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Emerge contact: Tom Atkinson

30 January 2020

Attention: Jake Hickey
Alkina Holdings Pty Ltd
50 Clune Street
Bayswater WA 6053

Delivered by email to: jake@instantwaste.com.au

Dear Jake,

BLACK COCKATOO HABITAT TREE ASSESSMENT – PART LOTS 3060, 4689 AND 29259 GREAT SOUTHERN HIGHWAY, SAINT RONANS

Alkina Holdings Pty Ltd intends to develop the Great Southern Landfill project within part of Lots 4869, 47883 and 29259 Great Southern Highway and a portion of Great Southern Highway classified as 'road' in Saint Ronans. These lots are located approximately 80 kilometres (km) east of the Perth Central Business District within the Shire of York and are zoned 'general agriculture', 'recreation and open space' and 'road' under the Shire of York *Local Planning Scheme No. 2*.

The portions of these lots applicable to the project extend over approximately 163.46 hectares (ha) in size and are referred to herein as 'the site'. Great Southern Highway passes through the northern portion of the site, Wandoo National Park lies to the west of the site and rural land surrounds the remainder of the site. The location and extent of the site is shown in **Figure 1.**

The proposed development will occur within a development footprint as shown in **Figure 2**. This footprint is smaller than the site boundary of this assessment.

Planning context

The Environmental Protection Authority (EPA) has decided to assess the project at the level of public environmental review and identified in the associated 'environmental scoping document' (ESD) published on the 29 August 2019 a potential for impact to 'terrestrial fauna' and 'flora and vegetation' factors. Specifically, that:

- '*clearing of native vegetation may impact on habitat for Carnaby's, Baudin's and forest red-tailed black cockatoos*' and
- '*the operation of the landfill may attract feral animals to the area, which in turn may impact on the native fauna that reside in the surrounding conservation reserves*'.

Black cockatoos are also protected under the *Environmental Protection and Biodiversity Conservation Act* (EPBC Act). The development proposal for the site was previously referred under the EPBC Act in July 2013 and it was determined to be a 'not controlled action'. Given the proposal remains the same there is no obligations for further assessment under the EPBC Act.

Purpose and scope of work

Emerge Associates (Emerge) were engaged by Alkina Holdings Pty Ltd to provide environmental consultancy services to support the EPA approval process for the site. The purpose of this survey is to provide an update to existing black cockatoo survey data to inform this process.

The scope of work was specifically to:

- inspect tree hollows that were identified in previous surveys
- conduct a targeted survey of black cockatoo habit trees and tree hollows not covered by previous surveys
- determine the extent of black cockatoo habitat trees[1] (HT) that are located within the development footprint.

Previous surveys

Two previous fauna surveys that are known to have been completed over portions of the site:

- *Technical Memorandum, tree survey to support native vegetation clearing permit application for the proposed Great Southern Landfill* (Golder Associates 2018)
- *Alluwuna Landfill Vegetation and Fauna Assessment* (ENV Australia 2012)
- *Flora, Vegetation and Fauna Assessment, Allawuna Roadside* (ENV Australia 2013).

Foraging, roosting and breeding habitat for species of black cockatoo was identified within the respective survey areas of these surveys.

Targeted black cockatoo breeding habitat assessment

Methodology

Environmental consultants from Emerge and Zootopia visited the site on 26 August, 23 and 26 September, 12 October 2019 and 24 January 2020 to conduct a targeted black cockatoo breeding habitat assessment.

All hollows in previously identified HTs (ENV Australia 2012, 2013; Golder 2018) were examined using a drone or pole mounted camera. The site was also searched for additional HTs due to the varying extent of the previous surveys and the current assessment. Hollows that were deemed potentially suitable from the ground based on the criteria outlined below were then assessed further using a drone or pole mounted camera to confirm the hollows' internal dimensions and suitability for breeding by black cockatoos.

