APPENDIX 10. KLEINFELDER ECOLOGICAL INSPECTION LETTERS

Kleinfelder Australia Pty Ltd
95 Mitchell Road
CARDIFF NSW 2285
T| +61 2 4949 5200
www.kleinfelder.com.au
ABN: 23 146 082 500
NEWCASTLE OFFICE

22 June 2020

File Ref: NCA20L112874
Document Ref: NCA20L112874

Quarry Manager
Newcastle Sand
398 Cabbage Tree Road
Williamtown, NSW 2318

Attention: Paul Bourne
Delivered by email: paul@newcastlesand.com.au

Subject: Sector 1a and Sector 2 Pre-clearance Survey

Assessment

On June 12, 2020 a Kleinfelder ecologist, Ben Stewart, conducted a pre-clearance assessment within sector 1a and sector 2 (referred to as the resource area) of the Newcastle Sand Resource Quarry at Williamtown, NSW (**Figure 1**). The resource area consists of approximately 4.5 ha of a dry sclerophyll sand community with the upper stratum dominated by *Corymbia gummifera* (Red Bloodwood), *Angophora costata* (Smooth-bark Apple) and *Banksia serrata* (Old Man Banksia) with a moderately dense ground cover. At the time of assessment, the area was recovering from the effects of fire.

The resource area was assessed for habitat trees (hollow-bearing trees, dead stags containing hollows and trees containing nests), hollowed logs and the presence and abundance of exotic weed species. The location of these features and the survey effort were recorded during the assessment (**Figure 2**). Pink chalk paint was used to conspicuously mark a “H” on the trunk of habitat trees (**Plate 1**). Pink flagging tape was used in conjunction with the chalk paint to aid in visual identification of habitat trees where the painted “H” was obscured by epicormic growth or shrubs. Any habitat trees located within three (3) metres of the resource boundary were marked appropriately to avoid impact during the construction phase.

A total of 25 hollow-bearing trees, 21 dead stag trees containing hollows and one (1) hollowed log were recorded during the assessment (**Table 1**). No stick nests were observed within the resource area or observed within three (3) metres of the resource boundary. The majority of the habitat trees were observed to have no obvious signs of fauna use. Only three (3) habitat trees were observed to have signs of fauna use, which included fresh scratches on the trunk or 'chew marks' (typical of arboreal mammals such as Sugar Gliders and Squirrel Gliders (**Plate 2**)). Additionally, numerous non-habitat trees (trees without hollows) within the resource area contained 'chew marks' on their trunks.

A total of four (4) exotic weed species were identified during the assessment. These included:

- *Megathyrsus maximus* (Guinea Grass)
- *Cyperus aggregatus*
- *Sida rhombifolia* (Paddy's Lucerne)
- *Axonopus fissifolius* (Narrow-leafed Carpet Grass).

Exotic weed species were confined to previously disturbed areas i.e. cleared tracks where they were observed in low concentrations. Weeds consisted of scattered individuals or small patches up to approximately 6m^2 in area.

Limitations

Every effort was made to record habitat features as accurately as possible during the assessment. Habitat features such as the number of hollows, height of hollows above the ground, width at the hollow entrance and a hollow's suitability for threatened species e.g. Squirrel Glider are determined from ground-based surveys. The effects of fire (charred limbs and bark) affected depth perception (when viewing hollows through binoculars) which made it difficult to determining a hollow from a shallow cut-out of a knot or snapped branch.

Recommendations

As per Section 6.14 of the Biodiversity and Rehabilitation Management Plan (Kleinfelder, 2020), hollows are to be replaced at a rate of 1:1 and installed in adjacent vegetation prior to the clearing of the vegetation in the surveyed areas. Due to the low abundance of exotic weeds within the resource area, it is not necessary to separate topsoil containing weeds from uncontaminated topsoil.

For any further questions, please do not hesitate to contact me.

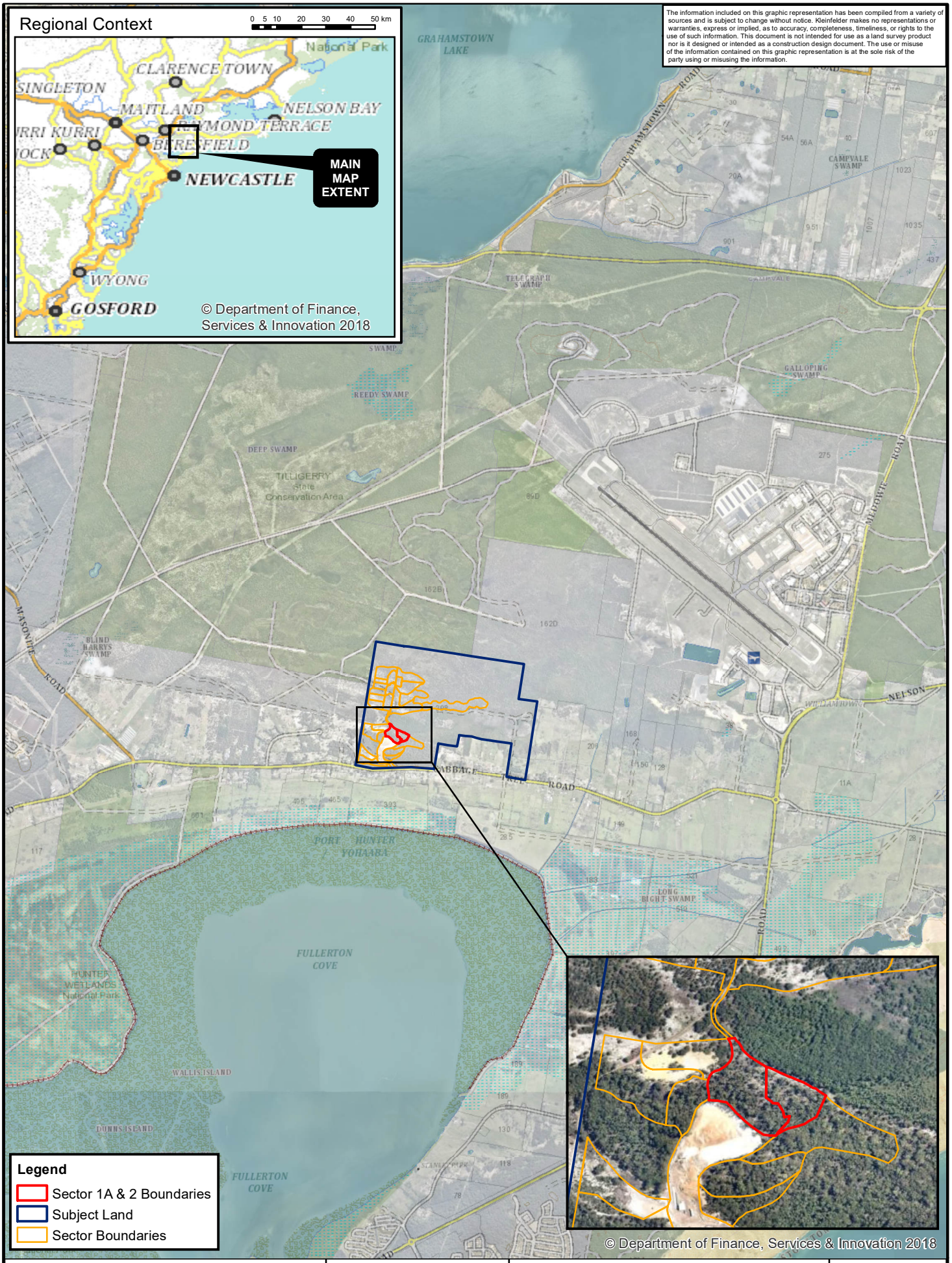
Sincerely,

Kleinfelder Australia Pty Ltd

Ben Stewart MMsc & Mgmt

Ecologist
Email: BSStewart@kleinfelder.com

Mobile: 0427 487 991



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PROJECT REFERENCE: 20210768

DATE DRAWN: 2020/06/16 09:18 Version 1

DRAWN BY: GJoyce

DATA SOURCE:
NSW DFSI - 2018
Nearmap - 2020

Locality

Trustee for WSS
Pre-Clear Survey - Sectors 1A & 2
June 2020

FIGURE:

