Lot 806 South West Highway, Byford

Black Cockatoo Habitat Assessment and Targeted Threatened Flora Survey

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Internal Review

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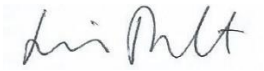		
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Executive Summary

Western Environmental Approvals Pty Ltd (WEPL) was commissioned by Planning Solutions on behalf of Accord Property to undertake additional biological surveys across Lot 806 South Western Highway, Byford (the 'Survey Area'). Accord Property lodged a development application for a bulky goods showroom in October 2022. Accord Property was subsequently advised that the proposed development may be required to be referred under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and a Native Vegetation Clearing Permit (NVCP) pursuant to the *Environmental Protection Act* 1986 (EP Act) and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (the Regulations) obtained, prior to development commencing.

Eco Logical Australia (2022) undertook a review of environmental approvals considerations and a gap analysis of previous biological surveys. It was recommended that additional biological survey efforts should be undertaken, including a targeted black cockatoo habitat assessment and additional targeted search effort for Threatened flora species.

A targeted flora search and black cockatoo habitat assessment was undertaken during a one two-person day on 12 October 2023. The targeted flora search was undertaken according to the *Flora and Vegetation Technical Guidance* (EPA, 2016), conducting parallel transects at approximately 10 m intervals. The black cockatoo habitat field survey was undertaken in accordance with the *Referral Guideline for 3 WA Black Cockatoo Species (*DCCEEW, 2022) for identifying breeding, foraging, and roosting habitat.

Flora

Three Threatened flora species were considered to have a 'Medium' pre-survey likelihood of occurrence.

No Commonwealth, or State listed Threatened Flora were recorded in the Survey Area during the targeted search. No Threatened flora species were assessed as having a ‘High’ or ‘Medium’ post-survey likelihood of occurrence.

Considering that suitable survey effort was applied during an appropriate seasonal period; and noting the degraded condition of the Survey Area it is concluded that no Threatened flora species are likely to occur within the Survey Area.

Black Cockatoo

The Survey Area falls within the modelled distribution and breeding range for Baudin’s black cockatoo, Carnaby’s black cockatoo and the Forest Red-tailed black cockatoo (DCCEEW, 2022). The Survey Area also falls within the 1km buffer applied to a confirmed Carnaby’s black cockatoo roost sites. Foraging evidence (chewed marri nuts) for all three species of black cockatoo was recorded during the field survey.

A total of 152 potential breeding trees (DBH > 30 cm) were recorded. No evidence of current or previous nesting behaviour such as chew marks at hollow entrance attributed to black cockatoos, or flushed individuals were recorded. Majority (148 of the 152 recorded trees) did not show signs of potential nesting hollow development (Class 5 trees). One marri tree had a potentially suitable hollow for black cockatoos

(Class 3), however when the hollow was inspected with a pole camera, it was evident that it was occupied by Galahs.

Fauna habitats are present within the Survey Area which are characterised by foraging species for all three black cockatoo species, including marri, jarrah, *Banksia* sp. and wandoo. However, majority of the Survey Area comprise cleared areas, scattered/planted eucalypts or dense *Acacia* patches which have low to no foraging habitat value.

Foraging habitat quality was rated using the Commonwealth Habitat Quality Scoring Tool (DCCEEW, n.d.). Foraging habitat quality extents within the Survey Area out of ten were the same for all three black cockatoo species and was a follow:

- 2.64 ha (10/10), 0.21 ha (9/10), 0.14 ha (6/10) and 5.26 ha (Low 2 to None 0).

Analysis of estimated foraging habitat extent within the region indicated approximately 22,268 ha of remnant native vegetation mapped within a 12 km buffer of the Survey Area. The estimated area extent of 2.99 ha of foraging habitat with a quality ≥6/10 within the Survey Area represents 0.013 % of the estimated regional habitat extent.

Throughout the Survey Area, isolated stands of tall (> 10 m) eucalypts are scattered which may provide suitable roosting habitat. No evidence of scat marking, branch clipping or feather dropping was recorded suggesting that the location is not a highly frequented roosting location. Access to water is present from nearby brooks and recreational dams.

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1. Introduction

1.1 Project Background

Western Environmental Approvals Pty Ltd (WEPL) was commissioned by Planning Solutions on behalf of Accord Property to undertake additional biological surveys across Lot 806 South Western Highway, Byford (the 'Survey Area'). Accord Property lodged a development application for a bulky goods showroom in October 2022. Accord Property was subsequently advised by the Shire of Serpentine-Jarrahdale ('the Shire') and the Department of Biodiversity, Conservation and Attractions (DBCA) that the proposed development may require referral under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and a Native Vegetation Clearing Permit (NVCP) pursuant to the *Environmental Protection Act 1986* (EP Act) and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (the Regulations) obtained, prior to development commencing.

Eco Logical Australia (2022) was commissioned to undertake a review of environmental approvals considerations and a gap analysis of previous biological surveys. It was determined that additional biological survey effort comprising a targeted black cockatoo habitat assessment and additional targeted search effort for Threatened flora species should be undertaken to support environmental approvals.

WEPL undertook the targeted black cockatoo habitat assessment and targeted search for Threatened flora species in spring of 2023.

1.2 Scope and Objectives

The following scope of works was undertaken:

- Contemporary desktop review to determine the likelihood of Threatened flora species to occur within the Survey Area.
- Review of previous biological survey effort and reports.
- Targeted searches for Threatened Flora species using methods consistent the Environmental Protection Authority (EPA) *Technical Guidance for Flora and Vegetation Surveys* (2016) and the Department of the Environment (DotE) *Draft Survey Guidelines for Australia's Threatened Orchids: Guidelines for Detecting Orchids Listed as 'Threatened' Under the Environment Protection and Biodiversity Conservation Act 1999* (2013)
- Assessment of black cockatoo habitat in accordance with the *Referral guideline for three WA threatened black cockatoo species* (DCCEEW, 2022), including:

- A field assessment that identified any potentially significant breeding habitat trees (DBH >50 cm or >30 cm for Wandoo) or foraging habitat for Black Cockatoo. Where potentially suitable nesting hollows were recorded, an internal inspection with a pole camera or drone was undertaken.

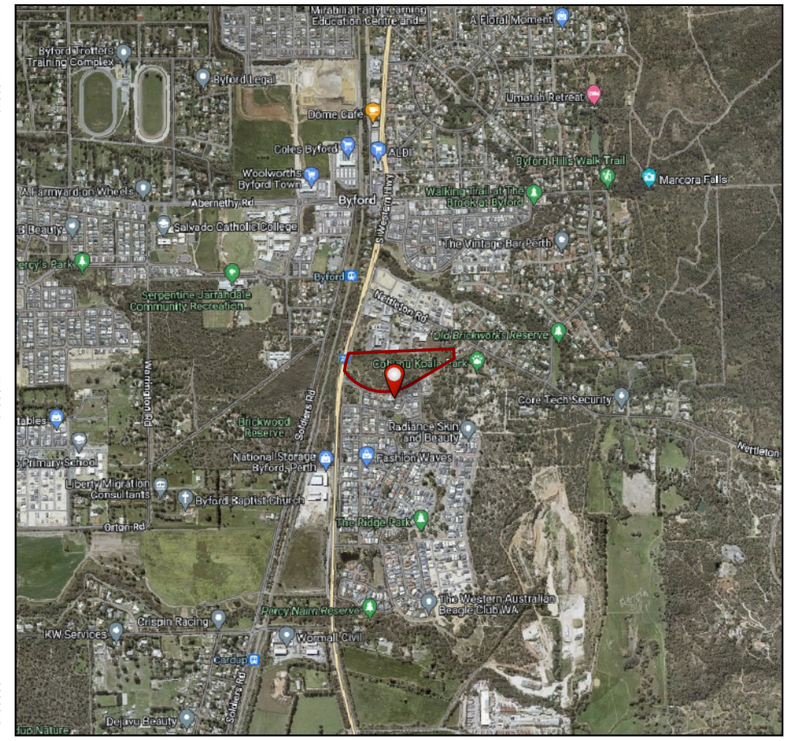
- Mapping of foraging habitat extent by area within the Survey Area in accordance with the Foraging Habitat Quality Scoring Tool (DCCEEW, n. d.).

- Preparation of a report outlining the methodology and results of desktop and field surveys and significance of proposed impacts.

- Preparation of a geospatial data package prepared in accordance with Index of Biodiversity Surveys for Assessments (IBSA) requirements.

1.3 Location

The Survey Area is located 33.4 km south-east of the Perth CBD in the Shire of Serpentine-Jarrahdale (Figure 1) and covers approximately 8.3 ha.



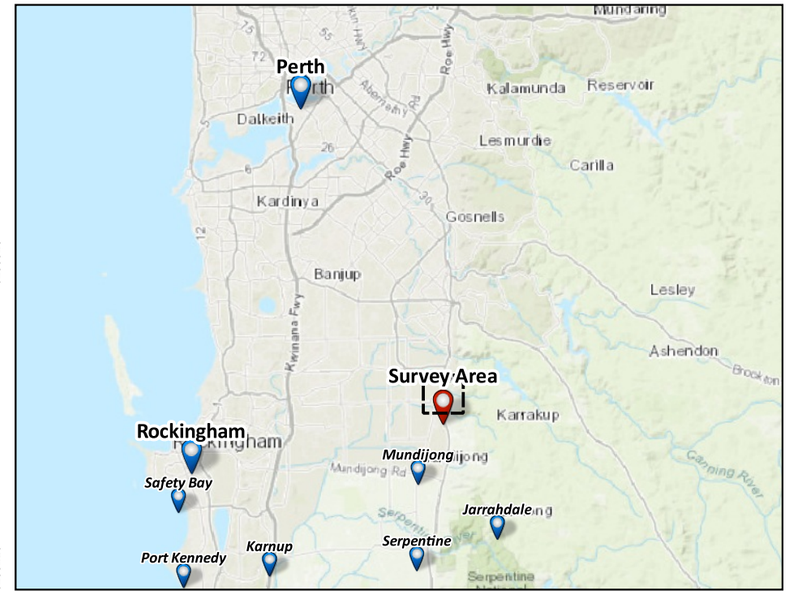


Figure 1: Survey Area Location

N

0 39 78 117 156 m

PROJECT/REPORT NAME	Black Cockatoo Habitat Assessment, Targeted Orchid Survey and EPBC Act Referral Lot 806 South West Highway, Byford
SCALE	1:2,647
SHEET SIZE	A3 COLOUR
CLIENT	Planning Solutions
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
PROJECT NUMBER	A23.069
VERSION	0
DATA SOURCE	LANDGATE AERIAL IMAGERY Summer 2023
DRAWN BY / REVIEWED BY	MD/LT
DATE	5/3/2024

Legend

SurveyArea

No	Description	Drawn	Approved	Date
A	Original issue	MD	LT	5/3/2024

NOTES:

Cadastral boundary (LGATE-002). Base map ESRI Topo. Townsites (LGATE-248).