HTs were individually assessed against attributes outlined in **Table 1** below. HTs were deemed as potentially suitable for use by breeding black cockatoos if the opening diameter was ≥10 cm (Groom 2010) and if the hollow was located in a trunk or branch that is generally large enough to support a mature black cockatoo.

Active searches were conducted for secondary evidence of breeding and roosting activity such as chew marks, droppings, branch clippings, foraging evidence or moulted feathers.

The location of HTs recorded in the site and information on hollows (if present) were mapped on aerial imagery. The data for each HT was compiled in a table format.

[1] Native *Eucalyptus* and *Corymbia* species with a diameter at breast height (DBH) ≥50 cm

Table 1: Attributes recorded as part of the black cockatoo habitat tree (HT) assessment

Attribute	Description
Image	Each HT was individually photographed.
GPS location	The location of each HT was recorded using a handheld GPS unit.
Tree species	Species and common name were identified.
Diameter at breast height (cm)	Each HT was measured using a diameter tape.
Tree height (m)	The height of each HT was estimated.
Hollow information	If observed, hollows were noted and photographed.
Entrance information	The hollow entrance diameter was estimated and the entry position noted (e.g. top-entry or side-entry).
Hollow orientation	The orientation of hollows was recorded (vertical, near-vertical, non-vertical).
Signs of use of hollows	Signs of use of hollows by black cockatoos or other species were noted.

Results

The site is located within the known distribution range of *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) and within the known distribution and breeding range of *Calyptorhynchus latirostris* (Carnaby's cockatoo). However, the site is located outside of the known distribution and breeding range of *Calyptorhynchus baudinii* (Baudin's Cockatoo) and it is therefore considered unlikely that this species would breed within the site. Foraging evidence attributed to forest red-tailed black cockatoo was observed within the site.

A total of 633 HTs were recorded within the site as shown in **Table 2**.

Three of the HTs were deemed to each contain one hollow suitable for breeding by Carnaby's cockatoo or forest red-tailed black cockatoo, based on entrance size and confirmed internal dimensions. One of these hollows was also observed to have signs of use (chew marks) around the entrance. However, this hollow appeared to be occupied by *Cacatua roseicapilla* (galahs) and the chew marks were attributed to this species. No signs of use were observed within the other two hollows.

Three of the HTs were considered to contain potentially suitable nesting hollows due to their apparent size as observed from the ground. These trees are located within the Great Southern Highway road reserve and therefore their hollows could not be inspected internally due to safety concerns. Further investigation would be required to confirm the internal dimensions of these hollows.

Twenty-two of the HTs contained unsuitable hollows and the remaining 605 HTs did not contain hollows. The location of HTs within the site is shown in **Figure 2** and data for each HT is provided as **Attachment 1**.

Table 2: Number of habitat trees (HT) recorded within the site

	Total number of HTs	HTs with suitable hollows	HTs with potentially suitable hollows requiring further investigation	HTs with unsuitable hollows	HTs with no hollows
Previous surveys (ENV Australia 2012, 2013; Golder Associates 2018)	266	1	0	9	256
Emerge (2020)	367	2	3	13	349
Total within the site	**633**	**3**	**3**	**22**	**605**

Of the 633 HTs within the site, 331 are located within the development footprint as shown in **Table 3** and **Figure 2**. No trees with suitable or potentially suitable hollows lie within the development footprint. Thirteen of the 331 trees contained unsuitable hollows and the remaining 318 did not contain hollows.

Table 3: Number of habitat trees (HT) recorded within the development footprint

	Total number of HTs	HTs with suitable hollows	HTs with potentially suitable hollows requiring further investigation	HTs with unsuitable hollows	HTs with no hollows
Previous surveys (ENV Australia 2012, 2013; Golder Associates 2018)	229	0	0	7	222
Emerge (2020)	102	0	0	6	96
Total within the development footprint	**331**	**0**	**0**	**13**	**318**

A number of large trees within the site have the potential to provide roosting habitat for black cockatoos. However, no evidence of recent or historical roosting activity within the site was observed during the survey.

