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Erindale Road Residential Development: Black Cockatoo Hollow Suitability Assessment

1. Introduction

Digital 4 Pty Ltd on behalf of BAI Communications Pty Ltd (trading as Broadcast Australia; the proponent) is proposing to rezone 179 (Lot 802) Erindale Road, Hamersley under the City of Stirling (CoS) Local Planning Scheme No. 3 (LPS No.3) from "Local Reserve: Public Use Reserve (Commonwealth)" to "Development Zone", to enable Residential development (the proposal).

To facilitate Urban/Residential development, the clearing of native vegetation will be required within Lot 802 and a portion of Lot 803 (the survey area; Figure 3.1). The proposal was referred to the Department of Environment and Energy (DoEE) on 18 February 2019 for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2018/8324).

On 3 June 2019, the delegate for the Minister of the Environment determined that the proposal was a controlled action requiring assessment through preliminary documentation. Specifically, on the basis of the potential impacts to threatened species and ecological communities, namely:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*; CBC) – endangered
- Forest Red-tailed Black Cockatoo (*C. banksii naso*; FRTBC) – vulnerable
- Banksia Woodland of the Swan Coastal Plain Threatened Ecological Community.

The DoEE requested further information to enable assessment through preliminary documentation, including a Black Cockatoo nest hollow assessment. This survey must:

- be conducted within the Black Cockatoo breeding season (July to November), as defined in relevant statutory documentation
- be conducted using a telescopic pole-mounted camera or camera drone technology
- include close visual inspection of all potential nesting hollows within the proposed action area (and immediate vicinity) from above ground-level and provide photographic evidence of all potential nesting hollows inspected
- detail any evidence of use by Black Cockatoos i.e. chew marks, feather, debris
- include mapping of all potential breeding trees, suitable nesting hollows and known nesting hollows within the proposed action area (and immediate vicinity).

This report builds upon the findings of a Black Cockatoo habitat assessment undertaken in support of the proposal's referral under the EPBC Act (Strategen [now Strategen-JBS&G] 2019). All significant trees previously identified in this report have been subject to this assessment, the results of which are presented in the following sections.

2. Methodology

The Black Cockatoo nest hollow assessment was conducted on 22 October 2019 by two ecologists from Strategen-JBS&G with relevant experience as specified by the *EPBC Act Referral guidelines for three threatened Black Cockatoo species* (DSEWPaC 2012) and the Environmental Protection Authority (EPA)'s *Technical guidance: Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA 2016). Table 2.1 identifies personnel involved in the hollow assessment as well as project managers, their role and qualifications.

Table 2.1: Personnel

Name	Role	Qualifications and experience
Carli O'Brien	Senior Environmental Consultant (Project manager)	<ul style="list-style-type: none">• Bsc (Environmental Science; Marine Science)• Six (6) years post-graduate experience including Black Cockatoo habitat assessments• Volunteer Carnaby's breeding survey w/ Birdlife WA 2018, utilising pole-mounted camera
Chris Lehman	Environmental Consultant	<ul style="list-style-type: none">• Bsc (Environment Management)• Three (3) years post-graduate experience including Black Cockatoo habitat assessments
William Oversby	Junior Environmental Consultant	<ul style="list-style-type: none">• BSc (Environmental Biology) (Hons)• Three (3) years post-graduate experience including avian faunal surveys on the Swan Coastal Plain

Of the 33 trees originally recorded within the project area which met the criteria (Diameter at Breast Height [DBH]>500mm) to be considered a potential breeding tree, 17 were previously recorded as having hollows present, of which only six were considered either suitable (five) or possibly suitable (one) for nesting use. All 17 trees recorded as having hollows present were subject to this hollow suitability assessment.

The time of year in which the hollow assessment was conducted (October) was chosen to align with the Black Cockatoo breeding season. While FRTBC's are known to breed at any time of the year, with peaks in April to June and August to October, the breeding season for CBC is from between July to late February/ early March (DoEE 2017).

