



Natural Area
CONSULTING MANAGEMENT SERVICES

Shire of Toodyay

Black Cockatoo Habitat Assessment

Julimar and Chitty Road

Natural Area Holdings Pty Ltd
Whadjuk Country
57 Boulder Road, Malaga, WA, 6090
Ph: (08) 9249 7634
info@naturalarea.com.au
www.naturalarea.com.au



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Executive Summary

The Shire of Toodyay (the Shire) has requested a Black Cockatoo habitat assessment to be conducted along Julimar and Chitty Road to support an application for a clearing permit. Natural Area Consulting Management Services (Natural Area) was commissioned by the Shire to conduct a Black Cockatoo habitat assessment which involved the identification and assessment of habitat trees. Evidence of foraging and roosting, and the presence of foraging habitat were also recorded.

Baudin's Black Cockatoo were seen flying over both the Julimar Road and Chitty Road survey areas. The vegetation within the survey areas was identified to be high-quality Black Cockatoo foraging habitat. Evidence of historical feeding was observed at the Julimar Road survey area. No evidence of roosting (scats and feathers at the base of trees) was observed at either of the survey areas.

No evidence of breeding was observed at either of the survey areas. Nine potential habitat trees for cockatoos were present at the Julimar Road survey area and four potential habitat trees at the Chitty Road survey area. One of the habitat trees at the Julimar Road survey area, and three of the habitat trees at the Chitty Road area contained hollows which were considered to have the potential to be suitable for use by Black Cockatoos. These trees were graded and assigned a Class 3 value as they contained hollows that were of a suitable size and orientation to support Black Cockatoo nesting. Additionally, 35 trees were identified at the Julimar Road survey area with a DBH of 300 mm to 500. None of these contain hollows and are therefore all assigned a Class 5 value, however these were surveyed as they have the potential to develop suitable nesting hollows in the future.

Many of the hollow entrances were not visible from the ground so an assessment of the internal hollow characteristics and their potential use could not be confirmed. Of the entrances that were visible, no chew marks or evidence of hollow use were observed during the survey. There was also no secondary evidence of hollow use such as scats and feathers at the base of the trees. Internal inspection of the hollows would be required to confirm the suitability of the hollows for Black Cockatoos. It should also be noted that not all hollows may have been visible from the ground. New growth, dense foliage and position in the landscape can hide hollows from vision.

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1.0 Introduction

Natural Area was commissioned by the Shire to conduct a Black Cockatoo habitat assessment along Julimar Road and Chitty Road reserve vegetation to support the Shire's application for a clearing permit to the Department of Water and Environmental Regulation (DWER). Clearing of vegetation is required to enable the Shire to conduct road upgrades, which will include re-sheeting the existing road, defining open drains/culvert outlets and sealing the road for safety improvements.

1.1 Location

The Julimar Road and Chitty Road survey areas are located within the Jarrah Forest region in the Shire of Toodyay. The survey area along Julimar Road is approximately 17.8 km north-west of the Toodyay townsite and extends from SLK 17.56 to SLK 19.81 (Figure 1). The Chitty Road survey area is approximately 14.9 km south of the Toodyay townsite and only involved the assessment of four individual trees. The locations of these potential habitat trees are SLK 0004.50, 0005.58, and 0005.78 (two trees at this last location) (Figure 2).

1.2 Scope

Natural Area undertook a Black Cockatoo habitat assessment at Chitty Road and Julimar Road to identify and record attributes of potential habitat trees. Activities undertaken for both survey areas included:

- a desktop assessment of previous reports, surveys, and available data (Protected Matters Search Tool (PMST) and NatureMap)
- a field survey to identify Black Cockatoo habitat trees, foraging areas and record required attributes including:
 - diameter at breast height (DBH) of trees \geq 300 mm
 - GPS location
 - height
 - health
 - species of individual habitat trees
 - presence, size, location and type of hollows
 - evidence of Black Cockatoo feeding or roosting activities (e.g., chewed Banksia cones and *Eucalyptus* sp. nuts, presence of feathers, droppings)
 - recording foraging habitat, vegetation type and condition
- mapping and reporting outcomes of assessment activities.



