TECHNICAL MEMORANDUM

Black Cockatoo and Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community Habitat Quality Score Assessment Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

PROJECT NUMBER	EP24-129(07)	**DOC. NUMBER**	EP2129(07)—0013B RAW
PROJECT NAME	Erindale Road Development Support	**CLIENT**	BAI Communications
AUTHOR	EKB	**REVIEWER**	RAW
VERSION	B	**DATE**	21/10/2025

1. INTRODUCTION

BAI Communications are investigating development of part of Lot 802 Erindale Road and Lot 1 and Lot 803 Wanneroo Road in Hamersley. The proposed development envelope comprises 13.55 ha for residential purposes within Lot 802 and the western portion of Lot 803 ('residential development area') and 19.66 ha retained for conservation purposes within Lot 803 and the eastern portion of Lot 1 ('conservation area'). The residential development area and the conservation area are collectively referred to as the 'site' and extend over 33.21 ha, as shown in **Figure 1**.

The following matters of National environmental significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) have been recorded in the site (Emerge Associates 2025b, c)[1]:

- *Zanda latirostris* (Carnaby's black cockatoo) which is listed as 'endangered' under the EPBC Act and the State *Biodiversity Conservation Act 2016* (BC Act) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which is listed as 'vulnerable' under the EPBC Act and the BC Act (collectively referred to as 'black cockatoos').
- The 'banksia woodlands of the Swan Coastal Plain' threatened ecological community (TEC) which is listed as endangered under the EPBC Act and 'priority 3' in Western Australia (herein referred to as the 'banksia woodlands TEC').

To inform impact assessment and potential future management within the conservation area, Emerge were engaged to determine the 'habitat quality score' (HQS) for these MNES within the site, using scoring tools provided by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). The results of the HQS for the MNES are outlined in this technical memorandum.

[1] Note that one other MNES, 'tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' TEC, occurs within the site but the existing EPBC referral occurred prior to the TEC listing and so does not require further impact assessment.

2. BLACK COCKATOOS

2.1. Existing information

The site contains black cockatoo breeding, foraging and roosting habitat (Emerge Associates 2025b, a), as summarised in **Table 1** and shown in **Figure 2** and **Figure 3**.

When the DAWE (2022) black cockatoo foraging habitat quality scoring tool is applied, most of the foraging habitat in the site classifies as 'high-quality' native foraging habitat.

Table 1: Black cockatoo values within the site (Emerge Associates 2025a)

Habitat type	Values within the site	
	CBC	FRTBC
Breeding	N/A (outside of breeding distribution)	60 potential nesting trees (no hollows suitable for black cockatoo breeding)
Roosting	No roosts observed. Trees across most of the site would provide suitable roosting habitat. A known forest red-tailed black cockatoo night roosting site lies to the east of the site and trees in the north-eastern portion of the site would be considered part of a black cockatoo night roosting site.	
Foraging	28.68 ha of foraging habitat comprising: • 28.66 ha of native primary • 0.02 ha of native secondary	23.57 ha of foraging habitat comprising: • 22.44 ha of native primary • 0.73 ha of native secondary • 0.04 ha of non-native secondary

2.2. Habitat quality score

A HQS was determined for both the residential development area and the conservation area using the *Habitat scoring system for WA black cockatoo foraging habitat* provided by DCCEEW (refer **Appendix A**).

The HQS considers site condition, site context and species stocking components. The site condition component was determined through existing information (Emerge Associates 2025b, c, d, a) and a field survey conducted in May 2025, as outlined below. The site context and species stocking components were determined through existing information outlined in (Emerge Associates 2025b); Emerge Associates (2025a).

2.2.1. Field survey

A botanist and an ecologist from Emerge visited the site on 14 May 2025 to conduct the field survey. The purpose of the survey was to assess the projected foliage cover of black cockatoo foraging habitat, to inform the site condition component of DCCEEW's scoring system. The survey also aimed to identify portions within the conservation area which may be suitable for improvement to restore black cockatoo habitat and/or banksia woodland TEC vegetation.

The site was traversed on foot and 70 relevés were sampled at locations shown on **Figure 4**. Relevés were pre-selected and systematically arrayed across the site with reference to vegetation units and vegetation condition. Relevé locations were selected irrespective of aerial imagery, to avoid bias related to the variable canopy cover in the site.

The data recorded within each relevé included:

- site details (site number, observers, date, location)

- 'projected foliage cover' (PFC) of the following black cockatoo foraging plants[2]:
  - *Eucalyptus marginata* (jarrah)
  - *Corymbia calophylla* (marri)
  - *Eucalyptus gomphocephala* (tuart)
  - *Banksia attenuata/B. menziesii/B. prionotes/B. ilicifolia* (*Banksia* spp.)
  - *Allocasuarina fraseriana/A. humilis* (*Allocasuarina* spp.)
  - *Xanthorrhoea preissii/X. brunonis* subsp. *brunonis* (*Xanthorrhoea* spp.)
  - Other foraging species (e.g. *Hakea prostrata*, *Grevillea* spp.).

Patches of vegetation within the conservation area which may be suitable for management works to improve or create black cockatoo habitat and/or banksia woodland TEC, such as areas with low native species richness/cover and/or highly degraded areas and/or high weed cover, were identified as the team traversed the site.

2.2.2. Data analysis

Relevé data was stratified by development context (residential development area and conservation area). A mean PFC was calculated for each black cockatoo species in each area, based on their foraging preferences (refer to (Emerge Associates 2025b); Emerge Associates (2025a)). Ultimately, the mean PFC from the relevés was considered along with information obtained from the flora and vegetation assessment (Emerge Associates 2025c, d) and review of high-resolution aerial imagery to determine final PFC values.

A HQS was calculated using DCCEEW's scoring system[3], with inputs comprising the PFC, publicly available databases and results from (Emerge Associates 2025b); Emerge Associates (2025a).

2.2.3. Habitat quality score

Raw PFC data is provided in **Appendix B**.

The HQS assigned to the residential development area and conservation area for Carnaby's black cockatoo (CBC) and forest red-tailed black cockatoo (FRTBC) is provided in **Table 2**. Detailed scoring is provided in **Appendix C**.

Table 2: Black cockatoo habitat quality score assigned to each area within the site and each black cockatoo species

Location	Habitat quality score (out of 10)	
	CBC	FRTBC
Residential development area	8	7
Conservation area	8	7

Part of the residential development area was subject to a fire in February 2023 (Emerge Associates 2025b). The condition of vegetation within the burnt area is predicted to improve as the vegetation matures and regeneration of *Banksia prionotes* is evident. To account for this, the regeneration of CBC foraging habitat post recent fire has been considered when attributing the HQS. As the vegetation matures within the burnt area, it is not expected to substantially change the average PFC

[2] Identified as providing black cockatoo foraging habitat in Emerge Associates (2025a).
[3] Scoring system provided by DCCEEW but not known to be publicly available.

of foraging species available across the residential development area so as to result in an increase above an average of 40% PFC. Subsequently no change in the site condition score and overall HQS for the residential development area is anticipated and no adjusted HQS has been applied. This is further discussed in **Section 2.3** below.

2.3. Discussion

Emerge Associates classify foraging habitat for black cockatoos as being native or non-native (to align with DAWE (2022) native and exotic categories) and primary and secondary (to assist in the interpretation of value). Most of the residential development area and conservation area was designated as primary native foraging habitat given the vegetation present includes key native foraging plants (Emerge Associates 2025b, a). This is consistent with the broad classification provided by DAWE (2022) that the vegetation represents 'high-quality' native foraging habitat.

DCCEEW require that a HQS be further assigned to assess impacts and associated offsets. The scoring system for calculating a HQS provided by DCCEEW assesses eight attributes of quality including the fine-scale PFC of foraging plants. Scoring habitat quality in this way may provide consistency across EPBC Act referral assessments. However, the system is arguably over-complicated, and the resultant HQS, an integer between 1 and 10, is unlikely to characterise true habitat value in a meaningful way. For example, the difference that 30-40% foraging plant PFC (score of 5) would make to black cockatoos compared to 40-50% foraging plant PFC (score of 6) is likely negligible.

This assessment found that the distribution, density and PFC of foraging plants, particularly jarrah and *Banksia* spp., varies across the site. PFC between 5% and 60% were recorded in relevés and clear differences in cover are visible in aerial imagery. Some of this variation was due to a recent fire that temporarily reduced canopy cover. Some of the variation is due to natural patterns expected to occur within banksia woodlands. Given black cockatoos forage opportunistically over large areas (6-12 km) and hence don't need to rely on the same resource year on year, and that a proportion of canopy cover is expected to regrow in the near future, vegetation that currently had low or high PFC was not separated out. The relevé data was instead used to provide an indication of mean PFC across the site. The final PFC assigned and used in the site condition component of the HQS scoring system was ultimately determined based on a variety of information sources, including knowledge gained from comprehensive field surveys.

As outlined in (Emerge Associates 2025b); Emerge Associates (2025a), part of the residential development area was subject to a bushfire in February 2023, which killed many mature *Banksia prionotes* trees. The bushfire stimulated recruitment, and in the recent May 2025 field survey high *B. prionotes* regeneration was evident. Most of these seedlings were small plants (<1 m high) but some larger plants were flowering. As these seedlings mature into trees, the PFC of foraging plants for CBC is expected to increase to 40%, remaining within the 30-40% PFC and site condition category of 5. When applying this to the HQS tool site context, this would not increase the future HQS from the current HQS of 8. The change in PFC as vegetation matures aligns with the HQS assigned within the conservation area which was not subject to recent fire. The HQS assigned to the conservation area is likely to remain stable, provided current conditions are not altered.

3. BANKSIA WOODLANDS TEC

3.1. Existing information

The site contains a total of 28.36 ha of the banksia woodlands TEC, of which 12.29 ha is located within the residential development area and 16.07 ha is located within the conservation area(Emerge Associates 2025c, d), as shown in **Figure 5**. The vegetation which represents the banksia woodlands TEC in the site is in 'excellent', 'very good', 'good' and 'degraded' condition according to the EPA (2016) scale (Emerge Associates 2025c).