Conclusions

The site contains 633 habitat trees of which three contain hollows suitable for nesting by species of black cockatoo and three contain potentially suitable nesting hollows requiring further investigation. Given that the site lies within the known distribution range of forest red-tailed black cockatoo and within the known distribution and breeding range of Carnaby's cockatoo, the site is considered to provide potential breeding habitat for these species.

A total of 331 habitat trees, lie within the development footprint. None of these habitat trees contain hollows suitable for nesting by species of black cockatoo.

No evidence of recent or historical black cockatoo roosting activity was observed within the site.

Summary and closing

We trust that this letter provides you with sufficient information regarding black cockatoo breeding habitat within the site.

If you have any questions or require further information, please do not hesitate to contact the undersigned.

Yours sincerely

Emerge Associates

Tom Atkinson
SENIOR ENVIRONMENTAL CONSULTANT

cc: nil

Encl: Figure 1: Site Location
Figure 2: Black Cockatoo Habitat Trees
Attachment 1: Black Cockatoo Habitat Tree Data

General References

ENV Australia 2012, *Allawuna Landfill Vegetation and Fauna Assessment*, J112235-001, Final.

ENV Australia 2013, *Flora, Vegetation and Fauna Assessment, Allawuna Roadside*, J114490-001, Final.

G. A. P. Ltd (Golder) 2018, *Lots 21 and 22 - The Peninsula: Details of Proposed Surcharging Works*. 1784151-009-R, Rev 0.

Golder Associates 2018, *Technical Memorandum - Tree survey to support vegetation clearing permit application for the proposed Great Southern Landfill*.

Groom, C. 2010, *Artificial Hollows for Carnaby's Black Cockatoo: An investigation of the placement, use, monitoring and maintenance requirements of artificial hollows for Carnaby's black cockatoo*, Department of Environment and Conservation, Perth.