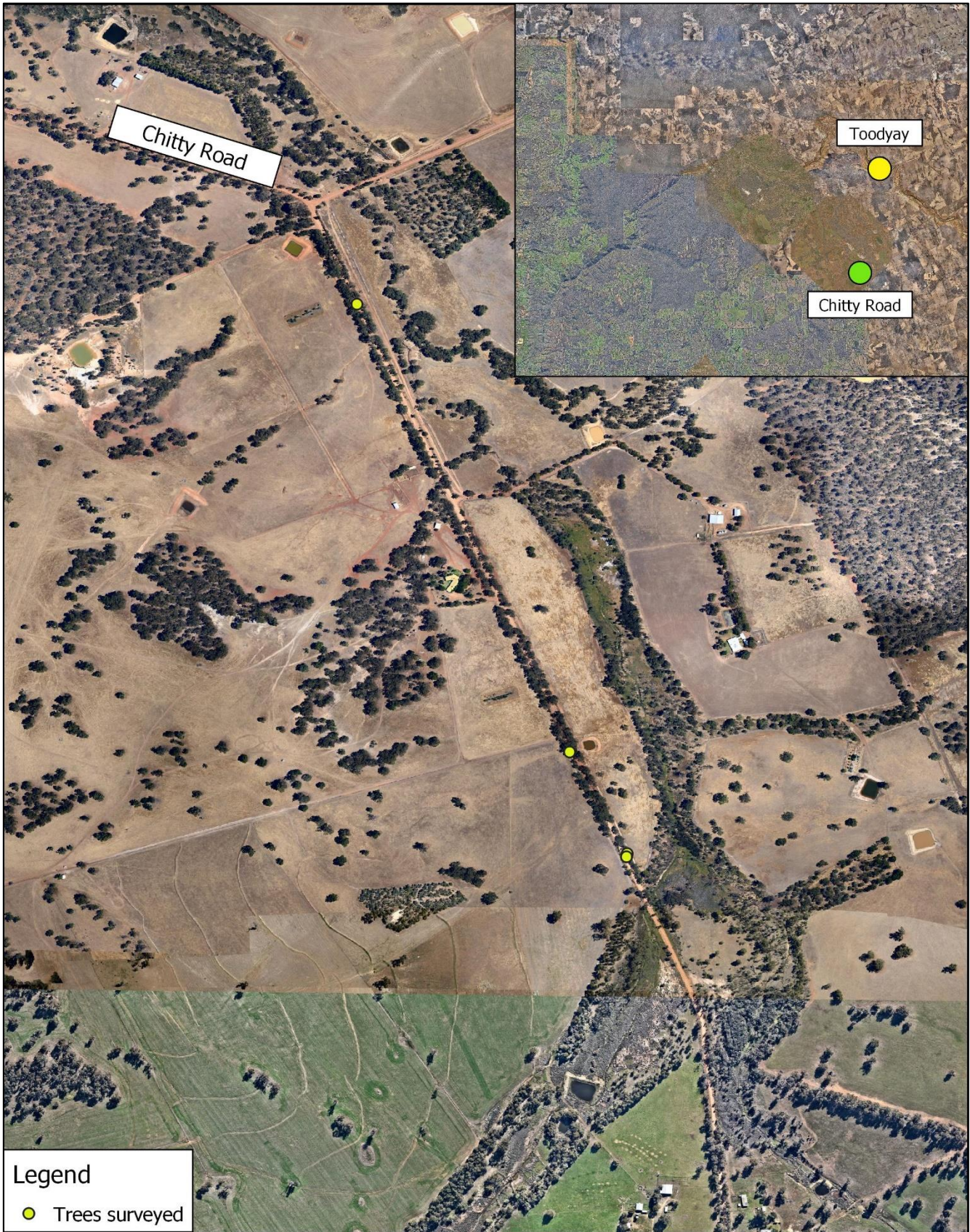
Legend
[Red line symbol] Site boundary



Figure 1:
Shire of Toodyay
Black Cockatoo Habitat Assessment
Julimar Road

Client: Shire of Toodyay
Date: 21/10/2022
Created by: C. Koopman
Image Source: Nearmap, 2022
Datum: GDA 94





Legend
● Trees surveyed



Figure 2:
Shire of Toodyay
Black Cockatoo Habitat Assessment
Chitty Road Site Boundary

Client: Shire of Toodyay
Date: 21/10/2022
Created by: C. Koopman
Image Source: Nearmap 2022
Datum: GDA 94

0 100 200 m



2.0 Site Characteristics

The characteristics of a site have a strong bearing on the flora, vegetation, fauna, and ecological communities present. Key characteristics of the Julimar Road and Chitty Road survey areas are outlined in this section.

2.1 Regional Context

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies bioregions within Western Australia based on environmental factors such as climate, geology and vegetation and fauna assemblies. Both survey areas are within the Northern Jarrah forest IBRA subregion (Department of Primary Industries and Regional Development, 2022). This region is characterised by clayey soils with isolated remnants of laterite. Vegetation comprises of Jarrah, Marri and Wandoo woodlands with a variety of species rich shrublands (Williams and Mitchell, 2001).

2.2 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters. According to the Bureau of Meteorology (2022); Northam, site number 010111, the region has an average:

- rainfall of 427.3 mm pa, with rain falling predominantly between June and August
- maximum temperature ranging from 17 °C in winter to 34.2 °C in summer, with a maximum recorded temperature of 48.1 °C
- minimum temperatures ranging from 5.4 °C in winter to 17.2 °C in summer, with a minimum recorded temperature of -3.9 °C
- predominant wind directions include morning easterlies and westerly sea breezes during the summer months, with an average wind speed of 12.2 km/h and gusts of more than 100 km/h.

2.3 Topography and Soils

The topography of the Julimar Road survey area is undulating with an Australian Height Datum (AHD) ranging from 220 to 268. The Chitty Road survey area lies between 242 to 260 AHD (Department of Primary Industries and Regional Development (DPIRD), 2022a).

Three soil types were identified within the Julimar Road survey area (Michibin, Leaver and Yalanbee subsystems) and two were identified in the Chitty Road survey area (Williams (Boyagin) and Yalabee subsystem) (DPIRD, 2022b). These are described in Table 1.