Surveying was conducted using a combination of the tap-and-flush method (Birdlife n.d.) and inspection via a telescopic pole-mounted camera. The tap-and-flush method is considered the quickest and most effective method of confirming hollow use by Black Cockatoos (Birdlife n.d.). Each tree was initially knocked two to three times at the base with a large stick or similar, with the intention of flushing out resident Black Cockatoos. The impact of this tree tapping-and flushing is minimal; disturbance is limited to Cockatoos who are likely to climb to the top of a hollow to investigate the source of the noise. Given each tree is only tapped at maximum three times in any given breeding season, this is unlikely to have a negative effect on the bird's behaviour or breeding success. Implementation of this method also ensures no Black Cockatoo is disturbed by the subsequent presence of the pole mounted camera within the hollow.

Where tapping and flushing did not reveal the presence of a Black Cockatoo, a telescopic pole-mounted camera was deployed to accurately gauge hollow morphometrics and record any visible evidence of use. The following parameters were recorded for each hollow:

- Hollow entry height above ground level
- Orientation of the hollow
- Hollow entry type (spout, chimney, side)
- Hollow opening width
- Depth of the hollow

- Evidence of Black Cockatoo activity

It should be noted however that if a hollow was determined to be unsuitable based on hollow opening width, no further hollow morphometrics were recorded.

Hollows may be considered suitable for breeding by Black Cockatoos if they meet the required specifications for opening width, height above ground level, aspect, and nest depth. In addition to these criteria, evidence of foraging around the base of the tree, chew marks around the periphery of the hollow and the presence of feathers or scat are good indications that a hollow may be in use. The specifications that tree hollows are required to meet to be considered suitable for breeding are based on available scientific studies and are outlined below:

Opening width

The diameter of a hollow must be great enough to allow access by an adult Black Cockatoo. Analyses of museum specimens of Carnaby's Black Cockatoo undertaken by Saunders *et al.* (1982) and Abbot and Whitford (2002) have determined that the average diameter at the shoulders of an adult Carnaby's Black Cockatoo ranges from 9.5 to 13 cm. As such, the minimum diameter for any hollow to be suitable for use must be 10 cm (Groom 2010).

Height above ground level

Carnaby's Black Cockatoos have been recorded using hollows at a wide range of heights above ground level; between 2 and 10 m in a wandoo dominated landscape, or 3 and 10+ m in a salmon gum dominated site (Saunders 1979). While there is no evidence to suggest that hollows located at a greater height are preferentially chosen by Black Cockatoos, it is considered that 2 m above ground level is the minimum height required for hollows to be considered suitable for breeding.

Aspect

There is no evidence to suggest that any particular aspect of nesting hollows is particularly favoured by Black Cockatoos (Groom 2010). However, regular monitoring of artificial nesting hollows has shown that hollows placed at any aspect other than vertically with top entrances (Chimney type) are likely to attract nest competitors such as feral bees, galahs and corellas (DPaW 2015). It is therefore considered that hollows with a vertical aspect are better suited for breeding by Black Cockatoos.

Nest Depth

The majority of positively identified natural breeding hollows have a depth ranging between 0.5 and 2.0 m deep. While it should be noted that nest depth varies over time as debris accumulates and plant-matter decays and depresses, it is generally considered that any hollow with a depth less than 0.5 m is considered not suitable for breeding by Black Cockatoos.

2.1 Survey limitations and constraints

Table 2.2 displays the evaluation of the hollow suitability assessment against a range of potential limitations that may have an effect on that assessment. Based on this evaluation, the assessment has not been subject to constraints that would affect the thoroughness and the conclusions reached.