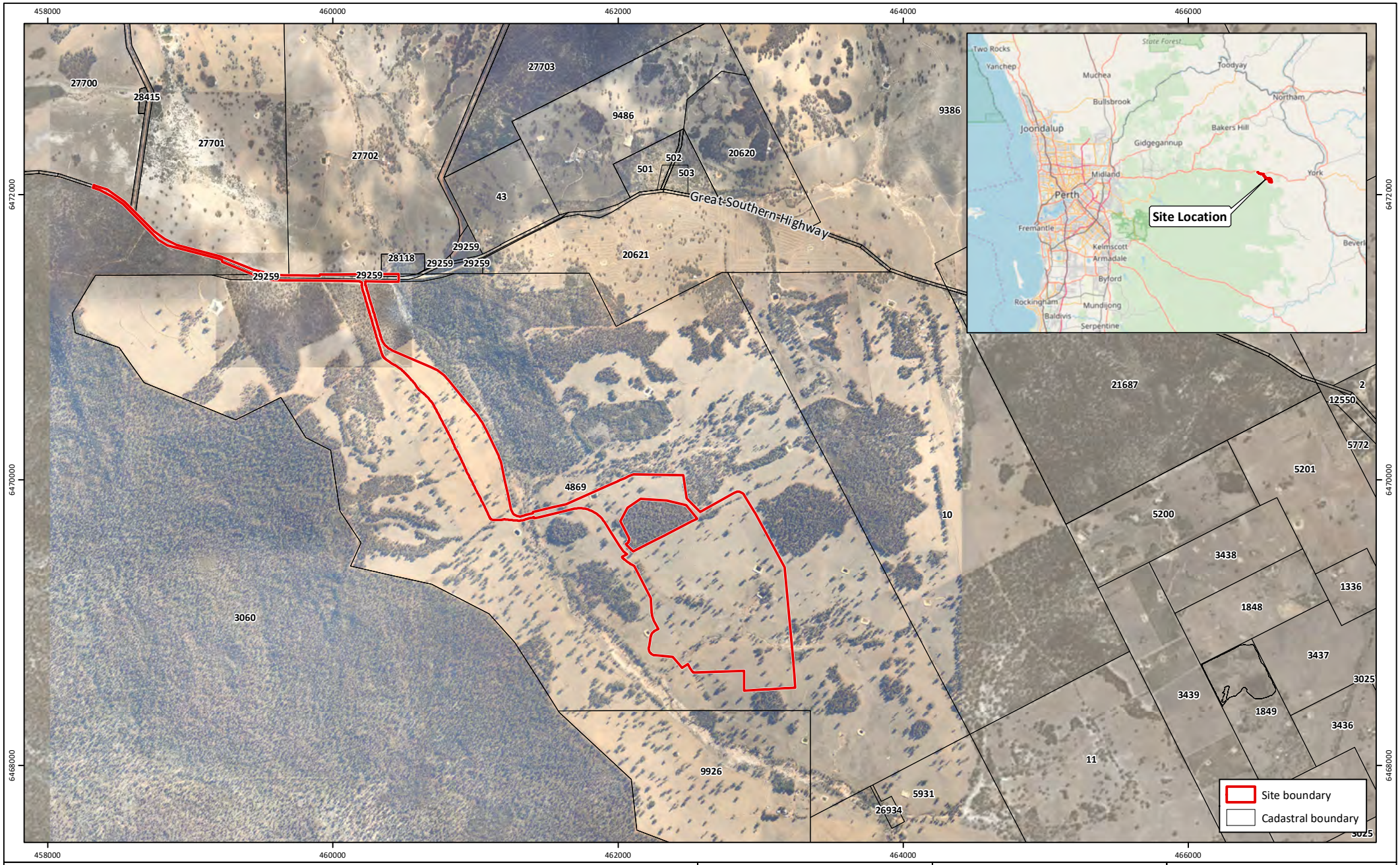

Figure 1: Site Location

Project: Black Cockatoo Habitat Tree Assessment
Part Lots 4869, 9926, 26934 and 5931 Great Southern Highway, Saint Ronans