Table 1: Soil types within the survey areas

Name	Symbol	Description
Michibin subsystem	253CcMN	Gentle to moderate hill slopes of freshly weathered soils. Red and yellowish-brown loams and clays, often gravelly with rocky areas and lateritic crests. <i>E. loxophleba</i> and <i>wandoo</i> . <i>Casuarina</i> on rock and <i>E. marginata</i> and <i>accedens</i> on gravel.
Leaver subsystem	253ByLV	Gravelly slopes and ridges of the western Darling Plateau. Gravelly yellow and red duplexes, gravelly deep clayey sands and

Name	Symbol	Description
		sandy loams over laterite and clay. <i>E. calophylla</i> , <i>Banksia</i> spp., <i>Adenanthos</i> with <i>E. wandoo</i> and <i>E. marginata</i> on clay.
Yalanbee subsystem	253WnYA	Residual plateau at the top of the landscape shallowly dissected by Pindalup valleys. Pisolitic gravelly, yellowish-brown soils that vary in texture from loamy sands to clays, with pockets of pale sands and areas of outcropping laterite.
Williams subsystem (Boyagin)	253ByWL	Valley floors of the major tributary streams in the western part of the survey area.

2.4 Vegetation Complexes

Three vegetation complexes were identified as occurring within the Julimar Road survey area (Michibin, Coolakin and Yalanbee) and two in the Chitty Road survey area (Michibin and Coolakin) (DBCA, 2022e). These complexes and their corresponding descriptions are outlined in Table 2.

Table 2: Vegetation complexes

Name	Symbol	Description
Michibin	Mi	Dominated by Wandoo woodland and small patches of York Gum with an understorey of <i>Acacia acuminata</i> , <i>Casuarina huegeliana</i> and <i>Acacia microbotrya</i>
Coolakin	Ck	Dominated by Wandoo woodland with a mixture of Jarrah, Marri and Yarri
Yalanbee	Y6	Woodland of <i>Eucalyptus wandoo</i> and <i>Eucalyptus accedens</i> , with small occurrences of Wandoo, Marri woodland and Jarrah, Marri forest

Source: Heddle *et al.*, 1980

2.5 Black Cockatoo Habitat

There is potential for the three threatened black cockatoos and their habitat to occur within both survey areas including, the Carnaby's Cockatoo (*Zanda latirostris*) and the Baudin's Black Cockatoo (*Zanda baudinii*) listed as endangered, and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) listed as vulnerable under the *EPBC Act 1999* (Cwlth). All are listed as threatened under the *Biodiversity Conservation Act 2016* (WA).

3.0 Methodology

The Black Cockatoo habitat surveys undertaken at the Julimar Road and Chitty Road survey areas were conducted in accordance with the 'Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*) and the Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*)' (Department of Agriculture, Water and the Environment, 2022b).

3.1 Desktop and Literature Review

The desktop survey included reviewing online databases and past surveys in the area to gather contextual knowledge and determine preliminary site characteristics including:

- likely native and non-native fauna and flora species present to determine likelihood of black cockatoo foraging and habitat tree species
- current extent of native vegetation
- general floristic community types to determine likelihood of cockatoo foraging and habitat presence
- likely presence of threatened or priority fauna species, particularly black cockatoos.

The following reports and databases were accessed to obtain relevant information:

- NatureMap (DBCA, 2022d)
- Protected Matters Search Tool (Department of the Agriculture, Water and Environment, 2022a) (Appendix 1).

3.2 On-ground Habitat Assessment

Natural Area Ecologists Shelley Hill and Cally Koopman, with field assistant Shannon Treloar, undertook the Black Cockatoo habitat survey on the 7th September and 11th November 2022, with key data recorded using Mappt software on a handheld tablet. The habitat assessment included:

- traversing the Julimar Road survey area in a systematic search, and assessing the four individual trees on Chitty Road as specified by the Shire
- recording location and evidence of breeding, roosting and foraging activities (e.g. chew marks, feathers, scats)
- marking the GPS location of each habitat tree with DBH \geq 300 mm
- recording the height, health, and species of each habitat tree
- recording evidence of hollows, including size, type, and location within the tree
- recording foraging habitat, vegetation type, and condition.

The Chitty Road and Julimar Road surveys areas are geographically separated and thus for the purpose of this report the results for each survey area will be presented separately. The Julimar Road survey area required ecologists to traverse the areas within the survey site to identify all potential habitat trees, whilst the Chitty Road survey area involved the assessment of four individual trees as identified by the Shire.

3.2.1 Breeding habitat

In addition to recording habitat tree attributes in accordance with the Commonwealth guidelines, the Bamford tree scoring matrix (Bamford Consulting Ecologists, 2016) was applied to score each individual habitat tree. This grading system (Table 3) classes trees according to their individual characteristics (evidence of use, type and size of hollow present).

Table 3: Bamford (2016) habitat tree grading

Class	Description of Trees and Hollows/ Activity
1	Active nest observed; adult (or immature) bird seen entering or emerging from hollow
2	Hollow of suitable size and angle (i.e. near vertical) visible with chew marks around entrance
3	Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present (as suggested by structure of tree, such as large, vertical trunk broken off at a height of >10 m)
4	Tree with large hollows or broken branches that might contain large hollows, but hollows or potential hollows are not vertical or near vertical; thus, a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black Cockatoos
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown

3.2.2 Foraging Habitat

The Black Cockatoo foraging quality scoring tool (DAWE, 2022b) was applied to the survey areas to determine the quality of Black Cockatoo foraging habitat. This scoring tool assigns a habitat score between one and ten, with a score of ten representing the maximum possible score and very high-quality foraging habitat. Contextual adjustors (attributes that improve or reduce functionality of foraging habitat) such as tree species composition, distances from known breeding and roosting sites, distance from other foraging habitat, evidence of feeding debris, and presence of disease e.g. *Phytophthora* spp. or Marri Canker were used to evaluate habitat quality. The scoring tool template is provided in Table 4.

