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for the
City of Albany

Black Cockatoo survey of the Albany Heritage Park Link Trail.

Final Report October 2022

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1. Introduction

The Albany Heritage Park (**AHP**) comprises of Mt Clarence (Corndarup) and Mt Adelaide (Irrerup) and is an important urban reserve for a suite of south coast fauna, including four threatened species:

- Western Ringtail Possum;
- Carnaby's Black Cockatoo;
- Forest Red-tailed Black Cockatoo; and
- Baudin's Black Cockatoo.

(City of Albany 2006; Leighton 2012 Van Helden et al. 2021).

AHP forms part of the coastal corridor link across the south coast of Western Australia, which is the strongest east-west vegetation link in southern Australia and has national and international significance (Wilkins *et al.* 2006).

The City of Albany Mounts Master Plan is a comprehensive, long-term vision for Mt Clarence and Mt Adelaide that aims to respect and enhance its unique landscape setting. A key Project within the Master plan is the AHP Link Trails which aims to develop a balanced, site responsive trail network system for walkers and bike riders, linking major destinations, neighbourhoods and activity nodes within the city. The planned trails cater to a range of different trail users, styles, levels of difficulty and experiences (active, passive, heritage, nature) whilst ensuring the protection of the sites' environmental, cultural and heritage values.

As part of the process of mitigating the impacts of the trail on the three threatened Black Cockatoo species, the following conditions are being met:

- No large hollow bearing trees will be removed.
- Where possible, trail alignments will avoid common food plants of the black cockatoos such as marri and jarrah trees, and proteaceous trees and shrubs.

The WA Department of Water, Environment and Regulation (**DWER**) has requested the City of Albany to engage a fauna specialist to carry out a Black Cockatoo habitat tree assessment, specifically to identify within the 30m buffer of the proposed trail alignment (**Survey Area**):

1. Trees that have a diameter, measured at 1.3 metres from the base of the tree over bark, of 50 centimetres or greater that contain a hollow(s) that may be suitable for breeding by Black Cockatoos;
2. Trees that show signs of current roosting; and
3. Any evidence of foraging by Black Cockatoos observed during the survey work.

2. Black Cockatoo species occurring on the south coast

2.1 Carnaby's Cockatoo (*Calyptorhynchus (or Zanda) latirostris*) – EPBC Act listing; EN (Endangered)

The preferred habitats of this species are uncleared or remnant native eucalypt woodlands or forests containing Marri, Jarrah or Karri (*Eucalyptus diversicolor*) and shrublands or Kwongan heathland

dominated by *Hakea*, *Dryandra*, *Banksia* and *Grevillea* are considered habitat for this species (DSEWPaC 2012). On the south coast they feed on Jarrah and Marri seeds and a wide variety of mainly proteaceous species. Breeding hollows generally have an entrance diameter >200mm and occur in trees that are 120–150 years old; trees approaching 680 mm DBH are close to developing suitable hollows (DPaW 2013).

The Survey Area occurs within the known distribution and predicted breeding range of Carnaby's Cockatoo (DSEWPaC 2012).

2.2 Baudin's Cockatoo (*Calyptorhynchus (or Zanda) baudinii*) – EPBC Act listing; EN (Endangered)

Baudin's Cockatoo occurs in high-rainfall areas, usually at sites that are heavily forested and dominated by Marri, Jarrah and Karri. It also occurs in woodlands of Wandoo (*E. wandoo*), Blackbutt (*E. patens*), Flooded Gum (*E. rudis*), and Yate (*E. cornuta*) (DSEWPaC, 2012). Baudin's cockatoo feeds mainly on the seeds of Marri, but may also feed on the seed of *Banksia* spp., *Hakea* spp. and *Erodium botrys*. Additionally, Baudin's Cockatoo feeds on invertebrate larvae and on apple, pear and persimmon in domestic and commercial fruit orchards (Chapman 2008). Trees with hollows suitable for Baudin's Cockatoo are likely to be 500 mm or greater DBH and suitable hollows usually have a diameter of 300-400 mm (Saunders 1974b, 1979).

The Survey Area occurs within the known distribution and known breeding range of Baudin's Cockatoo (DSEWPaC 2012).

2.3 Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – EPBC Act listing – VU (Vulnerable)

Forest Red-tailed Black Cockatoo commonly occur in Jarrah, Karri and Marri forests and also in a range of other forest and woodland types, including Blackbutt, Wandoo and Tuart (*E. gomphocephala*), Albany Blackbutt, Yate and Flooded Gum (DSEWPaC, 2012). Ninety percent of the Forest Red-tailed Black Cockatoo total diet consists of marri and jarrah seeds (Johnstone & Kirkby 1999), and it depends on both feed trees during breeding periods (Johnstone *et al.* 2013). Other feed trees include Blackbutt, Albany Blackbutt, Forest Sheoak (*Allocasuarina torulosa*), Snottygobble (*Persoonia* spp.) and Karri. A realistic minimum age for trees bearing suitable hollows is approximately 120–150 years (trees diameters of 500–600 mm). Most nest hollows occur in intermediate-sized trees (Whitford *et al.* 2015).

The Survey Area occurs within the modelled distribution of the Forest Red-tailed Black Cockatoo. The breeding range has not been modelled although it is recognised that it may breed anywhere within its occurrence range (DSEWPaC 2012).

3. Past surveys or records for Black Cockatoos within the Albany Heritage Park

All three species of Black Cockatoos use the reserve for feeding (authors observations) and roosting (Birdlife WA), and are a common sight here, either flying over or resting or feeding commonly in Marri and Jarrah trees. However, despite their conspicuous presence on the reserve there are few formal surveys or records of them utilising the Albany Heritage Park.

Records exist for one or more of the three species from the following sources:

3.1 Nature Map Search

A Nature Map (DBCA 2022) search submitted on the for a 10km radius of the centre of the reserve (minimum distance the search too allows) returned a total of 168 records. Spatial data are not available for these records as they are threatened species.