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1.4 Legislation and Guidance

This assessment was conducted in accordance with Commonwealth and State legislation, guidelines and advice:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Western Australian *Environmental Protection Act 1986* (EP Act).
- Western Australian *Biodiversity Conservation Act 2016 (*BC Act).
- Western Australian *Biodiversity Conservation Regulations 2018.*
- Commonwealth DotE. (2013). *Matters of National Environmental Significance. Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999*.
- WA EPA. (2016). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment.* Known herein as the 'Flora and Vegetation Technical Guidance'.
- DCCEEW (2022) *Referral Guidelines for 3 Threatened Black Cockatoo Species Carnaby's Cockatoo (Zanda latirostris), Baudin's Cockatoo (Zanda baudinii) and the Forest Red-tailed Black-cockatoo (Calyptorhynchus banksii naso).*
- DotE (2013) *Draft Survey Guidelines for Australia's Threatened Orchids: Guidelines for Detecting Orchids Listed as 'Threatened' Under the Environment Protection and Biodiversity Conservation Act 1999.*

Brief descriptions of relevant Commonwealth and State legislation is provided in Appendix A. While definitions and criteria for Commonwealth ad State conservation codes is provided in Appendix B.

1.5 Survey Limitations and Constraints

Limitations and constraints of the fauna, flora and vegetation survey as outlined in the Flora and Vegetation and Fauna Survey Technical Guidance are detailed below in Table 1. No limitations were identified.

Table 1: Limitations and Constraints of the Flora and Black Cockatoo Survey

Possible Limitation	Degree of Limitation (Significant, Moderate or Negligible)	Potential Constraints on Survey Outcomes
Survey Level/ Scope	Negligible	The targeted Threatened flora survey and targeted assessment of black cockatoo is considered suitable based on species expected to be present and the extent and condition of vegetation/habitat present within the Survey Area. The level of information collect is suitable to provide information required to inform the development of the infrastructure footprint and support approvals and referrals.
Availability of contextual information at a regional and local scale	Negligible	All data required to complete the scope of works including regional and local contextual information was available.
Site Access	Negligible	The Survey Area was readily accessed by vehicle and on foot.
Survey Intensity and Extent	Negligible	Suitable survey effort by an experienced ecologist was applied. Survey effort is shown in Figure 2 and included one two-person day in October. All planned Survey Areas were adequately sampled in line with the project scope of works.
Experience	Negligible	The ecologist leading the field survey (Andrew Fry) has been conducting flora and vegetation surveys and fauna habitat assessments in Western Australia for over 10 years, with over 10 years experience in the southwest bioregion.
Timing, weather, season	Negligible	In the three months prior to survey rainfall was below long-term average. The seasonal conditions were considered to be suitable for the targeted search to be undertaken. The recommended primary survey period for flora and vegetation surveys for the region as per the EPA Technical Guidance occurs in spring (September-November). The primary survey was completed in early October. The seasonal timing was considered appropriate considering the objectives of the survey. The survey was undertaken within the recommended timing for both foraging and breeding habitat for forest red-tailed black cockatoo (year round) and Carnaby's black cockatoo (year-round foraging, July to December breeding) and close to optimal for Baudin's cockatoo (foraging March to September, breeding all year) (DCCEEW, 2022). Targeted searches were undertaken for secondary evidence of the species presence (i.e. foraging evidence which can be done at any time of year) and to evaluate the potential suitability of the habitat. The temperatures and weather experienced during the field survey was not considered a limitation to the survey and did not affect the ability to record fauna or habitats.

Possible Limitation	Degree of Limitation (Significant, Moderate or Negligible)	Potential Constraints on Survey Outcomes
Proportion of the flora and fauna recorded and/or collected, and any identification issues	Negligible	Species sampling was in line with the technical guidance for Detailed flora and vegetation and Basic fauna surveys.
Mapping Reliability	Negligible	The majority of the Survey Areas was traversed by foot and mapping reliability is considered high.
Disturbances (fire, flood etc.)	Negligible	Areas of disturbance associated with historic clearing and weeds were recorded but were not a constraint on the results of the survey.

2. Methodology

2.1 Desktop Review

2.1.1 Literature Review

Existing biological information for the Survey Area and surrounds was reviewed prior to the field survey, including:

- Available biological surveys and information:
    - Coterra Environment (2018). *Environmental Assessment Report - Lot 806 South Western Highway, Byford.* Unpublished report for CLE Town Planning and Design.
    - Bennett Environmental Consulting Pty Ltd (BEC). (2010). *Vegetation and Flora of Lot 806 South West Highway Byford.* Unpublished report for Coterra Environment.

2.1.2 Database searches

Existing database searches presented in Eco Logical Australia (2022) and BEC (2010) were utilised. These included DBCA database searches and Protected Matters Search Tool (PMST). Search results and findings of previous biological surveys were used to determine the likelihood of occurrence assessment of Threatened flora species within the Survey Area. These are summarised in Table 2 below.

Table 2: Database Searches

Database Name	Date	Search Type	Search Area
Protected Matters Search Tool (PMST) (Department of Climate Change, Energy, the Environment and Water)	6/12/2022 (Ecological, 2022)	Commonwealth listed Threatened flora and fauna and TECs	-
Threatened and Priority Flora (TPFL) database search (Department of Biodiversity Conservation and Attractions)	2010 (BEC, 2010)	Threatened and Priority Flora	10 km buffer
Western Australian Herbarium (WAHerb) flora database search (Department of Biodiversity Conservation and Attractions)	2010 (BEC, 2010)	Threatened and Priority Flora	

2.1.3 Likelihood of Occurrence

Threatened flora species identified from the database searches were assessed to determine the likelihood of their occurrence within the Survey Area. The assessment was conducted both prior to the field survey and based on the likelihood of occurrence criteria presented in Table 3.

Only species either recorded during the survey or considered as having a high or medium likelihood of occurrence in post field survey assessment will be discussed in detail. Species classified as having low likelihood of occurrence will not be discussed unless a justification for this classification is required.

Table 3: Likelihood of Occurrence Criteria

Likelihood	Criteria
Recorded	Recorded in the Survey Area from database searches (if confident record is accurate), previous survey by others or by current survey. Community buffer area recorded in the Survey Area.
High	Suitable habitat occurs within the Survey Area; and • Records of flora or community <2 km from the Survey Area, with record <30 years old.
Medium	Suitable or marginally suitable habitat occurs within the Survey Area; and • Records of flora species or community <5 km from the Survey Area. • Species or community is strongly linked to a specific habitat, which occurs within the Survey Area and records are present <10 km from the Survey Area.
Low	• The species or community has a well understood and specific habitat preference/ requirements, which is absent from the Survey Area. • Records are historical only, or are pre mapping procedures (e.g. records assigned to towns or place names). • Suitable habitat is present, but there are no existing records of the species or community from the region despite reasonable previous search effort.

2.2 Field Surveys

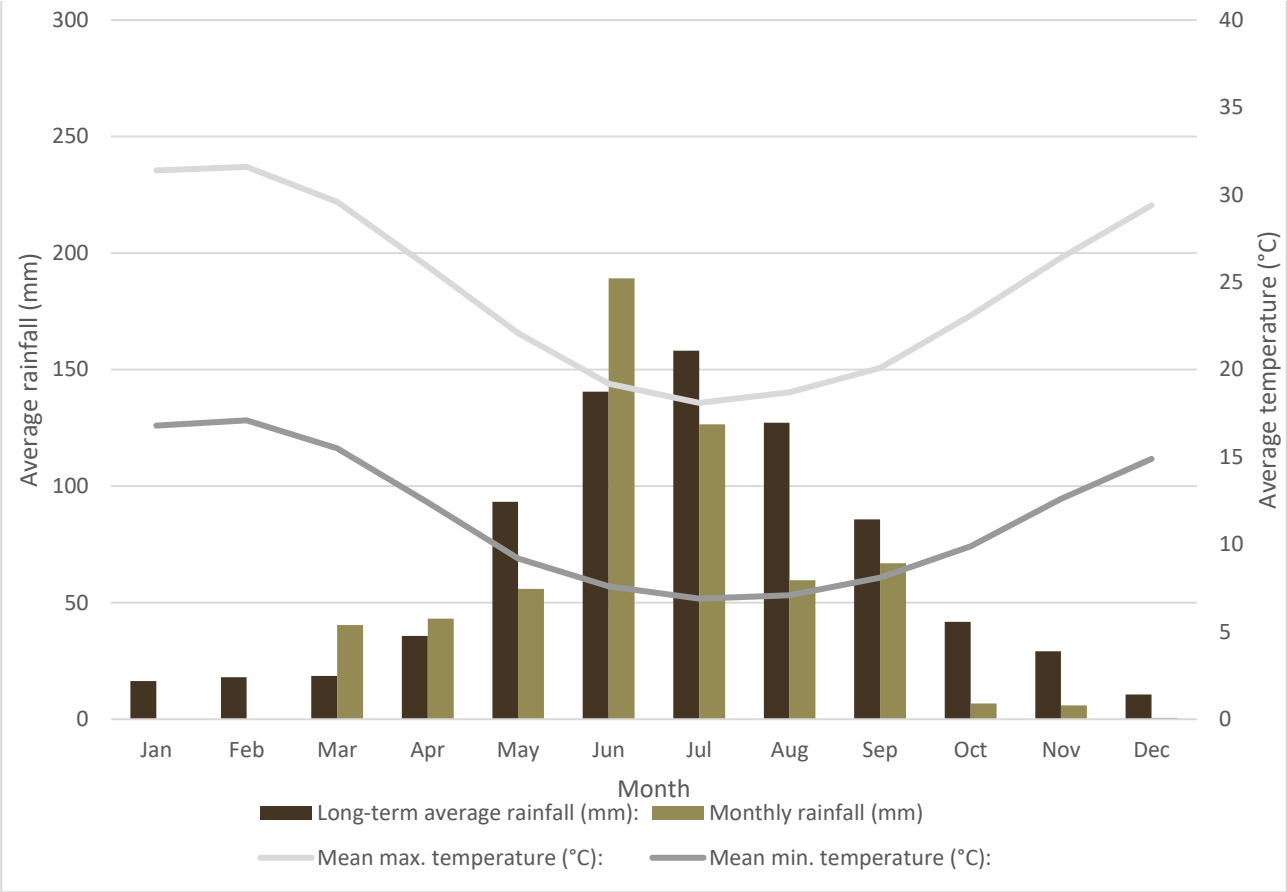
2.2.1 Climate and Pre-Survey Rainfall

Climate statistics were calculated using data from the closest long-term Bureau of Meteorology (BoM) station, Jandakot Aero (Station 009172), located 19.34km northwest of the Survey Area (Graph 1s). A 30-year data interval was utilised to establish the current climate normal, as the interval allowed for year-to-year variation while avoiding the influence of long-term changes in climate.

The long-term mean minimum temperature for Jandakot ranges from 6.9C (July) to 17.1C (February) (1991-2020) and the long-term mean maximum temperature ranges from 18.1C (July) to 31.6C (February) (Graph 1) (BoM, 2024).

Jandakot weather station recorded 582mm of rain in the eight months prior to the survey (February to September 2023), which is 95.4mm below the long-term average of 677.4mm in the same period (BoM,2024). Conditions during winter 2023 showed an increase in rainfall in June (189.2mm in 2023 compared to 140.5mm) and decreasing rainfall trend observed from July (126.6mm in 2023 compared to 158.2mm) to August (59.6mm in 2023 compared to 127.3mm) (BoM,2024). In the three months prior to the survey (July to September 2023), 253.2mm of rain was recorded, which is 118mm below the long-term average rainfall at 371.2mm.

Pre survey rainfall was considered suitable to allow targeted flora surveys to be undertaken.



