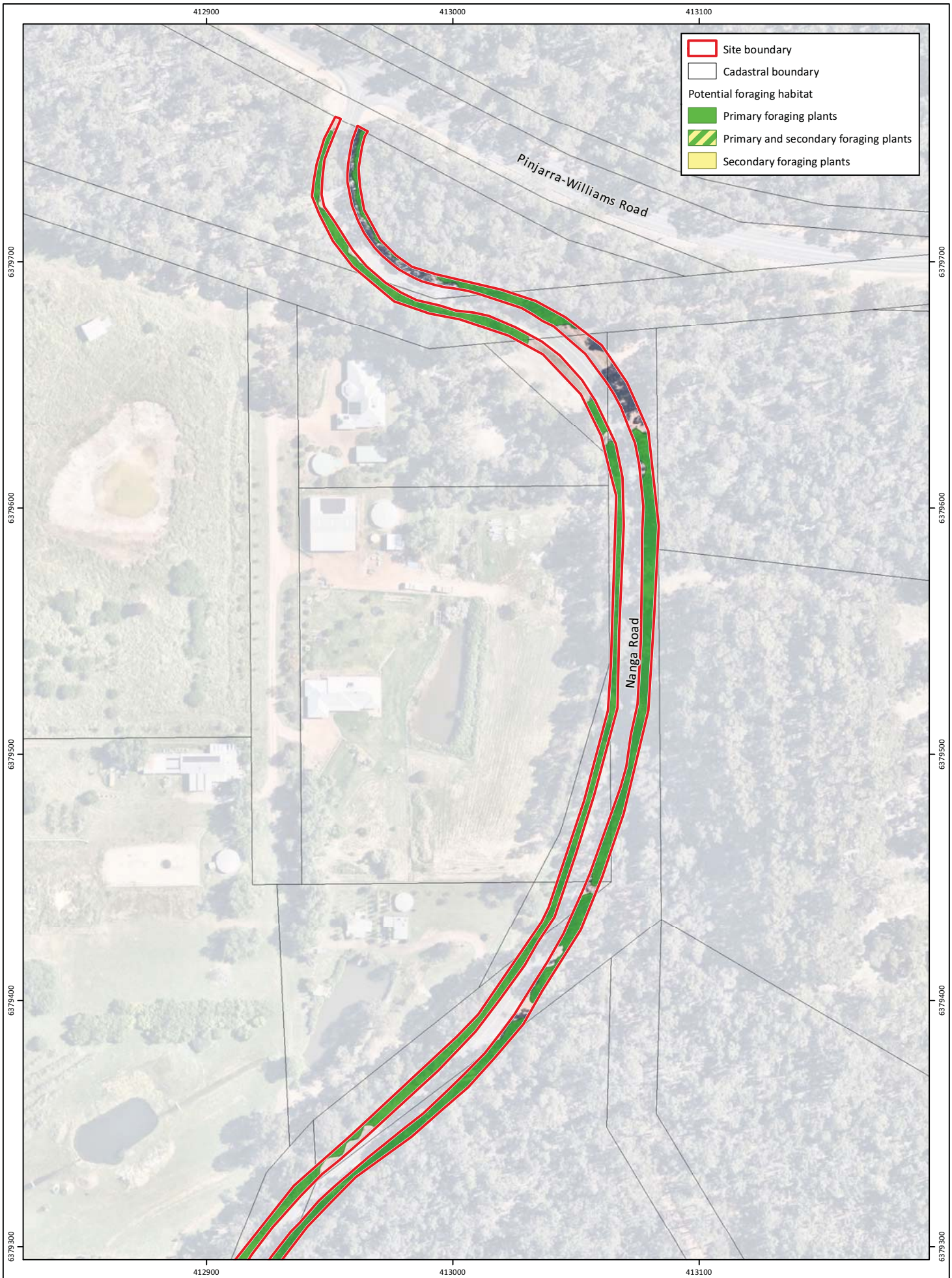

Figure 4: **Carnaby's Cockatoo Foraging Habitat - Map 1 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F04