Client: Alkina Holdings Pty Ltd

Plan Number:
EP19-091(02)--F12a

Drawn:	GAR
Date:	29/01/2020
Checked:	RAW
Approved:	ALB
Date:	29/01/2020

N

0 500 1,000
Metres

Scale: 1:35,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

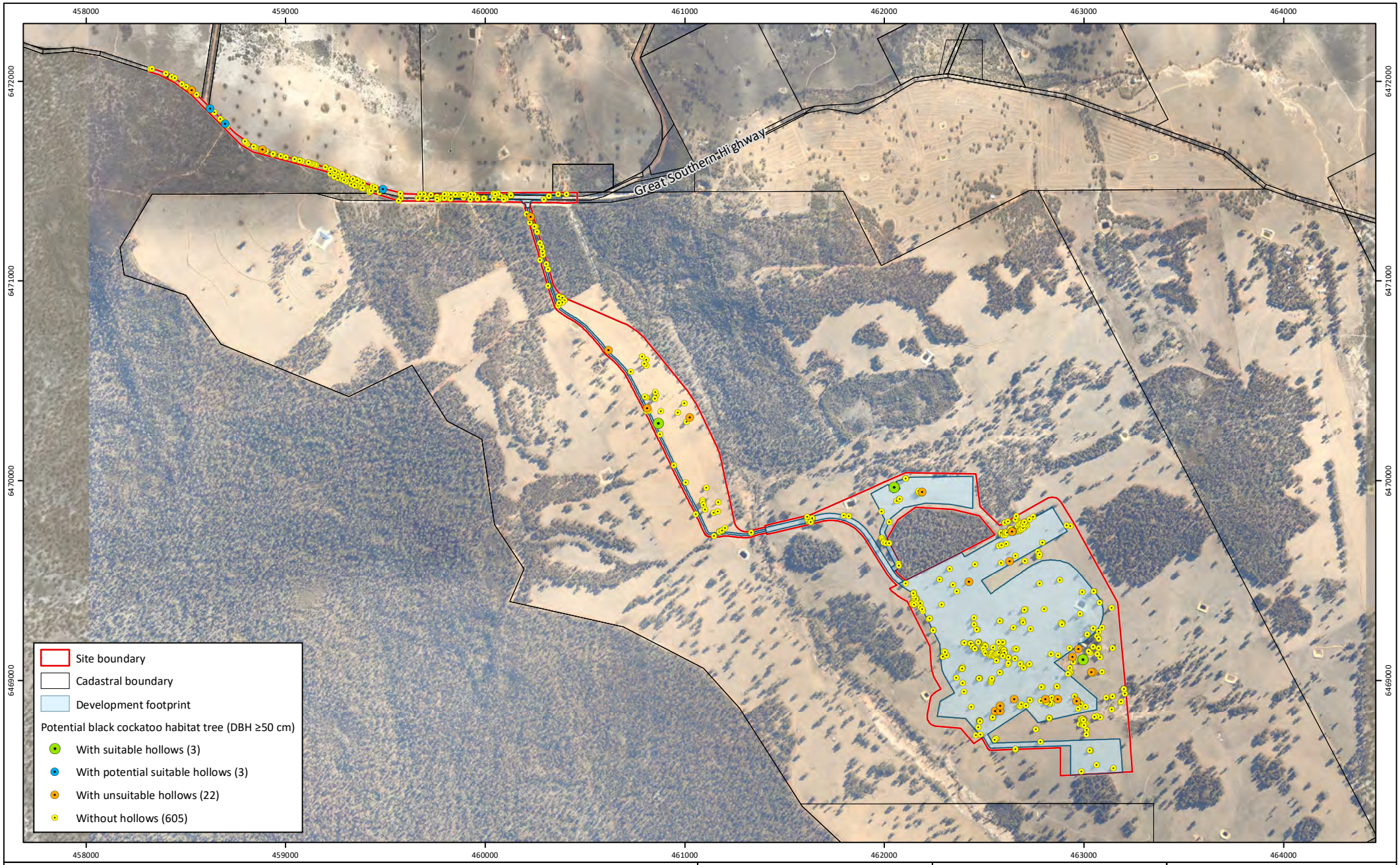

Figure 2: Potential Black Cockatoo Habitat Trees

Project: Black Cockatoo Habitat Tree Assessment
Part Lots 4869, 9926, 26934 and 5931 Great Southern Highway, Saint Ronans

Client: Alkina Holdings Pty Ltd

Plan Number:
EP19-091(02)--F13b

Drawn:	GAR
Date:	29/01/2020
Checked:	RAW
Approved:	ALB
Date:	29/01/2020

N

0 250 500 750
Metres

Scale: 1:25,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Potential Black Cockatoo Habitat Tree Inventory - Part Lots 3060, 4869 and 29259 Great Northern Highway , Saint Ronans

Survey	Tree ID	Easting	Northing	DBH (cm)	Species	General notes	Number of potential hollows	No of suitable hollows	Hollow inspection notes
Emerge 2020	61	459994	6471415	41	Eucalyptus wandoo		1	0	Potential small hollow with an entrance size of less than 10 cm.
Emerge 2020	93	459329	6471486	62	Corymbia calophylla		1	0	Potential small hollow with an entrance size of less than 10 cm.
Emerge 2020	130	460619	6470654	155	Corymbia calophylla		2	0	Identified hollow (horizontal branch) is unsuitbale for black cockatoos (diameter too small and unfavourable orientation)
Emerge 2020	135	460229	6471322	117	Corymbia calophylla		2	0	Examined with drone - Two hollows - side entry and chimney - appear too small internaly. Side entry hollow contained at least 3 eggs - 28s?.
Emerge 2020	138	460813	6470365	78	Corymbia calophylla		2	0	Branch diameters too small to accommodate black cockatoo. Hollow not inspected.
Emerge 2020	147	461027	6470318	105	Corymbia calophylla		2	0	This tree contains no hollows that were considered suitable for black cockatoos. Hollow entrances small or marginal and accomodating branches too small.
Emerge 2020	149	460869	6470288	99	Corymbia calophylla		1	1	Well chewed side entry hollow - most likely occpupied by galahs but can not entirely be discounted as being suitable for black cockatoos
Emerge 2020	192	462191	6469943	92	Corymbia calophylla		1	0	This tree has been burnt and is now only about 3m high - no suitable hollows
Emerge 2020	201	462051	6469967	92	Stag		1	1	Examined with drone - Multiple small hollows. One possible large hollow (spout) but no signs of use