1

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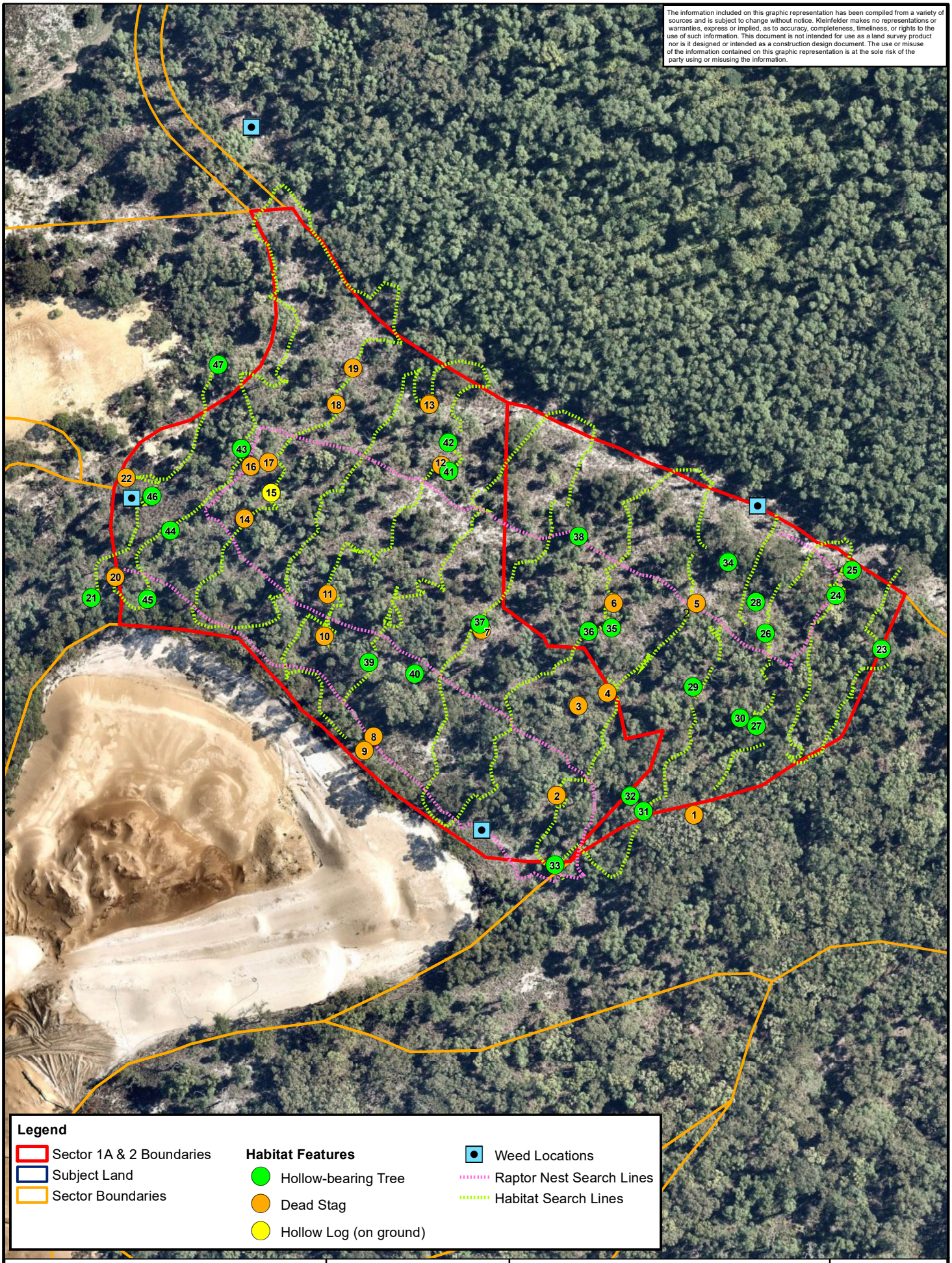

Metres
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PROJECT REFERENCE: 20210768

DATE DRAWN: 2020/06/16 09:38 Version 1

DRAWN BY: GJoyce

DATA SOURCE:
NSW DFSI - 2018
Nearmap - 2020

Survey Effort, Habitat Features and Weed Locations

Trustee for WSS
Pre-Clear Survey - Sectors 1A & 2
June 2020

FIGURE:

2

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Table 1: Habitat tree census before clearing within sector 1a and sector 2.

Location			Tree Description	Habitat Features		Size of Hollow Entrance (cm)			Squirrel Glider Suitability	Signs of Use
Map Ref.	Easting	Northing	Species	Hollow type	Number of hollows	0-5	5-20	>20	Yes / No	Yes / No
1	387921	6368975	Dead Stag	Upright	1	-	-	-	No	No
2	387879	6368981	Dead Stag	Branch	1		1		No	No
3	387886	6369009	Dead Stag	Upright	1	1			No	No
4	387895	6369013	Dead Stag	Branch	2	-	-	-	No	No
5	387922	6369040	Dead Stag	Branch	2	-	-	-	No	No
6	387897	6369040	Dead Stag	Branch	2		2		No	No
7	387857	6369032	Dead Stag	Upright	3		2	1	No	No
8	387823	6368999	Dead Stag	Upright	1		1		No	No
9	387821	6368995	Dead Stag	Upright	2		1		No	No
10	387809	6369030	Dead Stag	Branch	1	-	-	-	No	No
11	387810	6369043	Dead Stag	Upright	1		1		No	Yes
12	387844	6369082	Dead Stag	Branch	2		2		No	No
13	387841	6369101	Dead Stag	Branch	3		3		No	No
14	387784	6369066	Dead Stag	Branch	1		1		No	No
15	387792	6369074	Log	-	1	-	-	-	No	No
16	387786	6369082	Dead Stag	-	2	1	1		No	No

Location			Tree Description	Habitat Features		Size of Hollow Entrance (cm)			Squirrel Glider Suitability	Signs of Use
Map Ref.	Easting	Northing	Species	Hollow type	Number of hollows	0-5	5-20	>20	Yes / No	Yes / No
17	387792	6369083	Dead Stag	-	2	2			No	No
18	387812	6369101	Dead Stag	-	1		1		No	No
19	387817	6369112	Dead Stag	-	3	3			No	No
20	387745	6369048	Dead Stag	Fissure	1	1			No	No
21	387737	6369042	*A. costata*	Trunk	3	-	-	-	No	No
22	387748	6369078	Dead Stag	Upright	1			1	No	No
23	387979	6369026	*A. costata*	Branch	3	1	2		No	No
24	387965	6369042	*C. gummifera*	Branch	1		1		No	No
25	387970	6369050	*C. gummifera*	Branch	1		1		No	No
26	387943	6369031	*C. gummifera*	Branch	1		1		No	No
27	387940	6369003	*A. costata*	Trunk	1		1		No	No
28	387940	6369040	*C. gummifera*	Branch	1		1		No	No
29	387921	6369014	*C. gummifera*	Trunk	4		4		No	No
30	387935	6369005	*A. costata*	Branch	1		1		No	No
31	387906	6368976	*A. costata*	Branch	1	1			No	No
32	387902	6368981	*C. gummifera*	Branch	1	1			No	No
33	387879	6368960	*A. costata*	Branch	2		2		No	No