Graph 1: Long Term and Monthly Total Rainfall, Maximum and Minimum Temperatures for Jandakot Aero WA (Station no: 9172) (BoM, 2024)

2.2.2 Timing and Survey Team

The survey timing and survey team is summarised in the table below.

Table 4: Timing and Survey Team

Date	Survey Team	Flora License
12/10/23	Andrew Fry	FB62000002-2
	Lovisa Thambert	FB62000468

2.2.3 Targeted Search for Threatened Flora

Targeted searches for Threatened flora species were undertaken according to the *Flora and Vegetation Technical Guidance* (EPA, 2016), conducting parallel transects (approximately 10 m) over the Survey Area (Figure 2). The majority of the Survey Area was traversed, including all suitable habitat. Areas of unsuitable habitat with no vegetation cover except for grasses were searched at a lower intensity due to the vegetation being highly degraded.

The locations of any Threated flora records were marked using a handheld GPS with the following data recorded:

- Observer, date, and time.
- Local abundance/population size and/or population boundary.
- Representative photos of each species and habitat.
- Collection of representative specimens.
- Notes on habitat and vegetation type.

Figure 2: Survey Effort

N

0 26 52 78 104 m

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SCALE	1:1,781
SHEET SIZE	A3 COLOUR
CLIENT	Planning Solutions
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
PROJECT NUMBER	A23.069
VERSION	0
DATA SOURCE	LANDGATE AERIAL IMAGERY Summer 2023
DRAWN BY / REVIEWED BY	MD/LT
DATE	29/2/2024

Legend

- Survey Area
- Tracklog

No	Description	Drawn	Approved	Date
A	Original issue	MD	LT	29/2/2024

NOTES:

Cadastral boundary from LANDGATE 2022. Label corresponds to the vegetation association number.

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2.2.4 Black Cockatoo Assessment

The Swan Coastal Plain is used by black cockatoos primarily for foraging resources, along with some small patches of breeding habitat. Vegetation used by black cockatoos is dominated by Banksia spp. and tuart (*Eucalyptus gomphocephala*) woodlands, as well as marri (*Corymbia calophylla*) and jarrah (*E. marginata*) (DCCEEW 2022).

On the Swan Coastal Plain, Baudin's cockatoo and Carnaby's cockatoo are most commonly present from February through to September, while the presence of Forest red-tailed Black cockatoo is more flexible across the year (DCCEEW, 2022). The survey in October provided a good opportunity to record foraging individuals. If no individuals are directly observed during the survey, searching for foraging evidence is considered a reliable alternative given it will generally persist in the landscape (particularly marri nut chews; DCCEEW, 2022).

The black cockatoo habitat field survey was undertaken in accordance with the *Referral Guideline for 3 WA Black Cockatoo Species* (DCCEEW, 2022) for identifying breeding, foraging, and roosting habitat.

Breeding Habitat Assessment

Breeding habitat for black cockatoos may comprise known nesting trees, suitable nesting trees, or potential nesting trees (DCCEEW, 2022). Suitable nesting trees are those that currently contain a suitable nest hollow (1.3 m from the ground) and potential nesting trees are those which have a suitable diameter at breast height (DBH) to develop a hollow but do not current have hollows (DCCEEW, 2022). For most Eucalypt species, suitable nest hollows are found within live or dead trees with DBH of at least 500 mm. Trees with a DBH >300mm are considered suitable to develop a nesting hollow in the future (DCCEEW, 2022).

All trees of species with the potential to form hollows (typically jarrah, marri and tuart) and with sufficient diameter (i.e., DBH > 300 mm) were recorded using a GPS. The following was recorded for each such tree:

- Species.
- DBH (approximately 1.3 m from the ground).
- Tree health (noting the presence of diseases or other threatening processes such as presence of dieback (*Phytophthora cinnamomi*) or marri canker (*Quambalaria coyrecup*).
- Presence of hollows (as observable form the ground).

In addition to the Commonwealth guidelines for assessing potential breeding trees, a scoring system based on that developed by Dr Mike Bamford was applied to class potential breeding trees, as shown in Table 5.

Table 5: Classification of Potential Black Cockatoo Breeding Trees

Class	Description of Tree and Hollows/Activity
1	Active nest observed; adult (or immature) bird seen entering or emerging from hollow, eggs present.
2	Hollow of suitable size and angle 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 >10m).
4	Tree with hollows or broken branches that might contain hollows, but hollows or potential hollows are not of a suitable size, or are aligned or obstructed so as to prevent access
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.

Where trees were identified to contain a potentially suitable breeding hollow (based on the entrance size), an internal hollow inspection was undertaken using a pole camera to inspect the internal dimensions.

Foraging Habitat Assessment

Foraging habitat is described as areas that include plants of species known to support foraging within the range of each black cockatoo species. Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) woodlands are particularly important to Baudin's cockatoo and Forest red-tailed black cockatoo, while proteaceous heaths (shrublands dominated by *Banksia, Hakea* and *Grevillea* species) are also utilised by Carnaby's cockatoo (DCCEEW, 2022).

The potential of the habitat within the Survey Area to support foraging was described, and any evidence was recorded, along with opportunistic sightings of any black cockatoo individuals. Areas of suitable foraging trees was mapped using polygons the quantify foraging habitat extent within the Survey Area.

These findings were subsequentially used to determine a numerical value of the foraging quality using the Foraging quality scoring tool template provided as an appendix to the Commonwealth referral guidelines (DCCEEW, 2022). A secondary assessment was then undertaken by applying the scoring tool developed and provided by DCCEEW (n.d.). Further detail of the scoring methodology is provided in section 3.1.3. Foraging habitat polygon values were scored based on the foraging value scores as listed by DCCEEW (n. d.).

Roosting Habitat Assessment

During the field survey, searches were conducted for evidence of roosting, such as piles of scats, feeding debris, or chewed trees.

3. Field Results

3.1 Targeted Search for Threatened Flora

3.1.1 Desktop Assessment

The Eco Logical Australia (2022) desktop assessments identified fourteen Threatened flora species to be present within a 10 km radius of the Survey Area (Table 6). Eco Logical Australia (2022) also identified that "There are five Threatened Orchids that may potentially occur within the subject site".

No Threatened Flora species are indicated as having been previously recorded within the Survey Area from DBCA database search results or BEC (2010) surveys. Considering the habitats described by BEC (2010) within the site, database search results and habitat preferences of Threatened species, three species were considered to have 'medium' likelihood of occurrence pre-survey within the Survey Area. These were:

Endangered:

- *Synaphea* sp. Pinjarra Plain (A.S. George 17182)

Critically Endangered:

- *Synaphea* sp. Serpentine (G.R. Brand 103)
- *Synaphea* sp. Fairbridge Farm (D. Papenfus 696)

The assessment of Likelihood of Occurrence and discussion of habitat preferences are provided below in Table 6.

3.1.2 Threatened Flora Survey

One two-person day on 12 October 2023 was dedicated to the targeted search for Threatened flora through suitable habitat within the Survey Area.

No Threatened flora species were recorded within the Survey Area.

The post-field assessment considered that no Threatened flora have a 'High' or 'Medium' likelihood of occurrence within the Survey Area. Considering that suitable survey effort was applied during an appropriate seasonal period; and noting the degraded condition of the Survey Area it is concluded that no Threatened flora species are likely to occur within the Survey Area.

Table 6: Assessment of Likelihood of Occurrence

Species	Cons Status	Source		Preferred Habitat	Flowering Period	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence	Justification
		BEC (2010) DBCA database	PMST Search					
Andersonia gracilis	EN	-	+	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Sep-Nov	Low	Low	Habitat not suitable. Species reported as occurring on seasonally damp, black sandy clay flats near or on the margins of swamps (GoWA, 2008).
Anthocercis gracilis	VU	-	+	Granite outcrops	Sep-Oct	Low	Low	Habitat not suitable. No granites present
Diuris micrantha	VU	-	+	Amongst sedges in low lying areas and wetlands	Aug-Oct	Low	Low	Habitat too dry, no wetland present, few sedges present. Habitat not suitable.
Diuris purdiei	EN	+	+	Amongst sedges in winter submerged areas	Late sept-Oct	Low	Low	Habitat too dry, no wetland present, few sedges present. Habitat not suitable.
Drakaea elastica	EN	+	+	In sandy soil adjacent to winter-wet depressions, swamps and water courses, growing in mixed woodlands, often under Kunzea species.	Sep-Nov best survey period July-Aug	Low	Low	Habitat not suitable. Soil not sandy, no associations with *Kunzea*
Drakaea micrantha	VU	+	+	Grey sand Jarrah (*Eucalyptus marginata)* and common sheoak (*Allocasuarina fraseriana*) woodland or forest associated with *Banksia* species. Often with *Kunzea*	Sep-Oct	Low	Low	Habitat not suitable. Soil not sandy, no associations with Kunzea

Species	Cons Status	Source		Preferred Habitat	Flowering Period	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence	Justification
		BEC (2010) DBCA database	PMST Search					
Eleocharis keigheryi	VU	-	+	Clay, sandy loam. Emergent in freshwater: creeks, claypans	Aug-Not	Low	Low	Habitat not suitable no claypans.
Eucalyptus x balanitis	EN	-	+	Sandy soils with lateritic gravel. In valley on scarp	Oct-Dec	Low	Low	In Perth region known from a single tree at Armadale. There is some uncertainty around the origin of the Armadale plant, with some suggestion it may have been planted (DAWE, 2021)
Lasiopetalum pterocarpum	EN	-	+	Up on scarp. Dark red-brown loam or clayey sand over granite. On sloping banks near creeklines.	Aug-Dec	Low	Low	Habitat not suitable. No granites, not on scarp.
Morelotia australiensis **listed as *Tetraria australiensis***	VU	+	+	Grey sand over clay. winter-wet swampy depressions, drainage lines or rises surrounding swamps. *Corymbia calophylla* woodland over low shrubs, herbs and sedges	Nov-Dec. Best survey in summer and post fire.	Low	Low	Habitat low potentially suitable. Lacking wetland element.
Synaphea **sp. Pinjarra Plain (A.S. George 17182)**	EN	+	+	Gravel and clays at base of hills	Sep – Nov	Medium	Low	Potentially suitable habitat present. Species not identified as present following suitable survey effort.
Synaphea **sp. Serpentine (G.R. Brand 103)**	CR	+	+	Gravel and clays at base of hills	Aug-Nov	Medium	Low	Potentially suitable habitat present. Species not identified as present following suitable survey effort.

Species	Cons Status	Source		Preferred Habitat	Flowering Period	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence	Justification
		BEC (2010) DBCA database	PMST Search					
***Synaphea* sp. Fairbridge Farm (D. Papenfus 696)**	CR	-	+	Gravel and clays at base of hills	October	Medium	Low	Potentially suitable habitat present. Species not identified as present following suitable survey effort.
Thelymitra stellata	EN	-	+	Jarrah woodland on ridges, slopes and breakaways. Up on scarp	Oct-Nov	Low	Low	Habitat not suitable. Occurs on ridges on top of scarp.

3.1.3 Black Cockatoo Assessment

The Black Cockatoo habitat assessment was undertaken during one two-person day on 12 October 2023.