3.2. Habitat quality score

A HQS was determined for both the residential development area and the conservation area using a habitat quality scoring framework provided by DCCEEW (refer **Appendix D**).

The HQS assigned to each portion of the site is provided in **Table 3** and detailed in **Appendix E**.

Table 3: Banksia woodland TEC habitat quality score assigned to each area within the site

Location	Habitat quality score (out of 10)
Residential development area	4.9
Conservation area	6.5

As outlined in (Emerge Associates 2025c), part of the residential development area was subject to a fire in February 2023. The condition of vegetation within the burnt area is predicted to improve as the vegetation matures, and so an 'adjusted HQS' was determined for the residential development area, which assumes that vegetation in 'good' improved to 'very good' and 'degraded' improved to 'good').

Table 4: Predicted adjusted banksia woodland TEC habitat quality score

Location	Habitat quality score (out of 10)
Residential development area	5.6

3.3. Discussion

Vegetation condition is the key input to the banksia woodlands TEC scoring framework, providing up to 80 points out of a possible 140 (noting that pristine vegetation condition is not considered to exist within the applicable range of the Keighery (1994) scale). The banksia woodland vegetation in the conservation area is in overall better condition than the residential development area as it has been subject to less disturbance and has higher native species richness (Emerge Associates 2025c, d). Accordingly, the conservation area was scored a higher HQS of 6.5 out of 10.

Additionally, the presence of a state listed TEC and a priority ecological community (PEC) in the conservation area, compared to only a state-listed PEC in the residential development area, provided higher scores in the site condition component.

The lower vegetation condition in the residential development area was partly due to the recent fire reducing canopy and understorey cover. However, this area has also been subject to greater, long-term (historical) disturbance. Whilst native species regeneration was evident in portions affected by the fire, native species cover and richness were notably lower across most of the residential

development area compared to the conservation area. To account for predicted improvements, largely relating to plant maturation and vegetation structure development, an adjusted HQS was calculated, resulting in a score of 5.6 out of 10. This demonstrates that the conservation area is overall more intact than the residential development area.

4. PROPOSED MANAGEMENT AREAS

Twelve patches within the conservation area were identified as potentially suitable for restoration for the purposes of enhancing black cockatoo habitat and/or banksia woodlands TEC. A description of each area is provided in **Table 5** and the location of each patch is shown in **Figure 6**. The HQS assigned to each area is provided in **Appendix F** and shown in **Table 5**.

Table 5: Descriptions of current flora and black cockatoo attributes within each proposed management area

ID	Description	HQS		
		CBC	FRTBC	Banksia Woodland TEC
1	Dense native ground layer of herbs *Alexgeorgea nitens* and *Corynotheca micrantha* across most of the area. Moderate to high cover of non-native grasses. Part of the area subject to a recent burn. Very low cover of *Banksia* spp. and Xanthorrhoea spp. Vegetation in degraded condition.	5	5	3.7
2	Dense native ground layer of herbs *Alexgeorgea nitens* and *Corynotheca micrantha* and shrub *Grevillea vestita* across most of the area. Moderate to high cover of non-native grasses. Some mature and some scattered juvenile *Banksia* spp. plants. Scattered jarrah trees in eastern portion and Xanthorrhoea spp. in southern and eastern portions. Large woody weed (shrub) **Gaudium laevigatum* present. Vegetation in degraded condition.	6	6	3.7
3	Native ground layer of herbs *Alexgeorgea nitens* and *Corynotheca micrantha* and scattered native shrubs across most of the area. Moderate to high cover of non-native grasses. Some mature and some scattered juvenile *Banksia* spp. plants, jarrah trees and *Xanthorrhoea* spp. Vegetation in good condition.	6	6	4.7
4	Mature *Banksia prionotes* trees over mostly non-native grasses with some scattered native plants and bare ground. Vegetation in good condition.	8	4	3.8
5	Mostly cleared with scattered native shrub regrowth or juvenile plants. Low weed cover. Vegetation in completely degraded condition.	3	3	2.3
6	Mature *Banksia prionotes* trees over mostly non-native grasses with some scattered jarrah trees, scattered native shrubs and bare ground. Variable in structure and diversity. Large woody weed (shrub) **Chamelaucium uncinatum* present. Vegetation in good condition.	8	6	4.7
7	Scattered *Banksia* spp. throughout most of patch, with higher PFC in the southern portion. Ground layer comprises mainly non-native grasses and bare ground. Vegetation in degraded condition.	7	5	3.7
8	Scattered *Banksia* spp. trees over scattered native shrubs *Xanthorrhoea* spp., *Jacksonia furcellata*, *Acacia saligna* over non-native weeds. Vegetation in degraded condition.	5	4	3.7
9	Jarrah and *Banksia* spp. trees and *Banksia* sp. seedlings over *Xanthorrhoea* sp. and scattered native shrubs, with non-native grasses and bare ground. Vegetation in good condition.	7	6	5.6
10	Mostly cleared and devoid of native vegetation. Small patch of *Xanthorrhoea preissii* and scattered native shrubs. Large woody weed (shrub) **Chamelaucium uncinatum* present on boundary and **Eucalyptus camaldulensis* in eastern portion. Vegetation in completely degraded condition.	4	4	2.3
11	Mostly cleared with scattered native shrub regrowth or juvenile plants. A few scattered juvenile Banksia sp. shrubs. Low weed cover. Vegetation in completely degraded condition.	4	3	2.3
12	No native vegetation – area comprises part of a cleared track in completely degraded condition.	3	3	2.2

5. CONCLUSIONS

HQS for black cockatoo habitat and banksia woodland TEC in the residential development area and conservation area are summarised in **Table 6**. An adjusted HQS for banksia woodland TEC within the residential development area of 5.6 out of 10 applies.

Table 6: Habitat quality score for black cockatoo habitat and banksia woodland TEC in the residential development area and conservation area

Location	Habitat quality score (out of 10)		
	Carnaby's black cockatoo	Forest red-tailed black cockatoo	Banksia woodland TEC
Residential development area	8	7	4.9
Conservation area	8	7	6.5

Twelve patches of vegetation within the conservation area are identified as having potential for restoration to improve their vegetation condition and relative HQS contribution (**Figure 6** and **Appendix F**).

6. REFERENCES

6.1. General references

Department of Agriculture, Water and the Environment (DAWE) 2022, *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo*, Canberra.

Emerge Associates 2025a, *Basic Fauna and Targeted Black Cockatoo Assessment - Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley*, EP24-129(03)--003B AJU, Version B.

Emerge Associates 2025b, *Basic Fauna and Targeted Black Cockatoo Assessment Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley*, EP24-129(03)--003 AJU, Revision C.

Emerge Associates 2025c, *Detailed Flora and Vegetation Assessment - Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley*, EP24-129(02)--009 SKP, Revision D.

Emerge Associates 2025d, *Detailed Flora and Vegetation Assessment - Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley*, EP24-129(02)--009A SKP, Version A.

Environmental Protection Authority (EPA) 2016, *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*, Perth.

Keighery, B. 1994, *Bushland Plant Survey: A guide to plant community survey for the community*, Wildflower Society of WA (Inc), Nedlands.

Figures

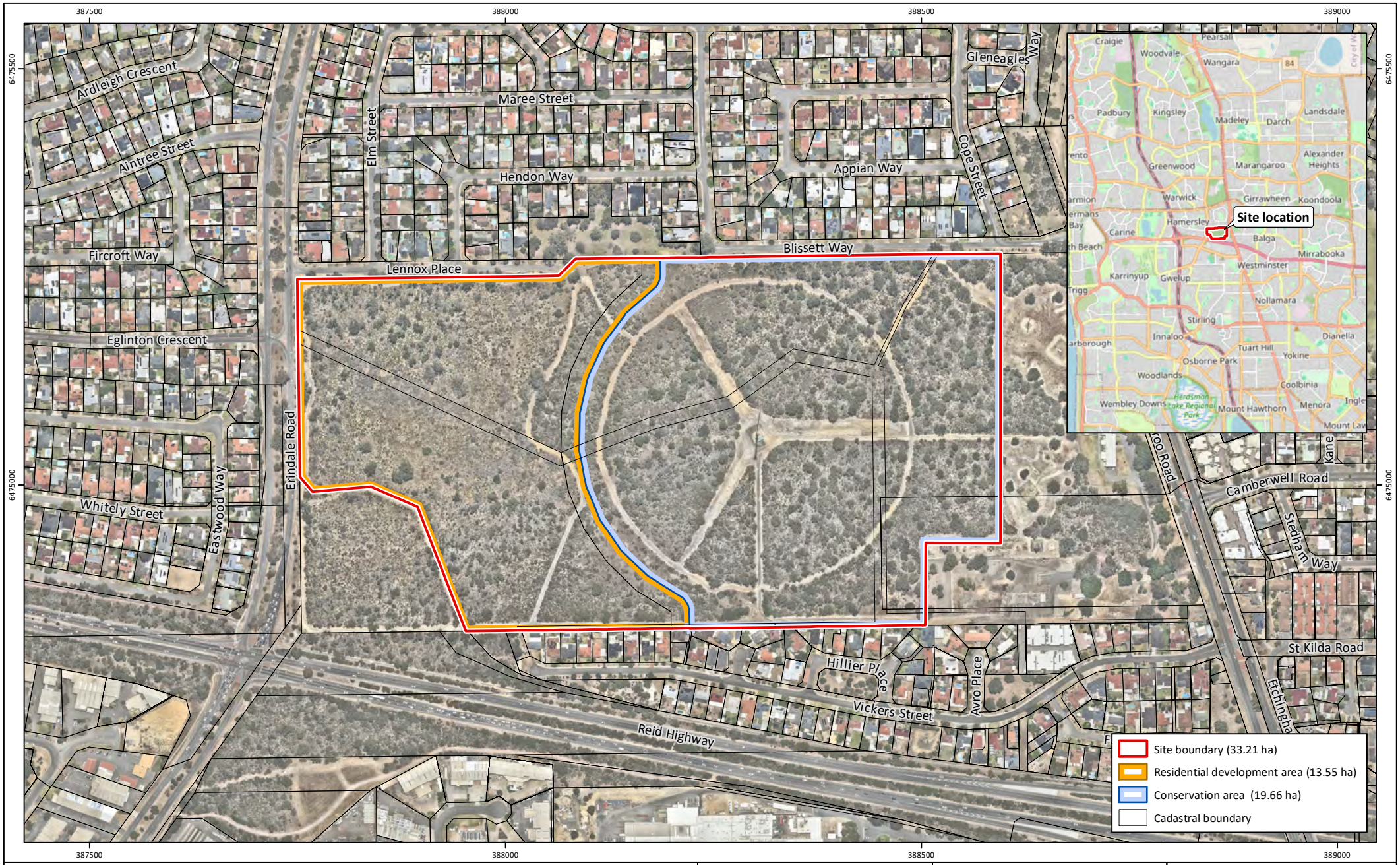

Figure 1: Site Location

Project:	Black Cockatoo and Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community Habitat Quality Score Assessment, Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley
Client:	BAI Communications