Table 4: Foraging quality scoring tool template

Starting score		Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red-tailed Black-Cockatoo
10		Start at a score of 10 if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.	Start at a score of 10 if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as Banksia spp. (including Dryandra spp.), Hakea spp. and Grevillea spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.	Start at a score of 10 if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. This tool only applies to sites equal to or larger than 1 hectare in size.
Attribute	Sub-tractions	Context adjustor (attributes reducing functionality of foraging habitat)		
Foraging potential	-2	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.
Connectivity	-2	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.
Proximity to breeding	-2	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.
Proximity to roosting	-1	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from significant plant disease	-1	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.
Total score		Enter score	Enter score	Enter score
Appraisal		To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition.		

Source: DAWE, 2022b

3.3 Limitations

Several potential limitations associated with Black Cockatoo surveys exist. Potential survey limitations and their impacts are outlined Table 5.

Table 5: Potential survey limitations

Potential Limitation	Degree of Limitation	Comments
Availability of data and information	Not a limitation	Government data on the three Black Cockatoo species as well as published guidelines are available.
Competency/experience of the survey team, including experience in the bioregion survey	Not a limitation	Survey team comprised of experienced and qualified ecologists who have conducted surveys targeting Black Cockatoo habitat assessments across the Swan Coastal Plain, and Jarrah Forest bioregions.
Scope of the survey, e.g., faunal groups were excluded from the survey	Minor	This was a targeted Black Cockatoo habitat assessment. The survey occurred during the day and assessments were made from the ground, capturing the required level of information for this survey. Internal hollow inspections would be required to confirm the characteristics of hollows and therefore their suitability to support nesting by Black Cockatoos.
Timing, weather, season	Not a limitation	The survey was conducted within the main breeding season for Black Cockatoos. Weather and season were not a limitation for habitat assessment.
Plant species identification		One species of <i>Eucalyptus</i> was not able to be confirmed in the field. This individual was not flowering at the time of the survey and no sample material was available to enable identification. The tree was considered to be a native species.
Disturbance that may have affected results, e.g., fire, flood	Not a limitation	No recent large-scale disturbance was noted at the time of the survey.
The proportion of fauna identified, recorded or collected	Not a limitation	This was a targeted Black Cockatoo habitat survey with no requirement for the identification of other fauna species.
Adequacy of the survey intensity and proportion of survey achieved, e.g. the extent to which the area was surveyed	Not a limitation	Julimar Road: all trees within the survey area with a DBH \geq 300 mm were surveyed. Chitty Road: specific trees were assessed as specified by the Shire.
Access problems	Not a limitation	Ecologists were able to traverse throughout the survey areas with no restrictions.
Problems with data and analysis, including sampling biases	Not a limitation	Analysis and assessment of Black Cockatoo habitat was carried out in accordance with published guidelines.

4.0 Results

4.1 Desktop Survey

A desktop search of NatureMap database (DBCA, 2022d) and the Protected Matters Search Tool (Appendix 1) (Department of Agriculture, Water, and the Environment, 2022a) indicated the potential for all three Black Cockatoo species to occur within 10 km of the survey area (Table 6).

Table 6: Black Cockatoo species listed by NatureMap and PMST

Species Name	Cons Code	Nature Map	PMST	Presence
<i>Calyptorhynchus banksii naso</i>	VU	X	X	Species or species habitat known to occur
<i>Zanda latirostris</i>	EN	X	X	Breeding known to occur within area
<i>Zanda baudinii</i>	EN	X	X	Species or species habitat likely to occur within area

Both survey areas are located within a Carnaby's Cockatoo confirmed breeding area. Confirmed breeding areas are identified where chicks or eggs of the Carnaby's Black Cockatoo have been observed (DBCA, 2022c).

The closest recorded black cockatoo breeding site (2 km buffer) is approximately 12 km north-east of the Julimar Road survey area and 10 km north of the Chitty Road survey area. Breeding sites are where Black Cockatoos have been confirmed to be breeding and birds have been recorded entering or leaving the nest or the inside of the nest has been viewed with eggs or chicks (DBCA, 2022a). In addition, the closest Black Cockatoo Roosting site (1 km Buffer) is approximately 7 km east of the Julimar Road survey area and 6 km south of the Chitty Road survey area. A confirmed roost site is recorded when Carnaby's Cockatoos are observed roosting during a formal roost survey (DBCA 2022b).

4.2 Field Survey

The Julimar Road survey area contained vegetation in Degraded condition and consisted of Jarrah and Marri Woodland over introduced grasses and herbs. The Chitty Road survey area contained vegetation in Degraded condition and consisted of Wandoo and Jarrah Woodland over *Acacia* spp., *Banksia* spp. and mixed native herbs and introduced grasses. All habitat tree data is provided in Appendix 2.

4.2.1 Breeding Habitat

Julimar Road

A total of 44 trees with a diameter of greater than 300 mm at breast height were recorded within the Julimar Road survey area. All trees recorded, with the exception of one (JU 43), were alive and were observed to be from seven species. The most commonly observed species were Wandoo (*Eucalyptus wandoo*) with 12 individuals and Marri (*Corymbia calophylla*) with ten individuals.