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Approved:	TAA
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Figure 4: **Carnaby's Cockatoo Foraging Habitat - Map 2 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F04

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Figure 4: **Carnaby's Cockatoo Foraging Habitat - Map 3 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number: EP20-146(01)--F04

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Figure 4: **Carnaby's Cockatoo Foraging Habitat - Map 4 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number: EP20-146(01)--F04

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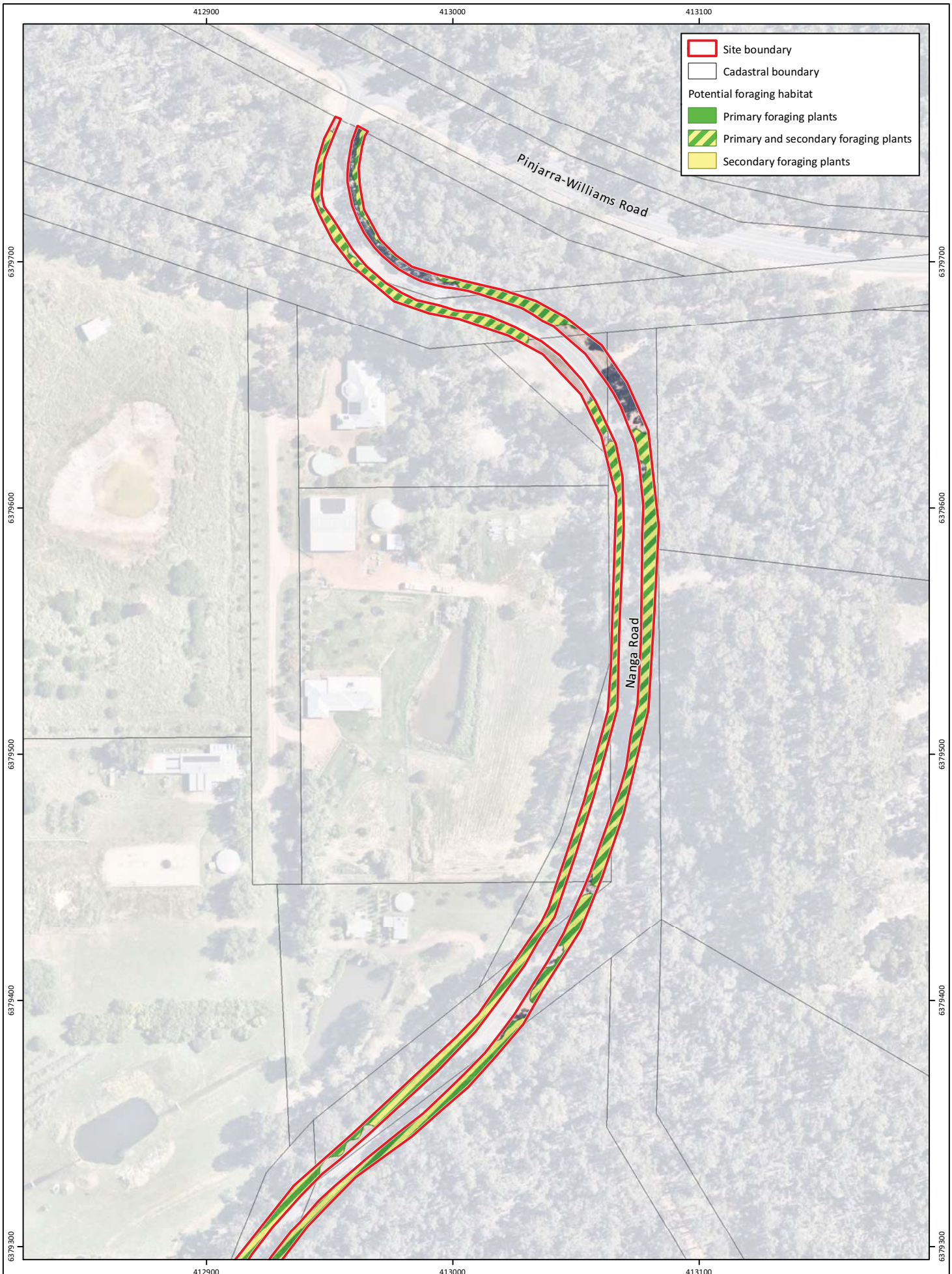