Table 2.2: Hollow suitability assessment methodology: potential limitations and constraints

Potential limitation	Impact on assessment	Comment
Competency/ experience of the consultant carrying out the survey	Not a constraint	All survey personnel have the appropriate training and experience in surveying for the target species (Table 2.1)
Scope (what faunal groups were sampled and were some sampling	Not a constraint	Two faunal species were targeted by this survey; Carnaby's Black Cockatoo and Forest Red-tailed Black

Potential limitation	Impact on assessment	Comment
methods not able to be employed because of constraints such as weather conditions)		Cockatoo. All sampling methods were able to be employed
Proportion of fauna identified, recorded and/ or collected	Not a constraint	In total, two faunal species were identified and recorded. No fauna were collected.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	Not a constraint	The survey has been undertaken on Carnaby's Black Cockatoo and Forest Red-tailed Black Cockatoo, both of which have been well studied and documented with ample literature available
The proportion of the task achieved and further work which might be needed	Not a constraint	The entire task was achieved. All target trees were appropriately surveyed.
Timing, weather, season, cycle	Not a constraint	The survey was conducted during the breeding seasons of both Black Cockatoo species.
Disturbances (e.g. fire, flood, accidental human intervention etc) which affected the results of the survey	Not a constraint	The survey area has not been subject to fire or other significant disturbance in the recent past. Fencing surrounding the site excludes unauthorised access.
Intensity (in retrospect, was the intensity adequate)	Not a constraint	The survey area was traversed on foot utilising pre-existing survey data. Every trees containing hollows were assessed.
Completeness (e.g. was relevant area fully surveyed)	Not a constraint	All trees targeted by the survey were successfully assessed.
Resources (e.g. degree of expertise available in animal identification to taxon level)	Not a constraint	The available resources were adequate to complete the survey
Remoteness and/or access problems	Not a constraint	Local roads and access (past the external fence) was adequate.
Availability of contextual (biogeographic) information on the region	Not a constraint	The survey has been undertaken on the Swan Coastal Plain which has been well studied and documented with ample literature available.

3. Results

In addition to the 17 trees originally identified as having hollows present in the 2018 habitat assessment (Strategen 2018), one large stag tree was identified within the survey area with the potential to contain a hollow suitable for breeding by Black Cockatoos. A duplicate in the data was also observed, where two trees originally identified in immediate proximity were confirmed to be a single tree (tree 9). In total, the number of trees surveyed remained at 17 (Figure 3.1).

Across these 17 trees, 30 hollows were identified, with an average of approximately 2 hollows per tree. The maximum number of hollows in a tree was 4 (Trees 3 and 11), with the minimum number of hollows being zero (tree 7). The data collected, as well as hollow imagery taken has been provided in Appendices 1 and 2.

No Black Cockatoos were flushed from any trees during the tap-and-flush phase of the survey, nor were any heard calling or seen flying over the site during the survey's duration.

Of the 30 hollows included in this survey, only one was determined to be suitable for use by Black Cockatoos; hollow 2 within tree 11 (Plate 1; Plate 2). This hollow was determined to be suitable based on the following:

- A hollow entry height of 7 m above ground level
- A hollow entry diameter of 15 cm
- Depth of the hollow being 50 cm

- Chew marks were observed on the periphery of the hollow entrance (Plate 2)

It should be noted however that an adult Kookaburra (*Docelo novaeguineae*) was flushed from the hollow during the tap-and-flush phase of the assessment, and three eggs from an unknown species were observed at the hollow's base (Plate 1).