Potential Black Cockatoo Habitat Tree Inventory - Part Lots 3060, 4869 and 29259 Great Northern Highway , Saint Ronans

Survey	Tree ID	Easting	Northing	DBH (cm)	Species	General notes	Number of potential hollows	No of suitable hollows	Hollow inspection notes
Emerge 2020	221	462425	6469496	41	Eucalyptus wandoo		2	0	Accomodating branch diameter too small. Internal dimensions not inspected.
Emerge 2020	796	462700	6469781	30	Eucalyptus wandoo		2	0	This tree contains no hollows that were considered suitable for black cockatoos. Hollow entrances small or marginal and accomodating branches too small.
Emerge 2020	803	462641	6469744	54	Eucalyptus wandoo		1	0	Inspected with pole camera. Entrance size is of suitable size but the internal base diameter is too small to support black cockatoos.
Emerge 2020	819	459450	6471471	32	Eucalyptus wandoo		2	0	Apparent top entry - examined with pole camera - too shallow/open - unsuitable.
Emerge 2020	843	458887	6471658	56	Eucalyptus wandoo		1	0	Potential small hollow with an entrance size of less than 10 cm.
Emerge 2020	1314	462628	6469599	63	Eucalyptus wandoo		1	0	Potential small hollow with an entrance size of less than 10 cm. Does not appear to be deep enough.
Emerge 2020	1320	463048	6469042	45	Eucalyptus wandoo		1	0	Potential small hollow with an entrance size of less than 10 cm.
Emerge 2020	1321	463038	6469042	51	Eucalyptus wandoo		1	0	Potential small hollow with an entrance size of less than 10 cm.
Emerge 2020	1378	462643	6469745	71	Eucalyptus wandoo		1	0	Inspected with pole camera. Entrance size is of suitable size but the internal base diameter is too small to support black cockatoos.

Potential Black Cockatoo Habitat Tree Inventory - Part Lots 3060, 4869 and 29259 Great Northern Highway , Saint Ronans

Survey	Tree ID	Easting	Northing	DBH (cm)	Species	General notes	Number of potential hollows	No of suitable hollows	Hollow inspection notes
Emerge 2020	1403	459488	6471461	130	Corymbia calophylla		2	N/A	No internal inspection undertaken due to close proximity to Great Southern Highway (safety concern). Appears potentially suitable from the ground but requires confirmation.
Emerge 2020	1421	458698	6471788	68	Eucalyptus wandoo		1	N/A	No internal inspection undertaken due to close proximity to Great Southern Highway (safety concern). Appears potentially suitable from the ground but requires confirmation.
Emerge 2020	1426	458623	6471861	75	Eucalyptus wandoo		1	N/A	No internal inspection undertaken due to close proximity to Great Southern Highway (safety concern). Appears potentially suitable from the ground but requires confirmation.
Emerge 2020	1429	458529	6471956	65	Eucalyptus wandoo		1	0	Potential small hollow with an entrance size of less than 10 cm.
ENV 2012	53	462974	6469158	132	Stag		10	0	This tree contains no hollows that were considered suitable for black cockatoos. Hollow entrances small or marginal and accomodating branches too small.
ENV 2012	71	462996	6469106	65	Eucalyptus wandoo		1	1	Dead wandoo next to live tree. Large side entry hollowinto upper trunk. Appears potentially suitable but no signs of use.