Location			Tree Description	Habitat Features		Size of Hollow Entrance (cm)			Squirrel Glider Suitability	Signs of Use
Map Ref.	Easting	Northing	Species	Hollow type	Number of hollows	0-5	5-20	>20	Yes / No	Yes / No
34	387932	6369052	-	Branch	2		2		Possible	No
35	387896	6369032	*C. gummifera*	Branch	2		2		No	No
36	387889	6369031	*C. gummifera*	Branch	1		1		No	No
37	387856	6369034	*A. costata*	Trunk	2		2		No	Yes
38	387886	6369060	*A. costata*	Branch	2		2		Possible	Yes
39	387822	6369022	*A. costata*	Branch	1	1			Possible	No
40	387836	6369019	*C. gummifera*	Branch	1		1		No	No
41	387847	6369080	*A. costata*	Crack/Fissure	1			1	No	No
42	387846	6369089	*C. gummifera*	Branch	1		1		Yes	No
43	387783	6369087	*C. gummifera*	Branch	2	1	1		No	No
44	387762	6369062	*C. gummifera*	Branch	2		2		Possible	No
45	387755	6369041	*A. costata*	Branch	2		2		No	No
46	387756	6369073	*C. gummifera*	Branch	1	1			No	No
47	387776	6369113	*C. gummifera*	Branch	1	1			Yes	No
Total Hollows					25	7	16	2		

Note: Eastings and Northings pertain to map reference GDA 94 MGA 56.

Plate 1 **Pink “H” marked on habitat trees for visual identification.**

Plate 2 **Horizontal ‘chew marks’ typical of arboreal mammals such as gliders.**

Kleinfelder Australia Pty Ltd
95 Mitchell Road
CARDIFF NSW 2285
T| +61 2 4949 5200
www.kleinfelder.com.au
ABN: 23 146 082 500
NEWCASTLE OFFICE

10 July 2020

File Ref: NCA20L113893
Document Ref: NCA20L113893

Quarry Manager
Newcastle Sand
398 Cabbage Tree Road
Williamtown, NSW 2318

Attention: Paul Bourne
Delivered by email: paul@newcastlesand.com.au

Subject: **Newcastle Sand Nest box Pre-installation Survey**

Background

Kleinfelder previously conducted a hollow-bearing tree survey within resource areas 1a and 2 which require the removal of vegetation. Twenty-five (25) hollows were identified for replacement during the survey. Their location, height above the ground, width at opening and suitability for threatened species i.e. Squirrel Glider were recorded. Nest boxes are to be installed at a 1:1 ratio of hollows removed pursuant to Section 6.14 of the Biodiversity and Rehabilitation Management Plan (BRMP). The BRMP also states that nest boxes should be installed to face away from the resource areas and to have a southerly aspect if possible.

Assessment

On July 10, 2020, a Kleinfelder ecologist, Ben Stewart, conducted a nest box pre-installation survey within two retained vegetation areas adjacent to the resource areas 1a and 2. Eleven (11) nest box locations were chosen within the retained vegetation to the south-west of resource areas, and fourteen (14) nest box locations were chosen within the retained vegetation to the north of resource areas (**Figure 1**). For each nest box location, the tree species, diameter at breast height (DBH), nest box number, aspect, install height and nest box size was recorded (**Table 1**).

Limitations and Recommendations

Nest box locations were spread through the retained vegetation areas as best as possible. Recommended installation heights and corresponding aspect was determined from the ground and may change slightly during installation. Recommended nest box aspects were chosen to typically face away from the resource area where appropriate and to face south where appropriate.

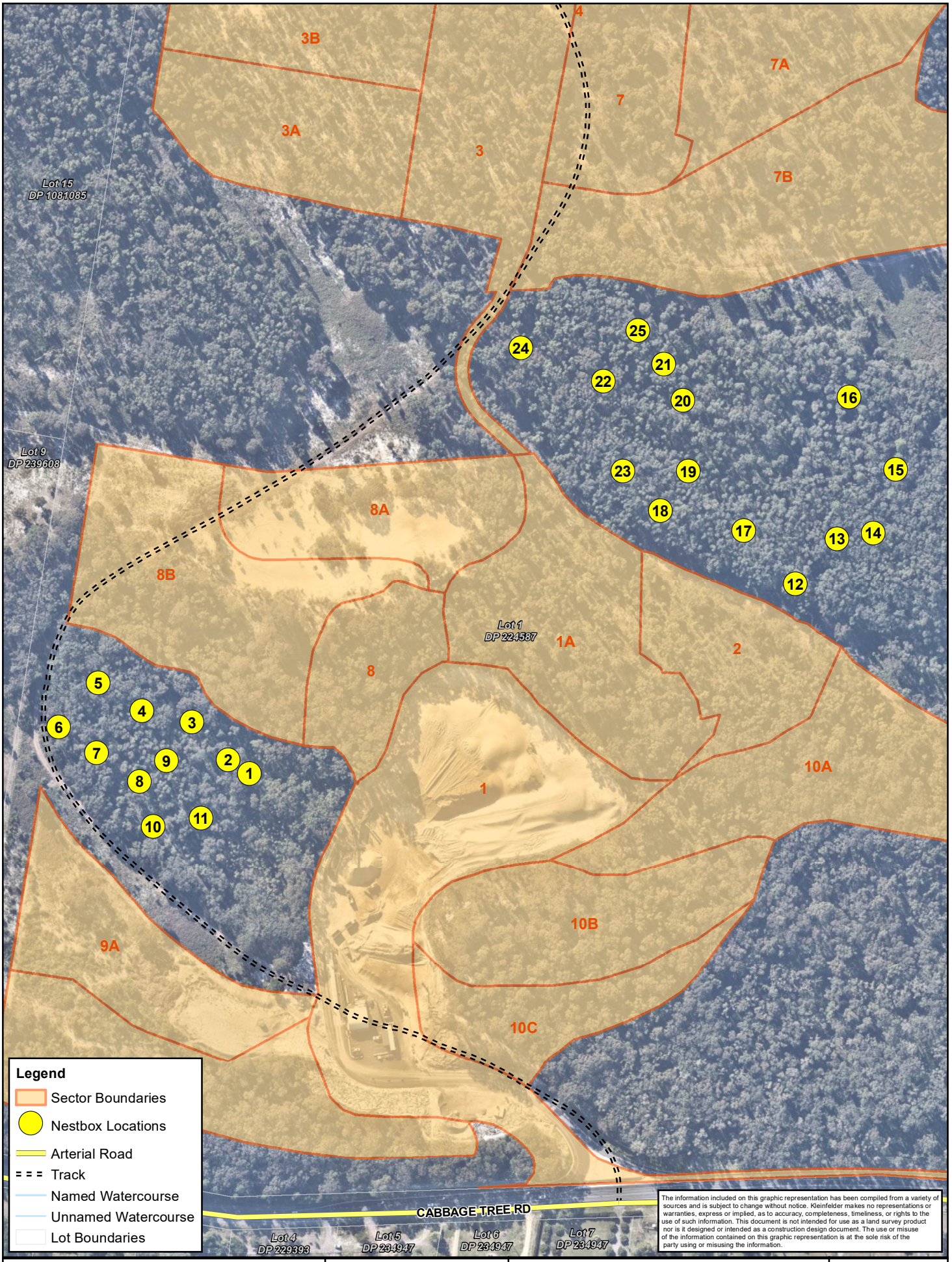
For any further questions, please do not hesitate to contact me.