Figure 5: **Baudin's Cockatoo Foraging Habitat - Map 1 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F11

Drawn:	GAR
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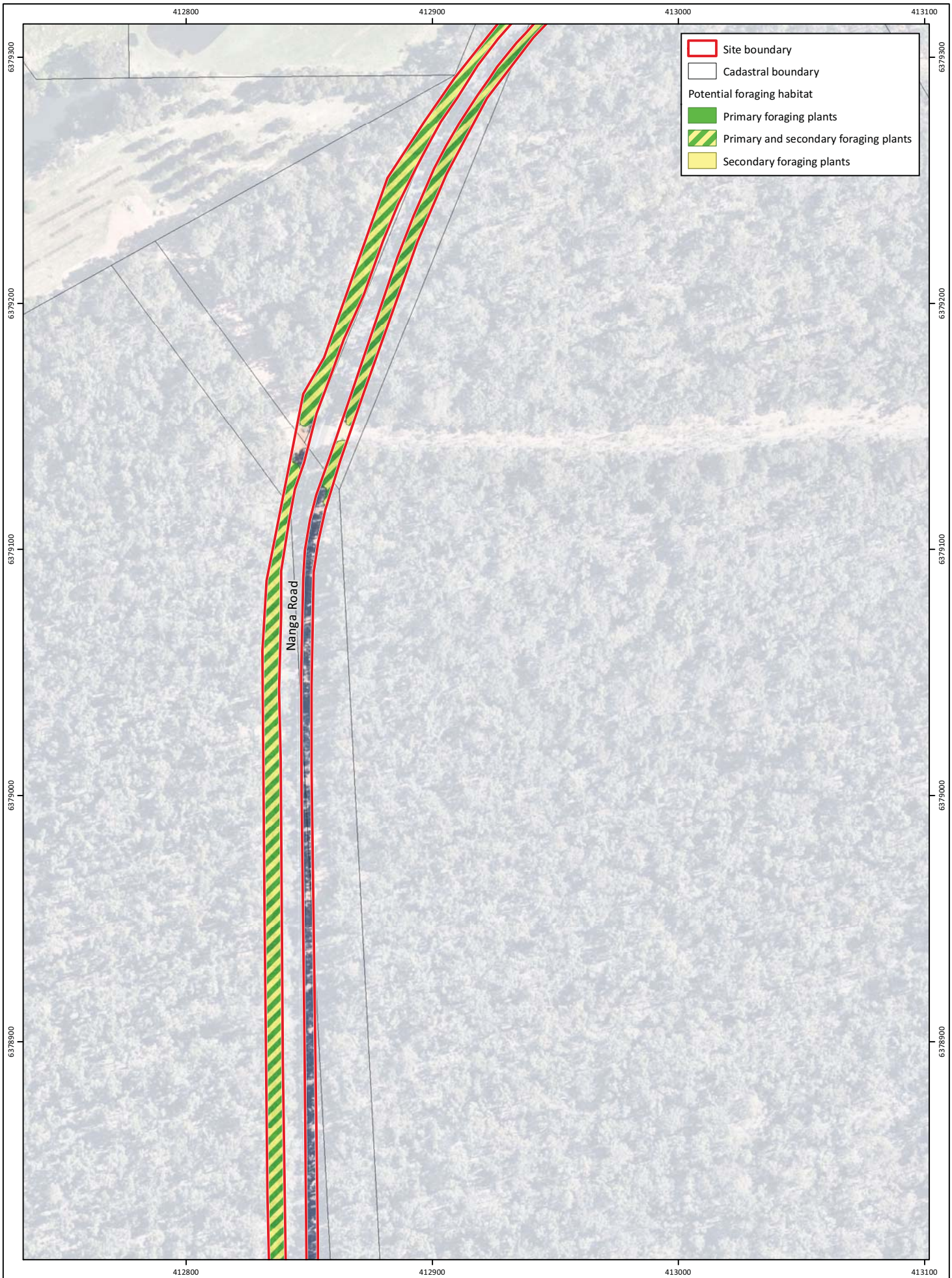