Plan Number:
EP24-129(07)--F69

Drawn:	CTH
Date:	22/05/2025
Checked:	RAW
Approved:	EKB
Date:	27/05/2025

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GDA2020 MGA Zone 50

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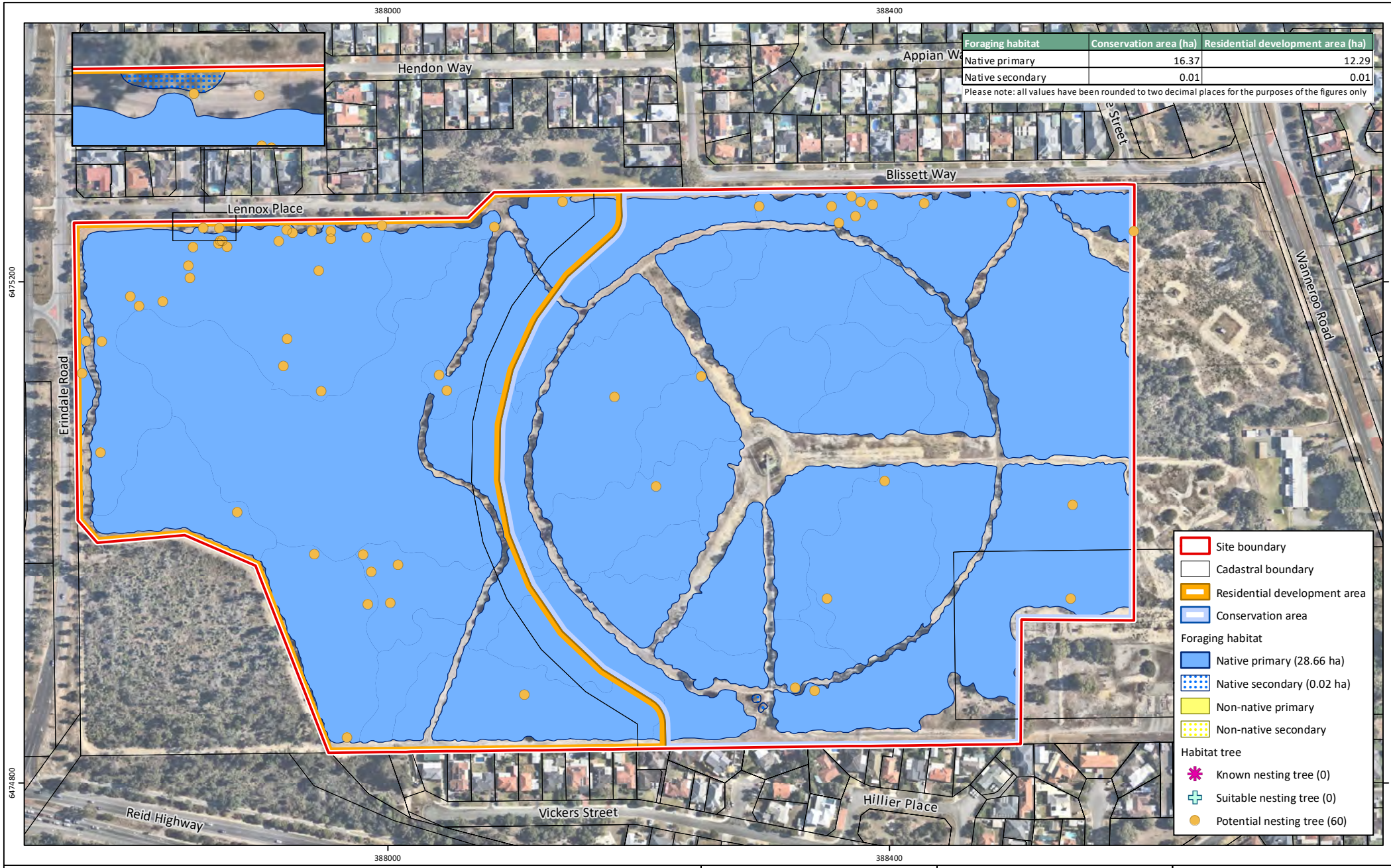

Foraging habitat	Conservation area (ha)	Residential development area (ha)
Native primary	16.37	12.29
Native secondary	0.01	0.01

Please note: all values have been rounded to two decimal places for the purposes of the figures only

Figure 2: Carnaby Black Cockatoo Foraging Habitat

Project: Black Cockatoo and Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community Habitat Quality Score Assessment, Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

Client: BAI Communications

Plan Number: EP24-129(07)--F70a

Drawn: CTH
Date: 29/04/2025
Checked: RAW
Approved: EKB
Date: 16/06/2025

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Scale: 1:4,000@A4

GDA2020 MGA Zone 50

emerge ASSOCIATES

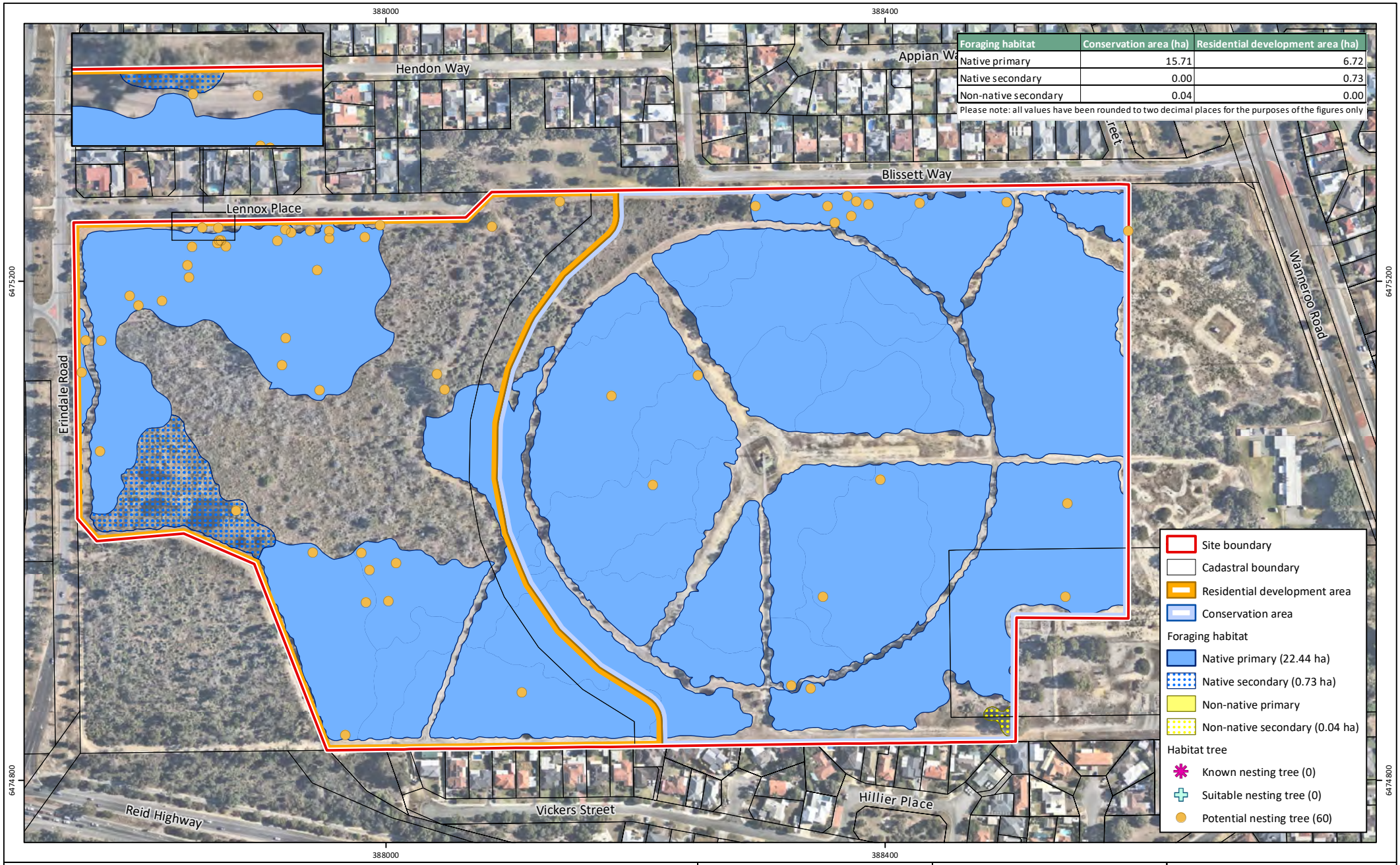

Figure 3: Forest Red-tailed Black Cockatoo Habitat

Project: Black Cockatoo and Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community Habitat Quality Score Assessment, Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