Sincerely,
Kleinfelder Australia Pty Ltd

Ben Stewart MMsc & Mgmt

Ecologist
Email: BSStewart@kleinfelder.com

Mobile: 0427 487 991



Metres
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PROJECT REFERENCE: 20211095
DATE DRAWN: 2020/07/10 15:16Version 1
DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2019
Nearmap - 2020

Nestbox Locations

Trustee for WSS
Nestbox Installation July 2020

FIGURE:
1

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Table 1: Nest box pre-install survey – July 2020.

Nest box ID	Tree Species	Latitude	Longitude	DBH (cm)	Recommended Height (m)	Recommended Aspect	Recommended Box size
1	*A. costata*	-32.81155986	151.7996272	32.5	5	S	Small
2	*A. costata*	-32.81148285	151.7994905	23	3.5	SW	Small
3	*C. gummifera*	-32.81127348	151.7992577	38.5	4	NW	Small
4	*A. costata*	-32.81120705	151.7989335	23	4.5	SW	Medium
5	*E. robusta*	-32.81105188	151.798651	44.5	4	SW	Large
6	*E. robusta*	-32.81129278	151.7983895	50.5	4	SE	Medium
7	*A. costata*	-32.81143688	151.7986337	22	4	S	Medium
8	*E. robusta*	-32.81159619	151.7989119	41.5	4	NW	Small
9	*E. robusta*	-32.81148448	151.7990893	34.5	5	S	Medium
10	*A. costata*	-32.81184598	151.7989979	39	5	S	Small
11	*E. robusta*	-32.81180194	151.7993105	20.5	4	SE	Medium
12	*A. costata*	-32.81055038	151.8031995	38.5	5	NW	Small
13	*E. robusta*	-32.81030437	151.803473	34	5	N	Medium
14	*E. robusta*	-32.81027423	151.8037098	30	4	S	Medium
15	*E. robusta*	-32.80992682	151.8038602	50.5	5	W	Large
16	*E. robusta*	-32.80952514	151.8035618	25	4.5	SE	Medium
17	*E. robusta*	-32.81025289	151.8028671	30.5	4.5	NE	Medium
18	*E. robusta*	-32.81013732	151.8023262	64.5	4.5	NW	Medium

Nest box ID	Tree Species	Latitude	Longitude	DBH (cm)	Recommended Height (m)	Recommended Aspect	Recommended Box size
19	*E. robusta*	-32.80992263	151.8025085	33.5	4	S	Small
20	*E. robusta*	-32.80953321	151.80248	36	4	S	Medium
21	*A. costata*	-32.80933308	151.8023561	48	3.5	SW	Medium
22	*A. costata*	-32.80942164	151.8019619	29.5	4.5	W	Medium
23	*E. robusta*	-32.80991821	151.802083	37	4	S	Medium
24	*E. robusta*	-32.8092348	151.8014276	37	4.5	NE	Medium
25	*E. robusta*	-32.80914408	151.8021916	30	5	W	Medium

28 July 2020

File Ref: NCA20L114507
Document Ref: NCA20L114507

Quarry Manager
Newcastle Sand
398 Cabbage Tree Road
Williamtown, NSW 2318

Attention: Paul Bourne

Delivered by email: paul@newcastlesand.com.au

Subject: **Sector 1a and Sector 2 Nocturnal and Diurnal Fauna Surveys and Tree Removal**

Fauna surveys

On 22 of July 2020, a Kleinfelder Ecologist, Ben Stewart, conducted a nocturnal fauna survey within Sectors 1a and 2 prior to tree removal pursuant to Section 6.6 of the Biodiversity and Rehabilitation Management Plan (BRMP). The survey consisted of a meandering spotlight transect and call-playback. Species targeted during call-playback were Koala (*Phascolarctos cinereus*) and the Squirrel Glider (*Petaurus norfolkensis*).

No fauna were detected during spotlighting or call-playback efforts.

On 23, 24 and 27 of July 2020, diurnal fauna surveys were conducted prior to tree removal pursuant to Section 6.6 of the BRMP. Diurnal surveys consisted of a walkthrough to identify any fauna residing within Sector 1a and 2. This also included inspecting stockpiles of felled trees.

No fauna were detected during the diurnal surveys.

Tree removal

On 23, 24 and 27 of July 2020, a Kleinfelder Ecologist and experienced fauna spotter-catcher, Ben Stewart supervised the clearing of non-habitat and habitat trees pursuant to Section 6.6 of the BRMP. Non-habitat trees were soft felled on the 23 and 24 of July under direction of the ecologist.

One pair of Feathertail Gliders (*Acrobates pygmaeus*) were revealed to be nesting within a small hollow (not previously identified during the hollow-bearing tree census) during the felling of non-habitat trees. The hollow containing the gliders was relocated to retained vegetation where nest boxes had been installed prior to the clearing, outside of the resource area as per Section 6.10 of the BRMP. The location of the relocated hollow was GPS marked for reference.

Habitat trees were left standing for a minimum of two nights, pursuant to Section 6.8 of the BRMP, and felled following the procedure outlined in Section 6.11 of the BRMP on 27 of July 2020 under the direction of the ecologist. Once felled, each hollow was thoroughly inspected for fauna.

No fauna were identified during the felling of the habitat trees. Two old glider nests (a collection of eucalyptus leaves arranged in a ‘bowl’ shape) were identified during this process.

Seed collection

During the pre-clearance survey, previously conducted by Kleinfelder, limited flora species were observed to contain fruit viable for seed collection, apart from the overstorey species *Angophora costata* (Smooth-bark Apple) and *Corymbia gummifera* (Red Bloodwood). During the tree removal process, fruit from each of these species was able to be collected from multiple felled individuals within the resource area.

Recommendations

No hollows were deemed suitable for relocation as per Section 6.11 of the BRMP (apart from the hollow containing the Feathertail Gliders) due to wood rot, termites, and damage upon tree felling.

Felled trees/limbs which may provide suitable ground habitat should be relocated into retained vegetation areas after the re-distribution of topsoil.

For any further questions, please do not hesitate to contact me.

Sincerely,

Kleinfelder Australia Pty Ltd

Ben Stewart MMsc & Mgmt

Ecologist
Email: BSStewart@kleinfelder.com

Mobile: 0427 487 991

Kleinfelder Australia Pty Ltd
95 Mitchell Road
CARDIFF NSW 2285
T| +61 2 4949 5200
www.kleinfelder.com.au
ABN: 23 146 082 500
NEWCASTLE OFFICE

30 October 2020

File Ref: NCA20L118152
Document Ref: NCA20L118152

Quarry Manager
Newcastle Sand
398 Cabbage Tree Road
Williamtown, NSW 2318

Attention: Paul Bourne
Delivered by email: paul@newcastlesand.com.au

Subject: Sector 3, 3A, 3B, 4, 4A, 4B Pre-clearance Survey

Assessment

On 29 October, 2020 a Kleinfelder ecologist, Mark Dean, conducted a pre-clearance assessment within sectors 3, 3A, 3B, 4, 4A and 4B (referred to as the resource area) of the Newcastle Sand Resource Quarry at Williamtown, NSW in accordance with Section 6.14A of the Biodiversity and Rehabilitation Management Plan (BRMP) (Kleinfelder, 2020) (**Figure 1**). The resource area consists of approximately 6.5 ha of a Coastal Sand Apple – Blackbutt Forest community with the upper stratum dominated by *Eucalyptus pilularis* (Blackbutt), *Corymbia gummifera* (Red Bloodwood), *Angophora costata* (Smooth-bark Apple), *Eucalyptus signata* (Scribbly Gum) *Eucalyptus camfieldii* (Camfield's Stringybark), *Eucalyptus parramattensis* (Parramatta Red Gum), and *Banksia serrata* (Old Man Banksia) with a sparse ground cover. At the time of assessment, the area was recovering from the effects of fire.