Figure 5: **Baudin's Cockatoo Foraging Habitat - Map 2 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number: EP20-146(01)--F11

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GDA 1994 MGA Zone 50

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Figure 5: **Baudin's Cockatoo Foraging Habitat - Map 3 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F11

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Figure 5: **Baudin's Cockatoo Foraging Habitat - Map 4 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number: EP20-146(01)--F11

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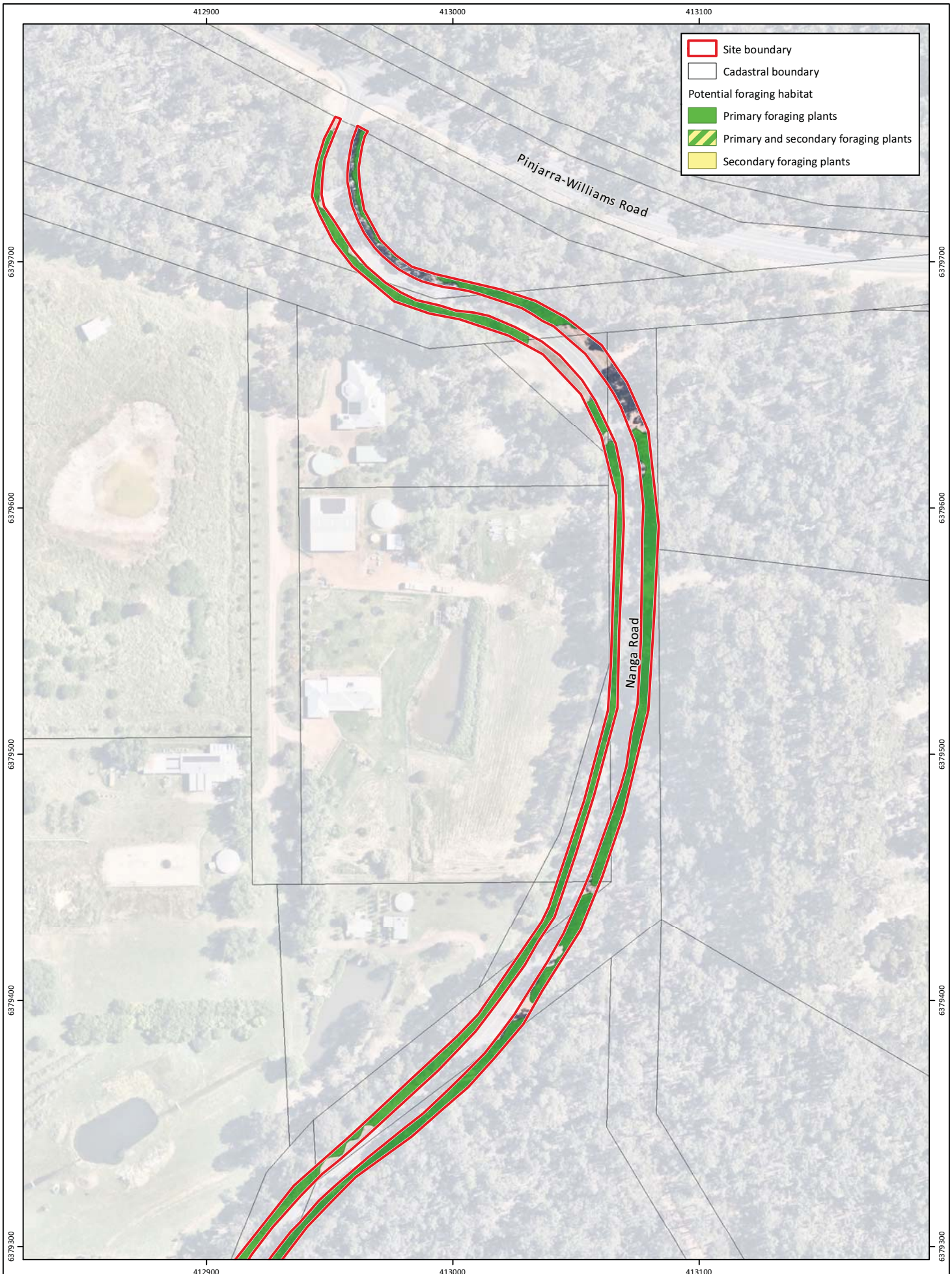