Client: BAI Communications

Plan Number: EP24-129(07)--F71a
Drawn: CTH
Date: 29/04/2025
Checked: RAW
Approved: EKB
Date: 16/06/2025

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GDA2020 MGA Zone 50

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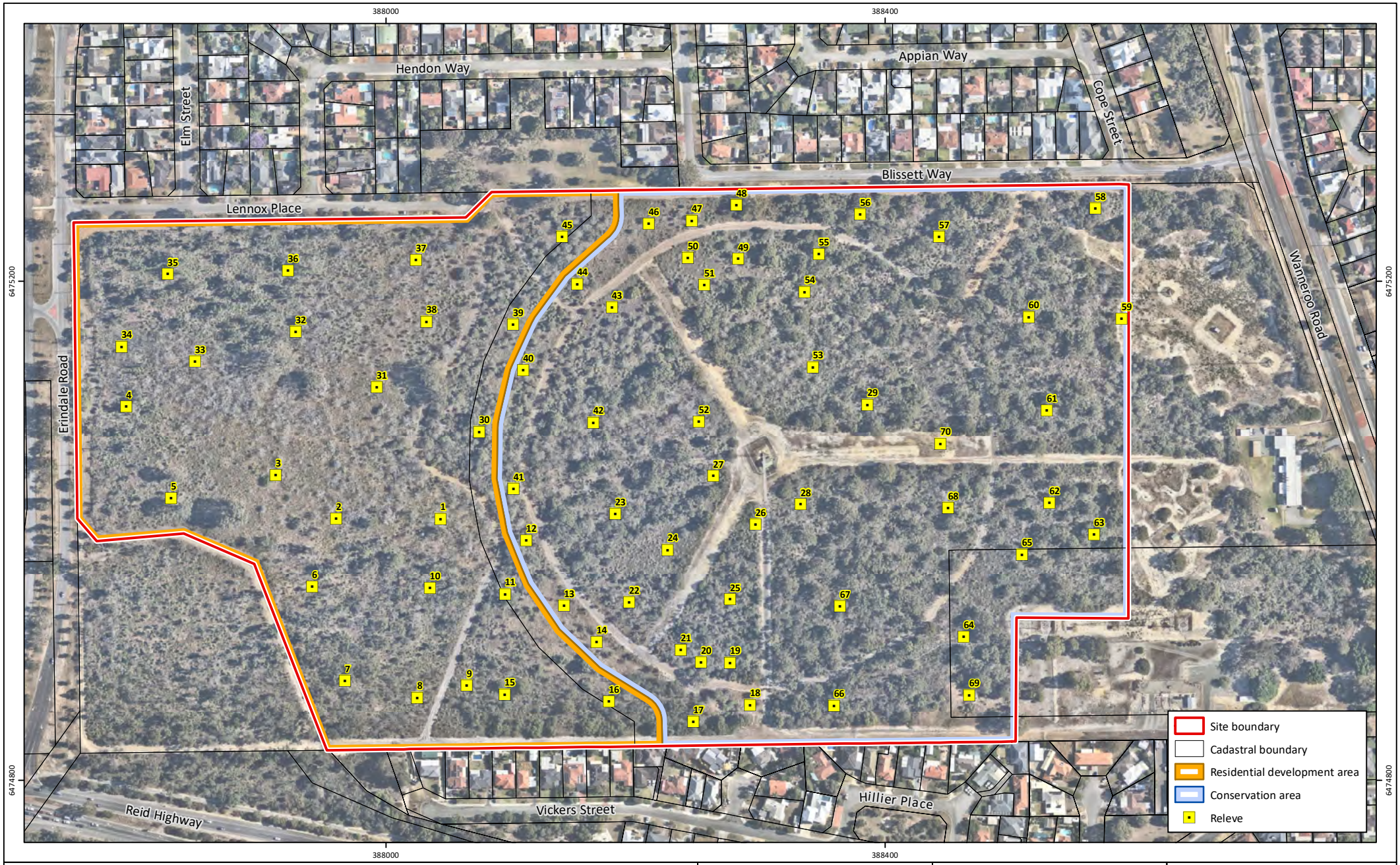

Figure 4: Foraging Habitat Samples

Project:	Black Cockatoo and Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community Habitat Quality Score Assessment, Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley
Client:	BAI Communications

Plan Number:
EP24-129(07)--F72

Drawn:	CTH
Date:	29/04/2025
Checked:	RAW
Approved:	EKB
Date:	27/05/2025

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GDA2020 MGA Zone 50

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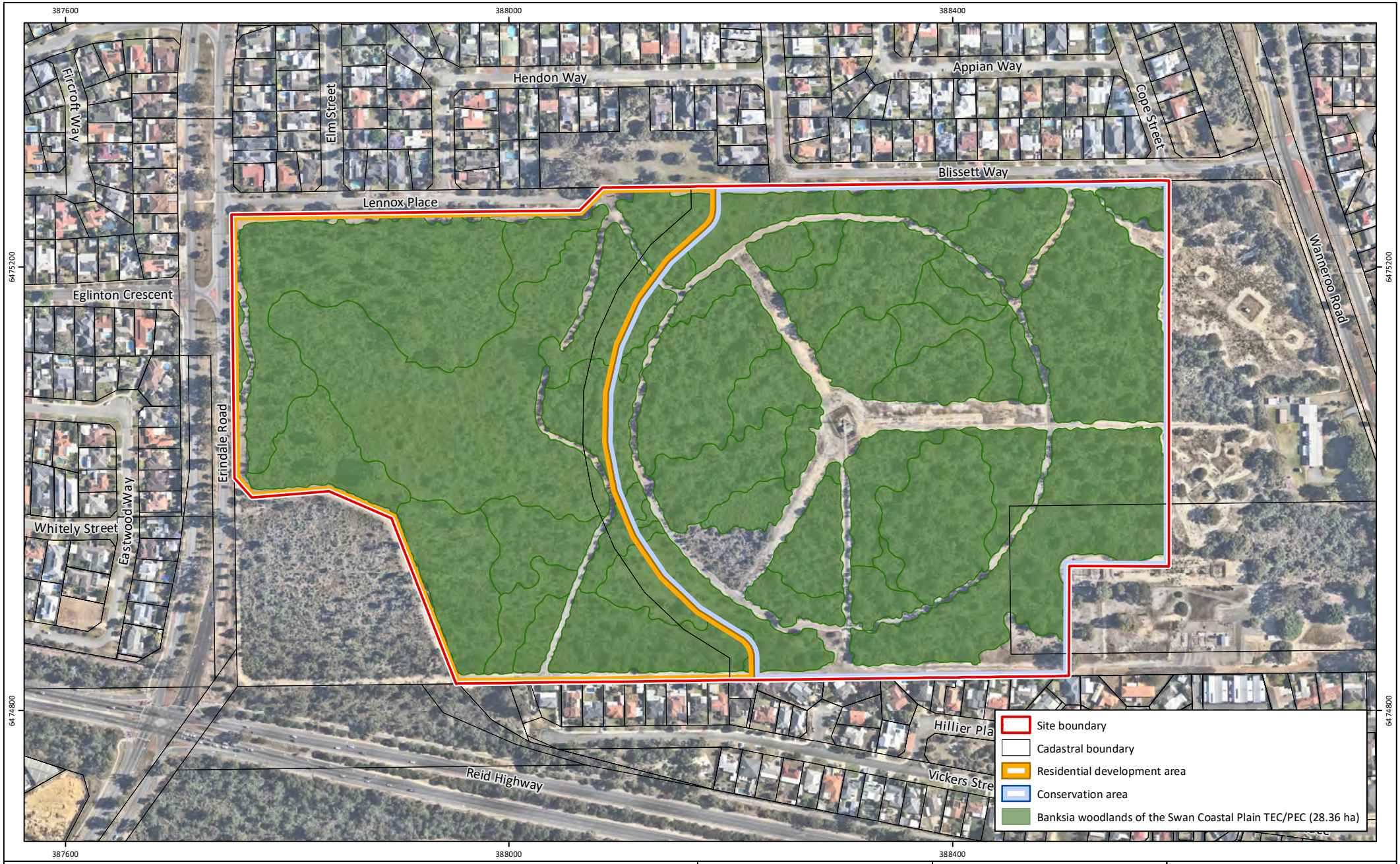

Figure 5: Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community

Project:	Black Cockatoo and Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community Habitat Quality Score Assessment, Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley
Client:	BAI Communications