Of the trees recorded, nine (20.5%) were identified to be over the threshold of 500 mm DBH and therefore satisfy the Commonwealth guidelines for Black Cockatoo habitat trees. The diameter of these trees ranged

from 550 mm to 1450mm and were identified from a variety of species, including Blue-leaved Jarrah (*Eucalyptus marginata* subsp. *thalassica*), Marri and Wandoo. One of these trees was a *Eucalyptus* species (JU 4) which was unable to be identified due to a lack of diagnostic characteristics such as flowers or seed pods. Of the potential habitat trees, one (JU 2) was assigned a Class 3 value, having exhibited a significant amount of crown senescence, dead branches, three small hollows and one hollow potentially suitable for Black Cockatoos (Figure 3). As the hollow entrance was not visible from the ground due to its position in the tree canopy, evidence of use could not be observed. There was, however, no secondary evidence of hollow use around any of the habitat trees such as scats and feathers. Internal inspection of the hollow would be required to confirm the suitability of the hollow for Black Cockatoos.

Of the potential habitat trees (DBH \geq 500mm), eight were assigned a Class 5 value according to the grading system for the assessment of potential Black Cockatoo nest trees; JU 1, JU 3, JU 4, JU 14, JU 21, JU 32, JU 37 and JU 44 (Bamford 2016). These trees had a healthy and spreading crown comprised of mostly intact branches with no hollows evident. Some of these trees have the potential to form suitable hollows for Black Cockatoos in the future, however it will likely take many years for these to form. Examples of the trees assessed in the survey area are shown in Figure 4.

The majority of the trees recorded within the site (79.5%; 35 trees) had a DBH of between 300 mm and 500 mm. These were also identified from a number of species, including Wandoo, Marri, Blue-leaved Jarrah and Powderbark Wandoo (*Eucalyptus accedens*). One of these trees was a dead *Eucalyptus* species which was unable to be identified due to a lack of diagnostic characteristics. None of these trees currently exhibit any hollows, both suitable or unsuitable for black cockatoo breeding, and as such they have all been assigned a class 5 value.

The locations of all potential habitat trees are shown in Figures 5 to 7, with data for each tree provided in Appendix 2.



Figure 3: One potentially suitable hollow in the Julimar Road survey area (tree JU 2)



Figure 4: Examples of potential habitat trees in the Julimar Road survey area



Legend

- DBH ≥ 500 mm
- 300 ≤ DBH < 500 mm
- ▭ Site boundary



Figure 5:
Shire of Toodyay
Black Cockatoo Habitat Assessment
Julimar Road Potential Habitat Trees

Client: Shire of Toodyay
Date: 23/11/2022
Created by: S. Hill
Image Source: Nearmap, 2022
Datum: GDA 94





Legend

- DBH ≥ 500 mm
- 300 ≤ DBH < 500 mm
- Site boundary



Figure 6:
Shire of Toodyay
Black Cockatoo Habitat Assessment
Julimar Road Potential Habitat Trees


Client: Shire of Toodyay
Date: 23/11/2022
Created by: S. Hill
Image Source: Nearmap, 2022
Datum: GDA 94



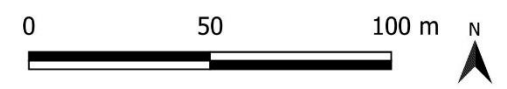


Legend

- DBH ≥ 500 mm
- 300 ≤ DBH < 500 mm
- Site boundary

 **Figure 7:**
Shire of Toodyay
Black Cockatoo Habitat Assessment
Julimar Road Potential Habitat Trees

Client: Shire of Toodyay
Date: 23/11/2022
Created by: S. Hill
Image Source: Nearmap, 2022
Datum: GDA 94



Chitty Road

Hollows were identified in three out of the four potential habitat trees assessed in the survey area; CH 1, CH 2 and CH 4. All trees were *Eucalyptus wandoo* (Wandoo). The habitat trees assessed in this survey area are shown in Figure 12. Photos of each of these trees are provided in Figures 8 to 11. Their assigned grading value and number of hollows present are summarised in Table 7.

All three of the trees which contained hollows were considered likely to be of a suitable size and orientation to support nesting by Black Cockatoos and therefore have been assigned a grading value of 3. All potentially suitable hollows were >10 m from ground level. Internal inspection of the hollows would be required to confirm the suitability of the hollows for Black Cockatoos. One tree (CH3) was assigned a grading value of 5 due to the lack of visible hollows.

Many of the hollow entrances were not visible from the ground so an assessment of the hollow characteristics and their potential use could not be confirmed. Of those that were visible, no chew marks or evidence of hollow use were observed during the survey. Additionally, no secondary evidence of hollow use such as scats and feathers at the base of the trees were observed.

Table 7: Details of the four potential habitat trees within Chitty Road survey area

Habitat Tree Number	Species	Grading value	Potentially suitable hollows present	Small hollows
CH1	<i>Eucalyptus wandoo</i>	3	2	2
CH2	<i>Eucalyptus wandoo</i>	3	4	0
CH3	<i>Eucalyptus wandoo</i>	5	0	0
CH4	<i>Eucalyptus wandoo</i>	3	1	0



Figure 8: Potential hollows in habitat tree CH 1



Figure 9: Potential hollows in habitat tree CH 2



Figure 10: Habitat tree CH 3, no hollows identified



Figure 11: Potential hollows within habitat tree CH 4



Legend

- DBH \geq 500 mm
- $300 \leq$ DBH < 500 mm



Figure 12:
Shire of Toodyay
Black Cockatoo Habitat Assessment
Chitty Road Potential Habitat Trees

Client: Shire of Toodyay
Date: 23/11/2022
Created by: S. Hill
Image Source: Nearmap 2022
Datum: GDA 94



4.2.2 Roosting habitat

No evidence of roosting in the form of scats or feathers was observed at either of the survey areas. Evening surveys were not conducted as part of this assessment, so potential roosting sites cannot be confirmed.

