HENLEY BROOK AVENUE ROAD WORKS

BLACK COCKATOO HABITAT ASSESSMENT

Prepared for:	City of Swan
Report Date:	28 June 2023
Version:	2
Report No.	2023-756

pgv ENVIRONMENTAL

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1 INTRODUCTION

1.1 Background

The City of Swan is in the process of widening Henley Brook Avenue south of Gnangara Road and extending the Road through to just south of Henley Street (Figure 1). The proposed road works are within an unmade part of the road reserve at the northern end and mostly through private lots at the southern end (Figure 2).

The widening and extension work will result in the clearing of some native vegetation. An application for a Clearing permit has been submitted to the Department of Water and Environmental Regulation (DWER) (CPS9953/1). DWER has requested further information on habitat for Black Cockatoos that may occur in the application area to facilitate the assessment of the clearing permit.

PGV Environmental was commissioned by the City of Swan to undertake a Black Cockatoo Habitat Assessment to assess the impact of the proposed road works to respond to the query from DWER.

1.2 Scope of Works

The Black Cockatoo Habitat Assessment was undertaken to:

- Map and quantify the extent and quality of foraging habitat for Carnaby's and Forest Red-tailed Black Cockatoos;
- Record any evidence of foraging;
- Assess the foraging quality;
- Identify all suitable breeding habitat trees for Carnaby's and Forest Red-tailed Black Cockatoos; and
- Identify any evidence of roosting on the site.

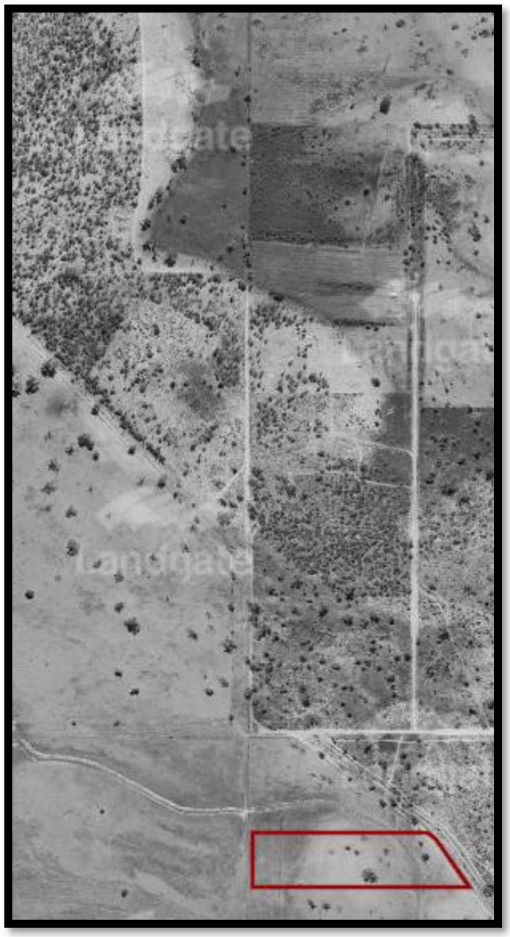
2 EXISTING ENVIRONMENT

2.1 Land Use

The earliest available historical aerial photograph of the site is from 1953 and shows the area contains native vegetation that appears to have been impacted and parkland cleared with a track through the central part (Plate 1). The alignment of the proposed extension of Henley Brook Avenue is partially aligned with a cleared track. There is significant clearing undertaken between 1953 and 1965 on much of the proposed road works site (Landgate, 2023) (Plate 2). Some remnant trees have been retained within the site.