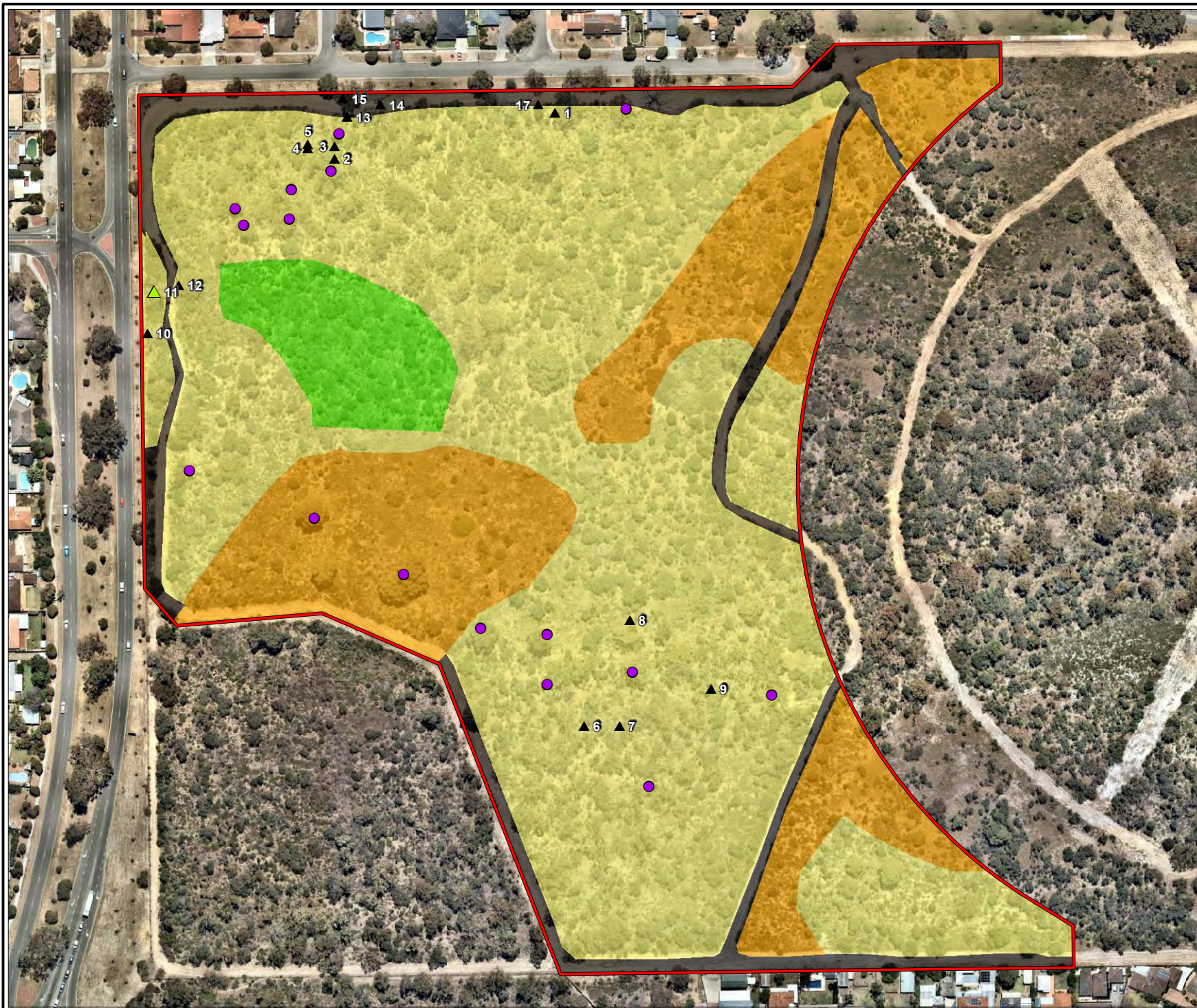
Of the remaining 29 hollows, all were determined to be unsuitable based on the hollow entry diameter being under the required 10 cm, or hollow depth being less than the required 50 cm. It should also be noted that bee hives were observed within five of the surveyed hollows, rendering them at least temporarily unsuitable for use by Black Cockatoos.



Plate 1: Internal view of hollow 2, tree 11 with three eggs present



Plate 2: Chew marks observed on the periphery of hollow 2, tree 11 (Circled)



Legend:

- Survey area
- Black Cockatoo Habitat quality
- Completely degraded
- Very poor (CBC, FRTBC)
- Moderate good (CBC) / Very poor (FRTBC)
- Good (CBC)
- Significant trees
- No hollows present
- Hollows present - not suitable
- Hollows present - suitable



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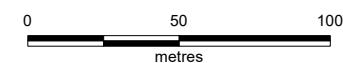
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Date 13/11/2019

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**Erindale road,
Hamersley WA**

**BLACK COCKATOO SIGNIFICANT
TREES WITH POTENTIALLY SUITABLE
HOLLOWS**

FIGURE 3.1

4. Discussion and conclusions

Only one of the 30 tree hollows surveyed was determined to be currently suitable for breeding by Black Cockatoos, based on hollow morphometrics. However, the presence of a kookaburra within the hollow and three eggs from an unconfirmed progenitor (likely kookaburra) suggest that the hollow is not currently in use by, or available for use for, Black Cockatoos. Chew marks on the periphery of the hollow opening are also unable to be confidently attributed to a particular species.