Plan Number:
EP24-129(07)--F73

Drawn:	CTH
Date:	29/04/2025
Checked:	RAW
Approved:	EKB
Date:	27/05/2025

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GDA2020 MGA Zone 50

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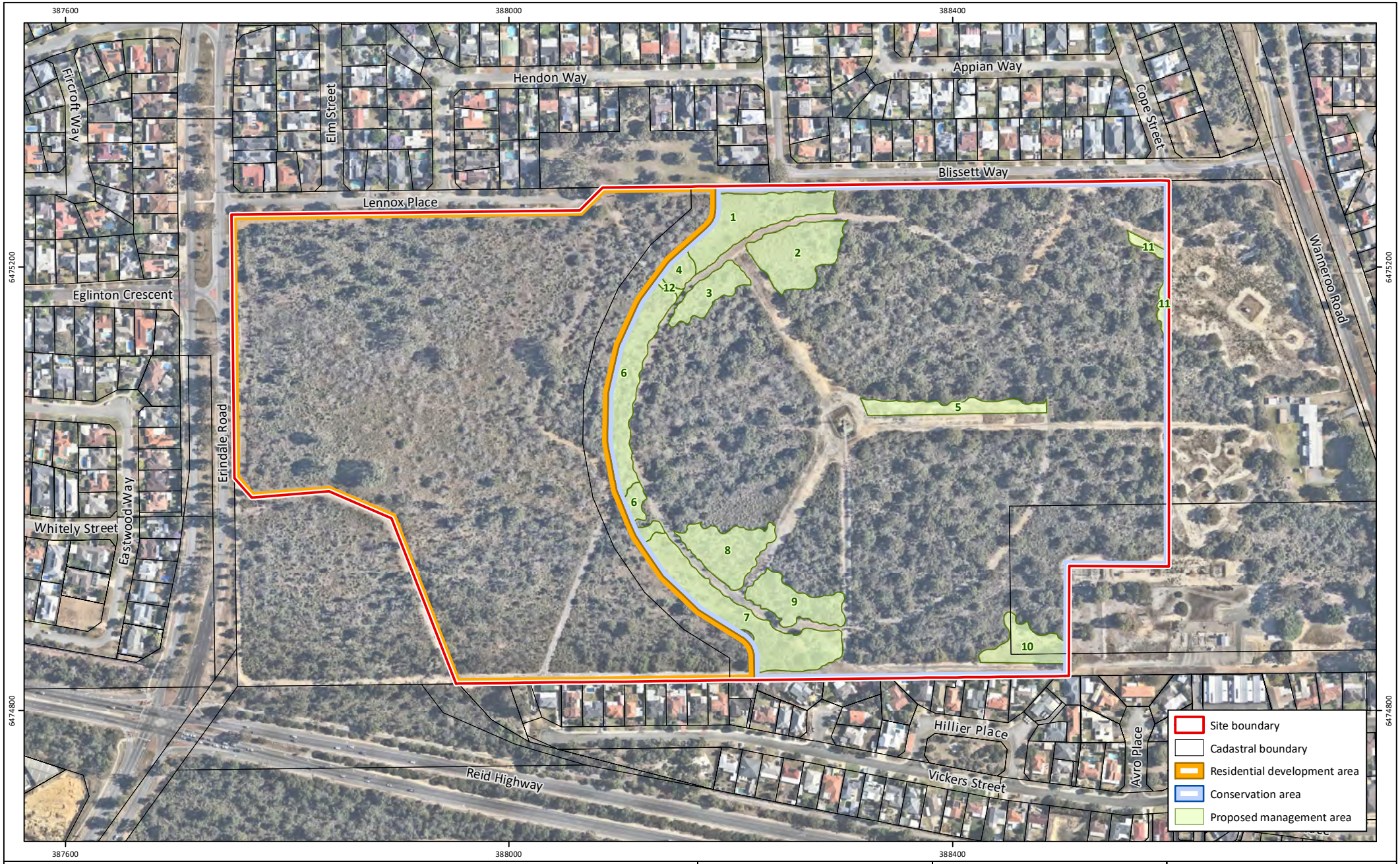

Figure 6: Vegetation Suitable for Future Management

Project:	Black Cockatoo and Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community Habitat Quality Score Assessment, Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley
Client:	BAI Communications

Plan Number:
EP24-129(07)--F74a

Drawn:	CTH
Date:	29/04/2025
Checked:	RAW
Approved:	EKB
Date:	24/06/2025

N

0 50 100 150
Metres

Scale: 1:4,500@A4

GDA2020 MGA Zone 50

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Appendix A

Habitat scoring system for WA black cockatoo foraging habitat (DCCEEW)

Habitat Scoring System for WA black cockatoo foraging habitat

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	Offset start quality	Without offset	With offset
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				
			Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >50% projected foliage cover. Low percentage (< 5%) of tree deaths.				
	6	High	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.				

[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.

Vegetation condition and structure. Habitat features	**5**	Moderate to high	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				
			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%).				
	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.				
	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				
			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.				

Vegetation condition and structure. Habitat features			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*.				
	1	Negligible to low	All species				
			Scattered specimens of known food plants but projected foliage cover of these is <2%. May include: paddocks or urban areas with scattered foraging trees.				
	0	None	All species				
			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).				
			Totals				

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

Final Totals				

Indicator		**Species Stocking Rate**[3]	**Impact Site**			**Offset Site**		
			CBC	**BBC**	**FRT**	**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.	Yes		Yes			
	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.

Legend	
	If the site scores between 0-2 (low to no value) for site condition, 0 for the site context score, or is **No** for species stocking rate, it is extremely unlikely to be considered as suitable habitat. This would not be appropriate to use as an offset site.

The metrics used to determine Site Condition, Site Context, and Species Stocking Rate were developed by the Department of Climate Change, Energy, the Environment, and Water in consultation with species experts in WA.

A standard habitat quality scoring system for a species allocates scores out of 3 for both site condition and site context, and out of 4 for species stocking rate. However, as black cockatoos are very mobile, this HQS uses a score out of 7 for site condition and a score out of 3 for site context. Site condition is considered the key factor in determining the quality of habitat for these black cockatoo species. Species stocking rate is considered only in terms of presence or absence of the species and does not add to the total score. Note that the species, or strong indicators of the species, must be present, consistent with the presence/usage description above, for an offset to be considered suitable.

Appendix B

Relevé Raw Data

Releve Raw Data

Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

Releve ID	Easting	Northing	Vegetation condition	Jarrah cover (%)	Tuart cover (%)	Banksia cover (%)	Allocasuarina cover (%)	Grasstree cover (%)	Other cover (%)
1	388043.6113	6475009.324	Degraded	15		30		5	
2	387959.8564	6475009.552	Degraded			15		5	Hakea 2%
3	387911.6466	6475044.642	Degraded			10		1	Hakea 1%
4	387791.5903	6475099.371	Good	20		3		40	
5	387827.7017	6475026.068	Good		35	2		25	Hakea 2%
6	387940.5932	6474955.374	Good	30		10		15	Hakea 2%
7	387966.9715	6474879.697	Good	55		2		15	
8	388025.0632	6474866.333	Very good			35		30	Melaleuca sp. 3%
9	388064.5443	6474875.891	Very good			30		40	Melaleuca sp. 5%
10	388035.0664	6474954.174	Good	45		7		30	
11	388095.2635	6474949.236	Good		15	30		35	Jacksonia furcellata 1%, Melaleuca sp. 2%
12	388112.1696	6474992.196	Good	30		5		20	Jacksonia furcellata 5%
13	388142.7325	6474940.125	Degraded			1			Jacksonia furcellata 5%
14	388168.7464	6474910.983	Degraded						Jacksonia furcellata 5%, Acacia sp. 10%
15	388095.1433	6474868.971	Very good	25		30		20	
16	388178.7935	6474863.169	Very good			40		10	Jacksonia furcellata 5%
17	388246.3017	6474847.159	Degraded	5		40		15	
18	388291.821	6474860.42	Completely degraded	3		1			Acacia saligna 5%
19	388275.946	6474894.317	Good	15		30		25	
20	388252.2974	6474894.535	Good	20		25		15	Jacksonia furcellata 1%
21	388236.0319	6474904.499	Good	2		10		10	Jacksonia furcellata 10%
22	388194.88	6474942.737	Degraded			2		3	Jacksonia furcellata 25%, Acacia saligna 5%
23	388183.8543	6475013.282	Very good	30		10		15	
24	388225.7602	6474984.647	Excellent			5		20	
25	388275.728	6474944.954	Excellent	7		10		15	
26	388296.1013	6475004.892	Good			5		10	
27	388262.1251	6475043.838	Very good	30		7		10	
28	388332.4932	6475021.061	Very good	5		25		10	
29	388385.9254	6475100.923	Very good	40		1		30	
30	388074.5764	6475079.073	Good	10	10	15	0	10	
31	387992.5666	6475114.87	Degraded	0	0	10	0	5	
32	387927.589	6475159.273	Good	30	10	10	0	25	Hakea divericata and Daviesia nudiflora 5%
33	387846.9362	6475135.587	Degraded	0	0	10	0	2	Hakea divaricata 25%
34	387787.9721	6475147.595	Degraded	15	0	15	0	10	Jacksonia furcellata 5%
35	387824.9752	6475205.66	Good	25	5	5	1	30	
36	387921.5151	6475208.454	Good	35	1	15	0	50	Daviesia divaricata and Daviesia nudiflora 2%
37	388023.9089	6475216.841	Good	1	0	4	0	5	Grevillea vestita 2%
38	388032.4531	6475167.424	Degraded	0	1	1	0	10	Jacksonia sericea 10%, Grevillea vestita 1%
39	388101.7238	6475165.292	Good	0	0	2	0	2	Jacksonia sericea 30%
40	388109.9562	6475128.625	Good	0	0	60	0	2	Pelargonium <1%, Grevillea vestita <1%
41	388102.1524	6475033.614	Good	0	0	40	0	0	Persoonia and Jacksonia furcellata 1%
42	388166.053	6475086.592	Very good	5	0	50	0	2	Jacksonia furcellata 1%
43	388180.864	6475179.156	Good	5	0	10	0	5	Grevillea vestita 10%
44	388153.3694	6475197.73	Good	0	0	40	0	30	Grevillea vestita 1%
45	388141.0411	6475235.641	Degraded	0	5	30	0	2	Grevillea vestita 1%, Pelargonium
46	388210.617	6475245.903	Degraded	0	0	5	0	1	Grevillea vestita 20%
47	388244.902	6475248.365	Degraded			20		10	Grevillea vestita 5%