Observations and Previous Records

The Survey Area falls within the modelled distribution and breeding range for Baudin's black cockatoo, Carnaby's black cockatoo and the Forest Red-tailed black cockatoo (DCCEEW, 2022). Numerous observation records for all three species are present in DBCA database search results within 5 km of the Survey Area.

A confirmed Carnaby's black cockatoo breeding location is present approximately 17 km north of the Survey Area in the Roleystone area (DBCA-054). The Survey Area does not overlap with the (12 km) key foraging area buffer of this confirmed breeding location. The Survey Area falls within the 1km buffer applied to confirmed Carnaby's black cockatoo roost sites (no specific ID code supplied) (DBCA-64). See Figure 3.

Foraging evidence (chewed marri nuts) for all three species was recorded during the field survey. Foraging evidence was recorded at three locations for Baudin's black cockatoo, four locations for Carnaby's and eleven locations for forest red-tailed.

Black Cockatoo Breeding Habitat Assessment

Potential black cockatoo breeding trees are defined as those which either have a suitable nest hollow or are of a suitable DBH (>50cm for most species) to develop a hollow (DCCEEW, 2022). Breeding typically occurs in native eucalypt species particularly marri, jarrah, wandoo and tuart however many species of eucalypt including non-endemic species may develop suitable hollows for breeding (DCCEEW, 2022). A summary of understood suitable nesting hollow characteristics for the three species is provided below in Table 7.

Table 7 Black Cockatoo Nesting Hollow Characteristics

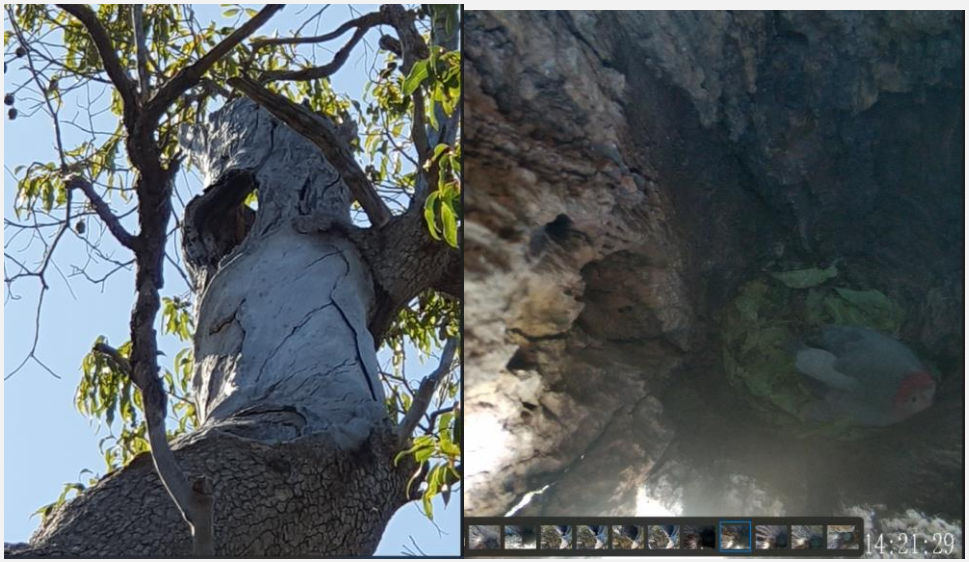
Species	Baudin's black cockatoo	Carnaby's black cockatoo	Forest red-tailed black cockatoo
Tree species and hollow characteristic	Nesting mainly in karri, marri, jarrah, wandoo, bullich, and tuart Preferred hollow dimensions have not been specifically studies but are considered likely to be similar to that of the Carnaby's black cockatoo	Nesting mainly in salmon gum, wandoo, tuart, jarrah, flooded gum, karri and marri. Utilise hollows from 10-65 cm diameter (average 26 cm and >1 m deep)	Nesting mainly in jarrah, marri, karri, wandoo, bullich, blackbutt and tuart Utilise hollow from 12-150 cm diameter (average 34 cm and >1 m depth)
Sources	DCCEEW 2022	DCCEEW 2022, Saunders et al 2014a, Saunders et al 2014b	DCCEEW 2022, Johnstone and Storr 1998, Johnstone et al 2013

A total of 152 potential breeding trees (DBH > 30 cm) were recorded, with 45 trees having a DBH >50 cm. Out of all trees recorded, the large majority (148 trees) did not show signs of potential nesting hollow development (Class 5 trees).

Three trees were assessed as possessing small hollows which are of an insufficient size to support nesting, however these trees are of sufficient age and growth form to be developing hollows (Class 4 trees). See Figure 4 for locations of potential breeding trees and Appendix C for summary of tree locations, species and DBH.

One tree (ID 51) was assessed as possessing a hollow with sufficient entry diameter, internal chamber dimensions and depth to represent a marginally suitable potential nesting hollow (Class 3), see Table 8 for details. No signs of usage by black cockatoo (distinctive chewing pattern) were present. Chew marks on branches around the hollow and hollow entrance indicate usage by galahs. Inspection with a pole camera confirmed that galahs were occupying the hollow. Galah are a recognised nest competitor for black cockatoo with Johnstone and Kirkby (Cataby research project 2004 – 2008) having reported numerous instances of failed breeding attempts attributed to corellas or galahs (Groom, 2010). With a chamber diameter of approximately 20-25 cm and depth of 50-60 cm the hollow is shallower than those typically utilised by black cockatoos and is considered to be at the lower end of the suitability range. Research for dimensions of hollows used by Carnaby's Cockatoo at Koobabbie reported minimum recorded dimensions of 15 cm floor of chamber and 30cm depth, however mean chamber floor diameter was 33cm and depth 132 cm (Saunders, 2014). Baudin's black cockatoo nesting requirements are understood to be similar to Carnaby's. Similarly, for forest red-tailed black cockatoo mean chamber floor diameters of 33 cm and depth of 144 cm were reported for 128 nest trees studied over 17 years (Johnstone et al, 2013). Also, to note the Byford locality on the coastal plain is not recognised as a typical breeding area for black cockatoo species (DCCEEW, 2022).

Table 8: Potentially Suitable Nesting Hollow

Tree ID	Species	ClassBamfo	DBH (mm)	Hollow Comment	Photo
51	Marri	3	650	Chimney hollow at 10m. Top opening 15-20cm. Side opening 15x25cm. Internal chamber 20-25 cm wide and 50-60cm deep. Galah pair nesting, Galah chew on rim and trunk below. No evidence of BC chew	

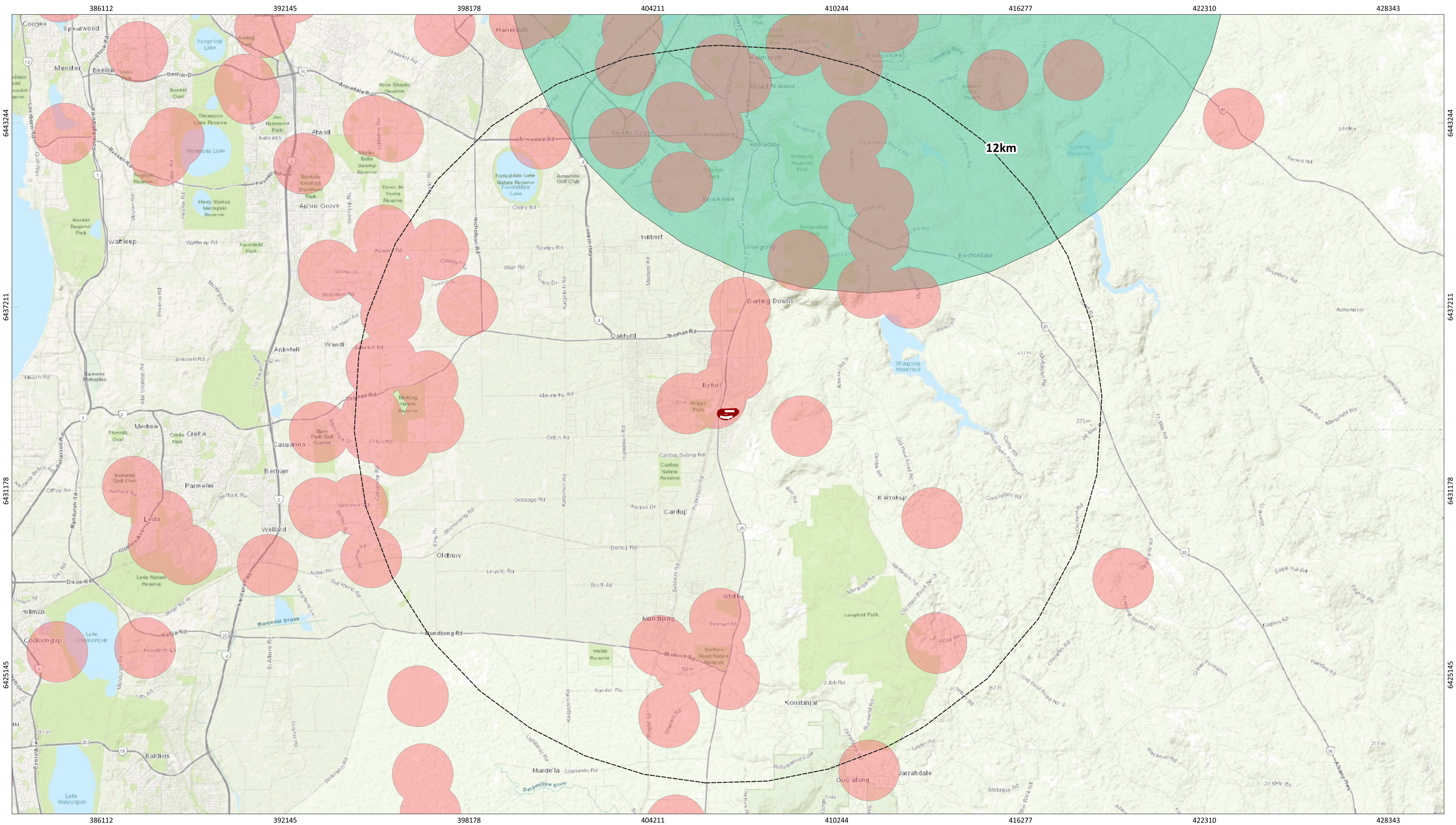


Figure 3: Known Black Cockatoo Roosting and Breeding Sites within 12 km Buffer

N

0 2 4 6 km

PROJECT/REPORT NAME	Black Cockatoo Habitat Assessment, Targeted Orchid Survey and EPBC Act Referral Lot 806 South West Highway, Byford
SCALE	1:120,670
SHEET SIZE	A3 COLOUR
CLIENT	Planning Solutions
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
PROJECT NUMBER	A23.069
VERSION	0
DATA SOURCE	LANDGATE AERIAL IMAGERY Summer 2023
DRAWN BY / REVIEWED BY	MD/LT
DATE	5/3/2024

Legend

- Survey Area
- Black Cockatoo Roosting Sites - Buffered (DBCA-064)
- Carnabys Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054)

No	Description	Drawn	Approved	Date
A	Original issue	MD	LT	5/3/2024

NOTES:

Cadastral boundary from LANDGATE 2022. Label corresponds to the vegetation association number.