Table 1: Records of Black Cockatoos from NatureMap

Name	Number of records
<i>Calyptorhynchus banksia</i> (Red-tailed)	12
<i>Calyptorhynchus baudinii</i> (Baudin's)	115
<i>Calyptorhynchus latirostris</i> (Carnaby's)	22
<i>Calyptorhynchus</i> sp.	13
<i>Calyptorhynchus</i> sp. 'white-tailed black cockatoo'	6
Total	168

3.2 Matters of National Environmental Significance (MNES) Search

A Protected Matters Search was carried out on the Commonwealth Government's Department of Agriculture, Water and the Environment (DAWE) website, using the Protected Matters Search (PMS) Tool (accessed 12 May 2022). The PMS Tool generates a report that provides general guidance on Matters of National Environmental Significance (MNES) or other matters protected by the *Environment Protection and Biodiversity Conservation Act (1999)* that may occur in an area of interest.

The DWARE website provides the caveat relating to the PMS Tool that "*Any information provided is indicative only, and local knowledge and information should be sought where possible*".

The search area submitted is shown in Figure 1.

The PMS search returned only two MNES relating to Black Cockatoos (Table 2); Carnaby's and Baudin's Black Cockatoos. Forest Red-tailed Black Cockatoo was not listed.



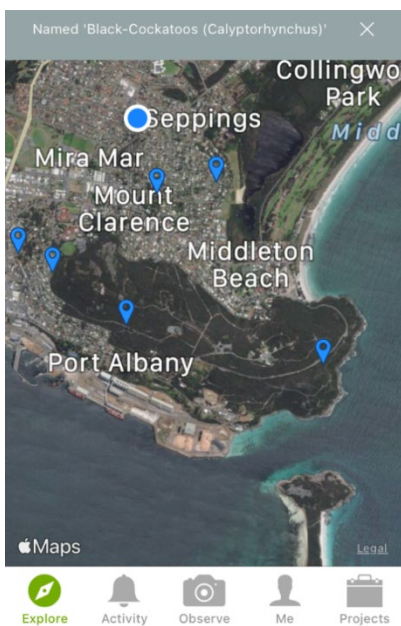
Figure 1: Area searched within the PMS search tool

Table 2: Result of Protected Matters search for Black Cockatoos

Species	Common name		Threatened Status
Zanda baudinii	Baudin's Black-Cockatoo, Long-billed Black-cockatoo	Breeding known to occur within area	Endangered (listed as <i>Calyptorhynchus baudinii</i>)
Zanda latirostris	Carnaby's Black Cockatoo, Short-billed Black-cockatoo	Species or species habitat known to occur within area	Endangered (listed as <i>Calyptorhynchus latirostris</i>)

3.3 Community observations

iNaturalist



iNaturalist is a citizen Science app that is a popular app used in Australia for community members to record flora and fauna observations. Citizen science apps can help provide much needed data and support to scientists and researchers who are working to better understand the state of biodiversity in Australia.

Data submitted to the app by community members is available to anyone using the app to access. A search of the app for the area of the Heritage Park returned 6 records of 'Black Cockatoos' (Figure 2).

Figure 2: Records of "Black Cockatoo" captured on iNaturalist. Accessed 20/05/22

3.4. Birdlife WA database

Birdlife WA have no known recorded breeding sites for any of the three species within the Heritage Park and only one roost site recorded for Carnaby’s Cockatoo. The roost site is within the 30m footprint of the draft trail alignment, on the eastern “zig-zag” (red star in map below). A recorded roost site is where birds have been seen to roost, however it does not necessarily indicate that it is used regularly for roosting (Sam Ryken, Birdlife WA Carnaby’s Cockatoo Coordinator, pers. com.)

3.5. Black Cockatoo Habitats within the Albany Heritage Park

The vegetation types occurring within the park have been mapped by Rathbone (2020). Table 4 shows the vegetation types and their potential use by Black Cockatoos.

Table 4; Vegetation types in the Heritage Park, potentially used by Black Cockatoos for breeding, feeding or roosting (vegetation data from Rathbone (2020)).

Vegetation Type	Black Cockatoo species		
	Carnaby’s	Baudin’s	Forest Red-tailed
<i>Callistachys Thicket</i>	-	-	-
<i>Coastal Shrubland</i>	Feeding	Feeding	-
<i>Eucalyptus/Corymbia Forest</i>	Breeding; feeding; roosting	Breeding; feeding; roosting	Breeding; feeding; roosting
<i>Gastrolobium/Hakea Shrubland</i>	Feeding	Feeding	-
<i>Granite Shrubland and Herbland</i>	-	-	-
<i>Gastrolobium/Hakea Shrubland</i>	Feeding	Feeding	-
<i>Peppermint Low Forest</i>	Feeding	Feeding	Feeding
<i>Sheoak Woodland</i>	Feeding	-	Feeding
<i>Revegetation</i>	Feeding	Feeding	Feeding

4. Field survey

4.1 Survey methods

Survey methodology followed the Referral guideline for three threatened black cockatoo species: Carnaby’s Cockatoo, Baudin’s Cockatoo and the Forest Red-tailed Black Cockatoo, and will also draw upon the revised draft referral guideline for three threatened black cockatoo species: Carnaby’s Cockatoo, Baudin’s Cockatoo and the Forest Red-tailed Black Cockatoo. Commonwealth of Australia, 2017, for other relevant, more current survey methods.

4.1.1 Survey dates

Surveys occurred between the 18th May and the 2nd September 2022.

Task	Date
Ground survey	18, 20, 22, 25, 27 May; 6,8,10, 11, 16 June; 3,4,8,11,13 July
Pole and camera survey of a subset of potential/possible trees after first trail re-alignment	29 July, 10, 12, Aug; 2 Sept

4.1.2 Vegetation types surveyed

Trees which were large enough to potentially contain hollows or to be roosting sites occurred only in the *Eucalyptus/Corymbia* Forest vegetation type (Table 4). Therefore, only this vegetation type was surveyed for habitat trees.

4.1.3 Assessment of habitat trees

All breeding tree species (karri (*Eucalyptus diversicolor*), marri (*Corymbia calophylla*), bullich (*E. megacarpa*), and jarrah (*E. marginata*)) were assessed within the 30m buffer of the proposed trail alignment. Any tree of these species that is visually suspected to be > 50cm diameter at a height of 1.3 m from the ground were measured to determine exact diameter at breast height (DBH) using a diameter tape measure. A GPS point was obtained for any of these tree species with a DBH of 50cm or above.