Releve Raw Data

Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

Releve ID	Easting	Northing	Vegetation condition	Jarrah cover (%)	Tuart cover (%)	Banksia cover (%)	Allocasuarina cover (%)	Grasstree cover (%)	Other cover (%)
48	388280.9768	6475260.99	Degraded		50	10		2	
49					0	40	0	15	Daviesia divaricata, Daviesia nudiflora and Jacksonia sericea 2%
	388282.2061	6475217.774	Degraded	10					
50	388241.8923	6475218.712	Degraded	0	0	5	0	15	Grevillea vestita 5%
51	388255.02	6475196.80	Degraded			25		15	
52	388250.64	6475087.29	Very good	5	0	40	0	5	
53	388342.06	6475130.95	Very good	0	0	30	0	15	
54	388335.56	6475191.33	Very good	20	0	10	0	30	Daviesia nudiflora 1%
55	388346.79	6475221.80	Very good	40	0	2	0	40	
56	388380.15	6475253.58	Very good	30	0	5	0	30	
57	388443.53	6475235.41	Excellent	40	0	15	0	40	
58	388568.77	6475258.12	Very good	40	0	25	0	20	
59	388589.72	6475169.94	Completely degraded	0	0	<1	0	<1	Jacksonia sericea 2%
60	388515.06	6475171.31	Very good	30	0	10	0	40	
61	388529.77	6475096.40	Very good	30	0	10	1	30	Jacksonia furcellata and Jacksonia sternbergiana 1%
62	388531.78	6475022.35	Very good	20	0	10	0	15	Hakea prostrata 1%
63	388567.47	6474997.02	Very good	35	0	10	0	30	
64	388463.11	6474914.96	Very good	10	0	1	0	2	Hakea prostrata 2%
65	388509.63	6474980.93	Very good	20	0	20	0	10	Hakea prostrata 1%
66	388359.05	6474859.79	Very good	40	0	30	0	40	
67	388363.74	6474939.50	Excellent	40	0	20	0	30	
68	388450.33	6475018.38	Very good	25	0	20	0	10	
69	388467.29	6474868.25	Completely degraded	0	0	0		<5	
70	388444.35	6475069.76	Completely degraded	0	0	0	0	0	

Note: Jarrah = *Eucalyptus marginata* , marri=*Corymbia calophylla* , tuart=*Eucalyptus gomphocephala* , *Banksia* =*B* . *attenuata* , *B* . *menziesii* and/or *B* . *prionotes* , grasstree=*Xanthorrhoea preissii* .

Appendix C

Habitat Quality Score – Black Cockatoos

Black Cockatoo Habitat Quality Scoring System - Carnaby's Black Cockatoo
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

	Indicator	Applicable score	Foraging value	Details	Score - conservation area	Explanation
Site condition	Vegetation condition and structure. Habitat features	**7**	Very High	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].		
		6	High	Native kwongan heath and shrubland (>25% projected foliage cover), banksia and eucalypt woodlands with >40% projected foliage cover. Low percentage (< 10%) of tree deaths.		
		5	Moderate to high	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%).	5	Releve data, quadrat data and review of aerial imagery indicates approximately 40% projected foliage cover of jarrah and banksia trees.
		4	Moderate	Native kwongan heath and shrubland, banksia or eucalypt woodlands with 20-30% projected foliage cover. Moderate percentage of tree deaths (30-40%).		
		3	Low to moderate	Native kwongan heath and shrubland, banksia or eucalypt woodlands with 10-20% projected foliage cover.		
		2	Low	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.		
		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.		
		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).	0	
				Site condition total	**5**	

Site context	Proximity of the site in relation to other habitat.	**3**	Site is within 6km of known breeding site.	or	Site is within 12km of other foraging resources with site condition of at least 3.	3	7 'potential' breeding sites occur within 6 km of the site but do not have confirmed breeding so no score applied. Other foraging resources of at least score of 3 occur within 12 km of the site and so score applies.
		2	Site is within 12km of known breeding site.	or	Site is within 15km of other foraging resources with site condition of at least 4.		
		1	Site is within 15km of known breeding site.	or	Site is between 15km and 20km of other foraging resources with site condition of at least 5.		
		0	Site is further than 15km from known breeding site.	or	Site is further than 20km from other foraging resources.		
					Site context total	**3**	

Species stocking rate^	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.		Yes	Previous survey recorded evidence of individuals and secondary foraging evidence (chewed fruits)
		No	Species is recorded or reported very infrequently and there is little or no foraging evidence.			
Final total out of 10					**8**	

Notes

^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.

If the site scores between 0-2 (low to no value) for site condition, 0 for the site context score, or is **No** for species stocking rate, it is extremely unlikely to be considered as suitable habitat. This would not be appropriate to use as an offset site.

The metrics used to determine Site Condition, Site Context, and Species Stocking Rate were developed by the Department of Climate Change, Energy, the Environment, and Water in consultation with species experts in WA.
A standard habitat quality scoring system for a species allocates scores out of 3 for both site condition and site context, and out of 4 for species stocking rate. However, as black cockatoos are very mobile, this HQS uses a score out of 7 for site condition and a score out of 3 for site context. Site condition is considered the key factor in determining the quality of habitat for these black cockatoo species. Species stocking rate is considered only in terms of presence or absence of the species and does not add to the total score. Note that the species, or strong indicators of the species, must be present, consistent with the presence/usage description above, for an offset to be considered suitable.

Black Cockatoo Habitat Quality Scoring System - Forest Red-tailed Black Cockatoo
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

	Indicator	Applicable score	Foraging value	Details	Score - conservation area	Explanation
Site condition	Vegetation condition and structure. Habitat features	**7**	Very High	Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >50% projected foliage cover. Low percentage (< 5%) of tree deaths.		
		6	High	Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >40% projected foliage cover. Low percentage (< 10%) of tree deaths.		
		5	Moderate to high	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%).		
		4	Moderate	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%).	4	Releve data, quadrat data and review of aerial imagery indicates approximately 25% projected foliage cover of jarrah and banksia trees.
		3	Low to moderate	Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with 5-20% projected foliage cover.		
		2	Low	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.		
		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.		
		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 condition total	**4**	

Site context	Proximity of the site in relation to other habitat.	**3**	Site is within 6km of known breeding site.	or	Site is within 12km of other foraging resources with site condition of at least 3.	3	7 'potential' breeding sites occur within 6 km of the site but do not have confirmed breeding so no score applied. Other foraging resources of at least score of 3 occur within 12 km of the site and so score applies.
		2	Site is within 12km of known breeding site.	or	Site is within 15km of other foraging resources with site condition of at least 4.		
		1	Site is within 15km of known breeding site.	or	Site is between 15km and 20km of other foraging resources with site condition of at least 5.		
		0	Site is further than 15km from known breeding site.	or	Site is further than 20km from other foraging resources.		
					Site context total	**3**	

Species stocking rate^	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.		Yes	Previous survey recorded evidence of individuals and secondary foraging evidence (chewed fruits)
		No	Species is recorded or reported very infrequently and there is little or no foraging evidence.			
Final total out of 10					**7**	

Notes

^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.

If the site scores between 0-2 (low to no value) for site condition, 0 for the site context score, or is **No** for species stocking rate, it is extremely unlikely to be considered as suitable habitat. This would not be appropriate to use as an offset site.

The metrics used to determine Site Condition, Site Context, and Species Stocking Rate were developed by the Department of Climate Change, Energy, the Environment, and Water in consultation with species experts in WA.
A standard habitat quality scoring system for a species allocates scores out of 3 for both site condition and site context, and out of 4 for species stocking rate. However, as black cockatoos are very mobile, this HQS uses a score out of 7 for site condition and a score out of 3 for site context. Site condition is considered the key factor in determining the quality of habitat for these black cockatoo species. Species stocking rate is considered only in terms of presence or absence of the species and does not add to the total score. Note that the species, or strong indicators of the species, must be present, consistent with the presence/usage description above, for an offset to be considered suitable.

Black Cockatoo Habitat Quality Scoring System - Forest Red-tailed Black Cockatoo
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

	Indicator	Applicable score	Foraging value	Details	Score - residential development area	Explanation
Site condition	Vegetation condition and structure. Habitat features	**7**	Very High	Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >50% projected foliage cover. Low percentage (< 5%) of tree deaths.		
		6	High	Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >40% projected foliage cover. Low percentage (< 10%) of tree deaths.		
		5	Moderate to high	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%).		
		4	Moderate	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%).	4	Releve data, quadrat data and review of aerial imagery indicates approximately 25% projected foliage cover of jarrah and banksia trees.
		3	Low to moderate	Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with 5-20% projected foliage cover.		
		2	Low	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.		
		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.		
		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 condition total	**4**	
Site context	Proximity of the site in relation to other habitat.	**3**	Site is within 6km of known breeding site.	or Site is within 12km of other foraging resources with site condition of at least 3.	3	7 'potential' breeding sites occur within 6 km of the site but do not have confirmed breeding so no score applied. Other foraging resources of at least score of 3 occur within 12 km of the site and so score applies.
		2	Site is within 12km of known breeding site.	or Site is within 15km of other foraging resources with site condition of at least 4.		
		1	Site is within 15km of known breeding site.	or Site is between 15km and 20km of other foraging resources with site condition of at least 5.		
		0	Site is further than 15km from known breeding site.	or Site is further than 20km from other foraging resources.		
				Site context total	**3**	
Species stocking rate^	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.		Yes	Previous survey recorded evidence of individuals and secondary foraging evidence (chewed fruits)
		No	Species is recorded or reported very infrequently and there is little or no foraging evidence.			
				Final total out of 10	**7**	

Notes

^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.

If the site scores between 0-2 (low to no value) for site condition, 0 for the site context score, or is **No** for species stocking rate, it is extremely unlikely to be considered as suitable habitat. This would not be appropriate to use as an offset site.

The metrics used to determine Site Condition, Site Context, and Species Stocking Rate were developed by the Department of Climate Change, Energy, the Environment, and Water in consultation with species experts in WA.
A standard habitat quality scoring system for a species allocates scores out of 3 for both site condition and site context, and out of 4 for species stocking rate. However, as black cockatoos are very mobile, this HQS uses a score out of 7 for site condition and a score out of 3 for site context. Site condition is considered the key factor in determining the quality of habitat for these black cockatoo species. Species stocking rate is considered only in terms of presence or absence of the species and does not add to the total score. Note that the species, or strong indicators of the species, must be present, consistent with the presence/usage description above, for an offset to be considered suitable.