4.2.3 Foraging habitat

The vegetation type present at both the Julimar Road and Chitty Road survey areas consisted of degraded Eucalypt Woodland over native shrubs, herbs and introduced grasses. Evidence of foraging by black cockatoos was observed at the Julimar Road survey area in the form of chewed Marri nuts (Figure 13). The nuts were considered likely to be many years old. Additionally, an area of recent foraging on the cones of Slender Banksia (*Banksia attenuata*) was identified outside of the survey boundary, between trees JU 33 and JU 34. No evidence of foraging was observed at the Chitty Road survey area. Baudin's Cockatoos were observed flying over both survey areas.



Figure 13: Evidence of historical foraging at Julimar Road survey site

The Black Cockatoo foraging quality scoring tool (DAWE, 2022b) was applied to the survey areas and a score of 8 was assigned to Chitty Road and a score of 10 assigned to Julimar Road for all three Black Cockatoo species (Table 8 and 9). These scores represent areas that are considered to have high-quality native foraging habitat for Black Cockatoos.

Table 8: Foraging quality score for Chitty Road survey area

	Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red- tailed Black- Cockatoo	Appraisal
Starting score	10	10	10	
Foraging potential	8	8	8	No evidence of foraging was observed
Connectivity	8	8	8	Foraging habitat is present within 12 km of the survey area
Proximity to breeding	8	8	8	Survey area is <12 km from breeding habitat
Proximity to roosting	8	8	8	Survey area is <20 km from a known night roosting habitat
Impact from significant plant disease	8	8	8	No disease was present within the survey area
Total Score	8	8	8	

Table 9: Foraging quality score for Julimar Road survey sites

	Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red- tailed Black- Cockatoo	Appraisal
Starting score	10	10	10	
Foraging potential	10	10	10	Evidence of foraging was observed
Connectivity	10	10	10	Foraging habitat is present within 12 km of the survey area
Proximity to breeding	10	10	10	Survey area is <12 km from breeding habitat
Proximity to roosting	10	10	10	Survey area is <20 km from a known night roosting habitat
Impact from significant plant disease	10	10	10	No disease was present within the survey area
Total Score	10	10	10	

5.0 Discussion

Black Cockatoo foraging habitat within both the Julimar and Chitty Road survey areas is considered to be high-quality. Evidence of historical feeding on Marri was observed at the Julimar Road survey area, as well as recent feeding on Slender Banksia, with numerous food sources present both within and in close proximity to both survey areas.

The four habitat trees across both survey areas which were classified as Class 3 contained hollows which were potentially of a suitable size and orientation to support nesting by Black Cockatoos, however no chew marks or evidence of use were observed during the survey. The majority (91.7%) of the habitat trees (DBH \geq 500 mm) identified were classified as Class 5 due to the lack of visible, suitably sized hollows for Black Cockatoo breeding. Those trees with a DBH of between 300 and 500 mm were also assigned a Class 5 value as they currently do not contain any suitable hollows. These trees were surveyed as they have the potential to develop suitable nesting hollows in the future (Department of Agriculture, Water and the Environment, 2022b).

Many of the hollows observed had entrances which were not visible from the ground, so an assessment of the hollow characteristics and their potential use could not be confirmed. Of those that were visible, no chew marks or evidence of hollow use was observed during the survey. There was also no secondary evidence of hollow use such as scats and feathers at the base of the trees. It should also be noted that not all hollows may have been visible from the ground, as new growth, dense foliage and position in the landscape can hide hollows from vision. Further certainty on the suitability of the hollows to support Black Cockatoo nesting could be attained by conducting internal hollow inspections to confirm the characteristics of the hollows.

6.0 References

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Appendix 1: PMST Report 10km



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: 21-Oct-2022

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

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:	1
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	35
Listed Migratory Species:	9

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	14
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:	13
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	6
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [\[Resource Information \]](#)

Name	State	Legal Status	Buffer Status
Historic			
Goldfields Water Supply Scheme, Western Australia	WA	Listed place	In buffer area only

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
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area	In feature area

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			
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 feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Zanda baudinii listed as Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area	In feature area
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
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Translocated population known to occur within area	In buffer area only
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat likely to occur within area	In feature area
OTHER			
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat may occur within area	In buffer area only
PLANT			
Acacia aphylla Leafless Rock Wattle [13553]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Acacia ataxiphylla subsp. magna Large-fruited Tammin Wattle [64823]	Endangered	Species or species habitat may occur within area	In buffer area only
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Anthocercis gracilis Slender Tailflower [11103]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Asterolasia nivea Bindoon Starbush [8225]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area	In feature area
Conospermum densiflorum subsp. unicephalum One-headed Smokebush [64871]	Endangered	Species or species habitat may occur within area	In feature area
Darwinia carnea Mogumber Bell, Narrogin Bell [9736]	Endangered	Species or species habitat may occur within area	In buffer area only
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Diplolaena andrewsii [6601]	Endangered	Species or species habitat likely to occur within area	In feature area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area	In feature area
Gastrolobium hamulosum Hook-point Poison [9212]	Endangered	Species or species habitat may occur within area	In buffer area only
Goodenia arthrotricha [12448]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Grevillea corrugata a shrub [65445]	Endangered	Species or species habitat known to occur within area	In feature area
Grevillea flexuosa Zig Zag Grevillea [2957]	Vulnerable	Species or species habitat known to occur within area	In feature area
Melaleuca sciotostyla Wongan Melaleuca [24324]	Endangered	Species or species habitat may occur within area	In feature area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area	In feature area
Verticordia fimbrileps subsp. fimbrileps Shy Featherflower [24631]	Endangered	Species or species habitat may occur within area	In buffer area only
Verticordia staminosa subsp. staminosa Wongan Featherflower [55825]	Endangered	Species or species habitat may occur within area	In buffer area only