Roosting trees generally occur in or near riparian environments or natural and artificial permanent water sources. They can be native or exotic trees and are generally the tallest trees in the area. Roosting trees with current roosting activity will be identified by signs such as cockatoo droppings and feathers.

4.1.3.1 Assessment of suitable hollows for Black Cockatoos.

The timing of the survey is not within the breeding season of Carnaby's or Baudin's Cockatoo so any potential breeding hollows will not be occupied.

Red-tailed Black Cockatoos can breed any time of the year so it is possible (though highly unlikely as all known breeding sites are further within the SW forests) that a hollow could be occupied by a breeding pair. Signs that this may be the case include a sighting of a bird at the entrance to the hollow, or a lone bird sitting in close proximity to the hollow. In this case the hollow will be revisited at dusk when birds return the hollow for the night, to confirm breeding activity.

1. Ground Survey

Hollows were assessed from the ground as potentially suitable for Black Cockatoos by the diameter of the entrance hole (10-50 cm), the width of the trunk or branch containing the hollow (generally > 30 cm). Binoculars were used for hollows high in the tree.

Signs of possible past hollow use were also searched for, for example chipping around the entrance of the hollow. The absence of chipping however does not indicate absence of breeding.

The presence of hollow competitors within a hollow (e.g. galahs, feral bees) was also recorded. During the ground survey, hollows were defined as either:

1. Possible; either a site on the tree that looked like a hollow entrance was observed but the entrance could not be seen from the ground or the top of the tree could not be observed from the ground, or
2. Potential; a suitable entrance hole was observed but, as no hollow inspection was carried out, the suitability of the hollow could not be determined.

2. Pole and Camera survey.

Trees with hollows classified as potential or possible that fell within 10m of the proposed trail alignment were identified by Common Ground. These trees required further inspection to determine the suitability of the hollow for Black Cockatoos using the pole and camera technique. In this technique an extendable pole is attached to a camera (GoPro) and extended up to the hollow and the inside of the hollow is inspected by positioning the camera above the hollow entrance or extended as far into the hollow as possible. The camera is blue toothed to an iPhone and the image on the camera is displayed on the phone.

Hollows viewed with the camera were classified as either;

1. **Suitable (S)** - hollow had suitable internal dimensions, or
2. **Not Suitable (NS)** - hollow had unsuitable internal dimensions; hollow may have suitable dimensions but was full of compacted debris; there was no hollow present.

4.1.3.2 Assessment of roosting sites and foraging activity

Evidence of roosting or feeding site of Black Cockatoos include the presence of cockatoo droppings and feathers. Chewed banksia or hakea nuts, pinecones or marri nuts, can indicate feeding by black cockatoos (including, the identification of bite patterns to indicate which black cockatoo species fed there). These can be assessed at any time of year, as cones can remain on the ground for up to two years (DSEWPac 2012).