Plate 1: Aerial Photograph from 1953

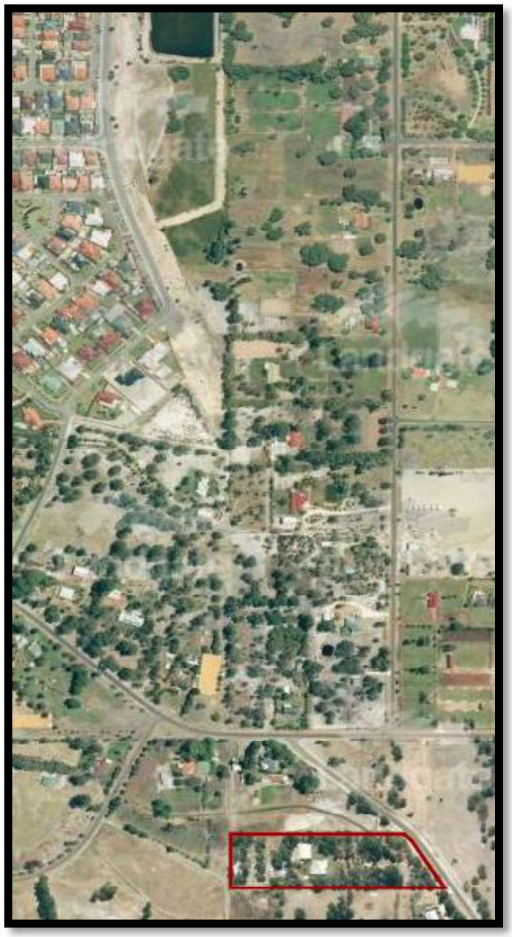
Plate 2: Aerial Photograph from 1974



Additional clearing is evident from the photograph from 1995 (Plate 3), after which a number of trees were planted within the area as observed in the photograph from 2008 (Plate 4).

Plate 3: Aerial Photograph from 1995

Plate 4: Aerial Photograph from 2008



2.2 Topography

The site is mostly flat 30-32 m Australian Height Datum (AHD) with a central ridge line rising up to 40m AHD (Figure 2).

2.3 Geomorphology and Soils

The site is mapped on the Bassendean Dune System and consists of very low relief, leached, grey siliceous Pleistocene sand dunes, intervening sandy and clayey swamps and gently undulating plains (Bolland, 1998). These soils are very leached, infertile and mildly acidic (DPIRD, 2023).

The soil phase mapped on the site is

- Bassendean, Jandakot Phase (212Bs_Ja) which is associated with low, gently sloping dunes on Aeolian sands. The soils are described as grey sand over pale yellow sands generally underlain by humic and iron podzols;
- Bassendean Yanga Phase (Bassendean) Phase (212Bs_Ya) which are located on poorly drained flats on alluvial deposits. The soils are semi-wet soils, yellow-brown shallow sands and grey deep sandy duplexes and are usually associated with dense *Melaleuca* scrub; and

- Bassendean Joel Phase (212Bs_J) which are poorly drained depressions with humus podzols (DPIRD, 2023).

2.4 Hydrology

Groundwater is at 27mAHD (DWER, 2023), which is between 3m and 13m below the surface. There is a multiple Use Palusplain mapped over most of the site (National Map, 2023).

2.5 Vegetation

The road reserve in the northern part of the site is mostly cleared and does not contain native vegetation (Plate 5) but is dominated by weeds including non-native Geraldton Wax (*Chamelaucium uncinatum*). A few *Acacia saligna* (Orange Wattle) shrubs and *Adenanthos cygnorum* (Woolly Bush) occur in the northern half.

Plate 5: Northern Part of the Site with Geraldton Wax

The vegetation in the central part of the site is a mixture of planted trees such as River Red Gums (*Eucalyptus camaldulensis*) and Tuart (*Eucalyptus gomphocephala*) (Plate 6) and scattered remnant native Jarrah (*Eucalyptus marginata*), Banksia trees (*Banksia attenuata, B. menziesii*) (Plate 7) and Marri (*Corymbia calophylla*) trees. Most of the Marri trees are young (Plate 8), however several large trees also occur.

Plate 6: Planted Row of Tuart Trees in the Central Part of the Site

Plate 7: Stand of Banksia trees in the Central Part of the Site

Plate 8: Marri Trees in the Central Part of the Site

The southern part of the site mostly contains the introduced River Red Gum (*E. camaldulensis*), some native Flooded Gum (*E. rudis*) and many hybrid *E. camaldulensis X E. rudis* trees (Plate 9).

Plate 9: Flooded Gums and River Red Gum x Flooded Gum in the Southern Part of the Site

The vegetation condition on the site was assessed using the system devised by Keighery and described in Bush Forever (Government of Western Australia, 2000) (Table 1).

Table 1: Vegetation Condition Rating Scale

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

Source: Government of Western Australia, 2000.

The vegetation on the site is all Completely Degraded.