The resource area was assessed for habitat trees (hollow-bearing trees, dead stags containing hollows and trees containing nests), hollowed logs and the presence and abundance of exotic weed species. The location of these features and the survey effort were recorded during the assessment (**Figure 2**). Pink chalk paint was used to conspicuously mark a "H" on the trunk of habitat trees. Pink flagging tape was used in conjunction with the chalk paint to aid in visual identification of habitat trees where the painted "H" was obscured by epicormic growth or shrubs.

A total of 12 hollow-bearing trees and 2 dead stags containing hollows were recorded during the assessment for a total of 14 small (0-5 cm opening) hollows (**Table 1**). No stick nests were observed within the resource area or observed within three (3) metres of the resource boundary. The majority of the habitat trees were observed to have no obvious signs of fauna use. Only one (1) habitat tree was observed to have signs of fauna use, which included 'chew marks' (typical of arboreal mammals such as Sugar Gliders and Squirrel Gliders (**Plate 1**)). Other non-habitat trees (trees without hollows) within the resource area also contained 'chew marks' on their trunks.

Additionally, there was three (3) fauna species noted during the pre-clearance these included *Varanus varius* (Lace Monitor), *Pogona barbata* (Eastern Bearded Dragon) and a *Eurostopodus mystacalis* (White-throated Nightjar) nesting 10m outside the resource area (**Plate 2**). The nesting area has been flagged off with wooden stakes and pink flagging tape to delineate the area to prevent any harm (**Plate 3**).

Limitations

Every effort was made to record habitat features as accurately as possible during the assessment. Habitat features such as the number of hollows, width at the hollow entrance and a hollow's suitability for threatened species e.g. Squirrel Glider are determined from ground-based surveys. The effects of fire (charred limbs and bark) affected depth perception (when viewing hollows through binoculars) which made it difficult to determining a hollow from a shallow cut-out of a knot or snapped branch.

Recommendations

As per Section 6.14A of the BRMP, hollows are to be replaced at a rate of 1:1 and installed in adjacent vegetation prior to the clearing of the vegetation in the surveyed areas. Due to the low abundance of exotic weeds within the resource area, it is not necessary to separate topsoil containing weeds from uncontaminated topsoil.

For any further questions, please do not hesitate to contact me.

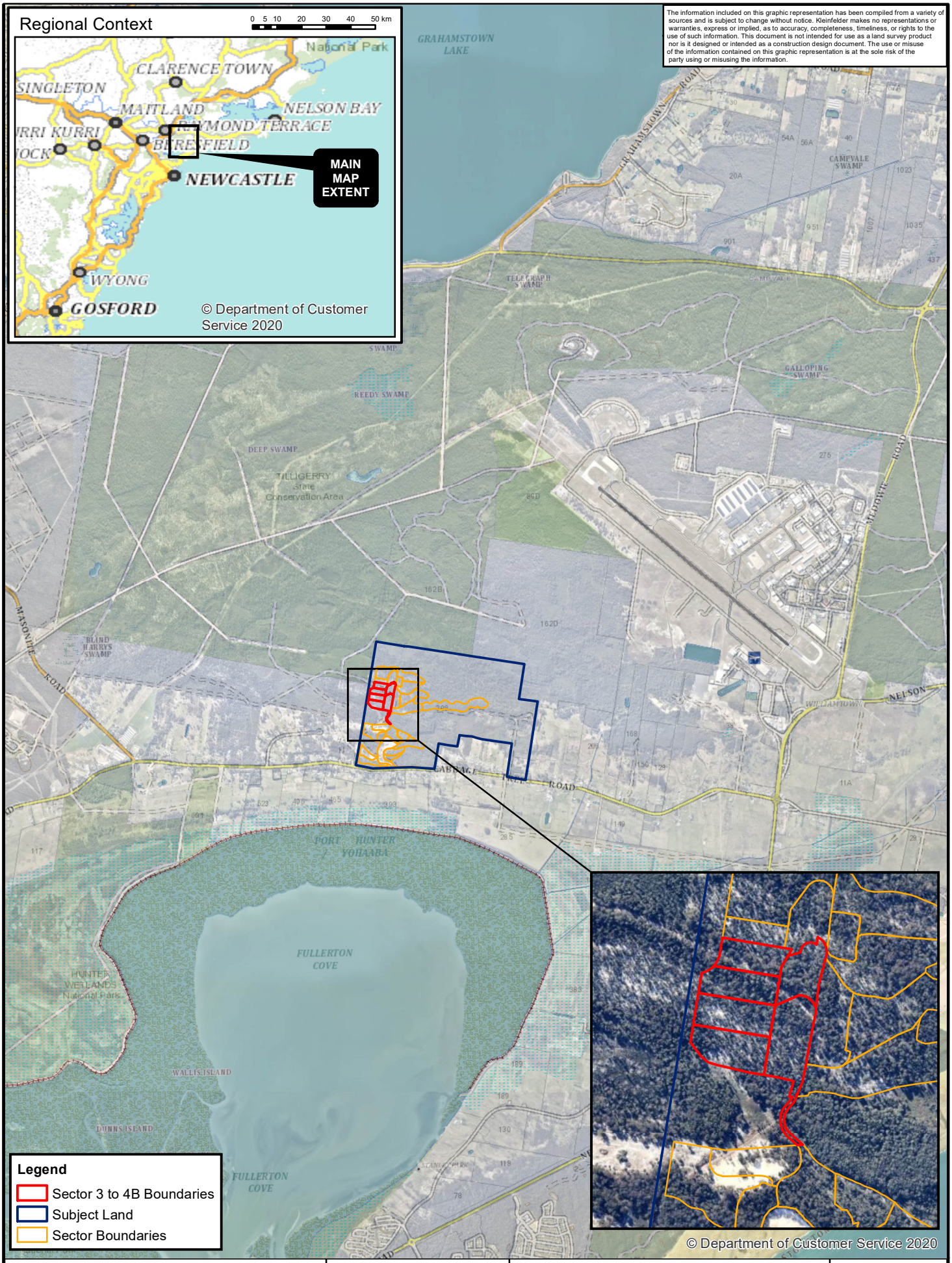
Sincerely,

Kleinfelder Australia Pty Ltd

Mark Dean EnvSc & Mgmt

Ecologist
Email: Mdean@kleinfelder.com

Mobile: 0455 381 346



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PROJECT REFERENCE: 20212528

DATE DRAWN: 2020/10/30 13:05 Version 1

DRAWN BY: GJoyce

DATA SOURCE:
NSW DFSI - 2018
Nearmap - 2020

Locality

Trustee for WSS
Pre-Clear Survey - Sectors 3 to 4B
October 2020

FIGURE:

1

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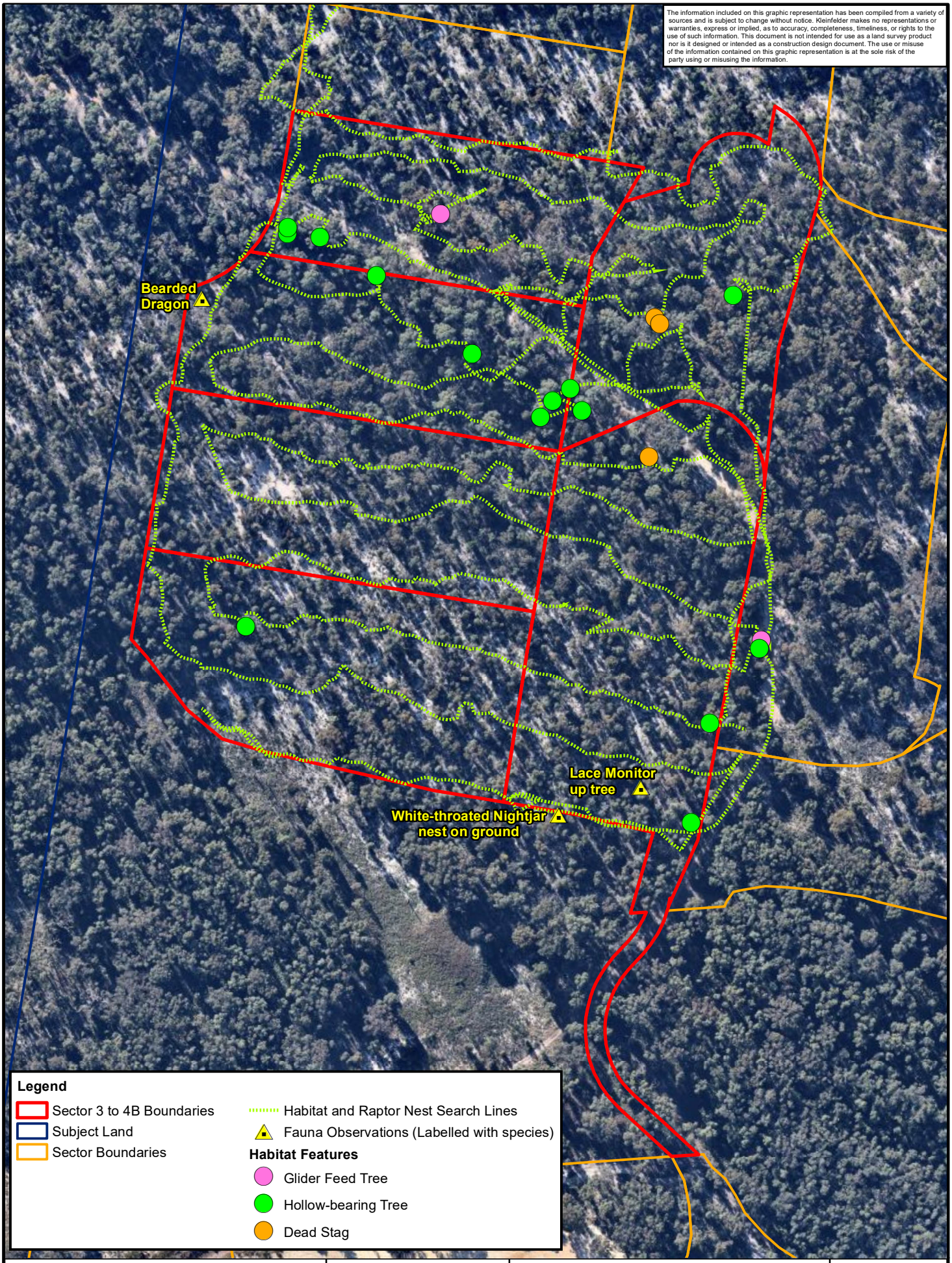

Legend

- Sector 3 to 4B Boundaries
- Subject Land
- Sector Boundaries
- Habitat and Raptor Nest Search Lines
- Fauna Observations (Labelled with species)

Habitat Features

- Glider Feed Tree
- Hollow-bearing Tree
- Dead Stag

Metres
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PROJECT REFERENCE: 20212528
DATE DRAWN: 2020/10/30 13:15 Version 1
DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2018
Nearmap - 2020

Survey Effort, Habitat Features and Weed Locations

Trustee for WSS
Pre-Clear Survey - Sectors 3 to 4B
October 2020

FIGURE: **2**

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Table 1: Habitat tree census before clearing within sector 3, 3A, 3B, 4, 4A and 4B.

Location			Tree Description	Habitat Features		Size of Hollow Entrance (cm)			Squirrel Glider Suitability	Signs of Use
Map Ref.	Easting	Northing	Species	Hollow type	Number of hollows	0-5	5-20	>20	Yes / No	Yes / No
1	387794	6369296	*Eucalyptus pilularis*	-	-	-	-	-	No	No
2	387629	6369536	*Corymbia gummifera*	-	-	-	-	-	No	No
3	387811	6369511	*Eucalyptus pilularis*	Branch	1	1	-	-	Yes	No
4	387801	6369336	*Eucalyptus signata*	Branch	1	1	-	-	Yes	No
5	387613	6369376	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
6	387777	6369445	Dead Stag	Branch	1	1	-	-	No	No
7	387733	6369461	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
8	387750	6369463	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
9	387745	6369473	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
10	387737	6369468	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
11	387705	6369487	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
12	387666	6369518	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
13	387630	6369538	*Corymbia gummifera*	Branch	1	1	-	-	No	No
14	387643	6369534	*Eucalyptus pilularis*	Branch	1	1	-	-	No	No
15	387779	6369501	Dead Stag	Upright	1	1	-	-	No	No
16	387781	6369499	Dead Stag	Upright	1	1	-	-	No	No

Location			Tree Description	Habitat Features		Size of Hollow Entrance (cm)			Squirrel Glider Suitability	Signs of Use
Map Ref.	Easting	Northing	Species	Hollow type	Number of hollows	0-5	5-20	>20	Yes / No	Yes / No
17	387692	6369544	*Corymbia gummifera*	-	-	-	-	-	Yes	Yes
18	387822	6369370	*Corymbia gummifera*	-	-	-	-	-	Yes	Yes
19	387822	6369367	*Eucalyptus pilularis*	-	-	-	-	-	No	No
Total Hollows					14	14	0	0		

Note: Eastings and Northings pertain to map reference GDA 94 MGA 56.

Plate 1 **Horizontal ‘chew marks’ typical of arboreal mammals such as gliders.**

Plate 2 ***Eurostopodus mystacalis*** **(White-throated Nightjar) Nest/Egg.**

Plate 3 ***Eurostopodus mystacalis*** **(White-throated Nightjar) Nest/Egg.**

Kleinfelder Australia Pty Ltd
95 Mitchell Road
CARDIFF NSW 2285
T| +61 2 4949 5200
www.kleinfelder.com.au
ABN: 23 146 082 500
NEWCASTLE OFFICE

17 November 2020

File Ref: NCA20L118815
Document Ref: NCA20L118815

Quarry Manager
Newcastle Sand
398 Cabbage Tree Road
Williamtown, NSW 2318

Attention: Paul Bourne
Delivered by email: paul@newcastlesand.com.au

Subject: **Newcastle Sand Nest box Pre-installation Survey**

Background

Kleinfelder previously conducted a hollow-bearing tree survey within resource areas 3, 3A, 3B, 4, 4A and 4B which require the removal of vegetation. Fourteen (14) hollows were identified for replacement during the survey. Their location, height above the ground, width at opening and suitability for threatened species i.e. Squirrel Glider, were recorded. Nest boxes are to be installed at a ratio of 1:1 for hollows removed pursuant to Section 6.14 of the Biodiversity and Rehabilitation Management Plan (BRMP). The BRMP also states that nest boxes should be installed to face away from the resource areas and to have a southerly aspect if possible.

An additional thirty-nine (39) nest boxes will be erected within the offset areas due to an error in the total hollows within the previous report from resource areas 1A and 2. There will also be an additional six (6) boxes to be included from the clearing of the access road within resource area 1.