SPIDER

Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area	In feature area
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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
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Migratory Wetlands Species

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to 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
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
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [\[Resource Information \]](#)

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

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [50970]	WA	In feature area

Listed Marine Species [\[Resource Information \]](#)

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to 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
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may 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

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
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Avon Valley	National Park	WA	In buffer area only
Bindoon Spring	Nature Reserve	WA	In buffer area only
Bobakine	Nature Reserve	WA	In buffer area only
Clackline	Nature Reserve	WA	In buffer area only
Mavis Jefferys	Nature Reserve	WA	In buffer area only
Moondyne	Nature Reserve	WA	In buffer area only
Nanamoolan	Nature Reserve	WA	In buffer area only
NTWA Bushland covenant (0159)	Conservation Covenant	WA	In buffer area only
Poison Gully	Nature Reserve	WA	In buffer area only
Rugged Hills	Nature Reserve	WA	In feature area
Unnamed WA13971	5(1)(g) Reserve	WA	In buffer area only
Unnamed WA19904	Nature Reserve	WA	In buffer area only
Unnamed WA30193	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				
Goldfields Water Supply Scheme Project	2019/8547	Controlled Action	Post-Approval	In buffer area only
Proposal to expand existing clay operations on Lot 1 Morangup Road, Morangup, WA	2013/6943	Controlled Action	Post-Approval	In buffer area only
Toodyay Road widening and upgrade, WA	2016/7665	Controlled Action	Post-Approval	In feature area
Widening maintenance zones for 3 roads, Wheatbelt region, WA	2016/7698	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Referral decision				
Clearing approx 9.3ha of native vegetation to expand existing clay extraction, Morangup, WA	2013/6876	Referral Decision	Completed	In buffer area only

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.

Appendix 2: Habitat Tree Data

Tree ID	Species ID	DBH (mm)	Height (m)	Condition	Crown Senescence	Bamford Score	Hollows	Location of Hollow	Size of Hollow	Type of Entrance	Height Above Ground	Chewing/Rubbing	Foraging Evidence	Photo Number	Comments
CH 1	<i>Eucalyptus wandoo</i>	1135	27	Fair	no crown, branches broken, resprouting	3	Yes	Vertical limbs	Approx: 10x20, 20x20, 20x20	knot, vertical chimney, oblique spout, northern chimney	22m, 25, 20, 19	No	No	19, 18, 16 17, 22	p1-22, slk 0004.50, 23.5m high, galls
CH 2	<i>Eucalyptus wandoo</i>	1235	22	Fair	top of crown dead, secondary crown	3	Yes	Vertical limb, vertical trunk, vertical limb, vertical limb	Approx: 20x20, 30x30, 10x10, 15x15	vertical spout, chimney, vertical spout, vertical spout	17m, 20m, 15m, 15m	No	No	40, 41, 42, 42	hollows entrances not visible, galls, mistletoe, SLK0005.58
CH 3	<i>Eucalyptus wandoo</i>	500	12	Good	full crown	5	No					No	No	43-49	
CH 4	<i>Eucalyptus wandoo</i>	1040	15	Fair	crown died off	3	Yes	Trunk	Approx. 30x30	vertical chimney	12m	No	No	50-62	SLK0005.78, other hollows may be present but not visible from ground
JU 1	<i>Corymbia calophylla</i>	650	11	Good	full crown, healthy	5	No	-	-	-	-	No	Yes - historical	100-109	Corymbia and Wandoo over grass, degraded
JU 10	<i>Eucalyptus wandoo</i>	445	11	Good	no	5	No	-	-	-	-	No	No	110	
JU 11	<i>Eucalyptus accedens</i>	403	12	Good	yes	5	No	-	-	-	-	No	No	108	
JU 12	<i>Eucalyptus wandoo</i>	360	9	Good	yes	5	No	-	-	-	-	No	No	107	
JU 13	<i>Corymbia calophylla</i>	330	8	Good	no	5	No	-	-	-	-	No	No	106	
JU 14	<i>Eucalyptus wandoo</i>	580	14	Good	yes	5	No	-	-	-	-	No	No	105	
JU 15	<i>Corymbia calophylla</i>	390	12	Good	no	5	No	-	-	-	-	No	Yes - historical	154	
JU 16	<i>Corymbia calophylla</i>	360	12	Good	no	5	No	-	-	-	-	No	No	156	
JU 17	<i>Corymbia calophylla</i>	355	13	Good	no	5	No	-	-	-	-	No	No	157	
JU 18	<i>Corymbia calophylla</i>	440	12	Good	no	5	No	-	-	-	-	No	No	158	White-tail Cockatoo in tree nearby
JU 19	<i>Corymbia calophylla</i>	490	11	Good	no	5	No	-	-	-	-	No	No	159	
JU 2	<i>Eucalyptus marginata subsp. thalassica</i>	1280	23	Poor	yes	3	Yes	Trunk and limbs	Approx. 20x20	vertical spout	20	No	No	85-99	3 small hollows less than 10x10, hollow photo 92, degraded eucalypt woodland and banksia sessilis over mixed native herbs
JU 20	<i>Corymbia calophylla</i>	300	8	Good	no	5	No	-	-	-	-	No	No	160	