5. Results

5.1 Black Cockatoo Habitat Trees

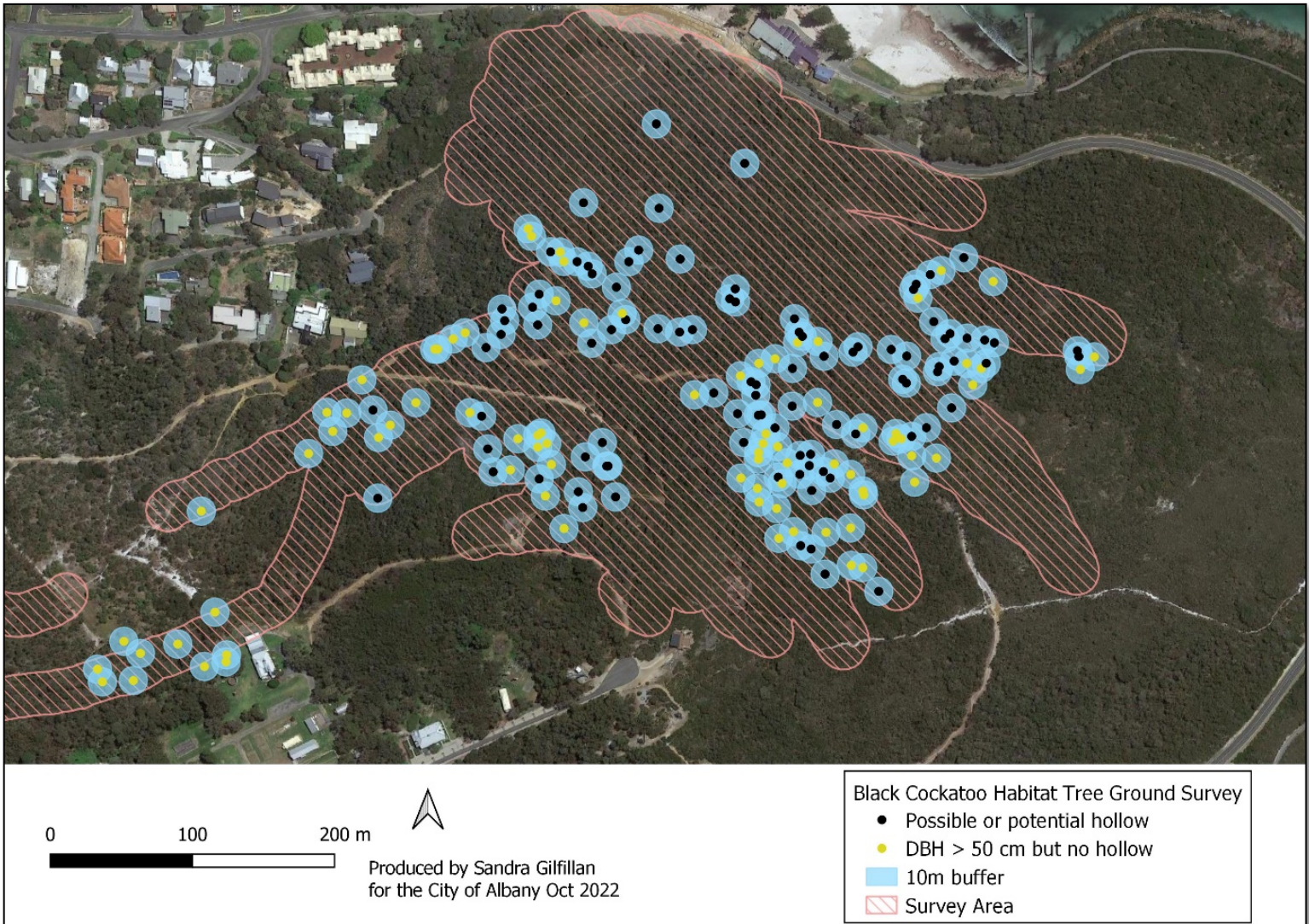
5.1.2 Ground Survey

Breeding trees

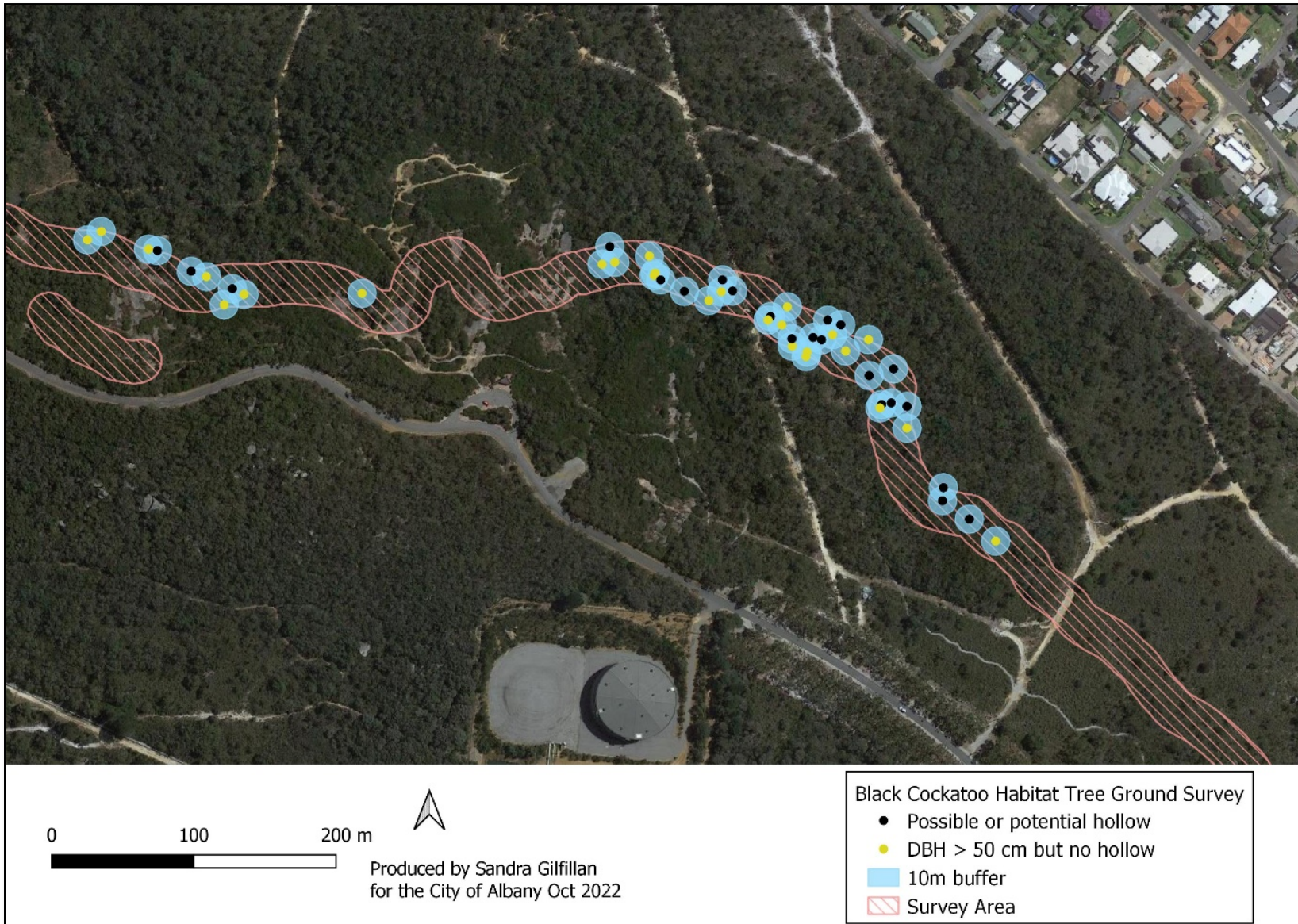
The ground survey identified a total of 231 trees that were >50cm DBH. Of these 121 had hollows that were assessed as either *possible* or *potential* (Table 5 and 6, Figure 3).

Table 5: Survey results of ground survey.