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406374 406463 406552 406641 406730 406819 406908 406997

6433810

6433721

6433632

6433543

406374 406463 406552 406641 406730 406819 406908 406997

Figure 4: Black Cockatoo Potential Breeding Habitat

N

0 26 52 78 104 m

SCALE	1:1,781
SHEET SIZE	A3 COLOUR
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
DATA SOURCE	LANDGATE AERIAL IMAGERY Summer 2023

PROJECT/REPORT NAME
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Lot 806 South West Highway, Byford

CLIENT
Planning Solutions

PROJECT NUMBER	VERSION
A23.069	0
DRAWN BY / REVIEWED BY	DATE
MD/LT	5/3/2024

Legend

Survey Area

Tree Species

- Dead
- Jarrah
- Marri
- Wandoo

Bamford Tree Class

- 3
- 4
- 5

No	Description	Drawn	Approved	Date
A	Original issue	MD	LT	5/3/2024

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Black Cockatoo Foraging Habitat Assessment

The majority of the Survey Area was historically cleared. No good quality remnant vegetation is present within the Survey Area.

Foraging habitat within the Survey Area primarily comprises marri, jarrah, banksia and wandoo, which provide 'High' foraging value for black cockatoo species (DCCEEW, 2022). The extent of foraging habitat within the Survey Area is shown on Figure 5.

The Commonwealth referral guidelines provides a foraging quality scoring tool to guide referral information (DCCEEW, 2022). The tool advises that if the Survey Area contains native vegetation used for foraging at any time by a black cockatoo species and is >1 ha in size, that it is considered at face value to be of 'Very High' quality and assigned a starting score of 10. The tool then allows for subtractions if attributes are present which reduce the functionality of the foraging habitat. The Commonwealth referral guidelines specify that the tool is to be applied once to the entire impact area even if there is more than one type of foraging habitat present. The calculated foraging habitat quality score is shown below in Table 9. Scores of 5-10 are interpreted as 'High' value foraging habitat.

Table 9: Foraging Quality Scoring Tool (DCCEEW, 2022)

Attribute	Baudin's Black cockatoo	Carnaby's Black cockatoo	Forest Red-tailed Black cockatoo
Starting score	10 - native eucalypt woodlands, and proteaceous woodland and heath, particularly Marri, including along roadsides and parkland cleared areas. Can include planted vegetation.	10 - native shrubland, kwongan heathland or woodland as well as native eucalypt woodland, including along roadsides and parkland cleared areas. Also includes planted native vegetation.	10- Jarrah or Marri woodland and/or forest, or if Wandoo and Blackbutt occur on the site, including along roadsides and parkland cleared areas.
Foraging potential (-2 if no foraging evidence)	No change, foraging evidence present	No change, foraging evidence present	No change, foraging evidence present
Connectivity (-2 if no other foraging habitat in 12km)	No change, other foraging habitat <12 km away	No change, other foraging habitat <12 km away	No change, other foraging habitat <12 km away
Proximity to breeding habitat (-2 if no breeding habitat in 12km)	-2 No recorded breeding habitat within 12 km	Recorded breeding habitat within 12 km	-2, No recorded breeding habitat within 12 km

Attribute	Baudin's Black cockatoo	Carnaby's Black cockatoo	Forest Red-tailed Black cockatoo
Proximity to roosting (-1 if >20km from known night roost)	No change, known roosting site <20 km distant	No change, known roosting site <20 km distant	No change, known roosting site <20 km distant
Impact from significant plant disease (-1 if >50% impact)	No change, impact from plant disease affecting <50% of foraging plants	No change, impact from plant disease affecting <50% of foraging plants	No change, impact from plant disease affecting <50% of foraging plants
Total score	8	10	8

The Commonwealth referral guidance allows for the inclusion of additional information for foraging habitat which may be considered during an assessment, such as the extent and density of recognised foraging plants within a Survey Area. As an additional source of information, WEPL provides an assessment of foraging habitat quality using a more detailed scoring tool developed by DCCEEW (n.d.) referred to as the Habitat Quality Scoring Tool to produce a numerical foraging habitat score. The Habitat Quality Scoring Tool allows for a score of 0 (none) to 7 (very high) for Site Condition. This is assessed based on density of known foraging species and health of vegetation. The 0-7 Site Condition score is applied to each mapped polygon of fauna habitat. The Habitat Quality Scoring Tool then applies a Site Context score out of three, this is applied only once to the whole Survey Area.

The Site Condition habitat quality score for each species, and the total area of that score present within the Survey Area are listed in Table 10 below and shown in Figure 5. The score was calculated as per the criteria listed in Appendix D.

Table 10: Habitat Quality Scoring Tool - Site Condition Extent

Score	Carnaby's Black Cockatoo (ha)	Baudin's Black Cockatoo (ha)	Forest Red-tailed Black Cockatoo (ha)
7 - Very High	2.64	2.64	2.64
6 - High	0.21	0.21	0.21
3 - Low to Moderate	0.14	0.14	0.14
2 - Low	0.10	0.10	0.10
0 - None	5.16	5.16	5.16
Total	8.26 ha	8.26 ha	8.26 ha

The Habitat Quality Scoring Tool then requires the application of a Regional Site Context score out of three (see Table 11) which is added to the Site Condition score for a final x/10 score. See Table 12 for final Habitat Quality Scoring Tool score. Note that habitat with a Site Condition starting score of 2 or less are extremely unlikely to be suitable habitat and do not have a Regional Site Context score added.

Table 11: Habitat Quality Scoring Tool - Regional Site Context

Regional Site Context					
Proximity of the site in relation to other habitat	3	Site is within 6 km of known breeding site.	or	Site is within 12 km of other foraging resources with site condition of at least 3.	**3**
	2	Site is within 12 km of known breeding site.		Site is within 15 km of other foraging resources with site condition of at least 4.	
	1	Site is within 15 km of known breeding site.		Site is between 15 km and 20 km of other foraging resources with site condition of at least 5.	
	0	Site is further than 15 km from known breeding site.		Site is further than 20 km from other foraging resources.	
Totals					**3**

Table 12: Final Habitat Quality Scoring Tool Score

Final Score	Carnaby's Black Cockatoo (ha)	Baudin's Black Cockatoo (ha)	Forest Red-tailed Black Cockatoo (ha)
10	2.64	2.64	2.64
9	0.21	0.21	0.21
8	-	-	-
7	-	-	-
6	0.14	0.14	0.14
5	-	-	-
4	-	-	-
3	-	-	-
2	0.10	0.10	0.10
1	-	-	-
0	5.16	5.16	5.16
Total	8.26	8.26	8.26

406374 406463 406552 406641 406730 406819 406908 406997

6433810

6433721

6433632

6433543

Figure 5: Black Cockatoo Foraging Habitat

N

0 26 52 78 104 m

SCALE	1:1,781
SHEET SIZE	A3 COLOUR
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
DATA SOURCE	LANDGATE AERIAL IMAGERY Summer 2023

PROJECT/REPORT NAME
Black Cockatoo Habitat Assessment, Targeted Orchid Survey and EPBC Act Referral
Lot 806 South West Highway, Byford

CLIENT
Planning Solutions

PROJECT NUMBER	VERSION
A23.069	0

DRAWN BY / REVIEWED BY	DATE
MD/LT	5/3/2024

Legend

Survey Area

Tree Species
- Dead
- Jarrah
- Marri
- Wandoo

Black Cockatoo Foraging Habitat Quality Score (DCCEEW, n.d.)
- 0 - None
- 2 - Low
- 3 - Low to Moderate
- 6 - High
- 7 - Very High

No	Description	Drawn	Approved	Date
A	Original issue	MD	LT	5/3/2024

NOTES:

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Regional Foraging Habitat Assessment

Analysis of estimated foraging habitat extent within the local area was also undertaken to provide further context. The estimated extent of foraging habitat is calculated for a buffer of 12 km around and including the Survey Area. This buffer is selected as recommended in the Commonwealth referral guidelines due to black cockatoos mainly foraging within 12 km of their nest site during the breeding season and their reliance on this proximity of foraging resources to successfully raise chicks (DCCEEW, 2022).

Analysis considers Remnant Native Vegetation Extent mapping (DPIRD-005) and Vegetation Complexes-Swan Coastal Plain and South West forest region (DBCA-046 and DBCA-047). See summary of regional vegetation complexes and extents in Table 13 and displayed in Figure 6.

Analysis indicates there is 22,267.68 ha of remnant native vegetation mapped within a 12 km buffer of the Survey Area. It is expected that the majority of this vegetation would contain suitable foraging species at the same or greater rate than that present within the Survey Area and Context Area. Much of this regional remnant native vegetation occurs within the jarrah forest to the east and regionals park and nature reserves.

Within the Survey Area there is 2.99 ha of foraging habitat scoring between 3 (Low to Moderate) and 7 (Very High) on the Habitat Quality Scoring Tool -Site Condition scale. This represents 0.013 % of the estimated regional habitat extent. The habitat quality within the Survey Area is considered likely to be of similar quality than much of the regional foraging habitat, which includes high quality banksia woodlands of the Bassendean Complex sandplains and the jarrah and marri forests of the Darling Scarp.

Table 13: Regional Foraging Habitat Extent within 12 km Buffer

Vegetation Complex and Description	Remnant Extent (ha)
Bassendean Complex-Central and South Vegetation ranges from woodland of *Eucalyptus marginata* (jarrah) - Allocasuarina fraseriana (sheoak) - Banksia species to low woodland of Melaleuca species, and sedgelands on the moister sites. This area includes the transition of Eucalyptus marginata (jarrah) to *Eucalyptus todtiana* (pricklybark) in the vicinity of Perth.	1907.16
Beermullah Complex Mixture of low open forest of *Casuarina obesa* (swamp sheoak) and open woodland of *Corymbia calophylla* (marri) - *Eucalyptus wandoo* (wandoo) - *Eucalyptus marginata* (jarrah). Minor components include closed scrub of *Melaleuca* species and occurrence of *Actinostrobus pyramidalis* (swamp cypress).	135.48
Cooke, Ce Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla* (subhumid zone) and open forest of *Eucalyptus marginata* subsp. *thalassica-Corymbia calophylla* (semiarid and arid zones) and on deeper soils adjacent to outcrops, closed heath of Myrtaceae-Proteaceae species and lithic complex on granite rocks and associated soils in all climate zones, with some *Eucalyptus laeliae* (semiarid), and *Allocasuarina huegeliana* and *Eucalyptus wandoo* (mainly semiarid to perarid zones).	110.75