Black Cockatoo Habitat Quality Scoring System - Carnaby's Black Cockatoo
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

	Indicator	Applicable score	Foraging value	Details	Score - residential development area	Explanation
Site condition	Vegetation condition and structure. Habitat features	**7**	Very High	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].		
		6	High	Native kwongan heath and shrubland (>25% projected foliage cover), banksia and eucalypt woodlands with >40% projected foliage cover. Low percentage (< 10%) of tree deaths.		
		5	Moderate to high	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%).	5	Releve data, quadrat data and review of aerial imagery indicates approximately 40% projected foliage cover of jarrah and banksia trees.
		4	Moderate	Native kwongan heath and shrubland, banksia or eucalypt woodlands with 20-30% projected foliage cover. Moderate percentage of tree deaths (30-40%).		
		3	Low to moderate	Native kwongan heath and shrubland, banksia or eucalypt woodlands with 10-20% projected foliage cover.		
		2	Low	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.		
		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.		
		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).	0	
				Site condition total	**5**	

Site context	Proximity of the site in relation to other habitat.	**3**	Site is within 6km of known breeding site.	or	Site is within 12km of other foraging resources with site condition of at least 3.	3	7 'potential' breeding sites occur within 6 km of the site but do not have confirmed breeding so no score applied. Other foraging resources of at least score of 3 occur within 12 km of the site and so score applies.
		2	Site is within 12km of known breeding site.	or	Site is within 15km of other foraging resources with site condition of at least 4.		
		1	Site is within 15km of known breeding site.	or	Site is between 15km and 20km of other foraging resources with site condition of at least 5.		
		0	Site is further than 15km from known breeding site.	or	Site is further than 20km from other foraging resources.		
					Site context total	**3**	

Species stocking rate^	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.		Yes	Previous survey recorded evidence of individuals and secondary foraging evidence (chewed fruits)
		No	Species is recorded or reported very infrequently and there is little or no foraging evidence.			
Final total out of 10					**8**	

Notes

^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.

If the site scores between 0-2 (low to no value) for site condition, 0 for the site context score, or is **No** for species stocking rate, it is extremely unlikely to be considered as suitable habitat. This would not be appropriate to use as an offset site.

The metrics used to determine Site Condition, Site Context, and Species Stocking Rate were developed by the Department of Climate Change, Energy, the Environment, and Water in consultation with species experts in WA.
A standard habitat quality scoring system for a species allocates scores out of 3 for both site condition and site context, and out of 4 for species stocking rate. However, as black cockatoos are very mobile, this HQS uses a score out of 7 for site condition and a score out of 3 for site context. Site condition is considered the key factor in determining the quality of habitat for these black cockatoo species. Species stocking rate is considered only in terms of presence or absence of the species and does not add to the total score. Note that the species, or strong indicators of the species, must be present, consistent with the presence/usage description above, for an offset to be considered suitable.

Appendix D

Woodman Environmental (2018) Banksia Woodlands TEC Habitat Quality Framework

Banksia woodland TEC habitat quality scoring framework (based on Woodman 2018)

Habitat Quality Scoring Framework		Score – Impact Site	Score – Offset site 1 - start	Score – Offset site 1 – without	Score – Offset site 1 - with
Site Condition (70%)	**Vegetation condition (Keighery 1994)** - Pristine (100) - Excellent (80) - Very good (60) - Good (40) - Degraded (20) - Completely Degraded (0)				
	Species Richness - Average native species richness within the top half of recorded range for the TEC (10) - Average native species richness within the bottom half of recorded range for the TEC (0)				
	Presence of Threatened taxa - Patch is critical habitat for, and hosts Threatened taxa (10) - Patch is critical habitat for Threatened taxa (5)				

	- Patch is not critical habitat for Threatened taxa (0)				
	Contains State listed TEC/PEC - Patch contains WA FCT listed as State TEC (20) - Patch contains WA FCT listed as State PEC (10) - Patch does not contain WA FCT listed as either TEC or PEC (0)				
	Presence of Dieback - Patch is dieback free (10) - Patch is partly dieback free (5) - Patch is dieback infested (0)				
	Condition total (out of 150)				
	Condition Score (Condition total / 150 * 70)				

Habitat quality scoring framework		**Score – Impact site**	**Score – Offset site 1 - start**	**Score – Offset site 1 – without**	**Score – Offset site 1 - with**
	Connectivity				

Site Context (30%)	- Patch is continuous with remnant vegetation and forms a corridor that links different landscape units (30) - Patch is continuous with remnant vegetation that forms a medium to large local remnant (20) - Patch is within 1km of other medium to large remnants (10) - Patch is within 12km of other significant remnants and contributes to support of significant avifauna (i.e. known Black Cockatoo Breeding sites are located within 12km) (5) - Patch does not meet any of the above criteria (0)				
	Patch size - 20 hectares or more (50) - 10-20 hectares (40)				

	- 5-10 hectares (30) - 2-5 hectares (20) - Less than 2 hectares (10)				
	Site location and risk - Patch is located in an area where the TEC has been extensively cleared (10)				
	Site location and risk - Patch is located at the geographical edge of the recorded range (10)				
	Context total (out of 100)				
	Context Score (Context total / 100 * 30)				
Quality total (out of 100)	**Condition Score + Context Score**				
Final Patch Habitat Quality Score (out of 10)	**Quality total / 10**				
Weighted Patch Score	**Final Patch Habitat Quality Score * area of patch (hectares)**	Not used, as have averaged across all patches	Not used, as have averaged across patches		
Site Habitat Quality Score (out of 10)	**All Weighted Patch Scores / total impact area**	As above	As above		

Sources: BORR South Offset Strategy (September 2022); BORR Southern Section Vegetation and Flora Study (BORR IPT 2020; impact site); Lots 153, 267 & 268 Ducane Road, Banksia Woodlands TEC Assessment (Biota Environmental Services, March 2021); revised BORR South Offset Strategy (December 2022), Appendix B in revised Offset Strategy (HQS for MNES); Appendix L in revised Offset Strategy (Broadscale dieback assessment of proposed offset sites for BORR – Terratree 2022 – note this is only preliminary, so final results are required.

Appendix E

Habitat Quality Score – Banksia Woodlands TEC

Banksia woodland TEC habitat quality scoring framework (Woodman 2018)
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

	Habitat quality scoring framework	Score - Conservation area	Explanation (site)
Site condition (70%)	**Vegetation condition (Keighery 1994)** -Pristine (100) -Excellent (80) -Very good (60) -Good (40) -Degraded (20) -Completely degraded (0)	59	2.6 ha (16%) in 'excellent' condition, 11.11 ha (69%) in 'very good', 1.04 ha (6%) in 'good' condition and 1.33 ha (8%) in degraded condition. Weighted average of 59 applied (rounded up)
	Species richness - Average native species richness within top half of recorded range for the TEC (10) - Average native species richness within the bottom half of recorded range for the TEC (0)	0	The native species richness for floristic community type (FCT) 28 ranges from 23 to 80 species per 10x10 sample and from 57 to 74 for FCT 20a (Gibson 1994). An average of 37 native species were recorded from samples within FCT 28 and an average of 46 native species were recorded from samples within FCT 20a in the conservation area. Therefore, the native species richness recorded from the residential development area lies in the bottom half of the recorded range for both FCTs.
	Presence of threatened taxa - Patch is critical habitat for, and hosts threatened taxa (10) - Patch is critical habitat for threatened taxa (5) - Patch is not critical habitat for threatened taxa (0)	10	The vegetation in the conservation area provides foraging habitat for *Zanda latirostris* (Carnaby's cockatoo) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which are listed as threatened under EPBC and BC Act. Carnaby's cockatoo was observed within the conservation area and evidence of foraging by both species was also observed.
	Contains State listed TEC/PEC - Patch contains WA FCT listed as State TEC (20) - Patch contains a WA FCT listed as State PEC (10) - Patch does not contain a WA FCT listed as either TEC or PEC (0)	20	Part of the vegetation in the impact area comprises FCT 20a which is a State listed TEC.
	Presence of dieback -Patch is dieback free (10) -Patch is partly dieback free (5) -Patch is dieback infested (0)	5	No formal dieback testing was undertaken and so the status of dieback within the site is unconfirmed. As a medium measure the site is assumed to be at least partially dieback free.
	Site condition total (out of 150)	94	
	Site condition score (site condition total / 150)*70	43.87	
Site context (30%)	- Patch is continuous with remnant vegetation and forms a corridor that links different landscape units (30) - Patch is continuous with remnant vegetation that forms a medium to large local remnant (20) - Patch is within 1 km of other medium to large remnants (10) - Patch is within 12 km of other significant remnants and contributes to support of significant avifauna (i.e. known Black Cockatoo Breeding sites are located within 12 km) (5) - Patch does not meet any of the above criteria (0)	10	The vegetation associated with the conservation area is isolated on the basis of roads separating it from larger patches of vegetation to the north and east and it does not link areas of vegetation or landscape units. The patch is within 1km of other medium to large remnants, including remnants likely to represent the banksia woodland TEC.
	Patch size - 20 hectares or more (50) - 10-20 hectares (40) - 5-10 hectares (30) - 2-5 hectares (20) - Less than 2 hectares (10)	50	The banksia woodland TEC within the conservation area forms part of a larger patch of the TEC which is over 20 ha in size.
	Site location and risk - Patch is located in an area where the TEC has been extensively cleared (10)	10	The banksia woodland TEC has been cleared extensively for residential development in the wider local area of the site.
	Site location and risk - Patch is located at the geographical edge of the recorded range (10)	0	The site is located relatively central within the distribution of the banksia woodland TEC.
	Site context total (out of 100)	70	
	Site context score (site context total / 100)*30	21	
	Site condition score + Site context score	64.87	
	Quality total (out of 10)	6.5	

Banksia woodland TEC habitat quality scoring framework (Woodman 2018)
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