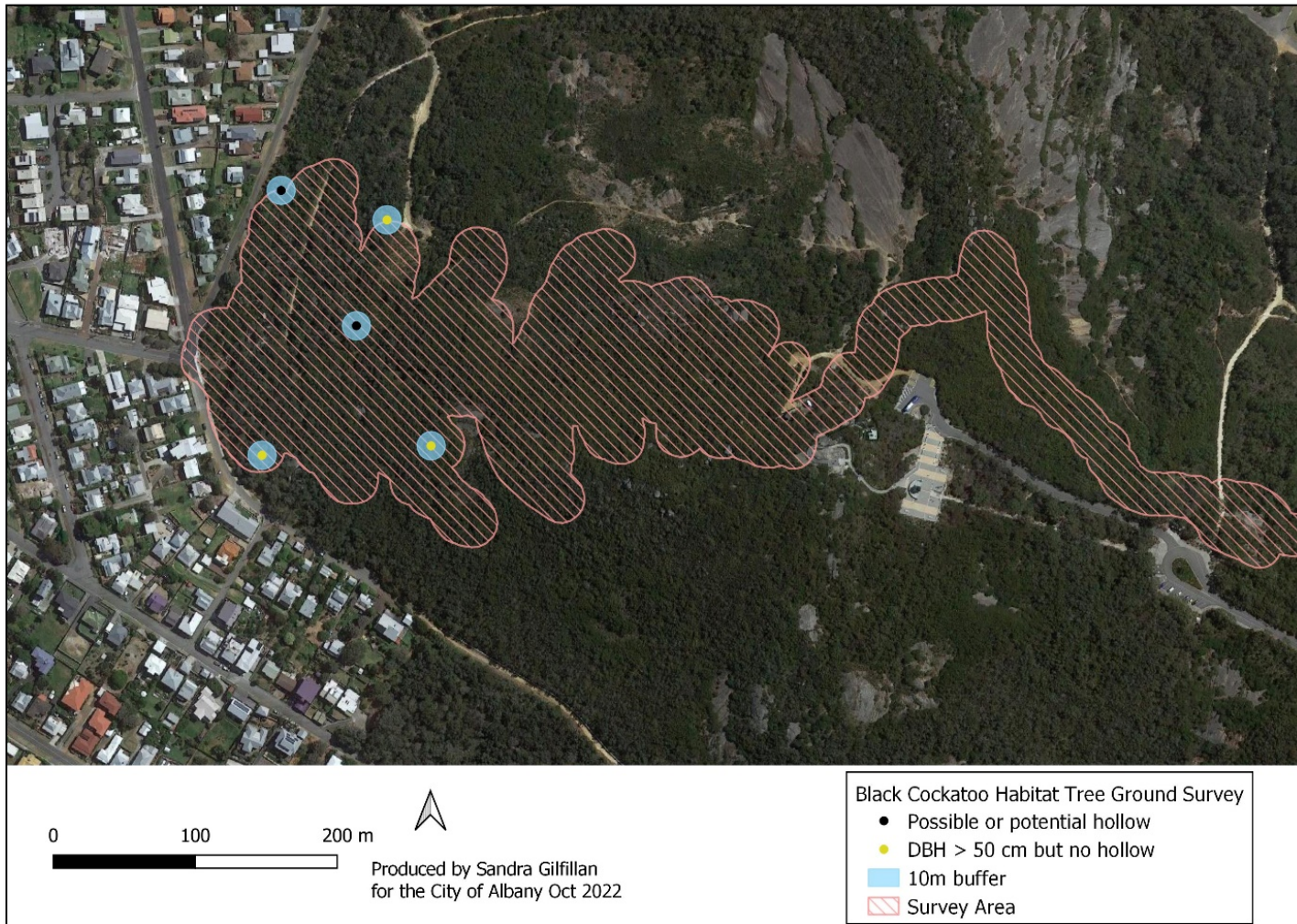
Tree Species	DBH 50cm or greater	Potential or possible hollow (ground observation)
Jarrah	32	31
Marri	65	68
Dead (species not determined)	21	19
Not recorded	3	3
Total	231	121



a)



b)



c)

Figure 3: Black Cockatoo Trees with DBH >50cm without hollows, and Black Cockatoo Habitat Trees (with possible or potential hollow) identified in the ground survey. a) eastern section, b) mid section and c) western section.

Roost sites

The roost site occurring on the Birdlife WA database was located within the *Gastrlobium/Hakea Shrubland* vegetation type, comprising 30-70% shrubs and less than 10% of low (<10m) trees (Rathbone (2020) (shown in Figure 6). No signs of roosting were observed at this site.

While the *Eucalyptus/Corymbia Forest* contained abundant tall trees (10-30m) (Rathbone (2020), and access to fresh water was available at the nearby Lake Seppings no signs of a roosting site were observed during the ground survey.

5.1.2 Pole and camera survey of hollows

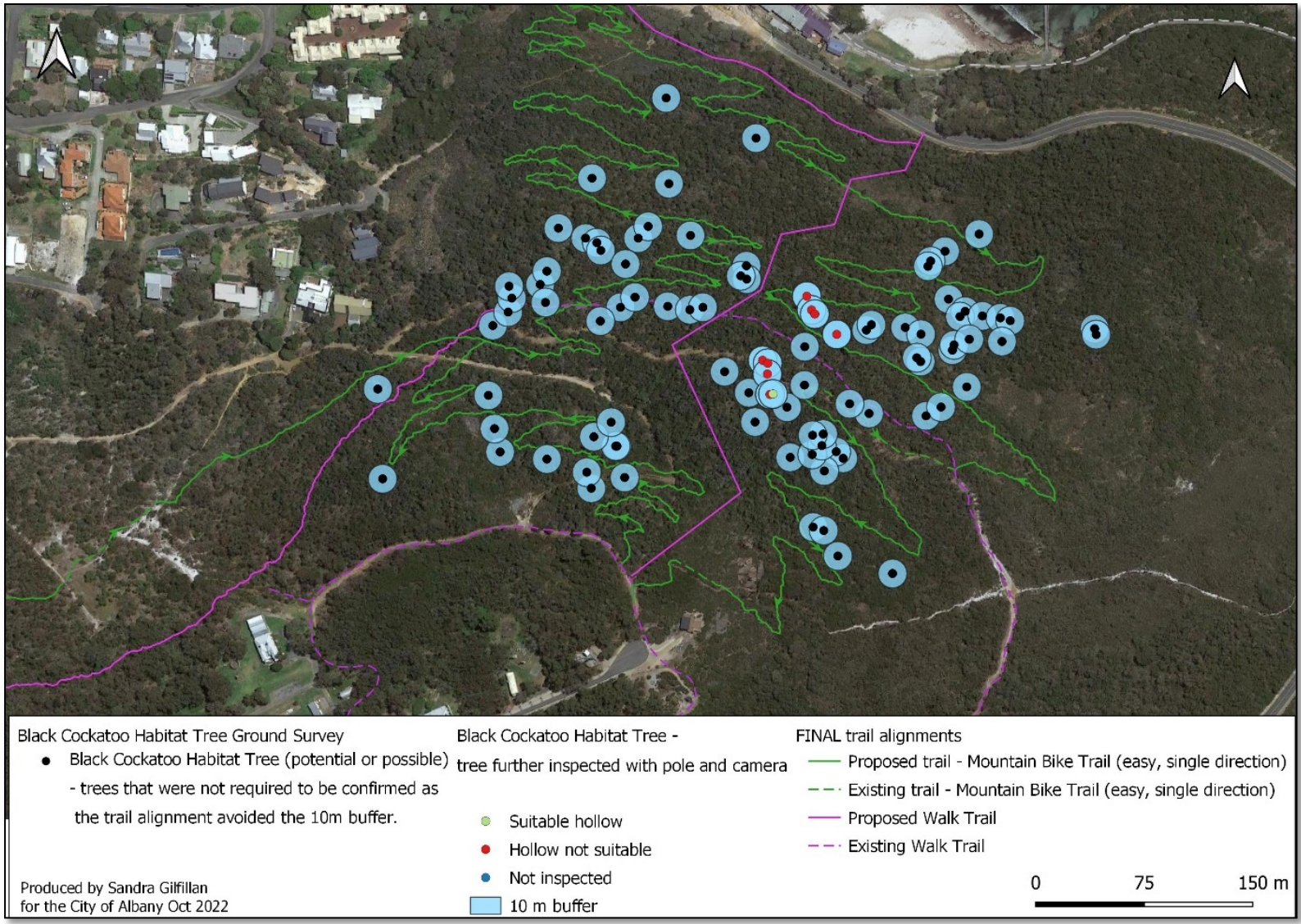
Twenty-two hollows were required to be further inspected using the pole and camera technique (Table 6). Of these, 20 were classified as not suitable (NS) only one was assessed as suitable for Black Cockatoos (Figure 4).