3 BLACK COCKATOO SPECIES

3.1 Carnaby's Black Cockatoo (Z*anda (Calyptorhynchus) latirostris*)

Carnaby's Black Cockatoo is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of *Banksia, Hakea, Eucalyptus, Grevillea, Pinus* and *Allocasuarina* spp. It is nomadic, often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 – 12m above the ground and have an entrance of 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell). Eggs are laid from July to October, with incubation lasting 29 days (DoE, 2014).

The site is inside the boundary of the modelled distribution for Carnaby's Black Cockatoos (DAWE, 2022). The site is shown as being within the buffer of a confirmed roost site but is not within a confirmed breeding area (National Map, 2022).

3.2 Baudin's Black Cockatoo (Z*anda (Calyptorhynchus) baudinii*)

Baudin's Black Cockatoo is most common in the far south-west of Western Australia. It is known to breed from the southern forests north to Collie and east to near Kojonup. Baudin's Black Cockatoo is typically found in vagrant flocks and utilises the taller, more open Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) woodlands where it feeds mainly on Marri seeds and various Proteaceous species (Johnstone, Johnstone and Kirkby, 2011).

The site is outside the modelled 'distribution for Baudin's Black Cockatoos however the species may be a vagrant visitor to the site (DAWE, 2022).

3.3 Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)

Forest Red-tailed Black Cockatoos are endemic to the humid to sub-humid south-west of Western Australia (SEWPaC, 2012). The range of Forest Red-tailed Black Cockatoos is bound by Gingin in the north to Mt Helena, Christmas Tree Well, West Dale, North Bannister, Mt Saddleback, Kojonup, Rocky Gully, upper King River and Green Range (east of Albany) (DoE, 2014; DAWE, 2022). It nests in tree hollows with a depth of 1-5m, that are predominately Marri, Jarrah and Karri (*E. diversicolor*) and it feeds primarily on the seeds of Marri and Jarrah (Johnstone, Johnstone and Kirkby, 2011).

The site is inside the modelled distribution for Forest Red-tailed Black Cockatoos (DAWE, 2022).

4 METHODOLOGY

4.1 Habitat definitions

4.1.1 Foraging Habitat

'Foraging habitat' for Black Cockatoos is determined from the plant species that are present on the site and evidence of feeding such as direct observation of birds or by chewed nuts and cones. Foraging plants utilised by each species of Black Cockatoo varies, with Carnaby's Black Cockatoo foraging on Eucalypts, pines and proteaceous species, whereas Forest Red-tailed Cockatoos prefer Eucalypts and Allocasuarina and many exotic species and Baudin's prefer mostly seeds of Marri and Jarrah, also Allocasuarina cones (DAWE, 2022).

4.1.2 Breeding Habitat

'Breeding habitat' is defined as trees of species known to support breeding within the range of the species which either have a suitable nest hollow OR have a DBH of 500mm or greater (DAWE, 2022).

Past studies have found that on average hollow openings are 25 cm x 27 cm (Saunders *et al.,* 1982, Saunders and Dawson, 2017) and 30 cm x 34 cm (Johnstone *et al*., 2013). The height of a hollow entrance off the ground is on average 19.384 m (Johnstone *et al*., 2013). Nearly all hollows that are used for nesting by Black Cockatoos are located in the main trunk and have a vertical aspect (Johnstone *et al*., 2013, Saunders and Dawson, 2017). Black Cockatoos are large birds with shoulders that are about 100 mm wide, therefore they require hollows with an entrance bigger than this (as shown above they are typically much larger), but the internal dimensions (depth and floor base) need to be much larger in order for it to be suitable to lay eggs in and for adults to be able to move around.

Previous research has found for Carnaby's Black Cockatoo a mean depth of 1.2 m and a floor diameter of 40 cm is required in order for it to be suitable to lay eggs in and for adults to be able to move around (Johnstone *et al*., 2013, Saunders and Dawson 2017).

The Black Cockatoo Referral Guidelines define trees of certain species with a DBH of 300 to 500mm or greater, dependent on the tree species, as breeding habitat regardless of the presence or not of hollows. The theory behind this definition is the concept that while the trees may not currently contain hollows, they are mature enough that in the next 50 years or so a hollow might form and be of use to Black Cockatoos for the purposes of breeding.