Direct nest competitors to Black Cockatoos were observed in seven of the 30 hollows surveyed. These were:

- European honeybees (*Apis mellifera*; five hollows; trees 5, 11, 10, 12, 17)
- Rainbow Lorikeet (*Trichoglossus moluccanus*; one hollow; tree 11)
- Kookaburra (one hollow; tree 11)

It is worth noting that, despite the absence of currently suitable hollows in most trees, trees of a suitable DBH have the potential to develop hollows in the long term (DSEWPaC 2012).

While foraging evidence has been previously recorded within the site, there was no evidence to suggest use of the site for breeding by Black Cockatoos. This may be due to the paucity of suitable hollows available within the site.

5. References





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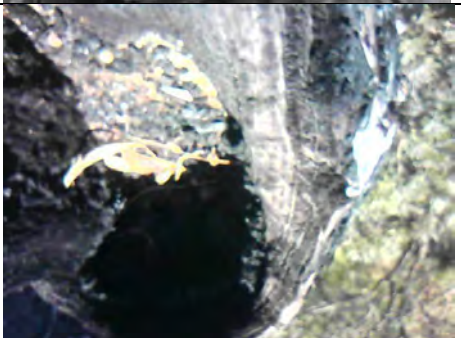
A1. Black Cockatoo hollow suitability data

Tree No.	Species	Co-ordinates		Hollow	Hollow entry height (m)	Hollow orientation	Hollow type	Hollow entry diameter (cm)	Hollow depth (cm)	Activity	Additional Comments/Suitability
		x	y								
1	Tuart	387945	6475238	1	5	Diagonal	Spout	5			Not Suitable
2	Jarrah	387841	6475205	1	10	Vertical	Chimney	20	5		Not Suitable
				2	10	Diagonal	Not a hollow				Multiple large openings. Not suitable
3	Stag	387842	6475220	1	4	Diagonal	Spout	10	20		Not Suitable
				2	4	Vertical	Chimney	70	5		Not Suitable
				3	5	Diagonal	Spout	15	10		Not Suitable
				4	5	Diagonal	Spout	10	5		Not Suitable
4	Jarrah	387829	6475221	1	10	Horizontal	Spout	<10			Not Suitable
5	Jarrah	387827	6475215	1	15	Horizontal	Spout	10		Bee hive	Not Suitable
6	Jarrah	387952	6474949	1	7	Horizontal	Spout	<10	10		Not Suitable
7	Jarrah	387985	6474942	N/A							No observable hollows
8	Jarrah	387980	6474981	1	3	Horizontal	Spout	<10			Not Suitable
9	Stag	388023	6474968	1	5	Diagonal	Spout	15	<10		Not Suitable
				2	5	Diagonal	Spout	15	<10		Not Suitable
10	Jarrah	387755	6475129	1	5	Diagonal	Spout	15	<5		Not Suitable
				2	5	Diagonal	Spout	7	<5	Bee hive	Not Suitable
				3	5	Diagonal	Spout	7	<5		Not Suitable
11	Jarrah	387757	6475155	1	6	Vertical	Side	10	10		Not Suitable
				2	7	Vertical	Side	15	50	<ul style="list-style-type: none"> 1x kookaburra flushed from hollow Chew marks around rim 3x eggs present within the hollow 	Suitable
				3	9	Diagonal	Spout	15	5	Bee hive	Not Suitable
				4	9	Diagonal	Spout	<10		1x lorikeet flushed from hollow	Not Suitable
12	Jarrah	387772	6475155	1	5	Diagonal	Not a hollow				Not Suitable
				2	5	Horizontal	Spout	<10		Bee hive	Not Suitable
				3	5	Horizontal	Spout	<10	<10		Not Suitable
13	Jarrah	387946	6475225	1	10	Horizontal	Spout	<10			Not Suitable
14	Stag	387862	645245	1	2	Vertical	Chimney	30	5		Far too shallow. Not Suitable
15	Jarrah	387852	6475246	1	7	Diagonal	Not a hollow				Multiple openings. Not Suitable
				2	7	Diagonal	Spout	5			Not Suitable
				3	7	Diagonal	Spout	5			Not Suitable