Vegetation Complex and Description	Remnant Extent (ha)
Darling Scarp, DS2 Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla*, with some admixtures with *Eucalyptus laeliae* in the north (subhumid zone), with occasional *Eucalyptus marginata* subsp. *elegantella* (mainly in subhumid zone) and *Corymbia haematoxylon* in the south (humid zone) on deeper soils adjacent to outcrops, woodland of *Eucalyptus wandoo* (subhumid and semiarid zones), low woodland of *Allocasuarina huegeliana* on shallow soils over granite outcrops, closed heath of Myrtaceae-Proteaceae species and lithic complex on or near granite outcrops in all climate zones.	1858.45
Dwellingup, D1 Open forest of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones.	1050.41
Dwellingup, D2 Open forest of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones.	8841.70
Forrestfield Complex Vegetation ranges from open forest of *Corymbia calophylla* (Marri) - *Eucalyptus wandoo* (Wandoo) - *Eucalyptus marginata* (Jarrah) to open forest of *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri) - *Allocasuarina fraseriana* (Sheoak) - *Banksia* species. Fringing woodland of *Eucalyptus rudis* (Flooded Gum) in the gullies that dissect this landform.	583.92
Guildford Complex A mixture of open forest to tall open forest of *Corymbia calophylla* (Marri) - *Eucalyptus wandoo* (Wandoo) - *Eucalyptus marginata* (Jarrah) and woodland of *Eucalyptus wandoo* (Wandoo) (with rare occurrences of *Eucalyptus lane-poolei* (Salmon White Gum)). Minor components include *Eucalyptus rudis* (Flooded Gum) - *Melaleuca rhaphiophylla* (Swamp Paperbark).	380.31
Helena 1, He1 Mosaic of open forest of *Corymbia calophylla-Eucalyptus patens-Eucalyptus marginata* subsp. *marginata* with some *Eucalyptus rudis* on the deeper soils ranging to closed heath and lithic complex on shallow soils associated with granite on steep slopes of valleys in humid and subhumid zones.	774.64
Murray 1, My1 Open forest of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla-Eucalyptus patens* on valley slopes to woodland of *Eucalyptus rudis-Melaleuca rhaphiophylla* on the valley floors in humid and subhumid zones.	3400.87
Serpentine River Complex Closed scrub of *Melaleuca* species and fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca rhaphiophylla* (Swamp Paperbark) along streams.	78.46
Southern River Complex Open woodland of *Corymbia calophylla* (Marri) - *Eucalyptus marginata* (Jarrah) - *Banksia* species with fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca rhaphiophylla* (Swamp Paperbark) along creek beds.	665.45
Swamp, S Mosaic of low open woodland of *Melaleuca preissiana-Banksia littoralis*, closed scrub of Myrtaceae spp., closed heath of Myrtaceae spp. and sedgelands of *Baumea* and *Leptocarpus* spp. on seasonally wet or moist sand, peat and clay soils on valley floors in all climatic zones.	76.83

Vegetation Complex and Description	Remnant Extent (ha)
Yarragil 1, Yg1 Open forest of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid and subhumid zones.	2023.62
Yarragil 2, Yg2 Open forest of *Eucalyptus marginata* subsp. *thalassica-Corymbia calophylla* on slopes, woodland of *Eucalyptus patens-Eucalyptus rudis* with *Hakea prostrata* and *Melaleuca viminea* on valley floors in subhumid and semiarid zones.	379.65
Grand Total	22,267.68

Roosting Habitat Assessment

The Survey Area intersects the buffer of a known roost site of Carnaby's black cockatoos (DBCA-064). No evidence of night roosting (e.g. piles of scats, feeding debris or chewed trees) were recorded within the Survey Area.

Night roosting locations are typically in proximity to foraging habitat (Black Cockatoos mainly foraging within 20km of night roosts) and with access to water points <2km from roosting location (DCCEEW, 2022). Any groups of tall trees, particularly large native eucalypts in proximity to water sources may provide night roosting habitat (DCCEEW, 2022). Throughout the Survey Area, isolated stands of tall (> 10 m) eucalypts are scattered which may provide suitable roosting habitat. Adjacent bush lands with foraging potential were located 1.2 km east of the Survey Area and access to permanent water was present from Beenyup brook 300 m to the north and Cardup brook 1.2 km to the south of the Survey Area (DWER-031).

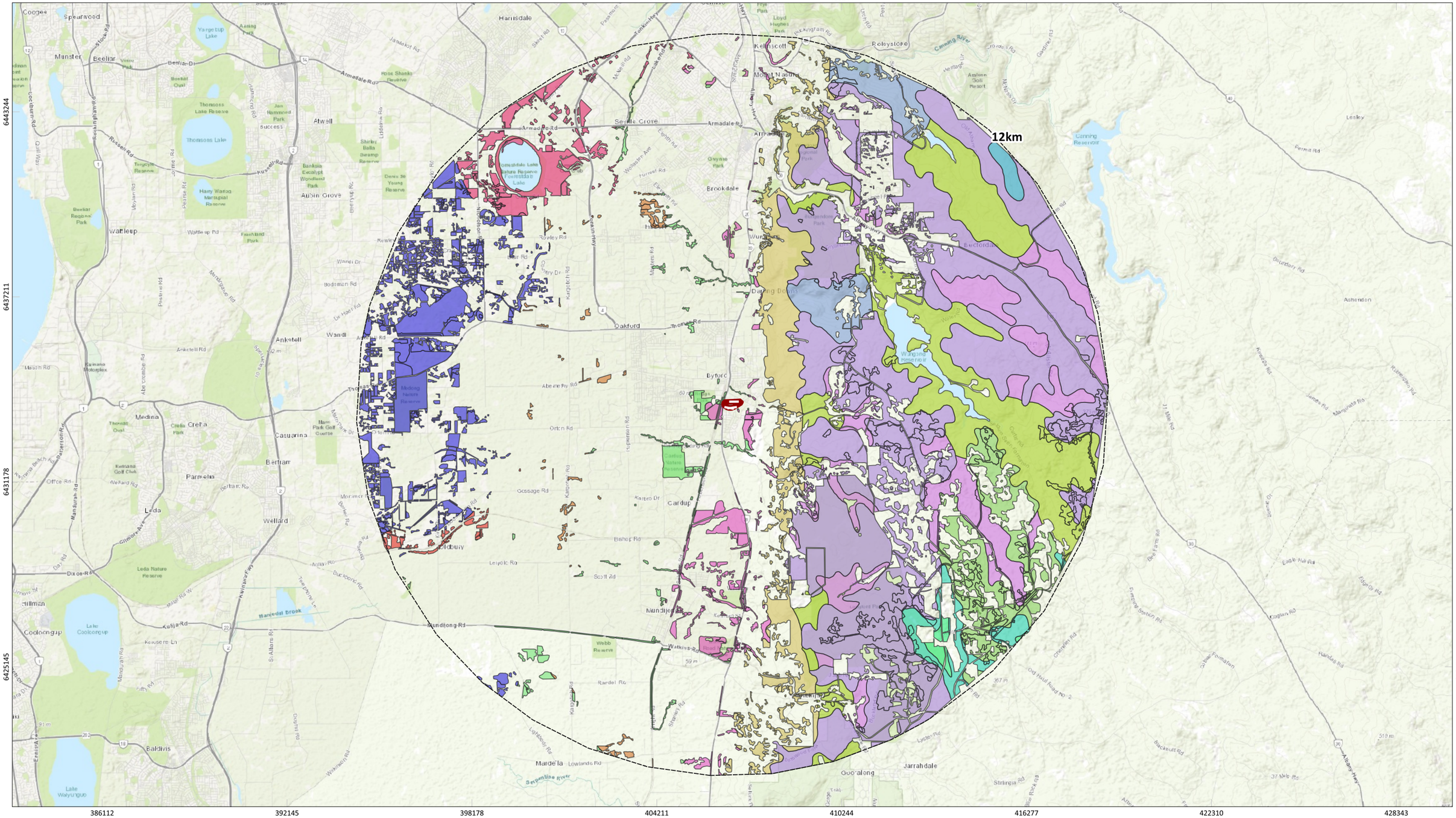

Figure 6: Black Cockatoo Foraging Habitat Extent 12 km Buffer

N

0 2 4 6 km

PROJECT/REPORT NAME	Black Cockatoo Habitat Assessment, Targeted Orchid Survey and EPBC Act Referral Lot 806 South West Highway, Byford
SCALE	1:120,670
SHEET SIZE	A3 COLOUR
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PROJECT NUMBER	A23.069
VERSION	0
DATA SOURCE	LANDGATE AERIAL IMAGERY Summer 2023
DRAWN BY / REVIEWED BY	MD/LT
DATE	5/3/2024

Legend

- Survey Area

Navtive Vegetation Intersected with Vegetation Complexes (DBCA-067 & 047)

- Bassendean Complex-Central and South
- Beermullah Complex
- Cooke, Ce
- Darling Scarp, DS2
- Dwellingup, D1
- Dwellingup, D2
- Forrestfield Complex
- Guildford Complex
- Helena 1, He1
- Murray 1, My1
- Serpentine River Complex
- Southern River Complex
- Swamp, S
- Yarragil 1, Yg1
- Yarragil 2, Yg2

No	Description	Drawn	Approved	Date
A	Original issue	MD	LT	5/3/2024

NOTES:

Cadastral boundary from LANDGATE 2022. Label corresponds to the vegetation association number.

WESTERN ENVIRONMENTAL

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4. Discussion

4.1 Flora of Conservation Significance

No Commonwealth listed, or State listed Threatened Flora were recorded during the targeted search survey within the Survey Area or were assessed as having a 'High' or 'Medium' post-survey likelihood of occurrence.

Considering that suitable survey effort was applied during an appropriate seasonal period; and noting the degraded condition of the Survey Area it is concluded that no Threatened flora species are likely to occur within the Survey Area.

4.2 Black Cockatoos

The Survey Area falls within the modelled distribution for the known foraging range of Baudin's cockatoo, within the breeding range of Carnaby's cockatoo, and is within the likely range of Forest red-tailed black cockatoo (DCCEEW, 2022).

A total of 152 potential breeding trees (DBH > 30 cm) were recorded. No evidence of current or previous nesting behaviour such as chew marks at hollow entrance attributed to black cockatoos, or flushed individuals were recorded. Out of all trees recorded, the large majority (148 trees) did not show signs of potential nesting hollow development (Class 5 trees). One Marri tree (ID 51) had a potentially suitable hollow (Class 3). The hollow was inspected with a pole camera where it was evident that Galah's were occupying the hollow. Galah are nest competitor with Black Cockatoos and are recorded as displacing or preventing hollow use by black cockatoos. The hollow could potentially be used by black cockatoos when the Galahs leave however, breeding is not typically observed in the Byford area of the Swan Coastal Plain.

Foraging habitat within the Survey Area is comprised primarily of Marri, Jarrah and Wandoo. The Commonwealth referral guidelines foraging quality scoring tool returns a score of ten out of ten ('High') for Carnaby's black cockatoos and eight out of ten ('High') for Forest Red-tailed and Baudin's black cockatoo. The Commonwealth referral guidelines specify that the tool is to be applied once to the entire impact area, even if there is more than one type of foraging habitat present. The guidance identifies that "loss of greater than or equal to 1 ha of foraging habitat scoring 5-10 using the foraging quality scoring tool is likely to require referral".

Foraging habitat quality was rated using the Commonwealth Habitat Quality Scoring Tool (DCCEEW, n.d.). Foraging habitat quality extents within the Survey Area out of ten were the same for all three black cockatoo species and was a follow:

- 2.64 ha (10/10), 0.21 ha (9/10), 0.14 ha (6/10) and 5.26 ha (Low 2 to None 0).

Analysis of estimated foraging habitat extent within the region indicates there is approximately 22,267.68 ha of remnant native vegetation mapped within a 12 km buffer of the Survey Area. The estimated area extent of 2.99 ha of foraging value habitat within the Survey Area represents 0.013 % of the estimated regional habitat extent. The majority of the regional vegetation is expected to contain suitable foraging species with much of the vegetation including high-quality banksia woodlands of the Bassendean Complex sandplains and the jarrah and marri forests of the Darling Scarp.

Throughout the Survey Area, isolated stands of tall (> 10 m) eucalypts are scattered which may provide suitable roosting habitat. No evidence of scat marking, branch clipping or feather dropping was recorded. Access to water is present from nearby brooks and recreational dams.