Feral honeybees (*Apis mellifera*) and galahs (*Eolophus roseicapillus*) were the only species observed to be occupying tree hollows.

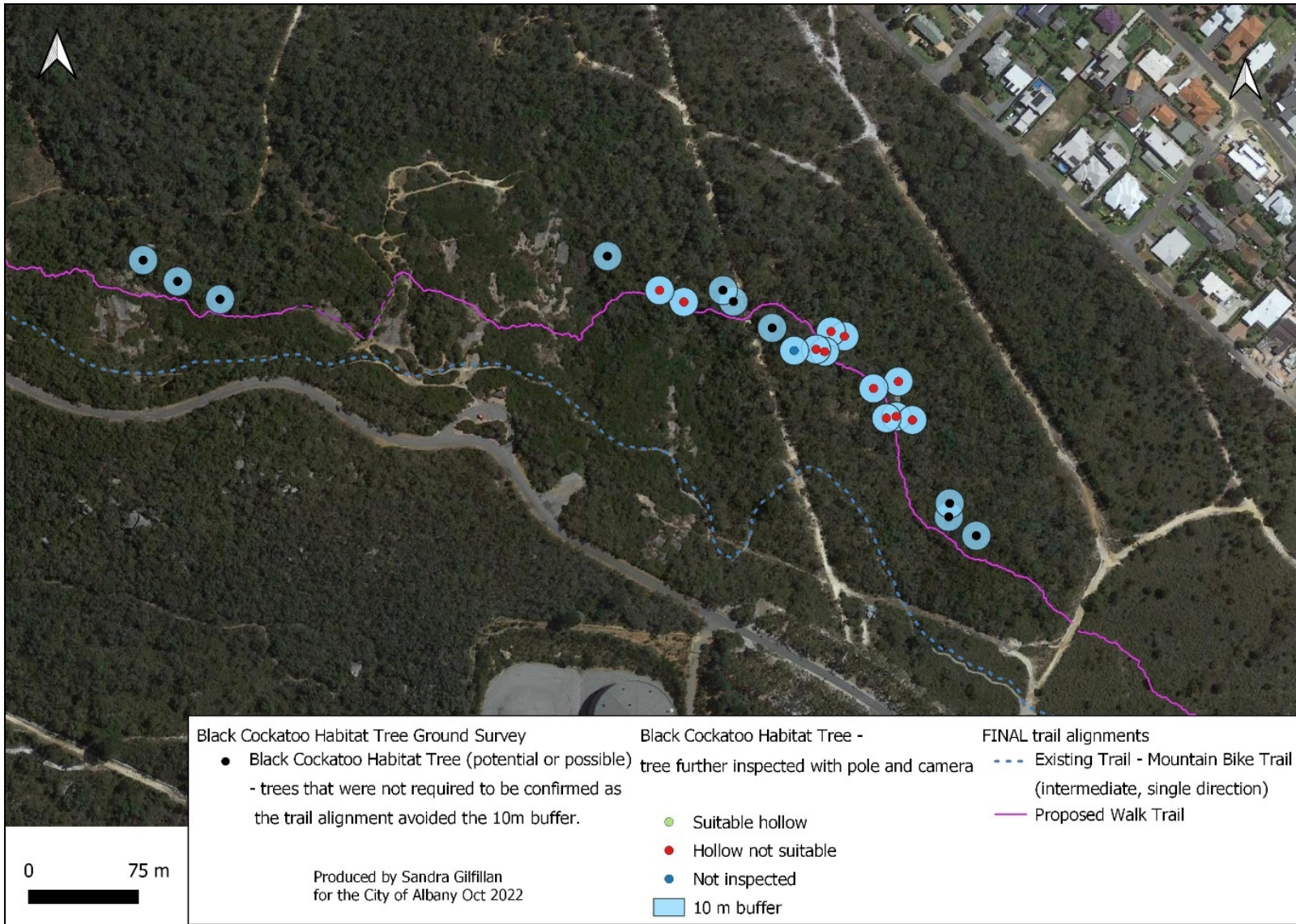
NB: one of these hollows was too high to inspect, and one had galahs nesting in it so could not be inspected.

Table 6: Survey results of pole and camera survey. See text for definitions of NS and S.