	Habitat quality scoring framework	Score - Residential development area	Explanation (site)
Site condition (70%)	**Vegetation condition (Keighery 1994)** -Pristine (100) -Excellent (80) -Very good (60) -Good (40) -Degraded (20) -Completely degraded (0)	36	1.05 ha (9%) in 'very good' condition, 6.83 ha (56%) in 'good' and 4.41 ha (36%) in degraded condition. Weighted average of 36 applied (rounded down)
	Species richness - Average native species richness within top half of recorded range for the TEC (10) - Average native species richness within the bottom half of recorded range for the TEC (0)	0	The native species richness for floristic community type (FCT) 28 ranges from 23 to 80 species per 10x10 sample and from 31 to 54 for FCT 21c (Gibson 1994). An average of 34 native species were recorded from samples within FCT 28 and an average of 35 native species were recorded from samples within FCT 21c in the residential development area. Therefore, the native species richness recorded from the residential development area lies in the bottom half of the recorded range for both FCTs.
	Presence of threatened taxa - Patch is critical habitat for, and hosts threatened taxa (10) - Patch is critical habitat for threatened taxa (5) - Patch is not critical habitat for threatened taxa (0)	10	The vegetation in the residential development area provides foraging habitat for *Zanda latirostris* (Carnaby's cockatoo) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which are listed as threatened under EPBC and BC Act. Evidence of foraging by both species was observed within the residential development area.
	Contains State listed TEC/PEC - Patch contains WA FCT listed as State TEC (20) - Patch contains a WA FCT listed as State PEC (10) - Patch does not contain a WA FCT listed as either TEC or PEC (0)	10	Part of the vegetation in the residential development area comprises FCT 21c which is a State listed PEC.
	Presence of dieback -Patch is dieback free (10) -Patch is partly dieback free (5) -Patch is dieback infested (0)	5	No formal dieback testing was undertaken and so the status of dieback within the site is unconfirmed. As a medium measure the site is assumed to be at least partially dieback free.
	Site condition total (out of 150)	61	
	Site condition score (site condition total / 150)*70	28.47	
Site context (30%)	- Patch is continuous with remnant vegetation and forms a corridor that links different landscape units (30) - Patch is continuous with remnant vegetation that forms a medium to large local remnant (20) - Patch is within 1 km of other medium to large remnants (10) - Patch is within 12 km of other significant remnants and contributes to support of significant avifauna (i.e. known Black Cockatoo Breeding sites are located within 12 km) (5) - Patch does not meet any of the above criteria (0)	10	The vegetation associated with the residential development area is isolated on the basis of roads separating it from larger patches of vegetation to the north and east and it does not link areas of vegetation or landscape units. The patch is within 1km of other medium to large remnants, including remnants likely to represent the banksia woodland TEC.
	Patch size - 20 hectares or more (50) - 10-20 hectares (40) - 5-10 hectares (30) - 2-5 hectares (20) - Less than 2 hectares (10)	50	The banksia woodland TEC within the residential development area forms part of a larger patch of the TEC which is over 20 ha in size.
	Site location and risk - Patch is located in an area where the TEC has been extensively cleared (10)	10	The banksia woodland TEC has been cleared extensively for residential development in the wider local area of the site.
	Site location and risk - Patch is located at the geographical edge of the recorded range (10)	0	The site is located relatively central within the distribution of the banksia woodland TEC.
	Site context total (out of 100)	70	
	Site context score (site context total / 100)*30	21	
	Site condition score + Site context score	49.47	
	Quality total (out of 10)	4.9	

Banksia woodland TEC habitat quality scoring framework (Woodman 2018)
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

	Habitat quality scoring framework	Score - Residential development area - adjusted	Explanation (site)
Site condition (70%)	**Vegetation condition (Keighery 1994**) -Pristine (100) -Excellent (80) -Very good (60) -Good (40) -Degraded (20) -Completely degraded (0)	49	6.687 ha (54%) in 'very good' condition, 4.699 ha (38%) in 'good' condition and 0.900 ha (7%) in degraded condition. Weighted score of 49 applied.
	Species richness - Average native species richness within top half of recorded range for the TEC (10) - Average native species richness within the bottom half of recorded range for the TEC (0)	0	The native species richness for floristic community type (FCT) 28 ranges from 23 to 80 species per 10x10 sample and from 31 to 54 for FCT 21c (Gibson 1994). An average of 34 native species were recorded from samples within FCT 28 and an average of 35 native species were recorded from samples within FCT 21c in the residential development area. Therefore, the native species richness recorded from the residential development area lies in the bottom half of the recorded range for both FCTs.
	Presence of threatened taxa - Patch is critical habitat for, and hosts threatened taxa (10) - Patch is critical habitat for threatened taxa (5) - Patch is not critical habitat for threatened taxa (0)	10	The vegetation in the residential development area provides foraging habitat for *Zanda latirostris* (Carnaby's cockatoo) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which are listed as threatened under EPBC and BC Act. Evidence of foraging by both species was observed within the residential development area.
	Contains State listed TEC/PEC - Patch contains WA FCT listed as State TEC (20) - Patch contains a WA FCT listed as State PEC (10) - Patch does not contain a WA FCT listed as either TEC or PEC (0)	10	Part of the vegetation in the residential development area comprises FCT 21c which is a State listed PEC.
	Presence of dieback -Patch is dieback free (10) -Patch is partly dieback free (5) -Patch is dieback infested (0)	5	No formal dieback testing was undertaken and so the status of dieback within the site is unconfirmed. As a medium measure the site is assumed to be at least partially dieback free.
	Site condition total (out of 150)	74	
	Site condition score (site condition total / 150)*70	34.53	
Site context (30%)	- Patch is continuous with remnant vegetation and forms a corridor that links different landscape units (30) - Patch is continuous with remnant vegetation that forms a medium to large local remnant (20) - Patch is within 1 km of other medium to large remnants (10) - Patch is within 12 km of other significant remnants and contributes to support of significant avifauna (i.e. known Black Cockatoo Breeding sites are located within 12 km) (5) - Patch does not meet any of the above criteria (0)	10	The vegetation associated with the residential development area is isolated on the basis of roads separating it from larger patches of vegetation to the north and east and it does not link areas of vegetation or landscape units. The patch is within 1km of other medium to large remnants, including remnants likely to represent the banksia woodland TEC.
	Patch size - 20 hectares or more (50) - 10-20 hectares (40) - 5-10 hectares (30) - 2-5 hectares (20) - Less than 2 hectares (10)	50	The banksia woodland TEC within the residential development area forms part of a larger patch of the TEC which is over 20 ha in size.
	Site location and risk - Patch is located in an area where the TEC has been extensively cleared (10)	10	The banksia woodland TEC has been cleared extensively for residential development in the wider local area of the site.
	Site location and risk - Patch is located at the geographical edge of the recorded range (10)	0	The site is located relatively central within the distribution of the banksia woodland TEC.
	Site context total (out of 100)	70	
	Site context score (site context total / 100)*30	21	
	Site condition score + Site context score	55.53	
	Quality total (out of 10)	5.6	

Appendix F

Habitat Quality Scores - Proposed Management Areas

Banksia woodland TEC habitat quality scoring framework (Woodman 2018)
Part Lot 802 Erindale Road, Lot 1 and Lot 803 Wanneroo Road, Hamersley

Habitat quality scoring framework		Management area and score											
		1	2	3	4	5	6	7	8	9	10	11	12
Site condition (70%)	**Vegetation condition (Keighery 1994**) -Pristine (100) -Excellent (80) -Very good (60) -Good (40) -Degraded (20) -Completely degraded (0)	20	20	40	21	0	40	19	20	40	0	0	0
	Species richness - Average native species richness within top half of recorded range for the TEC (10) - Average native species richness within the bottom half of recorded range for the TEC (0)	0	0	0	0	0	0	0	0	0	0	0	0
	Presence of threatened taxa - Patch is critical habitat for, and hosts threatened taxa (10) - Patch is critical habitat for threatened taxa (5) - Patch is not critical habitat for threatened taxa (0)	10	10	10	10	0	10	10	10	10	0	0	0
	Contains State listed TEC/PEC - Patch contains WA FCT listed as State TEC (20) - Patch contains a WA FCT listed as State PEC (10) - Patch does not contain a WA FCT listed as either TEC or PEC (0)	0	0	0	0	0	0	0	0	20	0	0	0
	Presence of dieback -Patch is dieback free (10) -Patch is partly dieback free (5) -Patch is dieback infested (0)	5	5	5	5	5	5	5	5	5	5	5	5
	Site condition total (out of 150)	35	35	55	36	5	55	34	35	75	5	5	5
	Site condition score (site condition total / 150)*70	16.33	16.33	25.67	16.80	2.33	25.67	15.87	16.33	35.00	2.33	2.33	2.33
Site context (30%)	- Patch is continuous with remnant vegetation and forms a corridor that links different landscape units (30) - Patch is continuous with remnant vegetation that forms a medium to large local remnant (20) - Patch is within 1 km of other medium to large remnants (10) - Patch is within 12 km of other significant remnants and contributes to support of significant avifauna (i.e. known Black Cockatoo Breeding sites are located within 12 km) (5) - Patch does not meet any of the above criteria (0)	10	10	10	10	10	10	10	10	10	10	10	10
	Patch size - 20 hectares or more (50) - 10-20 hectares (40) - 5-10 hectares (30) - 2-5 hectares (20) - Less than 2 hectares (10)	50	50	50	50	50	50	50	50	50	50	50	50
	Site location and risk - Patch is located in an area where the TEC has been extensively cleared (10)	10	10	10	10	10	10	10	10	10	10	10	10
	Site location and risk - Patch is located at the geographical edge of the recorded range (10)	0	0	0	0	0	0	0	0	0	0	0	0
	Site context total (out of 100)	70	70	70	70	70	70	70	70	70	70	70	70
	Site context score (site context total / 100)*30	21	21	21	21	21	21	21	21	21	21	21	21
	Site condition score + Site context score	37.33	37.33	46.67	37.80	23.33	46.67	36.87	37.33	56.00	23.33	23.33	23.33
	Quality total (out of 10)	3.7	3.7	4.7	3.8	2.3	4.7	3.7	3.7	5.6	2.3	2.3	2.3