5. Conclusion

The results of the targeted flora survey and targeted black cockatoo habitat assessment indicate that:

- No Threatened flora species are likely to occur within the Survey Area.
- 148 of the 152 recorded potential black cockatoo breeding trees did not contain hollows.
- Three potential breeding trees contained hollows which were not suitable for use by black cockatoos.
- One Marri tree (ID 51) had a potentially suitable hollow for use by black cockatoos, however the hollow was occupied by galahs. Galah are nest competitor with Black Cockatoos and are recorded as displacing or preventing hollow use by black cockatoos. The hollow could potentially be used by black cockatoos when the Galahs leave however, breeding is not typically observed in the Byford area of the Swan Coastal Plain.
- The Survey Area contains suitable foraging habitat for all three species of black cockatoos, with habitat quality comprising: 2.64 ha (10/10), 0.21 ha (9/10), 0.14 ha (6/10) and 5.26 ha (Low 2 to None 0).

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Appendix A
Legislation

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act aims to protect matters of national environmental significance (MNES). Under the EPBC Act, the Commonwealth Department of Climate Change, Energy and the Environment lists threatened species and communities in categories determined by criteria set out in the EPBC Act.

Projects likely to cause a significant impact on MNES should be referred to the DCCEEW for assessment under the EPBC Act.

Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 aims to conserve and protect biodiversity and biodiversity components within the State and to promote ecologically sustainable use of biodiversity components in the State.

Environmental Protection Act 1986

Declared Rare Flora (DRF) and Threatened Ecological Communities (TECs) are given special consideration in environmental impact assessments and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Exemptions for a clearing permit do not apply in an ESA. In addition, habitat necessary for the maintenance of indigenous fauna is considered in the clearing principles and assessed during consideration of applications for a clearing permit.

Biosecurity and Agricultural Management Act 2007

Plants may be 'Declared' by the Minister for Agriculture and Food under the BAM Act. The Western Australian Organism List contains information on the area(s) in which a plant is declared and the control and keeping categories to which it has been assigned in Western Australia. A declaration may apply to the whole State, to districts, individual properties or even to single paddocks. If a plant is 'Declared', landholders are obliged to control that plant on their properties.

Weeds of National Significance

The Australian Government along with the State and Territory governments has endorsed 32 WoNS. Four major criteria were used in determining WoNS:

- The invasiveness of a weed species.
- A weed's impacts.
- The potential for spread of a weed.
- Socio-economic and environmental values.

Each WoNS has a national strategy and a national coordinator, responsible for implementing the strategy. WoNS are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.

Department of Biodiversity, Conservation and Attractions Priority Lists

DBCA lists 'Priority' flora and fauna that have not been assigned statutory protection as "Threatened" under the BC Act and are under consideration for declaration as Threatened. Flora and fauna assessed as Priority 1-3 are considered to be in urgent need of further survey. Priority 4 flora requires monitoring every 5 -10 years.

DBCA maintains a list of Priority Ecological Communities (PECs) which identifies plant communities that require further investigation before possible nomination for TEC status. Once listed, a community becomes a PEC and, when endorsed by the WA Minister for Environment, becomes a TEC and protected as an ESA under Environmental Protection (Clearing of Native Vegetation) Regulations 2004.

Informal Recognition of Flora and Fauna

Certain populations or communities of flora and/or fauna may be of local significance or interest because of their patterns of distribution and abundance. For example, specific locations of flora and may be locally significant because they are range extensions to the previously known distribution, or are newly discovered taxa (and have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (land clearing, grazing, and changed fire regimes) and relict populations of such species assume local importance for DBCA. It is not uncommon for DBCA to make comment on these species of interest.

Appendix B
Definitions and Criteria

EPBC Act Categories for Flora, Fauna and Ecological Communities

Category	Threatened Species	Threatened Ecological Communities
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.	N/A.
Extinct in the wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.	N/A.
Critically Endangered (CE)	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely High risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely High risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered (EN)	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very High risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very High risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable (VU)	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a High risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a High risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish. (ii) the species is the focus of a plan of management that provides for	N/A.

Category	Threatened Species	Threatened Ecological Communities
	management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised. (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory. (iv) cessation of the plan of management would adversely affect the conservation status of the species.	

Conservation Codes for Western Australian Flora and Fauna (DBCA)

Conservation Codes for Western Australian Flora and Fauna	
Threatened, Extinct and Specially Protected fauna or flora1 are species2 which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such. **The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the Biodiversity Conservation Act 2016.** **Categories of Threatened, Extinct and Specially Protected fauna and flora are:**	
T	Threatened species Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act). Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna. Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using International Union for Conservation of Nature (IUCN) Red List categories and criteria as detailed below.
CR	Critically endangered species Threatened species considered to be "facing an extremely High risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered undersection 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
EN	Endangered species Threatened species considered to be "facing a very High risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
VU	Vulnerable species

Conservation Codes for Western Australian Flora and Fauna	
	Threatened species considered to be "facing a High risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable undersection 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.
Extinct species **Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.**	
EX	Extinct species Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.
EW	Extinct in the wild species 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", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
Specially protected species **Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.** **Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.**	
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; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
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, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

Conservation Codes for Western Australian Flora and Fauna	
OS	Other specially protected species Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
P	Priority species Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species 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, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.
1	Priority 1: Poorly-known species 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.
2	Priority 2: Poorly-known species 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.
3	Priority 3: Poorly-known species 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.
4	Priority 4: Rare, Near Threatened and other species in need of monitoring (a) Rare. 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) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

1 The definition of flora includes algae, fungi and lichens.

DBCA Definitions and Criteria for TECs and PECs

Criteria	Definition
Threatened Ecological Communities	
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B): A. Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or B. All occurrences recorded within the last 50 years have since been destroyed.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely High risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A. The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii): i. geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years). ii. modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. B. Current distribution is limited, and one or more of the following apply (i, ii or iii): i. geographic range and/or number of discrete occurrences, and/or area occupied is Highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years). ii. there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes. iii. there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C. The ecological community exists only as Highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

Criteria	Definition
	An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very High risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C): A. The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii): i. the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short-term future (within approximately 20 years). ii. modification throughout its range is continuing such that in the short-term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated. B. Current distribution is limited, and one or more of the following apply (i, ii or iii): i. geographic range and/or number of discrete occurrences, and/or area occupied is Highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short-term future (within approximately 20 years). ii. there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes. iii. there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of Higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a High risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C): A. The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated. B. The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. C. The ecological community may be still widespread but is believed likely to move into a category of Higher threat in the medium to long term future because of existing or impending threatening processes.
Priority Ecological Communities	
Priority One	Poorly known ecological communities Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of

Criteria	Definition
	survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority Two	Poorly known ecological communities Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, state forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities, but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
Priority Three	Poorly known ecological communities i. Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or. ii. Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or. iii. Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities, but do not meet adequacy of survey requirements and / or are not well defined, and known threatening processes exist that could affect them.
Priority Four	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. i. Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands. ii. Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. iii. Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority Five	Conservation Dependent Ecological Communities Ecological Communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix C
Potential Black Cockatoo Breeding Trees

Tree #	Species	Class BAMfo	DBH (cm)	Hollow notes	Location (GDA2020 / MGA50)	
					Easting	Northing
1	Marri	5	65		406759.5086	6433651.328
2	Marri	5	45		406751.6601	6433643.537
3	Marri	5	55		406743.7621	6433646.068
4	Dead	5	40		406720.0543	6433621.057
5	Marri	5	40		406689.1066	6433613.739
6	Marri	5	40		406690.4347	6433608.519
7	Marri	5	45		406683.9717	6433613.825
8	Marri	5	30		406679.0327	6433604.925
9	Marri	5	30		406658.6734	6433612.627
10	Marri	5	40		406673.132	6433601.539
11	Marri	5	35		406658.6734	6433612.627
12	Marri	5	50		406667.533	6433602.057
13	Marri	5	30		406647.262	6433602.729
14	Marri	5	45		406649.4548	6433597.594
15	Marri	5	35		406630.56	6433606.235
16	Marri	5	30		406628.2599	6433596.103
17	Marri	5	30		406581.9826	6433606.62
18	Marri	5	60		406525.7002	6433604.449
19	Marri	5	30		406504.0628	6433620.609
20	Marri	5	35		406514.5953	6433607.637
21	Marri	5	30		406500.7441	6433621.134
22	Marri	5	35		406502.6703	6433610.685
23	Marri	5	40		406495.7864	6433623.969
24	Marri	5	30		406485.2278	6433623.779
25	Marri	5	30		406490.051	6433629.374
26	Marri	5	65		406444.4948	6433666.342
27	Marri	5	65		406458.2317	6433653.173
28	Marri	5	40		406424.4145	6433662.178
29	Marri	5	45		406441.5504	6433669.023
30	Dead	5	30		406422.8288	6433672.141
31	Marri	5	65		406468.1786	6433667.207
32	Marri	5	50		406421.3736	6433687.353
33	Marri	5	30		406484.3792	6433640.318
34	Marri	5	40		406506.1919	6433634.44

Tree #	Species	Class BAMfo	DBH (cm)	Hollow notes	Location (GDA2020 / MGA50)	
					Easting	Northing
35	Jarrah	5	30		406495.3723	6433637.169
36	Marri	5	40		406501.4283	6433629.692
37	Marri	5	50		406501.1227	6433627.414
38	Marri	5	55		406498.7764	6433632.164
39	Marri	5	35		406522.3626	6433618.082
40	Marri	5	35		406547.582	6433634.968
41	Marri	5	40		406560.2766	6433621.538
42	Marri	5	30		406556.7006	6433629.184
43	Marri	5	35		406568.0545	6433618.583
44	Marri	5	45		406559.7519	6433639.415
45	Marri	5	35		406612.6073	6433611.145
46	Marri	5	40		406562.2116	6433641.949
47	Marri	5	30		406616.1989	6433617.64
48	Marri	5	35		406571.2296	6433631.234
49	Marri	5	35		406618.3085	6433617.937
50	Marri	5	60		406587.4308	6433623.64
51	Marri	3	65	Chimney hollow at 10m.mtop opening 15-20cm. Side opening 15x25cm. Internal chamber 20-25 cm wide and 50-60cm deep. Galah pair nesting, Galah chew on rim and trunk below. No evidence of BC chew	406629.3029	6433618.225
52	Marri	5	65		406593.4687	6433629.18
53	Marri	5	30		406680.2093	6433624.653
54	Marri	5	60		406609.2906	6433623.709
55	Marri	5	35		406688.2008	6433632.775
56	Marri	5	45		406613.8448	6433629.368
57	Marri	5	30		406690.5042	6433635.056
58	Marri	5	55		406599.1066	6433636.54
59	Marri	5	40		406729.4541	6433643.2
60	Marri	5	95		406640.6444	6433628.373
61	Dead	4	45	Has a 10 cm hollow occupied by regiont parrot 8 m up. Also broken and nurnt out branches with	406642.7121	6433624.704