Potential Black Cockatoo Habitat Tree Inventory - Part Lots 3060, 4869 and 29259 Great Northern Highway , Saint Ronans

Survey	Tree ID	Easting	Northing	DBH (cm)	Species	General notes	Number of potential hollows	No of suitable hollows	Hollow inspection notes
ENV 2012	72	462944	6469119	90	Eucalyptus wandoo		1	0	This tree contains no hollows that were considered suitable for black cockatoos. Hollow entrances small or marginal and accomodating branches too small.
ENV 2012	82	462557	6468847	160	Eucalyptus wandoo		8	0	This tree contains no hollows that were considered suitable for black cockatoos. Hollow entrances small or marginal and accomodating branches too small.
ENV 2012	85	462581	6468847	86	Stag		2	0	Apparent top entry - examined with pole camera - too shallow/open - unsuitable.
ENV 2012	86	462581	6468873	75	Eucalyptus wandoo		8	0	This tree contains no hollows that were considered suitable for black cockatoos. Hollow entrances small or marginal and accomodating branches too small.
ENV 2012	87	462651	6468907	89	Stag		2	0	Examined with drone - This tree has two large spouts - both appear to be unsuitable as the accommodating branches appear too small in diameter.
ENV 2012	96	462870	6468907	63	Stag		2	0	This tree contains no hollows that were considered suitable for black cockatoos. Hollow entrances small or marginal and accomodating branches too small.

Potential Black Cockatoo Habitat Tree Inventory - Part Lots 3060, 4869 and 29259 Great Northern Highway , Saint Ronans

Survey	Tree ID	Easting	Northing	DBH (cm)	Species	General notes	Number of potential hollows	No of suitable hollows	Hollow inspection notes
ENV 2012	100	462965	6468897	72	Stag		1	0	Examined with drone - One upward facing spout appeared potentially suitable but accommodating branch appears too small in diameter.
Golder 2018	D08	462809	6468908	111	Unknown		1	0	Examined with drone - possible top entry hollows too small in diameter to accommodate a black cockatoo
Golder 2018	D11a	462967	6468899	45	Unknown	6 tree cluster, possible hollow on large dead tree	1	0	In a close group of 6 that includes Tree 100 previoulsy idnetified by ENV. The tree does not appear to contain hollows suitable for black cokatoos to use for nesting.
Golder 2018	D11b	462967	6468899	65	Unknown	6 tree cluster, possible hollow on large dead tree	0	0	In a close group of 6 that includes Tree 100 previoulsy idnetified by ENV. The tree does not appear to contain hollows suitable for black cokatoos to use for nesting.
Golder 2018	D11c	462967	6468899	54	Unknown	6 tree cluster, possible hollow on large dead tree	0	0	In a close group of 6 that includes Tree 100 previoulsy idnetified by ENV. The tree does not appear to contain hollows suitable for black cokatoos to use for nesting.
Golder 2018	D11d	462967	6468899	43	Unknown	6 tree cluster, possible hollow on large dead tree	0	0	In a close group of 6 that includes Tree 100 previoulsy idnetified by ENV. The tree does not appear to contain hollows suitable for black cokatoos to use for nesting.

Potential Black Cockatoo Habitat Tree Inventory - Part Lots 3060, 4869 and 29259 Great Northern Highway , Saint Ronans

Survey	Tree ID	Easting	Northing	DBH (cm)	Species	General notes	Number of potential hollows	No of suitable hollows	Hollow inspection notes
Golder 2018	D11e	462967	6468899	63	Unknown	6 tree cluster, possible hollow on large dead tree	0	0	In a close group of 6 that includes Tree 100 previoulsy idnetified by ENV. The tree does not appear to contain hollows suitable for black cokatoos to use for nesting.
Golder 2018	D11f	462967	6468899	67	Unknown	6 tree cluster, possible hollow on large dead tree	0	0	In a close group of 6 that includes Tree 100 previoulsy idnetified by ENV. The tree does not appear to contain hollows suitable for black cokatoos to use for nesting.