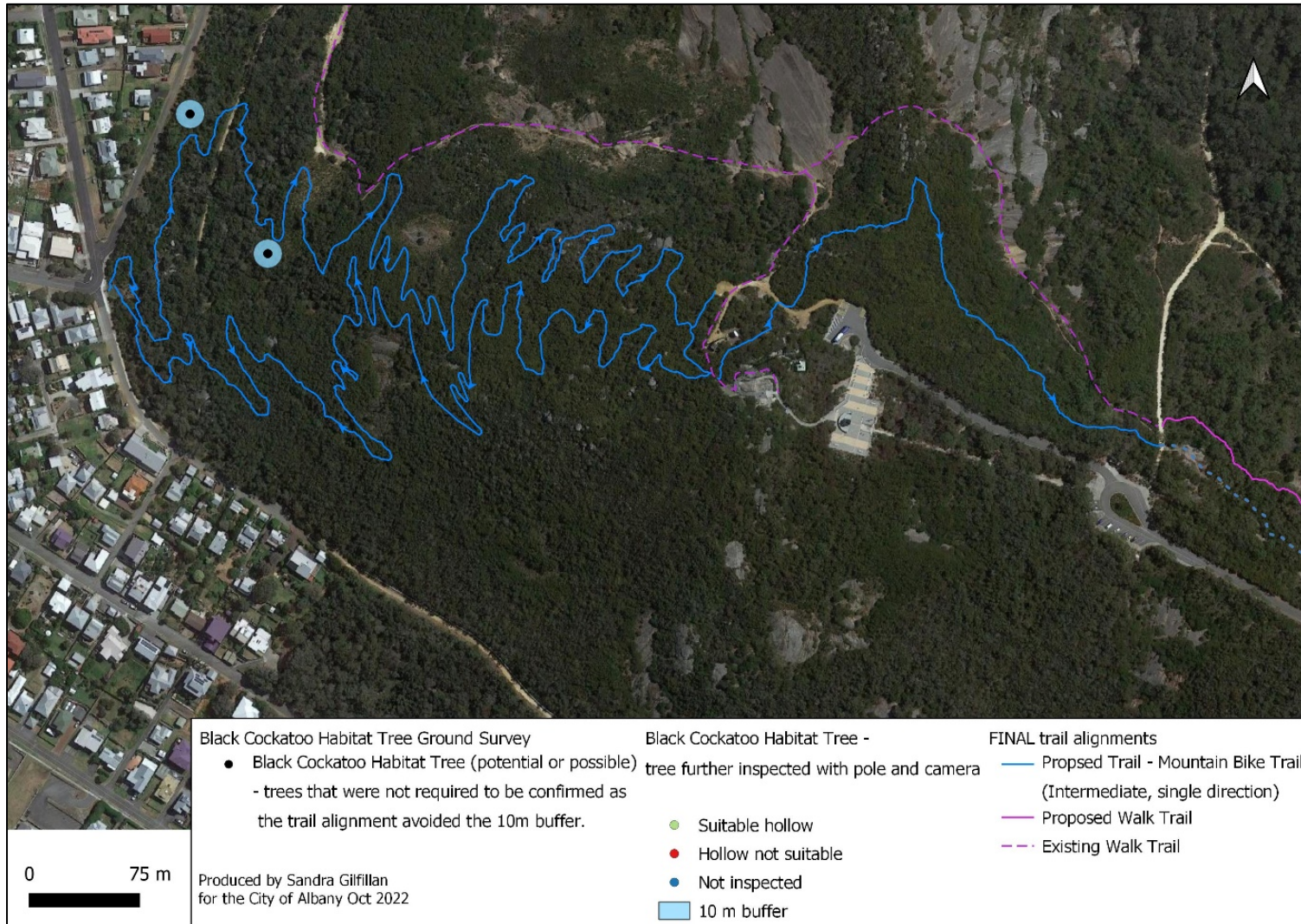
Tree Species	Hollow suitability (pole and camera survey)	
	Not suitable (NS)	Suitable (S)
Jarrah	3	-
Marri	14	1
Dead (species not determined)	3	-
Total	21	1



a)



b)



c)

Figure 4: Black Cockatoo Habitat Trees inspected with a pole and camera and their status. a) Eastern Section, b) Mid Section, c) Western Section