Assessment

On November 11, 2020, a Kleinfelder ecologist, Mark Dean, conducted a nest box pre-installation survey within three retained vegetation areas adjacent to future and current resource areas. Five (5) nest box locations were chosen within the retained vegetation to the west of resource area 1, twenty-eight (28) south of area 3 and 3A and twenty-six (26) to the north and north-west of 5A and 5B (**Figure 1**). For each nest box location, the tree species, diameter at breast height (DBH), nest box number, aspect, install height and nest box size was recorded (**Table 1**).

Limitations and Recommendations

Nest box locations were spread throughout the retained vegetation areas to maximise potential fauna utilisation. Recommended installation heights and corresponding aspect were determined from the ground and may change slightly during installation. Recommended nest box aspects were chosen to typically face away from the resource area where appropriate and to face south where appropriate.

For any further questions, please do not hesitate to contact me.

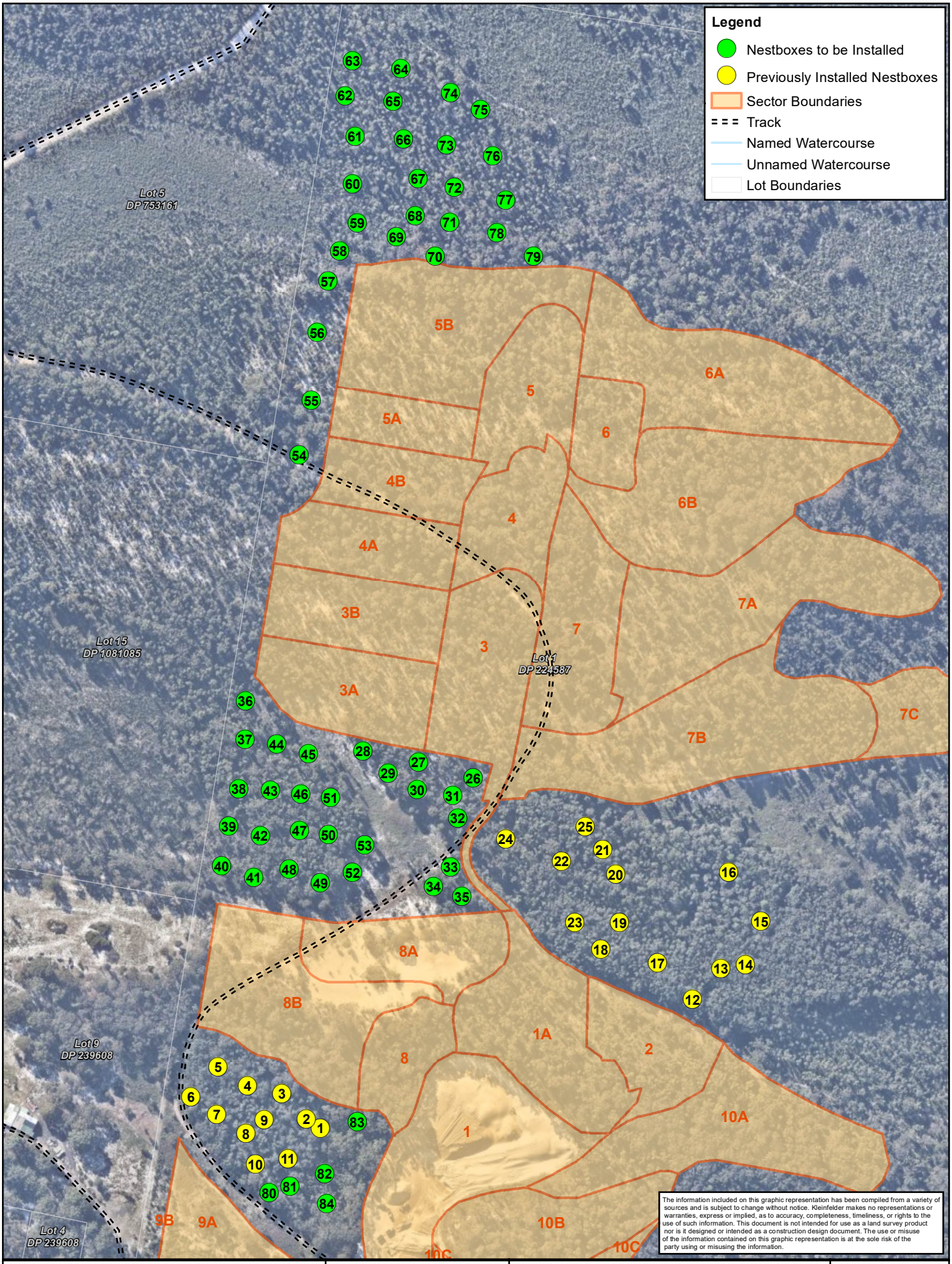
Sincerely,
Kleinfelder Australia Pty Ltd

Mark Dean EnvSc & Mgmt

Ecologist
Email: Mdean@kleinfelder.com

Mobile: 0455 381 346

Work: 02 4949 5200



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PROJECT REFERENCE: 20212528
DATE DRAWN: 2020/11/17 10:27 Version 1
DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2019
Nearmap - 2020

Nestbox Locations

Trustee for WSS
Nestbox Installation November 2020

FIGURE:
1

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Table 1: Nest box pre-install survey – November 2020.

Nest box ID	Tree Species	Latitude	Longitude	DBH (cm)	Recommended Height (m)	Recommended Aspect	Recommended Box size
26	*A. costata*	-32.8087404	151.8011233	29	4	S-SW	Medium
27	*E. signata*	-32.8086085	151.8006046	32	4	SW	Small
28	*E. pilularis*	-32.8085101	151.8000735	46	5	S-SW	Large
29	*A. costata*	-32.808694	151.8003105	30	5	S	Medium
30	*E. pilularis*	-32.8088307	151.8005885	48	4	SW	Medium
31	*C. gummifera*	-32.8088804	151.8009264	21	3.5	SE	Small
32	*E. pilularis*	-32.8090632	151.8009701	48	3.5	W	Medium
33	*A. costata*	-32.8094564	151.8008977	30	4	SW	Medium
34	*A. costata*	-32.8096122	151.800732	30	4	S	Small
35	*A. costata*	-32.8096981	151.8010051	60	3	SW	Medium
36	*A. costata*	-32.8080982	151.7989544	43	5	W	Medium
37	*A. costata*	-32.8084075	151.7989438	45	4	NW	Medium
38	*A. costata*	-32.8088067	151.7988785	35	3	SW	Small
39	*A. costata*	-32.8091083	151.7987784	32	4	S	Small
40	*A. costata*	-32.8094286	151.7987072	32	4	NW	Small
41	*C. gummifera*	-32.8095236	151.7990123	40	4	W	Small
42	*A. costata*	-32.8091856	151.7990833	51	3.5	S	Small
43	*C. gummifera*	-32.8088234	151.7991823	32	5	W	Medium
44	*A. costata*	-32.8084495	151.7992498	29	5	SW	Medium
45	*A. costata*	-32.8085314	151.7995487	46	3.5	SW	Medium
46	*A. costata*	-32.8088527	151.7994735	29	3	SW	Small
47	*C. gummifera*	-32.8091509	151.7994572	51	3.5	SE	Medium
48	*C. gummifera*	-32.8094626	151.7993545	41	4	SW	Medium
49	*C. gummifera*	-32.8095777	151.7996525	64	5	W-SW	Medium