4.1.3 Roosting Habitat

'Roosting habitat' is usually evident due to the presence of Black Cockatoos in the survey area in the evening and early morning and if there are scats or moulted feathers under the roosting area. Black Cockatoos utilise a wide range of native and non-native trees, situated within a variety of land-use types. Roosting habitat is generally in tall (average of > 25 m) tree species that have relatively thick trunks (average DBH of 1 m) and medium foliage density (average of 50%), and that are not too densely forested amongst other trees (average tree crown connectivity of 20 %) (Le Roux, 2017). Black cockatoos rely upon the availability of suitable night roosting sites in proximity to foraging resources, and particularly access to water within 2 km of the roost site (SEWPaC, 2012).

4.2 Site Survey

Dr Paul van der Moezel of PGV Environmental undertook a Black Cockatoo habitat assessment on 6 and 12 June 2023 in accordance with the Black Cockatoo Referral Guidelines and the methodology outlined in the SPRAT Database for each of the Black Cockatoo species.

The site was traversed on foot and information on Black Cockatoo foraging, roosting and breeding habitat was assessed. The extent, type and quality of the vegetation present, including the presence and extent of plants known to be used by Black Cockatoos was recorded.

Dr Paul van der Moezel has a PhD in Botany from The University of Western Australia and has undertaken more than 40 Black Cockatoo habitat assessments in the Perth Metropolitan Region in the last 10 years.

5 BLACK COCKATOO HABITAT

5.1 Foraging

The site contains eight species that are recognised as foraging habitat for Black Cockatoos (Table 2) (Davies 1966; Saunders 1980; Johnstone and Storr 1998; Johnstone and Kirkby 1999; Valentine and Stock, 2008; Groom 2011; Johnstone *et al*., 2011; SEWPaC, 2012; Johnstone, *et al.*, 2013; Groom, 2015; Johnstone *et al*., 2016; DAWE, 2022).

Table 2: Foraging Species for Black Cockatoos on the Site

Species	Common Name	Carnaby's Black Cockatoo	Forest red-tailed Black Cockatoo
Corymbia calophylla	Marri	✓	✓
Banksia attenuata	Candlestick Banksia	✓	
Banksia menziesii	Firewood Banksia	✓	
Corymbia calophylla	Marri	✓	✓
Eucalyptus gomphocephala	Tuart	✓	
Eucalyptus marginata	Jarrah	✓	✓
Eucalyptus rudis	Flooded Gum	✓	✓
Eucalyptus rudis x E. camaldulensis	Hybrid Flooded Gum	✓	✓

There was a small amount of evidence of black cockatoos (both Forest Red-tails and Carnaby's) having foraged on Marri nuts on the site (Plate 10 and 11). The extent of foraging habitat on the site is calculated to be 0.64 ha (Figure 3).

Plate 10: Forest Red-Tailed Black Cockatoo Foraging Evidence on Marri Nut

Plate 11: Carnaby's Black Cockatoo Foraging Evidence on Marri Nut

The foraging habitat value for Carnaby's Black Cockatoos was determined using the scoring tool in the revised Black Cockatoo Referral Guidelines (DAWE, 2022) (Table 10). The tool starts with a score of 10 and then subtracts points for contextual attributes (Table 10). The tool gives a result of 8 which is considered High quality foraging habitat.

Table 10: Scoring Tool for Foraging Habitat for Carnaby's Black Cockatoos

Attribute	Context Adjustor	Score with Breeding and Roosting as per mapping
Foraging potential	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	0
Connectivity	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	0
Proximity to breeding	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.	2
Proximity to roosting	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	0
Impact from significant plant disease	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	0
Score		**8**

5.2 Breeding

Black Cockatoos are known to breed in hollows of large eucalypts, including Jarrah trees. The site is not known as a breeding site for Black Cockatoos (DoP, 2011; National Map, 2022).

There were thirteen trees recorded by PGV Environmental that meet the definition of breeding habitat or potential breeding habitat due to their DBH being >500mm (Figure 3, Appendix 2). These were made up of seven planted Tuarts (*Eucalyptus gomphocephala*), four Marris (*Corymbia calophylla*), one Flooded Gum (*Eucalyptus rudis*) and Flooded Gum/River Red-Gum hybrid (*Eucalyptus rudis x E. camaldulensis*). None of the trees had any hollows.