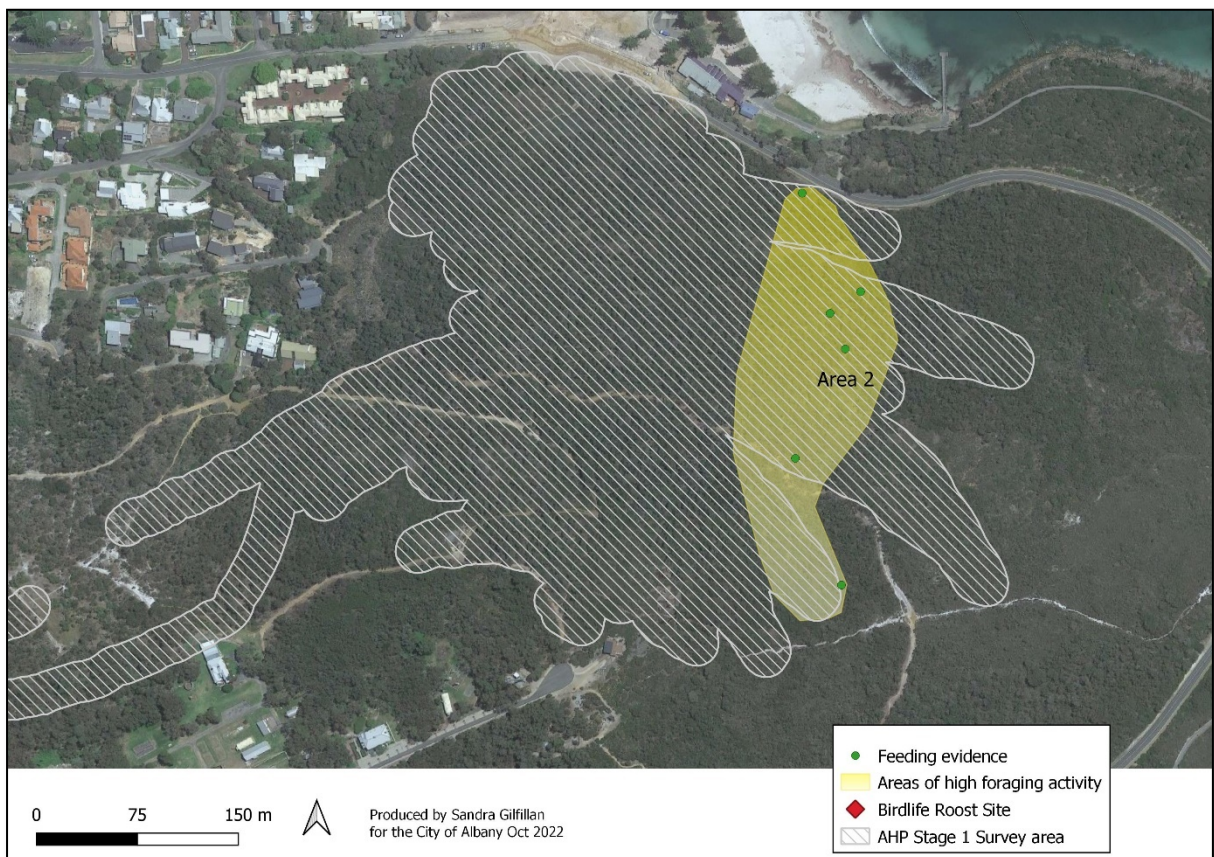
5.2 Black Cockatoo foraging activity

Initial searching for foraging signs within the survey area documented evidence of foraging frequently (every 5-10 m) (Figure 5b). Foraging evidence of the ground was difficult to assign to a particular tree in forest areas as tree canopies often overlapped. In addition, particularly on the east and west slopes, foraging evidence may have been washed downhill from actual foraging trees or areas. For these reasons, rather than recording precise locations of feeding evidence, areas of high opportunistic encounters (which likely relate to higher levels of feeding activity) were recorded during the search for potential breeding trees (Figure 6).

Area 1; This area contains the part of the survey area that was initially intensely searched for feeding evidence (section to the south containing many observations). Feeding evidence in this area was observed on Marri (by all three Black Cockatoo species), *Hakea elliptica* and *H. drupacea*, and *Banksia formosa* (Figure 6 and 7).

Area 2: Feeding evidence occurred throughout the *Eucalyptus/Corymbia Forest* vegetation type on the eastern slope. Areas with higher feeding evidence encounter rates are marked as Area 2 (Figure 6).

a)



b)

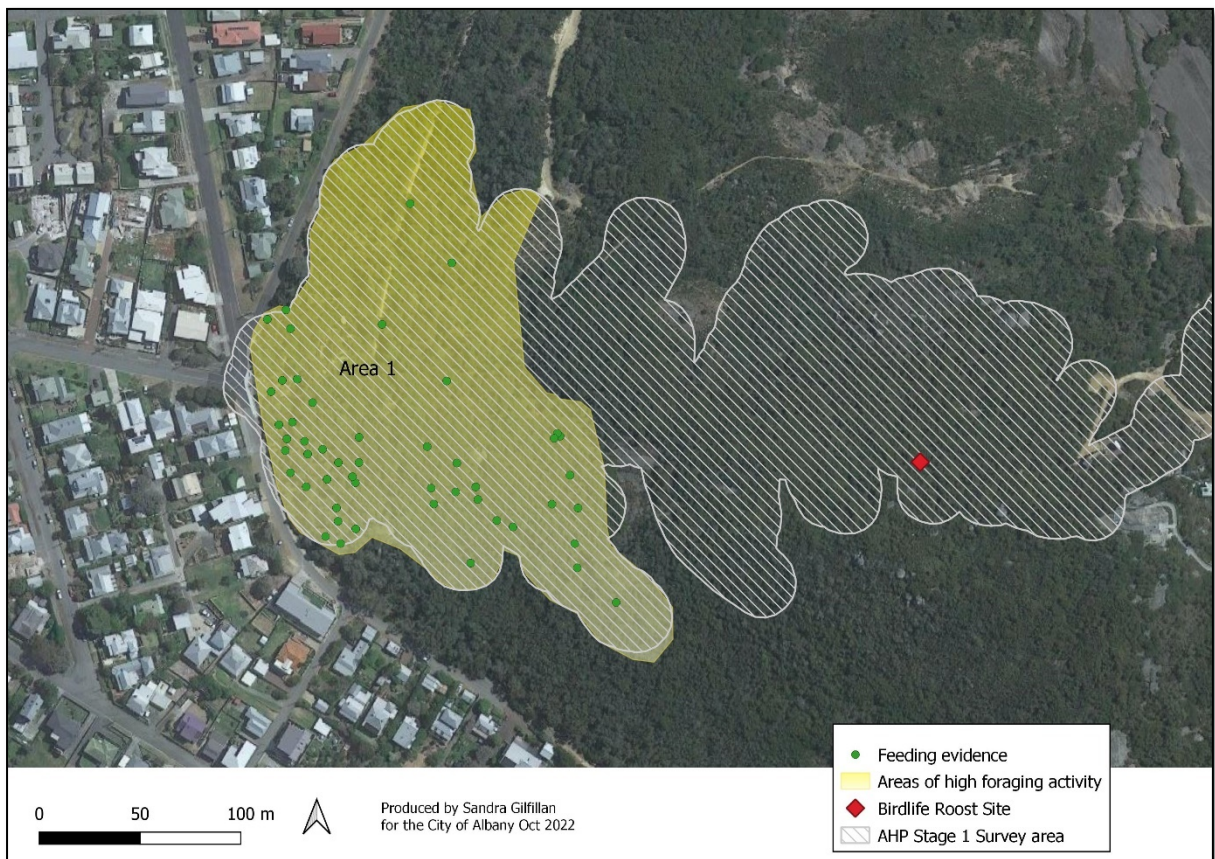


Figure 6; Evidence of feeding and areas of high foraging activity. a) east section, b) west section



a)



b)



c)



d)



e)

Figure 7: Evidence of feeding by Black Cockatoos observed. a) *Hakea dupracea* and b) *Banksia formosa* showing evidence of feeding, likely by Carnaby's Cockatoo, and feeding on Marri nuts by c) Carnaby's d) Baudin's and e) Forest Red-tailed Black Cockatoos.

6. References

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