Nest box ID	Tree Species	Latitude	Longitude	DBH (cm)	Recommended Height (m)	Recommended Aspect	Recommended Box size
50	*C. gummifera*	-32.8091863	151.7997333	35	4.5	W	Small
51	*A. costata*	-32.8088872	151.799756	38	4	SW	Small
52	*C. gummifera*	-32.8094959	151.7999606	53	5	S	Medium
53	*A. costata*	-32.8092724	151.8000786	32	4	W	Small
54	*C. gummifera*	-32.8061141	151.799497	64	4	NE	Medium
55	*C. gummifera*	-32.8056726	151.7996169	32	3.5	S	Medium
56	*E. pilularis*	-32.8051233	151.7996796	22	3	S	Small
57	*E. pilularis*	-32.8047119	151.7997903	25	4	N	Small
58	*A. costata*	-32.8044653	151.7999038	35	4.5	S	Medium
59	*A. costata*	-32.8042425	151.8000731	38	4.5	SW	Small
60	*E. pilularis*	-32.8039248	151.8000334	35	3.5	S	Small
61	*C. gummifera*	-32.8035392	151.8000639	51	4	W	Small
62	*C. gummifera*	-32.8032108	151.799972	35	4	SW	Small
63	*C. gummifera*	-32.8029303	151.8000474	51	4	SE	Medium
64	*C. gummifera*	-32.8029996	151.8005111	48	4	SE	Medium
65	*C. gummifera*	-32.8032624	151.8004307	38	3.5	S-SW	Medium
66	*C. gummifera*	-32.8035688	151.8005284	19	3.5	S	Small
67	*C. gummifera*	-32.8038882	151.8006633	19	3.5	SW	Small
68	*C. gummifera*	-32.8041897	151.8006286	35	4.5	S	Medium
69	*E. signata*	-32.8043595	151.8004472	57	3.5	S=SE	Small
70	*C. gummifera*	-32.8045188	151.8008195	29	4	N	Medium
71	*C. gummifera*	-32.8042452	151.8009603	35	4	S	Medium
72	*C. gummifera*	-32.8039641	151.8010073	29	3	S-SW	Medium
73	*C. gummifera*	-32.8036206	151.8009376	29	3	SE	Small
74	*C. gummifera*	-32.8031974	151.8009849	41	5	SE	Small

Nest box ID	Tree Species	Latitude	Longitude	DBH (cm)	Recommended Height (m)	Recommended Aspect	Recommended Box size
75	*C. gummifera*	-32.8033348	151.8012672	48	4.5	SE	Medium
76	*C. gummifera*	-32.8037113	151.8013782	41	3	S	Medium
77	*C. gummifera*	-32.8040681	151.8014964	32	4.5	SE	Small
78	*C. gummifera*	-32.804335	151.8014098	29	3	SW	Small
79	*A. costata*	-32.8045273	151.8017597	32	4	SW	Small
80	*A. costata*	-32.8120767	151.799127	64	4	SE	Small
81	*E. robusta*	-32.8120271	151.7993296	64	3.5	SW	Small
82	*E. robusta*	-32.8119267	151.7996599	51	3.5	SW	Medium
83	*E. robusta*	-32.8115109	151.7999769	57	4	S	Medium
84	*E. robusta*	-32.8121678	151.7996768	51	5	S	Medium

Kleinfelder Australia Pty Ltd
95 Mitchell Road
CARDIFF NSW 2285
T| +61 2 4949 5200
www.kleinfelder.com.au
ABN: 23 146 082 500
NEWCASTLE OFFICE

12 December 2020

File Ref: NCA20L119364
Document Ref: NCA20L119364

Quarry Manager
Newcastle Sand
398 Cabbage Tree Road
Williamtown, NSW 2318

Attention: Paul Bourne
Delivered by email: paul@newcastlesand.com.au

Subject: **Sector 3, 3A, 3B, 4, 4A, 4B Pre-clearance, Nocturnal, Diurnal Fauna Surveys and Tree Removal.**

Pre-clearance

On 20 November 2020 Kleinfelder ecologist, David Martin, conducted a pre-clearance assessment within Sector 3 (Access Road). The access road was assessed for habitat trees (hollow-bearing trees, dead stags containing hollows and trees containing nests), hollowed logs and the presence and abundance of exotic weed species. The location of these features and the survey effort were recorded during the assessment. Pink flagging tape was used in conjunction with the chalk paint to aid in visual identification of habitat trees where the painted "H" was obscured by epicormic growth or shrubs.

A total of one hollow-bearing tree containing one hollow was recorded during the assessment. No stick nests were observed within the area or observed within three (3) metres of the resource boundary. The majority of the habitat trees were observed to have no obvious signs of fauna use. One nest box location has been marked up (NB60) to offset the hollow bearing tree within the adjacent area.

Fauna surveys

On 2 of December 2020, a Kleinfelder Ecologist, Mark Dean, conducted a nocturnal fauna survey within Sector 3, 3A, 3B, 4, 4A, 4B prior to tree removal pursuant to Section 6.6 of the Biodiversity and Rehabilitation Management Plan (BRMP) **(Figure 1)**. The survey consisted of a meandering spotlight transect and call-playback. Species targeted during call-playback were Koala (*Phascolarctos cinereus*) and the Squirrel Glider (*Petaurus norfolkensis*).

One fauna species the Brown Quail (*Coturnix ypsilophora*) was detected during spotlighting efforts. Three juvenile quails were captured and relocated offsite adjacent to the extraction area in the direction the adult was seen flying away. No fauna was heard during call-playback efforts.

On 4 of December 2020, diurnal fauna surveys were conducted prior to tree removal pursuant to Section 6.6 of the BRMP. Diurnal surveys consisted of a walkthrough to identify any fauna residing within Sector 3, 3A and 3B.

One White-throated Nightjar (*Eurostopodus mystacalis*) was detected during the diurnal surveys and was dispersed into adjacent vegetation away from the clearing activities.

Tree removal

On 4 of December 2020, a Kleinfelder Ecologist and experienced fauna spotter-catcher, Mark Dean supervised the clearing of non-habitat and habitat trees pursuant to Section 6.6 of the BRMP within sectors 3, 3A and 3B. Non-habitat trees were soft felled under direction of the ecologist. The three habitat trees within the south-east portion of sector 3 have been left standing for a minimum of two nights, pursuant to Section 6.8 of the BRMP, and will be felled following the procedure outlined in Section 6.11 of the BRMP at a later date under the direction of the ecologist **(Figure 2)**.

One Koala (*Phascolarctos cinereus*) was found during the clearing operations within sector 3 in a Blackbutt (*Eucalyptus pilularis*) tree. Clearing operations were stopped immediately to assess the koala. The relocation of the koala was deemed to be hazardous to the welfare of the koala and was left to relocate overnight. The location of the Koala was GPS marked for reference. Clearing operations resumed within sector 3 away from the koala. The koala was assessed the next morning at 6:30am by Newcastle Sand staff and was not located in the Blackbutt has relocated into an adjacent vegetation.

Seed collection

During the pre-clearance survey, previously conducted by Kleinfelder, limited flora species were observed to contain fruit viable for seed collection, apart from the overstorey species *Angophora costata* (Smooth-bark Apple), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus pilularis* (Blackbutt). During the tree removal process, fruit from each of these species was available to be collected from multiple felled individuals within the resource area.

Recommendations

No hollows were found during the clearing operations for relocation as per Section 6.11 of the BRMP.

Felled trees/limbs which may provide suitable ground habitat should be relocated into retained vegetation areas after the re-distribution of topsoil.

Sincerely,
Kleinfelder Australia Pty Ltd

Mark Dean EnvSc & Mgmt

Ecologist
Email: Mdean@kleinfelder.com

Mobile: 0455 381 346

Figure 1 Locality

Figure 2 Clearing Extent

Plate 1 **Koala (*Phascolarctos cinereus*)**

Plate 2 **Brown Quail (*Coturnix ypsilophora*) chick**