Figure 6: Forest Red-tailed Black Cockatoo Foraging Habitat - Map 1 of 4

Project:	Black Cockatoo Habitat Assessment Nanga Road, Dwellingup
Client:	Shire of Murray

Plan Number:
EP20-146(01)--F12

Drawn:	GAR
Date:	10/02/2021
Checked:	TAA
Approved:	TAA
Date:	10/02/2021

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Scale: 1:2,000@A4

GDA 1994 MGA Zone 50

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Figure 6: **Forest Red-tailed Black Cockatoo Foraging Habitat - Map 2 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F12

Drawn:	GAR
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Approved:	TAA
Date:	10/02/2021

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Scale: 1:2,000@A4

GDA 1994 MGA Zone 50

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Figure 6: **Forest Red-tailed Black Cockatoo Foraging Habitat - Map 3 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F12

Drawn:	GAR
Date:	10/02/2021
Checked:	TAA
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Date:	10/02/2021

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Metres

Scale: 1:2,000@A4

GDA 1994 MGA Zone 50

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Figure 6: **Forest Red-tailed Black Cockatoo Foraging Habitat - Map 4 of 4**

Project: Black Cockatoo Habitat Assessment
Nanga Road, Dwellingup

Client: Shire of Murray

Plan Number:
EP20-146(01)--F12

Drawn:	GAR
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Scale: 1:2,000@A4

GDA 1994 MGA Zone 50

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Appendix A

Additional Information

Conservation Significant Fauna

Threatened and priority fauna

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

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

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

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

Conservation Code	Category
X	Threatened Fauna –Extinct There is no reasonable doubt that the last member of the species has died.
EW[#]	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 fauna categories listed 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 2018). Species listed under priorities 1-3 comprise possible threatened species that do not meet survey criteria or are otherwise data deficient. Species listed under priority 4 are those that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons (DBCA 2019a).

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

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

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

Black cockatoos

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

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

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

Species distribution and breeding range

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

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

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

Breeding habitat

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

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

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

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

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

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

Confirmed roost sites

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

Native foraging habitat

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

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

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

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

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

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

Pest fauna

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

Declared Pests

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

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

Table 5.

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

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

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

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

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

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

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

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

Literature

The main literature used for identifying fauna and fauna habitats is listed in **Table 7** below.

Table 7: 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)

References

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Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2011, *Modelled distribution of Carnaby's black cockatoo (Calyptorhynchus latirostris)*, Commonwealth of Australia, Canberra, Australian Capital Territory.