16	Stag	387824	6475232	1	4	Vertical	Chimney	30	5		Not Suitable
17	Stag	387941	6475241	1	10	Vertical	Chimney	20	20	Bee hive	Very open and exposed. Not Suitable



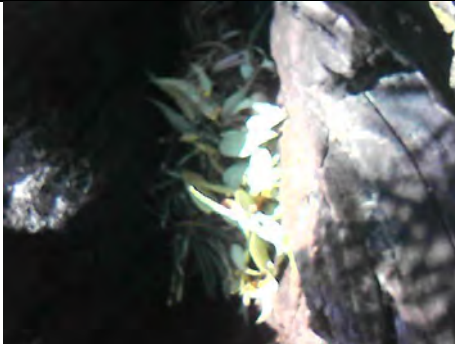

A2. Tree and nest hollow imagery



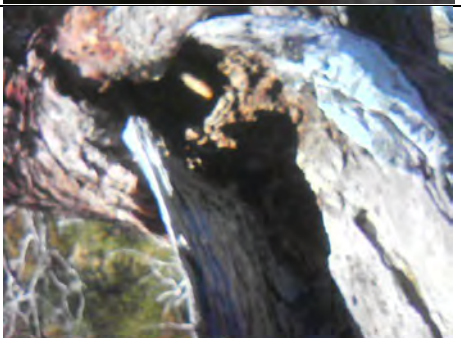

Tree No.	Imagery	Hollow No.	Imagery
1		1	Hollow determined to be unsuitable based on diameter as seen from ground (5cm). No further action taken.
2		1	
		2	


Tree No.	Imagery	Hollow No.	Imagery
3		1	
		2	
		3	
		4	




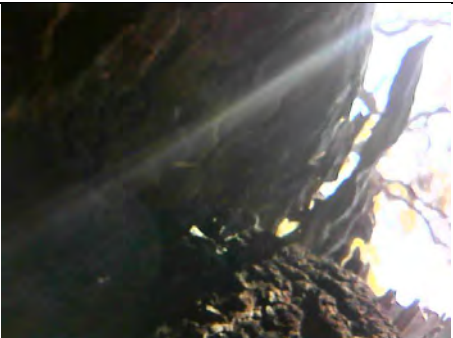
Tree No.	Imagery	Hollow No.	Imagery
4		1	
5		1	

Tree No.	Imagery	Hollow No.	Imagery
6		1	
7			No hollows were observed from the ground. No further action was taken.

Tree No.	Imagery	Hollow No.	Imagery
8		1	Hollow determined to be unsuitable based on diameter as seen from ground (<10cm). No further action taken.
9		1	
		2	

Tree No.	Imagery	Hollow No.	Imagery
10		1	
		2	
		3	Hollow determined to be unsuitable based on diameter as seen from ground (<10cm). No further action taken.
11		1	

Tree No.	Imagery	Hollow No.	Imagery
		2	 
		3	
		4	Hollow determined to be unsuitable based on diameter as seen from ground (<10cm). Lorikeet observed utilising hollow. No further action taken.

Tree No.	Imagery	Hollow No.	Imagery
12		1	
		2	
		3	Hollow determined to be unsuitable based on diameter as seen from ground (<10 cm). No further action taken.
13		1	

Tree No.	Imagery	Hollow No.	Imagery
14		1	
15		1	
		2	Hollow determined to be unsuitable based on diameter as seen from ground (5 cm). No further action taken.
		3	Hollow determined to be unsuitable based on diameter as seen from ground (5 cm). No further action taken.

Tree No.	Imagery	Hollow No.	Imagery
16		1	
New		1	