Tree ID	Species ID	DBH (mm)	Height (m)	Condition	Crown Senescence	Bamford Score	Hollows	Location of Hollow	Size of Hollow	Type of Entrance	Height Above Ground	Chewing/ Rubbing	Foraging Evidence	Photo Number	Comments
JU 21	<i>Eucalyptus marginata subsp. thalassica</i>	550	11	Good	no	5	No	-	-	-	-	No	No	161-168	
JU 22	<i>Eucalyptus marginata subsp. thalassica</i>	350	10	Good	no	5	No	-	-	-	-	No	No	169	
JU 23	<i>Eucalyptus marginata subsp. thalassica</i>	320	9	Good	no	5	No	-	-	-	-	No	No	170	
JU 24	<i>Eucalyptus marginata subsp. thalassica</i>	305	11	Good	no	5	No	-	-	-	-	No	No	171	
JU 25	<i>Eucalyptus marginata subsp. thalassica</i>	490	12	Good	no	5	No	-	-	-	-	No	No	172	
JU 26	<i>Eucalyptus accedens</i>	325	9	Good	no	5	No	-	-	-	-	No	No	173	
JU 27	<i>Eucalyptus marginata subsp. thalassica</i>	400	10	Good	no	5	No	-	-	-	-	No	No	174	
JU 28	<i>Eucalyptus marginata subsp. thalassica</i>	350	10	Good	no	5	No	-	-	-	-	No	No	175	
JU 29	<i>Eucalyptus accedens</i>	395	11	Good	no	5	No	-	-	-	-	No	No	181	
JU 3	<i>Eucalyptus marginata subsp. thalassica</i>	1450	24	Good	no	5	No	-	-	-	-	No	No	63-80	split/cavity at base of tree, jarrah woodland over weedy grasses and herbs
JU 30	<i>Eucalyptus accedens</i>	475	11	Good	no	5	No	-	-	-	-	No	No	179	bird nest p180
JU 31	<i>Corymbia calophylla</i>	465	10	Good	no	5	No	-	-	-	-	No	No	178	
JU 32	<i>Corymbia calophylla</i>	660	12	Good	no	5	No	-	-	-	-	No	No	177	
JU 33	<i>Eucalyptus accedens</i>	495	12	Good	no	5	No	-	-	-	-	No	No	176	
JU 34	<i>Eucalyptus wandoo</i>	395	11	Good	no	5	No	-	-	-	-	No	No	183	
JU 35	<i>Eucalyptus accedens</i>	335	13	Good	no	5	No	-	-	-	-	No	No	182	
JU 36	<i>Eucalyptus wandoo</i>	495	14	Good	no	5	No	-	-	-	-	No	No	184	
JU 37	<i>Eucalyptus wandoo</i>	560	12	Good	no	5	No	-	-	-	-	No	No	185	3 bird nests
JU 38	<i>Eucalyptus wandoo</i>	465	10	Good	no	5	No	-	-	-	-	No	No	187	
JU 39	<i>Eucalyptus wandoo</i>	390	10	Good	no	5	No	-	-	-	-	No	No	189	
JU 4	<i>Eucalyptus sp.</i>	650	8	Good	full crown, slight die back	5	No	-	-	-	-	No	No	110-121	Baudin's observed flying over
JU 40	<i>Eucalyptus rudis</i>	455	10	Good	yes	5	No	-	-	-	-	No	No	190	
JU 41	<i>Eucalyptus rudis</i>	315	9	Good	yes	5	No	-	-	-	-	No	No	191	
JU 42	<i>Eucalyptus rudis</i>	470	9	Good	no	5	No	-	-	-	-	No	No	197	
JU 43	<i>Eucalyptus sp. (dead)</i>	355	10	Good	NA	5	No	-	-	-	-	No	No	198	

Tree ID	Species ID	DBH (mm)	Height (m)	Condition	Crown Senescence	Bamford Score	Hollows	Location of Hollow	Size of Hollow	Type of Entrance	Height Above Ground	Chewing/ Rubbing	Foraging Evidence	Photo Number	Comments
JU 44	<i>Eucalyptus rudis</i>	610	11	Good	no	5	No	-	-	-	-	No	No	199	
JU 5	<i>Eucalyptus wandoo</i>	470	12	Good	yes	5	No	-	-	-	-	No	No	144	
JU 6	<i>Eucalyptus wandoo subsp. wandoo</i>	300	9	Good	no	5	No	-	-	-	-	No	No	143, 146-153	
JU 7	<i>Eucalyptus wandoo</i>	450	10	Good	no	5	No	-	-	-	-	No	No	142	
JU 8	<i>Eucalyptus wandoo</i>	360	10	Good	no	5	No	-	-	-	-	No	No	140	
JU 9	<i>Eucalyptus wandoo</i>	335	11	Fair	yes	5	No	-	-	-	-	No	No	113	