Tree #	Species	Class BAMfo	DBH (cm)	Hollow notes	Location (GDA2020 / MGA50)	
					Easting	Northing
62	Marri	5	35		406648.4683	6433686.331
63	Marri	4	60	Small	406644.7233	6433680.626
64	Marri	5	30		406667.7354	6433643.464
65	Marri	5	35		406619.1063	6433688.425
66	Marri	5	55		406685.6291	6433642.386
67	Marri	5	70		406594.0171	6433686.501
68	Marri	5	35		406687.803	6433653.945
69	Marri	5	35		406599.8228	6433667.34
70	Marri	5	35		406695.2591	6433646.889
71	Marri	5	30		406594.9335	6433662.761
72	Marri	5	45		406643.1231	6433641.096
73	Marri	5	40		406573.9828	6433668.833
74	Marri	5	30		406648.7194	6433655.354
75	Marri	5	30		406569.7311	6433675.494
76	Marri	5	30		406642.2889	6433655.944
77	Marri	5	40		406555.6343	6433677.821
78	Marri	5	40		406635.3035	6433655.72
79	Marri	5	45		406542.404	6433676.285
80	Marri	5	40		406629.9639	6433651.27
81	Marri	5	30		406534.5755	6433666.513
82	Marri	5	35		406633.0169	6433639.364
83	Marri	5	40		406524.2865	6433651.748
84	Marri	5	45		406620.0138	6433660.707
85	Marri	5	70		406562.4961	6433786.763
86	Marri	5	85		406605.0436	6433654.198
87	Marri	5	35		406648.6672	6433755.56
88	Marri	5	40		406555.0358	6433661.164
89	Marri	5	50		406638.7909	6433761.19
90	Marri	5	35		406549.2133	6433646.929
91	Marri	5	45		406636.1406	6433765.115
92	Marri	5	30		406519.974	6433669.92
93	Marri	5	30		406629.5273	6433775.317
94	Marri	5	40		406525.5374	6433685.34
95	Marri	5	90		406623.3999	6433788.1

Tree #	Species	Class BAMfo	DBH (cm)	Hollow notes	Location (GDA2020 / MGA50)	
					Easting	Northing
96	Marri	5	35		406530.4043	6433683.841
97	Marri	5	35		406610.7526	6433786.759
98	Marri	5	60		406503.6332	6433731.553
99	Marri	5	30		406762.2716	6433732.16
100	Marri	5	40		406533.9016	6433754.114
101	Marri	5	35		406764.0577	6433726.646
102	Jarrah	5	40		406557.0294	6433745.817
103	Marri	5	50		406759.5585	6433730.918
104	Jarrah	5	90		406557.1142	6433741.404
105	Marri	5	45		406749.8264	6433747.747
106	Marri	5	50		406572.668	6433746.795
107	Marri	5	35		406750.5598	6433751.512
108	Marri	5	85		406597.9741	6433742.245
109	Marri	5	55		406735.5617	6433729.292
110	Marri	5	30		406606.6077	6433744.094
111	Marri	5	65		406802.4469	6433752.019
112	Marri	5	35		406608.2036	6433746.448
113	Wandoo	5	40		406821.226	6433714.67
114	Marri	5	60		406564.2713	6433702.259
115	Wandoo	5	60		406837.1118	6433713.18
116	Marri	5	45		406575.5248	6433698.756
117	Wandoo	5	60		406840.21	6433714.609
118	Marri	5	90		406654.5174	6433754.011
119	Marri	5	55		406917.4808	6433799.385
120	Marri	5	100		406657.8931	6433765.528
121	Marri	5	55		406920.5851	6433797.762
122	Marri	5	35		406665.2576	6433778.125
123	Marri	5	30		406686.9047	6433772.164
124	Marri	5	55		406678.0608	6433766.375
125	Marri	5	70		406672.5259	6433759.928
126	Marri	5	45		406662.5506	6433736.667
127	Marri	5	40		406672.5235	6433722.38
128	Marri	5	40		406683.4109	6433735.631
129	Marri	5	45		406694.0701	6433757.641

Tree #	Species	Class BAMfo	DBH (cm)	Hollow notes	Location (GDA2020 / MGA50)	
					Easting	Northing
130	Marri	5	30		406703.6975	6433738.438
131	Marri	5	30		406764.7213	6433741.52
132	Marri	5	40		406764.06	6433746.128
133	Marri	5	80		406757.7214	6433775.779
134	Marri	5	35		406745.5364	6433766.798
135	Marri	5	30		406740.7129	6433774.671
136	Marri	5	40		406735.5775	6433773.605
137	Marri	5	45		406723.3111	6433772.276
138	Marri	5	45		406721.9972	6433761.294
139	Marri	5	35		406719.4251	6433762.435
140	Marri	5	40		406729.0943	6433754.17
141	Marri	5	30		406730.9425	6433754.888
142	Marri	4	100	Has a broken off branch that has developed a cup formation 6 m up. It also has a couple of broken branches with	406784.6177	6433751.009
143	Marri	5	30		406784.6851	6433726.64
144	Marri	5	30		406795.8478	6433724.522
145	Wandoo	5	40		406816.3594	6433705.058
146	Dead	5	40		406821.997	6433702.917
147	Wandoo	5	35		406819.2795	6433700.235
148	Wandoo	5	75		406828.1581	6433709.594
149	Wandoo	5	40		406835.9859	6433711.12
150	Marri	5	80		406857.1874	6433764.311
151	Marri	5	60		406837.7349	6433771.242
152	Marri	5	65		406864.8324	6433783.134

Appendix D
Habitat Quality Scoring Tool for Black Cockatoo Foraging Habitat (DCCEEW, n. d.)

This habitat scoring system describes elements indicative of suitable foraging habitat[1] for the three WA black cockatoo species (Carnaby's Black Cockatoo, Baudin's Black Cockatoo and the Forest Red-tailed Black Cockatoo) in WA. Its use must be supported by survey information and reporting, undertaken by suitably qualified and experienced ecologists.

Appropriate scores will best fit a description. Where all components of the 'detail' column description are not met, this must be specified, and justification provided for that score to be accepted by the Department.

For an offset site to be considered by the Department, the offset site must have a start score of 1 for each indicator (e.g., there must be a species stocking rate score of at least 1).

Indicator	Score	Detail		Impact site
Site Condition				
		Foraging value	Details	
Vegetation Condition and structure **Habitat features**	7	Very High	Carnaby's Black Cockatoo	
			Native kwongan heath and shrubland (>30% projected foliage cover), banksia and eucalypt woodlands with >50% projected foliage cover. Low percentage (< 5%) of tree deaths[2].	
			Baudin's Black Cockatoo	
			Marri-Jarrah Forest and woodlands with >50% projected foliage cover. Low percentage (< 5%) of tree deaths.	
			Forest Red-tailed Black Cockatoo	

[1] In some cases, an impact or offset site may contain or require both foraging and breeding habitat for one or more black cockatoos. Breeding habitat is species of trees known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow. For most species of trees, suitable DBH is 500 mm. For salmon gum and wandoo, suitable DBH is 300 mm.

[2] No tree deaths indicate robustness of habitat, unlikely for the habitat to decline in the medium-term. Tree deaths may be owing to disease, water stress, fire, etc.

Indicator	Score	Detail		Impact site
Vegetation Condition and structure Habitat features	6	High	Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >50% projected foliage cover. Low percentage (< 5%) of tree deaths.	
			Carnaby's Black Cockatoo	
			Native kwongan heath and shrubland (>25% projected foliage cover), banksia and eucalypt woodlands with >40% projected foliage cover. Low percentage (< 10%) of tree deaths.	
			Baudin's Black Cockatoo	
			Marri-Jarrah Forest and woodlands with >40% projected foliage cover. Low percentage (< 10%) of tree deaths.	
			Forest Red-tailed Black Cockatoo	
			Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >40% projected foliage cover. Low percentage (< 10%) of tree deaths.	
			Carnaby's Black Cockatoo	
			Native kwongan heath and shrubland (>20% projected foliage cover), banksia and eucalypt woodlands with 30-40% projected foliage cover; OR > 60% projected foliage cover but veg. condition reduced due to tree deaths (up to 20%).	
			Baudin's Black Cockatoo	
	5	Moderate to High	Marri-Jarrah Forest or woodlands with 30-40% projected foliage cover; OR > 60% projected foliage cover but veg. condition reduced due to tree deaths (up to 20%).	
			Forest Red-tailed Black Cockatoo	
			Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with 30-40% projected foliage cover; OR > 60% projected foliage cover but veg. condition reduced due to tree deaths (up to 20%).	

Indicator	Score	Detail		Impact site
	4	Moderate	Carnaby's Black Cockatoo	
			Native kwongan heath and shrubland, banksia or eucalypt woodlands with 20-30% projected foliage cover. Moderate percentage of tree deaths (30-40%).	
			Baudin's Black Cockatoo	
			Marri-Jarrah Forest or woodlands with 20-30% projected foliage cover; OR Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to tree deaths (up to 30-40%).	
			Forest Red-tailed Black Cockatoo	
			Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with: 20-30% projected foliage cover; OR 40-60% projected foliage cover but veg. condition reduced due to tree deaths (up to 30-40%).	
	3	Low to Moderate	Carnaby's Black Cockatoo	
			Native kwongan heath and shrubland, banksia or eucalypt woodlands with 10-20% projected foliage cover.	
			Baudin's Black Cockatoo	
			Marri-Jarrah Forest or woodlands with 5-20% projected foliage cover.	
			Forest Red-tailed Black Cockatoo	
			Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with 5-20% projected foliage cover.	
Vegetation Condition and structure **Habitat features**	2	Low	Carnaby's Black Cockatoo	
			Native kwongan heath and shrubland, banksia and eucalypt woodlands with <10% projected foliage cover; OR Paddocks and/or urban areas with scattered foraging trees such as banksias, marri.	
			Baudin's Black Cockatoo	

Indicator	Score	Detail		Impact site
			Marri-Jarrah Forest or woodlands with 1-5% projected foliage cover; OR Paddocks and/or urban areas with scattered foraging trees such as banksia, hakea, dryandra.	
			Forest Red-tailed Black Cockatoo	
			Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with 1-5% projected foliage cover; OR Paddocks and/or urban areas with scattered food plants such as Cape Lilac, Eucalyptus caesia and E. erythrocorys.	
			All species	
	1	Negligible to Low	Scattered specimens of known food plants but projected foliage cover of these is <2%. May include: paddocks or urban areas with scattered foraging trees.	
			All species	
	0	None	No Proteaceae, eucalypts or other potential sources of food. May include bare ground or developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).	

Site Context					
Proximity of the site in relation to other habitat	3	Site is within 6 km of known breeding site.	or	Site is within 12 km of other foraging resources with site condition of at least 3.	
	2	Site is within 12 km of known breeding site.		Site is within 15 km of other foraging resources with site condition of at least 4.	
	1	Site is within 15 km of known breeding site.		Site is between 15 km and 20 km of other foraging resources with site condition of at least 5.	
	0	Site is further than 15 km from known breeding site.		Site is further than 20 km from other foraging resources.	
Totals					

Final Totals	5

Indicator		Species Stocking Rate[3]	Impact Site		
			CBC	BBC	FRT
Confirm presence/ absence of species	Yes	Species is seen or reported regularly and/or there is abundant foraging evidence, e.g. chewed nuts can be identified as this species. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year.			
	No	Species is recorded or reported very infrequently and there is little or no foraging evidence.			

[3] Species stocking rate is indicated by yes or no to confirm if any of the species is frequently present or not. If yes, the presence must be for the species being impacted by the proposal, not for a species that will not be impacted.