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

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Appendix B

Black Cockatoo Foraging Plants

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

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

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

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

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

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

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

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

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

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Appendix C

Black Cockatoo Habitat Tree Data

EP20-146(01) Habitat Tree Data

Easting	Northing	DBH_cm	Species	Forage_ev	Hollows	Hollow_sui	Recorder	Rec_Date	BC_Label
412831.1455	6379050.834	66	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412831.7636	6379023.122	69	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412832.8718	6379067.702	63	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412833.2713	6379043.536	55	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412835.0956	6378792.986	64	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412836.7777	6378622.704	64	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412836.7893	6378866.951	55	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412838.2805	6378675.713	56	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412838.947	6378845.35	54	Corymbia calophylla	FRTBC	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412839.0089	6378859.653	74	Eucalyptus marginata	None	Yes	FALSE	SCM	10/12/2020	No suitable hollow(s)
412839.1664	6378553.432	79	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412839.3644	6378402.761	61	Eucalyptus marginata	None	Maybe	FALSE	SCM	10/12/2020	No suitable hollow(s)
412839.6883	6378686.147	52	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412840.0297	6378423.056	55	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412842.217	6378526.184	52	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412842.2508	6378404.893	74	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412842.6868	6378429.953	55	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412842.9264	6378445.366	67	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412843.5417	6378385.946	67	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412843.6445	6378470.318	50	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412845.1242	6378429.864	66	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412848.0677	6379162.296	51	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412848.4525	6378317.582	65	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412849.8934	6378324.247	53	Corymbia calophylla	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412849.9595	6379160.317	57	Corymbia calophylla	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412850.6351	6378282.455	65	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412857.7664	6378281.409	52	Corymbia calophylla	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412859.1155	6378426.661	53	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412859.2952	6378395.508	79	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412859.7739	6378373.005	53	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412860.0945	6378389.86	62	Eucalyptus marginata	None	Yes	TRUE	MS	10/12/2020	Potentially suitable hollow(s)
412860.5002	6378343.631	52	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412861.654	6378276.232	73	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412864.774	6379191.601	54	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412865.4783	6378310.303	51	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412867.5176	6378248.788	63	Eucalyptus marginata	None	Maybe	FALSE	SCM	10/12/2020	No suitable hollow(s)
412872.216	6378300.716	69	Eucalyptus marginata	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412877.6454	6378280.031	61	Eucalyptus marginata	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412877.8578	6378234.466	52	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412879.0562	6378226.05	55	Corymbia calophylla	FRTBC	Maybe	FALSE	SCM	10/12/2020	No suitable hollow(s)
412884.4479	6378220.332	56	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412888.8588	6378251.636	65	Eucalyptus marginata	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412900.8532	6378198.302	63	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412922.2682	6378160.683	60	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412934.203	6379321.928	80	Corymbia calophylla	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412936.8337	6378145.4	51	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412938.6984	6379322.3	50	Corymbia calophylla	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412941.3374	6378176.816	64	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412949.4504	6378170.678	59	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412949.8407	6378168.908	67	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412952.8956	6378162.504	54	Corymbia calophylla	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412955.5203	6378162.416	69	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412955.6808	6378122.726	62	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412961.2743	6379697.903	52	Corymbia calophylla	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
412997.2267	6379381.241	54	Corymbia calophylla	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
412999.0412	6378104.48	70	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413002.232	6378103.954	52	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413007.9789	6378100.456	52	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413015.4695	6379673.986	52	Corymbia calophylla	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413016.5159	6379672.221	51	Corymbia calophylla	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413020.2084	6378084.376	56	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413023.3777	6379413.068	62	Eucalyptus patens	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
413024.7693	6378077.21	63	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)

413025.0888	6378040.736	89	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
413025.2078	6378037.855	55	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
413040.841	6378029.011	50	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
413041.9339	6378021.925	52	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
413048.7169	6378049.924	64	Eucalyptus marginata	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413066.8713	6379594.388	60	Eucalyptus patens	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413067.2055	6379545.498	51	Eucalyptus patens	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413067.7933	6378033.128	74	Corymbia calophylla	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413078.2627	6379610.01	51	Corymbia calophylla	FRTBC	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413078.7359	6379534.512	82	Stag	None	No	FALSE	MS	10/12/2020	No suitable hollow(s)
413099.9357	6377968.883	67	Corymbia calophylla	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)
413169.9126	6377907.297	83	Eucalyptus marginata	None	No	FALSE	SCM	10/12/2020	No suitable hollow(s)