The nearest breeding sites for Black Cockatoos are located 20km to the north-west and 20km to the east-north-east (National Map, 2023).

5.3 Roosting

Black Cockatoos are known to roost overnight in tall trees including native and introduced eucalypts and pine trees generally in close proximity to a fresh water source. The site contains mature trees, however no evidence of roosting was recorded during the survey.

The site is not mapped as containing a recorded roosting habitat for Black Cockatoos but is in the buffer of two known sites and near several others (DoP, 2011; Peck *et al.,* 2018; National Map, 2023). The nearest roosting sites are reported to be around 1.5km to the north-east and 1.7km to the east (National Map, 2023) (Figure 4).

6 SUMMARY AND CONCLUSIONS

The Black Cockatoo Habitat Assessment resulted in the following findings:

- The site contains foraging and potential breeding habitat for Carnaby's and Forest Red-tailed Black Cockatoos;
- The extent of foraging habitat is 0.64 ha, made up of 8 tree species;
- Evidence of foraging on Marri nuts by Carnaby's and Forest Red-tailed Black Cockatoos was observed;
- There was no evidence of roosting or breeding activity on the site and there are no records of roosting or breeding on the site; and
- The site contains 13 trees with a DBH large enough to be considered potential breeding habitat trees. None of the trees had any hollows.

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FIGURES

PINPOINT CARTOGRAPHICS (08) 9562 7136 2023-756-f01.dgn

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City of Swan
BLACK COCKATOO HABITAT ASSESSMENT
HENLEY BROOK AVENUE ROAD WORKS

Drawn: P. van der Moezel	Date: 23 Jun 2023
Job: 10542 Rpt: 2023-756	Revision: A

SITE LOCATION

Figure 1

CADASTRAL SOURCE: Landgate, May 2023.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown April 2023.

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Drawn: P. van der Moezel | Date: 26 Jun 2023
Job: 10542 Rpt: 2023-756 | Revision: A

City of Swan
BLACK COCKATOO HABITAT ASSESSMENT
HENLEY BROOK AVENUE ROAD WORKS

SITE BOUNDARY AND TOPOGRAPHY

Figure 2

PINPOINT CARTOGRAPHICS (08) 9562 7136 2023-756-f03.dgn

CADASTRAL SOURCE: Landgate, May 2023.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown April 2023.

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Drawn: P. van der Moezel	Date: 26 Jun 2023
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City of Swan
BLACK COCKATOO HABITAT ASSESSMENT
HENLEY BROOK AVENUE ROAD WORKS

BLACK COCKATOO FORAGING AND POTENTIAL BREEDING HABITAT

Figure 3

APPENDIX 1

Tree Data

Henley Brook Avenue Extension Tree Data									
Map and describe trees greater than 500 mm in diameter				Date: 7.6.23		Observer: PvdM			
Tree Number	Species	Easting MGA zn50	Northing MGA zn50	Photo Number	Height	Diameter	Second Branch	Third Branch	Notes (hollows, bees etc.)
1	Tuart (planted)	403507	6480918		18	91			no hollows
2	Tuart (planted)	403507	6480896		18	61			no hollows
3	Tuart (planted)	403507	6480891		17	95			no hollows
4	Tuart (planted)	403507	6480887		18	84			no hollows
5	Tuart (planted)	403512	6480850	9:38	20	68			no hollows
6	Tuart (planted)	403519	6480851	9:38	15	67			no hollows
7	Tuart (planted)	403546	6480850		19	88			no hollows
8	Marri	403534	6480710	9:59	17	67	42		no hollows, 10:00 Carnaby's foraging evidence
9	Marri	403533	6480666	10:02	16	73			no hollows, dead upper branches
10	Marri	403510	6480501	10:35	12	88			no hollows, leaning
11	Marri	403533	6480466	10:40	15	70			no hollows
12	E rudis x E. camaldulensis	403521	6480285		18	61	51		no hollows
13	E. rudis	403533	6480238	11:09	15	80			no hollows
14	E. rudis	403495	6480355	2:09	16	56	43	34	no hollows
15	E rudis x E. camaldulensis	403470	6480363	2:15	18	81			no hollows
16	E rudis x E. camaldulensis	403469	6480370	2:17	16	54			no hollows
17	E. rudis	403482	6480446	3:25	20	131			no hollows